

**CITY STORMWATER MANAGEMENT PLAN (CSWMP)  
and  
EL PASO COUNTY STORMWATER MANAGEMENT PLAN**  
Rolling Meadows Channel and Floodplain Modification

*On Behalf Of:*



*Prepared by:*



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January 31, 2022

## **APPLICANT INFORMATION**

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### **PREPARING ENGINEER**

#### **CONTACT INFORMATION:**

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**GEC Administrator:** Designated by Contractor



## Project Signature Blocks

### **Engineer's Statement**

This CSWMP was prepared under my direction and supervision and is correct to the best of my knowledge and belief. If such work is performed in accordance with the CSWMP, the work will not become a hazard to life and limb, endanger property, or adversely affect the safety, use, or stability of a public way, drainage channel, or other property.

Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Seal

### **Contractor's Statement**

I will comply with the requirements of the Grading and Erosion Control Plan/CSWMP including Construction Control Measure inspection requirements and final stabilization requirements. I acknowledge the responsibility to determine whether the construction activities on these plans require Colorado Discharge Permit System (CDPS) permitting for stormwater discharges associated with construction activity.

Name of Contractor: \_\_\_\_\_

Authorized Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Address: \_\_\_\_\_

Email Address: \_\_\_\_\_

**Owner's Statement**

The owner will comply with the requirements of the CSWMP including Construction Control Measure inspection requirements and final stabilization requirements according to the City of Colorado Springs Stormwater Construction Manual. I acknowledge the responsibility to determine whether the construction activities on these plans require Colorado Discharge Permit System (CDPS) permitting for stormwater discharges associated with construction activity.

Owner Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name of Owner: \_\_\_\_\_ Phone: \_\_\_\_\_

Title: \_\_\_\_\_ Email: \_\_\_\_\_

**City of Colorado Springs Grading and Erosion Control Review**

This CSWMP is filed in accordance with City Code. This plan is reviewed in accordance with the Stormwater Construction Manual; latest revisions.

\_\_\_\_\_ Date: \_\_\_\_\_

For the SWENT Manager

Notes: \_\_\_\_\_

\_\_\_\_\_

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- Soil Survey of El Paso County Area Soils Map
- Geotechnical Report
- FEMA FIRM Floodplain Maps
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## **A. INTRODUCTION**

In 1972, Congress passed the Federal Water Pollution Control Act (FWPCA), also known as the Clean Water Act (CWA), to restore and maintain the quality of the nation's waterways. The ultimate goal was to make sure rivers and streams were fishable, swimmable, and drinkable. In 1987, the Water Quality Act (WQA) added provisions to the CWA that allowed the EPA to govern stormwater discharges from construction sites. In 1998, the EPA published the final notice for General Permits for Stormwater Discharges from Construction Activities Disturbing 5.0 Acres or Greater. On October 29, 1999, the EPA revised the minimum acreage to 1.0 Acre or more. The general permit includes provisions for development of a City Stormwater Management Plan (CSWMP) to maximize the potential benefits of pollution prevention and sediment erosion control measures at construction sites.

Development, implementation, and maintenance of the CSWMP will provide the general contractor with the framework for reducing soil erosion and minimizing pollutants in stormwater while constructing channel improvements in the Rolling Meadows development.

This CSWMP/SWMP will:

- Define the characteristics of the site and the type of construction which will be occurring;
- Describe the practices that will be implemented to control erosion and the release of pollutants in stormwater;
- Create an implementation schedule to ensure that the practices described in this CSWMP are in fact implemented and to evaluate the plan's effectiveness in reducing erosion, sediment, and pollutant levels in stormwater discharged from the site; and
- Describe the final stabilization/termination design to minimize erosion and prevent stormwater impacts after construction is complete.

This CSWMP includes the following:

- Identification of the GEC Administrator with a description of this person's duties;
- Description of the existing site conditions including existing land use for the site (i.e., parks/open space, residential areas, pavement, buildings, etc.), soil types at the site, as well as the location of any surface waters which are located on or next to the site (wetlands, streams, rivers, lakes, ponds, etc.);

- Identification of the body of water(s) which will receive runoff from the construction site, including the ultimate body of water that receives the stormwater;
- Identification of drainage areas and potential stormwater contaminants; and
- Description of stormwater management within Construction Control Measures (CCM) and Permanent Control Measures (PCM) necessary to reduce erosion, sediment and pollutants in stormwater discharge.

## **B. GENERAL GUIDANCE**

Construction Control Measures (CCM) and Permanent Control Measures (PCM) encompass a wide range of erosion and sediment control practices, both structural and non-structural in nature, that are intended to reduce or eliminate any possible water quality impacts from stormwater leaving a construction site. The individual CCM's appropriate for a particular construction site are largely dependent on the types of potential pollutant sources present, the nature of the construction activity, and specific-site conditions.

Most of the CCM's and PCM's referenced herein are widely used in the construction industry. They generally involve a simple and low-cost approach and can be very effective when properly installed and maintained.

CCMs for all slopes, channels, ditches, or any disturbed land area shall be completed immediately after grading or earth disturbance has occurred. All temporary soil erosion control measures and CCM's shall be maintained until site reaches final stabilization and permanent soil erosion control measures are implemented.

The GEC Administrator may modify the planned CCMs based on construction sequencing, site conditions, and/or other factors. The CSWMP/SWMP should be modified by field notes including dates of modifications and the purpose of the modification. The Grading and Erosion Control (GEC) Plan should reflect what has been constructed or modified onsite. The GEC Administrator will be responsible for documenting CCM's (including phasing of CCM implementation).

### **B.1 Implementation of Construction Control Measures & Permanent Control Measures**

Structural PCM's shall be coordinated with construction activities so the CCM is in place before construction begins. To prevent soil from washing into the public right-of way or the undisturbed areas of the site, the following CCM's and PCM's shall be implemented:

- Temporary perimeter controls (e.g. silt fences) will be installed before any clearing and grading begins.
- Stabilized construction site entrance will be constructed before clearing and grading begins.
- Clearing and grading will not occur in an area until it is necessary for construction to proceed.
- Once construction activity ceases permanently in an area, the area will be stabilized with permanent seed and mulch.
- Once the road is cleaned and the surrounding disturbed areas are 70% established with vegetation, the silt fences around the Project site can be removed.



- Exposed slopes greater than 3:1 will be covered by an erosion control blanket with mulching.
- Topsoil stockpiles will be stabilized with temporary seed and mulch no later than fourteen days from the last construction activities in that area.
- Sediment (mud and dirt) transported onto a public road, regardless of the size of the site, shall be cleaned/removed at the end each day.
- Soil erosion control measures for all slopes, channels, ditches, or any disturbed land area shall be completed immediately after grading or earth disturbance has occurred. All temporary soil erosion control measures and CCM's shall be maintained until site reaches final stabilization and permanent soil erosion control measures (PCM's) are implemented.

The GEC Plan, located in the Appendix, contains details, installation and maintenance notes, and locations for the proposed CCMs and PCMs. The proposed CCMs and PCMs are located within the Project site and no off-site Control Measures are utilized.

## **C. CITY STORMWATER MANAGEMENT PLAN REQUIREMENTS**

### **C.1 General Requirements**

The CSWMP is prepared in accordance with engineering, hydrologic and pollution control practices and intended to cover the extents of the Project Area, using CCM's to reduce the pollutants in stormwater discharges as described in Section 2 of this CSWMP. The CSWMP will be administrated by the GEC Administrator. The GEC Administrator shall have successfully completed the City-sponsored Stormwater Management and Erosion Control During Construction class and provide a certification of completion.

The GEC Administrator's duties include the following:

- Implement the CSWMP
- Oversee installation and maintenance of CCM's/PCM's as identified in the CSWMP
- Implement and oversee employee training
- Conduct or provide for inspection and monitoring activities
- Identify potential pollutant sources and make sure they are included in the CSWMP
- Identify any deficiencies in the CSWMP and make sure they are corrected
- Ensure that any changes in construction plans, phasing, or use of CCM/PCM's are addressed in the CSWMP

The provisions of this CSWMP must be implemented as they are written and updated, from the initiation of construction until final stabilization is complete. The City of Colorado Springs Stormwater Enterprise reserves the right to review the CSWMP, and to require the permittee to develop and implement additional measures to prevent and control pollution as is needed.

Relevant sections from the Spill Prevention Control and Countermeasure (SPCC) plans, or CCM's otherwise required by a separate CDPS permit may be implemented in this CSWMP.

### **C.2 Narrative Site Description**

The project is located to the east of Colorado Springs and is bounded by Drennan Road to the north and Lorson Ranch to the south. The project reach includes over 16,400 linear feet of East Fork Jimmy Camp Creek and is in Sections 1, 12, & 13, Township 15 South, Range 65 West of the 6th Principal Meridian. The Project is located in El Paso County, Colorado, with the lower portion of the project within Colorado Springs city limits. The Latitude and Longitude near the site is Lat: 38.767239°N and Long: -104.614342°W. This site is bounded to the north by Drennan Road and low-density residential housing, to the south by the Lorson Ranch residential development, to the

east by Meridian Road, and to the west by ranch land. East Fork Jimmy Camp Creek drains into Fountain Creek and is part of the Fountain Creek watershed.

The project is divided into two sections, the upper section and lower section. The upper section is between Drennan Rd and Bradley Rd and the lower section is from Bradley Rd to the end of the project at Lorson Ranch. The upper section is approximately 7,200 linear feet and the lower section is approximately 9,100 linear feet. The proposed improvements include sculpted concrete drop structures, establishment of a stable slope, extensive channel grading, and revegetation. The proposed creek work is located in the channel, thus access to the project will be through the channel and a temporary creek crossing is not expected.

The existing vegetation consists primarily of upland grasses with some wetlands present in depressional areas. East Fork Jimmy Camp Creek is stable, but some sections lack a defined channel. Due to the lack of a defined channel the existing channel thalweg was generalized with the valley alignment. The existing valley alignment is 15,800 linear feet. The proposed alignment has a longer meander path through the valley adding approximately 600 feet of stream length.

The upland areas of the existing site are fully vegetated, but in areas with a defined channel, the channel bottom is unvegetated because the streambed is highly mobile and doesn't allow vegetation to establish. Based on site visits and aerial imagery the existing channel width is estimated to be an average of 95-feet wide, although it varies significantly throughout the project reach.

The total project area is 159.5 acres; based on ocular estimates from site visits the percent of existing vegetative ground cover is between 50%-60%.

A total of 159.5 acres along the stream corridor will undergo disturbance from construction activity.

The sequence of construction is as follows:

- Install initial CCM's/ Construction Mobilization – Winter 2023
- Clearing and Grubbing – Winter 2023
- Begin construction – Winter 2023
- Perform grading and install structures – Winter 2023 / Spring 2024
- Complete reseeding and planting – Spring 2024
- Remove perimeter controls when "Final Stabilization" achieved – Spring 2024

The largest possible sources of non-stormwater pollution will be from trucks during equipment maintenance and refueling operations, and from grouting operations during construction of drop structures. The contractor shall be responsible for any spill cleanup during refueling operations in accordance with applicable city, county, and state regulations. The contractor will also be responsible for cleanup of any off-site vehicle tracking on paved roads, and for concrete washout

areas. Other sources of pollution such as vehicle washing, chemical storage or waste disposal are not anticipated. Non-stormwater discharges are not expected at the site. No recognized environmental conditions (REC) have been identified within the Project site.

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS); Web Soil Survey of El Paso County Area, Colorado, published by the United States Department of Agriculture, dated August 2022, was utilized to investigate the existing general soil types within and surrounding the Project area. A soil map for this area is provided in the Appendix. Per the information given within the Soil Conservation Survey, hydrologic soil group “B” characteristics are predominant across the study area with smaller pockets of “A” and “D” hydrologic soils groups. Soil types within the construction site are as shown in Table 1 below.

**Table 1 - NRCS Soil Survey for El Paso County**

<b>Soil ID No.</b>	<b>Soil Type</b>	<b>Hydrologic Classification</b>
2	Ascalon sandy loam, 1 to 3 percent slopes	B
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A
56	Nelson-Tassel fine sand loams, 3 to 18 percent slopes	B
78	Sampson loam, 0 to 3 percent slopes	B
89	Tassel fine sandy loam, 3 to 18 percent slopes	D

Geotechnical borings were done as part of the design for this project. The geotechnical report is included in the Appendix.

All exposed soil throughout the Project site will be revegetated. A full revegetation plan has been specified with appropriate seeding mixes. Additionally, coconut and coir fabrics have been specified for all disturbed areas, based on hydrologic zone. See the revegetation sheets (RV01 to RV07) of the Design Plan.

**C.3 Vicinity Map**



Figure 1: Vicinity Map

**C.4 Potential Pollution Sources**

Pollutants that result from clearing, grading, and excavation materials and have the potential to be present in stormwater runoff are listed in Table 2. Potential sources of stormwater contamination are listed in Table 3.

**Table 2 - Potential Construction Site Stormwater Pollutants**

Trade Name or Material	Chemical/Physical Description	Stormwater Pollutants
Pesticides (insecticides, fungicides, herbicides, rodenticides)	Various colored to colorless liquid, powder, pellets, or grains	Chlorinated hydrocarbons, organophosphates, carbamates, arsenic
Fertilizer	Liquid or solid grains	Nitrogen, phosphorous
Cleaning solvents	Colorless, blue, or yellow-green liquid	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates
Concrete	White solid	Limestone, sand
Paints	Various colored liquid	Metal oxides, stoddard solvent, talc, calcium carbonate, arsenic
Wastewater from construction equipment washing	Water	Soil, oil & grease, solids
Wood preservatives	Clear amber or dark brown liquid	Stoddard solvent, petroleum distillates, arsenic, copper, chromium
Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral oil
Gasoline	Colorless, pale brown or pink petroleum hydrocarbon	Benzene, ethyl benzene, toluene, xylene, MTBE
Diesel Fuel	Clear, blue-green to yellow liquid	Petroleum distillate, oil & grease, naphthalene, xylenes
Kerosene	Pale yellow liquid petroleum hydrocarbon	Coal oil, petroleum distillates
Antifreeze/coolant	Clear green/yellow liquid	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)
Erosion	Solid particles	Soil, sediment
Dust	Airborne solid particulate	Sediment, turbidity
Worker trash	Plastic, metal, paper, fabric, and glass trash	Miscellaneous garbage

**Table 3 - Potential Sources of Stormwater Contamination**

Potential Stormwater Contamination	Potential Pollutants	Potential Problem
Vehicle Tracking of Sediment	Soils/sediment	Tracking of sediment onto roads surrounding the construction entrance leading to increased sediment loading at the storm sewer outfall.
Concrete Washout Area	Concrete, sediments (lime & sand)	Particles washed from equipment runoff to the creek in stormwater.
Loading and Unloading Operations	Soils/sediments, concrete, fertilizers, organic material, pesticides, herbicides, hydraulic oil, gasoline, diesel, antifreeze, coolant, kerosene	Loading and unloading of materials could generate dust and mobilize other fine particulates found in soil conditioner and soil amendment. Hydraulic oil, antifreeze, coolant, gasoline, and diesel fuel could leak or spill and be released to stormwater in a rain event. Tracking of soil into the road through the construction site entrance may also occur.
Disturbed and Stored Soils	Hydraulic oil, gasoline, antifreeze, soil erosion, fertilizer, dust	Erosion and dust from soil stockpiles increasing sediment loads in stormwater. Leaking hydraulic oil and antifreeze from clearing and grading construction equipment. Gasoline and diesel fuel spills while fueling construction equipment, and erosion of exposed and stockpiled soils. Asphalt chemicals can be released to stormwater if a rain event occurs before curing is complete. Airborne pollution resulting from unvegetated disturbed surfaces and agitation from equipment.
Management of Contaminated Soils	Soils/sediments, heavy metals, VOCs	Excavation activities have the potential to encounter contaminated soil or break existing utilities (ex. gas lines) and contaminate surrounding soils.
Outdoor Material Storage	Soil/sediment	Erosion and dust from soil stockpiles increasing sediment loads in stormwater.
Revegetation and Soil Amendment	Fertilizers, pesticides, herbicides, organic material	Runoff of chemicals and organics from revegetated surfaces could contribute to nutrient loading in stormwater.
Vehicle and Equipment Maintenance and Fueling	Hydraulic oil, gasoline, diesel, antifreeze, coolant, kerosene	Leakage and spilling of fluids onto surfaces when maintaining and fueling equipment could runoff in stormwater.
Staging Areas and Construction Access	Hydraulic oil, gasoline, antifreeze, soil erosion, fertilizer, pesticides	Leaking hydraulic oil and antifreeze from clearing and grading construction equipment. Gasoline and diesel fuel spills while fueling construction equipment, and erosion of exposed and stockpiled soils. Asphalt chemicals can be released to stormwater if a rain event occurs before curing is complete. Tracking of soil into the road through the construction site entrance.

All waste materials will be collected and stored in a metal dumpster rented from a licensed solid waste management company. All trash and construction debris from the site will be deposited in the dumpster. The contractor will be responsible for the handling of all waste materials on site. No construction materials will be buried on-site. Good housekeeping and spill control practices

should be followed during construction to minimize stormwater contamination from petroleum products, fertilizers, paints, and concrete.

**C.5 Areas and Volume Statement**

The property encompasses a total area of 159.2 acres that will undergo disturbance and place approximately 70,096 CY of fill.

**C.6 Final Stabilization and Long-term Stormwater Management**

Once construction activity ceases permanently in an area, the area shall be stabilized with permanent landscaping and/or seed and mulch, or as designated on the GEC plans. Once the disturbed areas are 70% established with vegetation, the silt fences around the Project site can be removed.

**C.7 Inspection and Maintenance Procedures**

Visual inspections of all cleared and graded areas of the construction site will be performed on a minimum occurrence of once per week and/or within 24 hours of the end of any precipitation or snowmelt event that causes surface erosion. The inspection will be the responsibility of the GEC Administrator. An inspection report form has been provided in the Appendix. The inspection will verify that the structural PCM's described in Section B of this CSWMP are functioning properly, in good condition, up to date and minimize erosion. The inspection will also verify that the procedures used to prevent stormwater contamination from construction materials and petroleum products are effective. The following inspection and maintenance practices will be used to maintain erosion and sediment controls:

- Built up sediment will be removed from silt fencing when it has reached one-third the height of the fence.
- Silt fences will be inspected for depth of sediment, for tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- Sediment basins will be inspected for depth of sediment and built up sediment will be removed when it reaches 1 foot in depth.
- Temporary and permanent seeding will be inspected AND noted for bare spots, washouts, and healthy growth.
- The stabilized construction entrances will be inspected for sediment tracked on the road, for clean gravel, and to make sure that all traffic uses the stabilized entrance when leaving the site.
- The maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the GEC Administrator is provided in the Appendix. Completed forms will be maintained on-site during the entire construction project. Following construction and the expiration or inactivation of the permit, the completed forms will be retained at the general contractor's office, for a minimum of 3 years.



- If construction activities or design modifications are made to the site plan which could impact stormwater, this CSWMP will be amended appropriately. The amended CSWMP will have a description of the new activities that contribute to the increased pollutant loading and the planned source control activities.

### **C.8 Self Inspection**

The purpose of these inspections is to ensure that all Control Measures are installed according to the approved plans, appropriate as to the intended use, operating effectively, and being properly maintained. The GEC Administrator must be qualified according to Chapter 2, Section 5.0 of the Stormwater Construction Manual.

The GEC Administrator shall, at a minimum, make a thorough inspection at least once every 14 calendar days. Also, post-storm event inspections must be conducted within 24 hours following the end of any precipitation or snowmelt event that causes surface erosion. Provided the timing is appropriate, the post-storm inspections may be used to fulfill the 14-day routine inspection requirement. Alternatively, the GEC Administrator may choose to perform self-inspections every 7 calendar days and forego post-storm event inspections. The self inspection schedule must be identified in the GEC Administrator's most recent self-inspection. A more frequent inspection schedule than the minimum described may be necessary to ensure that Control Measures continue to operate as needed to comply with the GEC Plan. Site conditions such as steep grades and proximity to a state water are reasons for increasing the frequency of self-inspections.

The GEC Administrator shall submit documentation of the self-inspections by uploading the document to the City's Electronic Permitting Management System. Completed self-inspection forms must be submitted electronically within 5 business days of the self-inspection. The self-inspections must also be available either physically or electronically at the construction site at all times throughout the duration of the project. GEC Inspectors will review self-inspections during City compliance inspections. The use of a third-party inspection program does not remove this requirement. Additionally, the use of a third-party inspection program does not relieve the Permittee of the requirement to comply with all compliance inspections.

For sites or portions of sites where construction activities have been completed and final stabilization measures installed but final stabilization has not yet been achieved, the GEC Administrator shall make a thorough inspection of their Control Measures at least once every month. Post-storm event inspections must be conducted within 72 hours following the end of any precipitation or snowmelt event that causes surface erosion. The GEC Plan must be amended to indicate those areas where construction activities have been completed but final stabilization has not yet been achieved that will be inspected once a month. When site conditions make the schedule required in this section impractical, the permittee may petition the City to grant an

alternate inspection schedule. The alternative inspection schedule may not be implemented prior to written approval by the City and incorporation into the CSWMP. The Permittee is responsible to confirm that the frequency of inspections is sufficient to ensure that Control Measures remain in good working condition at all times.

***C.9 CCM/PCM Replacement and Failed CCM/PCMs***

At a minimum, the contractor shall inspect and keep a log of all CCM/PCM's on a weekly basis and after a significant precipitation event. CCM/PCMs should be assessed by a qualified inspector to determine if new or replacement CCM/PCMs are necessary. Where CCM/PCM's have failed, the failure must be addressed as soon as possible to minimize discharge of additional pollutants. As new CCM/PCMs are installed and/or replaced, this CSWMP should be updated to reflect the change(s).

#### **D. ADDITIONAL CSWMP AND CCM/PCM RESOURCES**

An employee training program should be developed and implemented to educate employees about the requirements of the CSWMP. This education program will include background on the components and goals of the CSWMP and hands-on training in erosion controls, spill prevention and response, good housekeeping, proper material handling, disposal and control of waste, equipment fueling, and proper storage, washing, and inspection procedures.

This plan was prepared in accordance with the Colorado Discharge Permit System (CDPS) General Permit. A copy of this permit is provided in the Appendix.

#### **E. SPILL PREVENTION AND RESPONSE PLAN**

The Spill Prevention and Response Plan (SPRP) is designed to outline requirements for the handling and management of hazardous substances (pesticides, herbicides, fuels, cleaners, etc.) stored or used at the Project Area.

##### **Materials Management and Handling**

- Chemicals that have the potential to be released in stormwater are to be used only where necessary and in a manner consistent with industry-standard uses and handling procedures.
- Ensure all hazardous materials are properly labeled.
- Store, dispense, and/or use hazardous substances in a way that prevents releases.
- Provide secondary containment when storing hazardous substances in bulk quantities (greater than 55-gallons).
- Maintain good housekeeping practices for chemicals stored onsite.
- Complete routine checks of hazardous substance storage areas.
- Provide monthly inspections of hazardous substance storage areas, secondary containment, and above ground and/or underground storage tanks.

##### **Spill Containment and Reporting**

A release of any chemical, oil, petroleum product, sewage, etc. that has the potential to enter surface water, groundwater, dry gullies, or storm sewers leading to surface water must be reported to the CDPHE immediately (25-8-601 CRS). When a spill is identified, the proper spill response should be implemented:

1. Assess the area for any immediate dangers or health and safety concerns. If any immediate dangers are present, call 911.

2. Contain any spilled materials. Assess the size of the leak and immediate threat of the spill reaching storm drains or permeable surfaces. If there is an immediate threat and no safety concerns, attempt to block the spill from reaching storm drains or other impermeable surfaces.
3. Stop the source of the spill if possible.
4. Cleanup spill in a timely manner. Use adsorbent materials (cat litter) and/or sock booms or rags to clean up the spill. Dispose of used materials appropriately.
5. Report and record spills to Qualified Stormwater Manager. Once the spill has been contained and any immediate threat to storm drains or permeable surfaces has been minimized, contact the Qualified Stormwater Manager. If necessary, a specialized cleanup contractor should be used to clean up the remaining contamination.
6. Follow applicable Colorado Discharge Permit System (CDPS) terms and conditions regarding spill reporting and response.
7. Report spills to the Colorado Department of Public Health and Environment (CDPHE). For non-permitted activities or in the case of an activity where a permit does not address reporting of or response to a spill which may cause pollution of surface or subsurface waters of the State, notify the Environmental Release and Incident Reporting Line within 24 hours at (877) 518-5608. Reporting should include:
  - a. Name of responsible person or name of Qualified Stormwater Manager
  - b. An estimate of the date and time of the release
  - c. The location of the spill and its source (saddle tank, manhole, storage container, etc.),
  - d. The type of material spilled (untreated wastewater, petroleum products, etc.)
  - e. The estimated volume of the spill
  - f. The time and date the spill was controlled or stopped
  - g. If the spill is ongoing, the estimated rate of flow and when the spill is expected to be controlled/contained
  - h. Measures being taken to contain, reduce, and/or clean the spill
  - i. A list of potentially impacted areas and known downstream water uses that will be or have been notified
  - j. The phone number and email of the Qualified Stormwater Manager.

8. Any accidental discharge to the sanitary sewer system must be reported immediately to the local sewer authority and the affected wastewater treatment plant.
9. Written notification following a reportable spill shall be submitted to the CDPHE within five days (5 CCR 1002-31, Section 61.8(5)(d)).

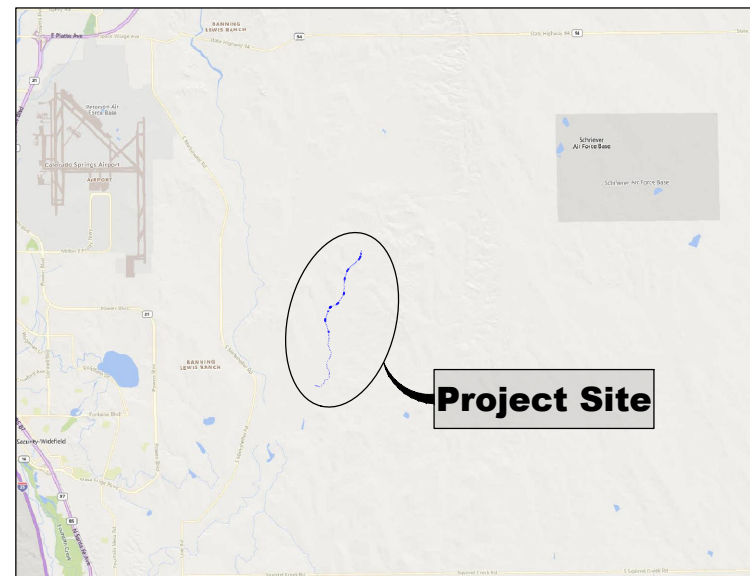
## **Appendix**

## **GEC Drawings**



***ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN***  
***60% DESIGN GEC PLANS***  
***THE LANDHUIS COMPANY***  
***MODIFICATION GRADING AND EROSION CONTROL PLAN***  
***JANUARY 2023***

MATRIX PROJECT No. 21.1129.009



VICINITY MAP

N.T.S.

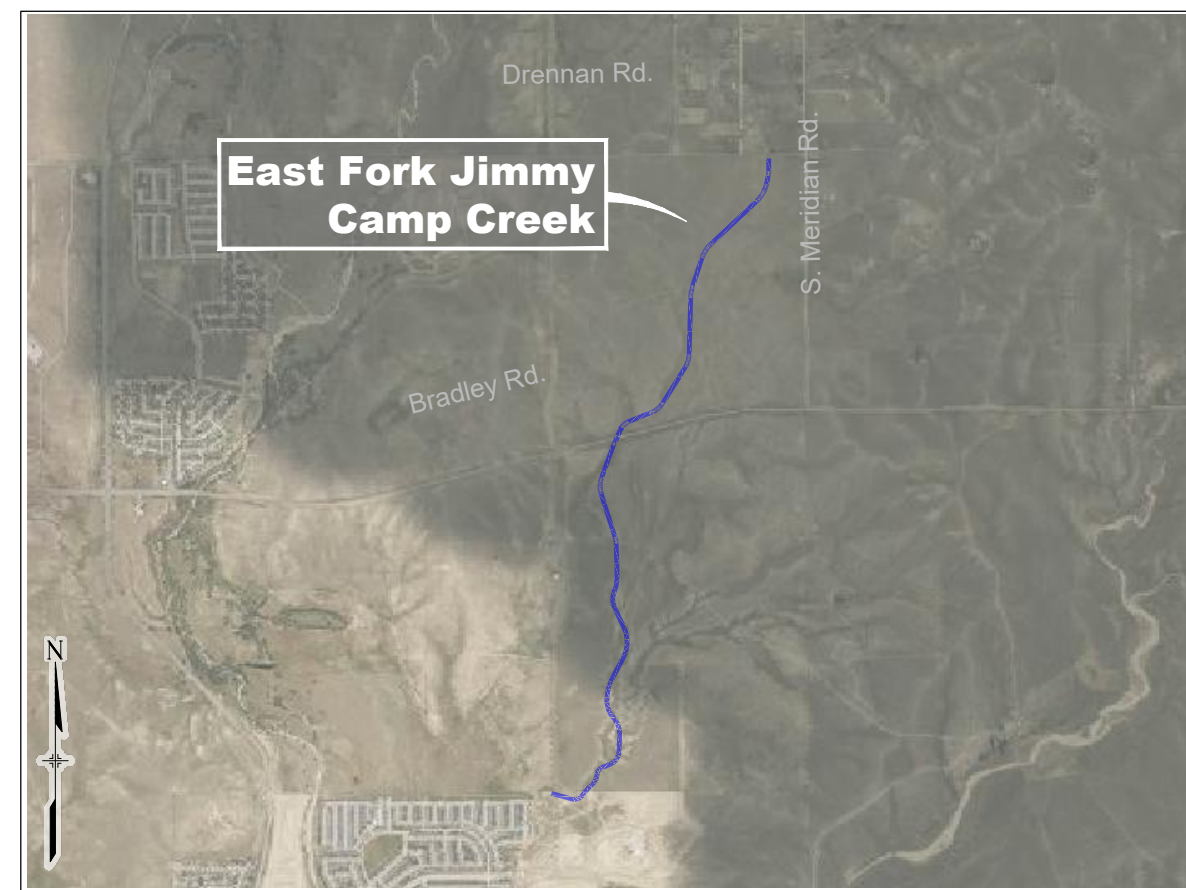
VERTICAL DATUM: THE ELEVATIONS ON THIS PROJECT ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

HORIZONTAL DATUM: THE COORDINATES FOR THIS PROJECT ARE NAD83/2011 COLORADO STATE PLANE CENTRAL ZONE GRID COORDINATES.

AERIAL PHOTO: PROVIDED BY AERIAL MAPPING SERVICES

BENCHMARK STATEMENT: THE BENCHMARK USED FOR THIS SURVEY IS FIMS MONUMENT NUMBER 202. A U.S. GEOLOGICAL SURVEY BRASS CAP STAMPED "11 HA 1947" IN A CONCRETE PAD, LOCATED ALONG DRENNAN ROAD, APPROXIMATELY 0.5 MILES EAST OF MARKSHEFFEL ROAD, APPROXIMATELY 200 FEET EAST OF A BRIDGE. THE MARK IS 32 FEET NORTH OF THE PAVEMENT, 23 FEET EAST OF A NORTH TO SOUTH FENCE LINE, AND 2 FEET NORTHEAST OF A POWER POLE."

PROPERTY INFORMATION: PARCEL LINES AND PROPERTY OWNERSHIP INFORMATION SHOWN WERE PROVIDED BY AN ALTA SURVEY.



LOCATION MAP

SCALE: 1" = 4,000'

## SHEET INDEX

TS01	TITLE SHEET	01
TS02	SIGNATURE PAGE	02
GN01-02	GENERAL NOTES	03-04
EC01-18	GRADING AND EROSION CONTROL PLANS	05-22

[illegible]





CITY OF COLORADO SPRINGS

ENGINEER'S STATEMENT

THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. IF SUCH WORK IS PERFORMED IN ACCORDANCE WITH THE GRADING AND EROSION CONTROL PLAN, THE WORK WILL NOT BECOME A HAZARD TO LIFE AND LIMB, ENDANGER PROPERTY, OR ADVERSELY AFFECT THE SAFETY, USE, OR STABILITY OF A PUBLIC WAY, DRAINAGE CHANNEL, OR OTHER PROPERTY.

PRINTED NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

PHONE NUMBER: \_\_\_\_\_

SEAL

OWNER'S STATEMENT

THE OWNER WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN INCLUDING CONSTRUCTION CONTROL MEASURE INSPECTION REQUIREMENTS AND FINAL STABILIZATION REQUIREMENTS ACCORDING TO THE CITY OF COLORADO SPRINGS STORMWATER CONSTRUCTION MANUAL. I ACKNOWLEDGE THE RESPONSIBILITY TO DETERMINE WHETHER THE CONSTRUCTION ACTIVITIES ON THESE PLANS REQUIRE COLORADO DISCHARGE PERMIT SYSTEM (CDPS) PERMITTING FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY

OWNER'S SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

NAME OF OWNER: \_\_\_\_\_ PHONE: \_\_\_\_\_

TITLE: \_\_\_\_\_ EMAIL: \_\_\_\_\_

CONTRACTOR'S STATEMENT

I WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN/CSWMP INCLUDING CONSTRUCTION CONTROL MEASURE INSPECTION REQUIREMENTS AND FINAL STABILIZATION REQUIREMENTS. I ACKNOWLEDGE THE RESPONSIBILITY TO DETERMINE WHETHER THE CONSTRUCTION ACTIVITIES ON THESE PLANS REQUIRE COLORADO DISCHARGE PERMIT SYSTEM (CDPS) PERMITTING FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY.

NAME OF CONTRACTOR: \_\_\_\_\_

AUTHORIZED SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

TITLE: \_\_\_\_\_

PHONE NUMBER: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

EMAIL ADDRESS: \_\_\_\_\_

CITY OF COLORADO SPRINGS GRADING AND EROSION CONTROL REVIEW

THIS GRADING AND EROSION CONTROL PLAN IS FILED IN ACCORDANCE WITH CITY CODE. THIS PLAN IS REVIEWED IN ACCORDANCE WITH THE STORMWATER CONSTRUCTION MANUAL; LATEST REVISIONS.

\_\_\_\_\_ DATE: \_\_\_\_\_

FOR THE SWENT MANAGER

NOTES: \_\_\_\_\_

\_\_\_\_\_

EL PASO COUNTY

ENGINEER'S STATEMENT

THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS PLAN.

\_\_\_\_\_

ENGINEER OF RECORD SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

OWNER'S STATEMENT

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN

\_\_\_\_\_

OWNER SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

EL PASO COUNTY

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/ OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/ OR ACCURACY OF THIS DOCUMENT. FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL, AS AMENDED.

IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION

\_\_\_\_\_

COUNTY PROJECT ENGINEER SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

REFERENCE DRAWINGS  <small>Rolling Hills MDDP topo X-1129-MDG22x34</small>					<b>60% DESIGN PLANS</b>  <b>NOTICE:</b> THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF AARON SUTHERLIN, PE IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.		PREPARED BY:  Excellence by Design	SEAL <div>PRELIMINARY THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE</div>	THE LANDHUIS COMPANY			
	ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN											
	SIGNATURE PAGE											
	DESIGNED BY:	TKM	SCALE	DATE ISSUED:								
	DRAWN BY:	EAL	HORIZ	JANUARY 2023								
CHECKED BY:	AJS	VERT.	SHEET	02 OF 44	DRAWING No.	TS02						



STANDARD GEC PLAN NOTES - CITY OF COLORADO SPRINGS

- NO CLEARING, GRADING, EXCAVATION, OR OTHER LAND DISTURBING ACTIVITIES SHALL BE ALLOWED (EXCEPT FOR WORK DIRECTLY RELATED TO THE INSTALLATION OF INITIAL CONTROL MEASURES) UNTIL A CITY GEC PERMIT HAS BEEN ISSUED.
- ALL LAND DISTURBING ACTIVITIES MUST BE PERFORMED IN ACCORDANCE WITH AND THE APPROVED GEC PLAN AND CSWMP.
- INITIAL CONTROL MEASURES SHALL BE INSTALLED AND INSPECTED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES TAKING PLACE. AN INITIAL SITE INSPECTION WILL NOT BE SCHEDULED UNTIL A CITY GEC PERMIT HAS BEEN "CONDITIONALLY APPROVED." CALL CITY STORMWATER INSPECTIONS, 385-5980, AT LEAST 48 HOURS PRIOR TO CONSTRUCTION TO SCHEDULE AN INITIAL INSPECTION AND OBTAIN FULL PERMIT APPROVAL.
- INDIVIDUALS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS) AND THE "CLEAN WATER ACT" (33 USC 1344), INCLUDING REGULATIONS PROMULGATED AND CERTIFICATIONS OR PERMITS ISSUED, IN ADDITION TO THE REQUIREMENTS INCLUDED IN THE CITY'S MS4 PERMIT, STORMWATER CONSTRUCTION MANUAL. IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND WATER QUALITY CONTROL LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL OR STATE AGENCIES, THE MORE RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
- STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS.
- ALL CONSTRUCTION CONTROL MEASURES SHALL BE MAINTAINED UNTIL PERMANENT STABILIZATION MEASURES ARE IMPLEMENTED. TEMPORARY CONSTRUCTION CONTROL MEASURES MUST BE REMOVED PRIOR TO PERMIT CLOSEOUT.
- CONCRETE WASH WATER SHALL NOT BE DISCHARGED TO OR ALLOWED TO RUNOFF TO STATE WATERS OR ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
- BUILDING, CONSTRUCTION, EXCAVATION, OR OTHER WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. CONSTRUCTION CONTROL MEASURES MAY BE REQUIRED BY THE GEC INSPECTOR IF DEEMED NECESSARY BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES (E.G., ESTIMATED TIME OF EXPOSURE, SEASON OF THE YEAR, ETC.).
- ALL WASTES COMPOSED OF BUILDING MATERIALS MUST BE REMOVED FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
- THE PERMITTEE SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, AND SAND THAT MAY ACCUMULATE IN THE STORM SEWER OR OTHER DRAINAGE CONVEYANCE SYSTEM AS A RESULT OF CONSTRUCTION ACTIVITIES.
- THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS. MATERIALS SHALL NOT BE STORED IN A LOCATION WHERE THEY MAY BE CARRIED BY STORMWATER RUNOFF INTO THE STORM SEWER SYSTEM AT ANY TIME.
- SPILL PREVENTION AND CONTAINMENT MEASURES SHALL BE USED AT ALL STORAGE, EQUIPMENT FUELING, AND EQUIPMENT SERVICING AREAS SO AS TO CONTAIN ALL SPILLS AND PREVENT ANY SPILLED MATERIAL FROM ENTERING THE MS4, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITY. BULK STORAGE STRUCTURES FOR PETROLEUM PRODUCTS AND OTHER CHEMICALS SHALL HAVE SECONDARY CONTAINMENT OR EQUIVALENT ADEQUATE PROTECTION. ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY, OR CONTAINED UNTIL APPROPRIATE CLEANUP METHODS CAN BE EMPLOYED. MANUFACTURER'S RECOMMENDED METHODS FOR SPILL CLEANUP SHALL BE FOLLOWED, ALONG WITH PROPER DISPOSAL METHODS.
- SEDIMENT (MUD AND DIRT) TRANSPORTED ONTO A PUBLIC ROAD, REGARDLESS OF THE SIZE OF THE SITE, SHALL BE CLEANED AS SOON AS POSSIBLE AFTER DISCOVERY.
- NO CHEMICALS ARE TO BE ADDED TO THE DISCHARGE UNLESS PERMISSION FOR THE USE OF A SPECIFIC CHEMICAL IS GRANTED BY THE STATE. IN GRANTING THE USE OF SUCH CHEMICALS, SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
- CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN FOURTEEN (14) CALENDAR DAYS AFTER FINAL GRADING OR FINAL LAND DISTURBANCE HAS BEEN COMPLETED. DISTURBED AREAS WHICH ARE NOT AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN FOURTEEN (14) DAYS SHALL BE ROUGHENED, MULCHED, TACKIFIED, OR STABILIZED WITH TARPS WITHIN FOURTEEN (14) DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN SIXTY (60) DAYS SHALL ALSO BE SEEDED, UNLESS AN ALTERNATIVE STABILIZATION MEASURE IS ACCEPTED AT THE INSPECTOR'S DISCRETION. ALL TEMPORARY CONSTRUCTION CONTROL MEASURES SHALL BE MAINTAINED UNTIL FINAL STABILIZATION IS ACHIEVED.
- THE GEC PLAN WILL BE SUBJECT TO RE-REVIEW AND RE-ACCEPTANCE BY THE STORMWATER ENTERPRISE SHOULD ANY OF THE FOLLOWING OCCUR: GRADING DOES NOT COMMENCE WITHIN TWELVE (12) MONTHS OF THE CITY'S ACCEPTANCE OF THE PLAN, THE CONSTRUCTION SITE IS IDLE FOR TWELVE (12) CONSECUTIVE MONTHS, A CHANGE IN PROPERTY OWNERSHIP OCCURS, THE PLANNED DEVELOPMENT CHANGES, OR ANY OTHER MAJOR MODIFICATIONS ARE PROPOSED AS DEFINED IN THE STORMWATER CONSTRUCTION MANUAL.
- IT IS NOT PERMISSIBLE FOR ANY PERSON TO MODIFY THE GRADE OF THE EARTH ON ANY UTILITY EASEMENT OR UTILITY RIGHT OF-WAY WITHOUT WRITTEN APPROVAL FROM THE UTILITY OWNER. CITY ACCEPTANCE OF THE GEC PLAN AND CSWMP DOES NOT SATISFY THIS REQUIREMENT. THE PLAN SHALL NOT INCREASE OR DIVERT WATER TOWARDS UTILITY FACILITIES. ANY CHANGES TO EXISTING UTILITY FACILITIES TO ACCOMMODATE THE PLAN MUST BE APPROVED BY THE AFFECTED UTILITY OWNER PRIOR TO IMPLEMENTING THE PLAN. THE COST TO RELOCATE OR PROTECT EXISTING UTILITIES OR TO PROVIDE INTERIM ACCESS SHALL BE AT THE APPLICANT'S EXPENSE.
- APPLICANT REPRESENTS AND WARRANTS THAT THEY HAVE THE LEGAL AUTHORITY TO GRADE AND/OR CONSTRUCT IMPROVEMENTS ON ADJACENT PROPERTY. THE CITY HAS NOT REVIEWED THE DEVELOPER'S AUTHORITY TO MODIFY ADJACENT PROPERTY. AN APPROVED GEC PERMIT DOES NOT PROVIDE APPROVAL FOR THE APPLICANT TO PERFORM WORK ON ADJACENT PROPERTY.

STANDARD GEC PLAN NOTES - EL PASO COUNTY

- STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF-SITE WATERS, INCLUDING WETLANDS.
- NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
- A SEPARATE STORMWATER MANAGEMENT PLAN (SWMP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. MANAGEMENT OF THE SWMP DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QUALIFIED STORMWATER MANAGER OR CERTIFIED EROSION CONTROL INSPECTOR. THE SWMP SHALL BE LOCATED ON-SITE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
- ONCE THE ESQCP IS APPROVED AND A "NOTICE TO PROCEED" HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON THE APPROVED GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY STAFF.
- CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND DISTURBED LAND AREAS SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF THE DISTURBANCE.
- ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.
- TEMPORARY STABILIZATION SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.
- FINAL STABILIZATION MUST BE IMPLEMENTED AT ALL APPLICABLE CONSTRUCTION SITES. FINAL STABILIZATION IS ACHIEVED WHEN ALL GROUND DISTURBING ACTIVITIES ARE COMPLETE AND ALL DISTURBED AREAS EITHER HAVE A UNIFORM VEGETATIVE COVER WITH INDIVIDUAL PLANT DENSITY OF 70 PERCENT OF PRE-DISTURBANCE LEVELS ESTABLISHED OR EQUIVALENT PERMANENT ALTERNATIVE STABILIZATION METHOD IS IMPLEMENTED. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED UPON FINAL STABILIZATION AND BEFORE PERMIT CLOSURE.
- ALL PERMANENT STORMWATER MANAGEMENT FACILITIES SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT EFFECT THE DESIGN OR FUNCTION OF PERMANENT STORMWATER MANAGEMENT STRUCTURES MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.
- EARTH DISTURBANCES SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY MINIMIZE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME. PRE-EXISTING VEGETATION SHALL BE PROTECTED AND MAINTAINED WITHIN 50 HORIZONTAL FEET OF A WATERS OF THE STATE UNLESS SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED.
- COMPACTION OF SOIL MUST BE PREVENTED IN AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES OR WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATIVE COVER. AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF COMPACTION PREVENTION IS NOT FEASIBLE DUE TO SITE CONSTRAINTS, ALL AREAS DESIGNATED FOR INFILTRATION AND VEGETATION CONTROL MEASURES MUST BE LOOSENEED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).
- ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE A STABILIZED CONVEYANCE DESIGNED TO MINIMIZE EROSION AND THE DISCHARGE OF SEDIMENT OFF-SITE.
- CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.
- DURING DEWATERING OPERATIONS, UNCONTAMINATED GROUNDWATER MAY BE DISCHARGED ON-SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE
- EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY

- REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
- WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
  - TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
  - THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
  - THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
  - NO CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED ON-SITE UNLESS PERMISSION FOR THE USE OF SUCH CHEMICAL(S) IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING APPROVAL FOR THE USE OF SUCH CHEMICAL(S), SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
  - BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OF 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ON-SITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.
  - NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES
  - OWNER/DEVELOPER AND THEIR AGENTS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS OF THE LAND DEVELOPMENT CODE, DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
  - ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.
  - PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
  - A WATER SOURCE SHALL BE AVAILABLE ON-SITE DURING EARTHWORK OPERATIONS AND SHALL BE UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
  - THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY [COMPANY NAME, DATE OF REPORT] AND SHALL BE CONSIDERED A PART OF THESE PLANS.
  - AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE (1)ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:  
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
WATER QUALITY CONTROL DIVISION WQCD – PERMITS  
4300 CHERRY CREEK DRIVE SOUTH  
DENVER, CO 80246-1530  
ATTN: PERMITS UNIT

NOTES ON WORKING IN WATERWAYS

- CONSTRUCTION VEHICLES SHOULD BE KEPT OUT OF A WATERWAY TO THE MAXIMUM EXTENT PRACTICABLE.
- WHERE IN-CHANNEL WORK IS NECESSARY, STEPS SUCH AS TEMPORARY CHANNEL DIVERSIONS MUST BE TAKEN TO STABILIZE THE WORK AREA AND CONTROL EROSION DURING CONSTRUCTION.
- WHERE AN ACTIVELY-FLOWING WATERCOURSE MUST BE CROSSED REGULARLY BY CONSTRUCTION VEHICLES, A TEMPORARY CROSSING SHOULD BE PROVIDED. THREE PRIMARY METHODS ARE AVAILABLE: (1) A CULVERT CROSSING, (2) TEMPORARY BRIDGE, AND (3) A STREAM FORD. SEE THE TEMPORARY STREAM CROSSING FACT SHEETS.
- WHERE AN ACTIVELY-FLOWING WATERCOURSE MUST BE CROSSED REGULARLY BY CONSTRUCTION VEHICLES, A TEMPORARY CROSSING SHOULD BE PROVIDED. THREE PRIMARY METHODS ARE AVAILABLE: (1) A CULVERT CROSSING, (2) TEMPORARY BRIDGE, AND (3) A STREAM FORD. SEE THE TEMPORARY STREAM CROSSING FACT SHEETS.
- A PERMIT IS REQUIRED FOR PLACEMENT OF FILL IN A WATERWAY UNDER SECTION 404 OF THE CLEAN WATER ACT. THE LOCAL OFFICE OF THE USACE SHOULD BE CONTACTED CONCERNING THE REQUIREMENTS FOR OBTAINING A 404 PERMIT. IN ADDITION, A PERMIT FROM USFWS MAY BE NEEDED IF THREATENED OR ENDANGERED SPECIES ARE OF CONCERN IN THE WORK AREA. TYPICALLY, THE USFWS ISSUES ARE ADDRESSED IN CONJUNCTION WITH THE 404 PERMIT IF ONE IS REQUIRED. A FLOODPLAIN DEVELOPMENT PERMIT AND OTHER LOCAL PERMITS MAY ALSO BE REQUIRED.
- WHEN WORK TAKES PLACE WITHIN A CHANNEL, A TEMPORARY WATER DIVERSION TO BYPASS THE WORK AREA IS TYPICALLY REQUIRED. SEE THE DIVERSION CHANNEL/DITCH BMP FACT SHEET FOR CRITERIA AND DESIGN DETAILS.
- TO THE EXTENT PRACTICAL, CONSTRUCTION IN A WATERWAY SHOULD BE SEQUENCED TO BEGIN AT THE MOST DOWNSTREAM POINT AND WORK PROGRESSIVELY UPSTREAM INSTALLING REQUIRED CHANNEL AND GRADE CONTROL FACILITIES.
- COMPLETE WORK IN SMALL SEGMENTS, EXPOSING AS LITTLE OF THE CHANNEL AT A TIME AS PRACTICAL. KEEP EQUIPMENT OPERATORS CONTAINED IN IMMEDIATE WORK AREA AND AVOID EXCESSIVE COMPACTING OF THE SOIL SURFACE BECAUSE IT INHIBITS REVEGETATION.
- WHERE FEASIBLE, IT IS BEST TO PERFORM IN-CHANNEL WORK BETWEEN OCTOBER 1 AND MARCH 31 IN COLORADO. THIS IS THE PERIOD WHEN THE CHANCES OF FLASH FLOODS AND FLOWS HIGHER THAN THE 2-YEAR FLOOD PEAK FLOWS ARE LESS LIKELY.
- DURING THE PROCESS OF CUT AND FILL, AVOID LETTING SIDE-CAST OR WASTE MATERIAL ENTER WATERWAYS OR PLACING IT ON UNSTABLE AREAS. INSTEAD, EFFICIENTLY MOVE EXCAVATED MATERIAL TO AREAS NEEDING FILL OR TO A STOCKPILE. FOR STREAM RESTORATION/STABILIZATION PROJECTS, CONSULTING WITH A FLUVIAL GEOMORPHOLOGIST ON STREAM STABILITY ISSUES MAY BE PRUDENT.

REFERENCE DRAWINGS  X-1129-MDG22a34						<b>60% DESIGN PLANS</b>  <b>NOTICE:</b> THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF AARON SUTHERLIN, PE IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.		PREPARED BY:  Excellence by Design	SEAL  <b>PRELIMINARY</b> THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE	LANDHUIS COMPANY			
	ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN												
	GENERAL NOTES												
	DESIGNED BY:	JDH	SCALE		DATE ISSUED:					JANUARY 2023	DRAWING No.		
	DRAWN BY:	TKM	HORIZ	N/A	CHECKED BY:					AJS	VERT.	N/A	SHEET



TOTAL LIMITS OF DISTURBANCE: 159.2 AC.  
ANTICIPATED CONSTRUCTION: WINTER 2023  
ANTICIPATED FINAL STABILIZATION: 2024

- NON-STRUCTURAL CONTROL MEASURES INCLUDE:
- SEASONAL PLANNING CONSIDERATIONS
  - LIMITING OF DISTURBED AREAS

RECEIVING WATERS:

EAST FORK JIMMY CAMP CREEK IS A TRIBUTARY OF JIMMY CAMP CREEK, PART OF THE LARGER FOUNTAIN CREEK WATERSHED.

THIS WORK IS NOT LOCATED WITHIN THE CITY OF COLORADO SPRINGS STREAMSIDE OR HILLSIDE OVERLAY.

EXISTING 100-YEAR FEMA FLOODPLAIN SHOWN IN THE DESIGN PLANS.

THE EROSION CONTROL PLAN PRESENTED IN THESE DRAWINGS SERVES AS A MINIMUM FOR THE REQUIREMENTS OF EROSION CONTROL DURING CONSTRUCTION. THE CONTRACTOR HAS THE ULTIMATE RESPONSIBILITY FOR DEVELOPING AN ADEQUATE EROSION CONTROL PLAN THAT IS COMPATIBLE WITH THEIR PLAN FOR EXECUTING THE WORK AND FOR PROVIDING ADEQUATE EROSION CONTROL AND WATER QUALITY THROUGHOUT THE DURATION OF THE PROJECT. THEREFORE, IF THE PROVIDED PLAN IS NOT WORKING SUFFICIENTLY TO PROTECT THE PROJECT AREAS, THEN THE CONTRACTOR SHALL PROVIDE ADDITIONAL MEASURES AS REQUIRED TO OBTAIN THE REQUIRED PROTECTION.

DEWATERING / FLOW DIVERSION IS NOT SHOWN. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLY WITH LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS REGARDING DEWATERING / FLOW DIVERSION MEANS AND METHODS.

TEMPORARY SEDIMENT PONDS NOT SHOWN. IF REQUIRED, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLY WITH LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS REGARDING SEDIMENT PONDS MEANS AND METHODS.

IF ADDITIONAL STAGING AREAS, STOCKPILES, OR CONCRETE WASHOUT AREAS ARE REQUIRED, THE CONTRACTOR MUST COMPLY WITH ALL APPLICABLE REGULATIONS. ADDITIONAL AREAS MUST NOT RESULT IN ADDITIONAL LAND DISTURBANCE.

NOTE:

THE FOLLOWING ITEMS ARE NOT APPLICABLE TO THESE PLANS:

- NO BUILD AREAS
- ASPHALT, CONCRETE BATCH PLANTS, AND/OR MASONARY MIX STATIONS
- PRESERVATION EASEMENTS

GENERAL GEC PLAN NOTES:

- PROPERTY LINES, PARCEL NUMBERS, AND PROPERTY OWNERSHIP SHOWN IN DESIGN PLANS ON SHEET EX01-02
- EXISTING VEGETATION IS NO NOTABLE SPECIES (GRASSES AND WEEDS).
- PROPOSED REVEGETATION AND EROSION CONTROL FABRIC EXTENTS PROVIDED IN THE DESIGN PLANS.
- EXISTING AND PROPOSED FEMA 100-YEAR FLOODPLAINS ARE SHOWN ON EX01-02 AND DR01-02, RESPECTIVELY
- PROJECT STAGING WILL BE NOTED IN LATER DESIGN PLANS. FULL PROJECT BUILD OUT SHOWN FOR 60% SUBMITTAL.

GRADING NOTES:

1. FINISH GRADES: FINISHED GRADE ELEVATION SHALL BE ESTABLISHED FROM THE PROPOSED CONTOURS SHOWN ON THE GRADING PLANS. DEPTHS AND DIMENSIONS SHOWN ON THE PLAN, SECTIONS, AND PROFILES SUPERSEDE PROPOSED CONTOURS SHOWN ON THE GRADING PLANS. ACCEPTABLE GRADING TOLERANCES ARE +/- 0.20 FEET OUTSIDE OF THE BANKFULL CHANNEL AND +/- 0.10 FEET WITHIN THE BANKFULL CHANNEL.

2. FILL MATERIAL: MATERIALS USED FOR FILL OR EMBANKMENT CONSTRUCTION SHALL CONSIST OF APPROVED GRANULAR SOIL MATERIAL ACQUIRED FROM PROJECT EXCAVATIONS OR FROM OFF-SITE SOURCES. EXCAVATED WEATHERED AND UNWEATHERED BED ROCK MATERIALS SHALL NOT BE USED AS FILL MATERIAL UNLESS OTHERWISE APPROVED. FROZEN MATERIALS SHALL NOT BE USED IN CONSTRUCTION OF EMBANKMENTS. EXCESS EXCAVATED NATIVE SOILS WHICH ARE NOT USED AS EMBANKMENT OR BACKFILL SHALL BE STOCKPILED AS DIRECTED BY THE OWNER.

a. SUITABLE ON-SITE AND IMPORTED FILL MATERIAL SHALL MEET THE FOLLOWING GRADATION REQUIREMENTS:

Standard Sieve Size	Percent Passing	
	Embankment Fill Material	Channel Fill Material
3 inch	100	100
No. 200	5-20	5-20
Liquid Limit	30 or less	Not Plastic
Plasticity Index	10 or less	Not Plastic

b. IN-PLACE MOISTURE DENSITY TESTS WILL BE PERFORMED TO ENSURE THAT FILL COMPLIES WITH CITY OF COLORADO SPRINGS STANDARDS.

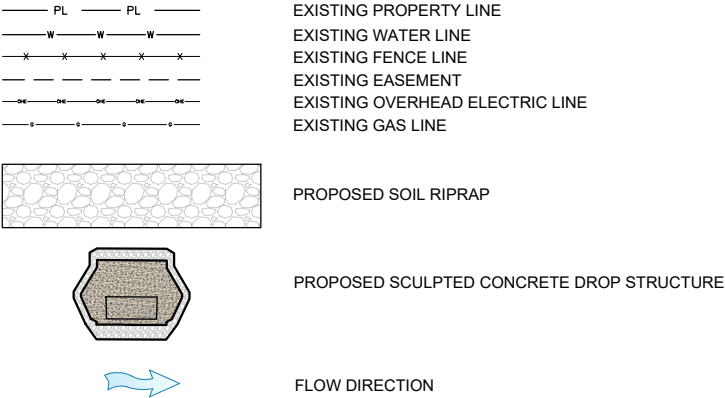
OPINION OF PROBABLE EROSION CONTROL COST

1.	VEHICLE TRACKING CONTROL (3) EACH AT \$1,325.00	\$ 3,975.00
2.	EROSION CONTROL BLANKET, COCONUT (500,354) SY AT \$6.00	\$3,002,124.00
3.	EROSION CONTROL BLANKET, KOIR (66,832) ST AT \$20.00	\$1,336,640.00
4.	SILT FENCE (1,423) LF AT \$2.50	\$ 3,557.50
5.	CONCRETE WASHOUT AREA (4) EACH AT \$1,535.00	\$ 6,140.00
6.	CHECK DAM (3) EACH AT \$386.00	\$ 1,158.00
SUB TOTAL		\$4,353,594.50
MAINTENANCE CONTINGENCY (40%)		\$1,741,437.80
TOTAL		\$6,095,032.30

STANDARD SYMBOLS



LEGEND



REFERENCE DRAWINGS  X-1129-MDG22x34				
	No.	DATE	DESCRIPTION REVISIONS	BY
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60% DESIGN PLANS

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PREPARED BY:



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FOR AND ON BEHALF OF  
MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009

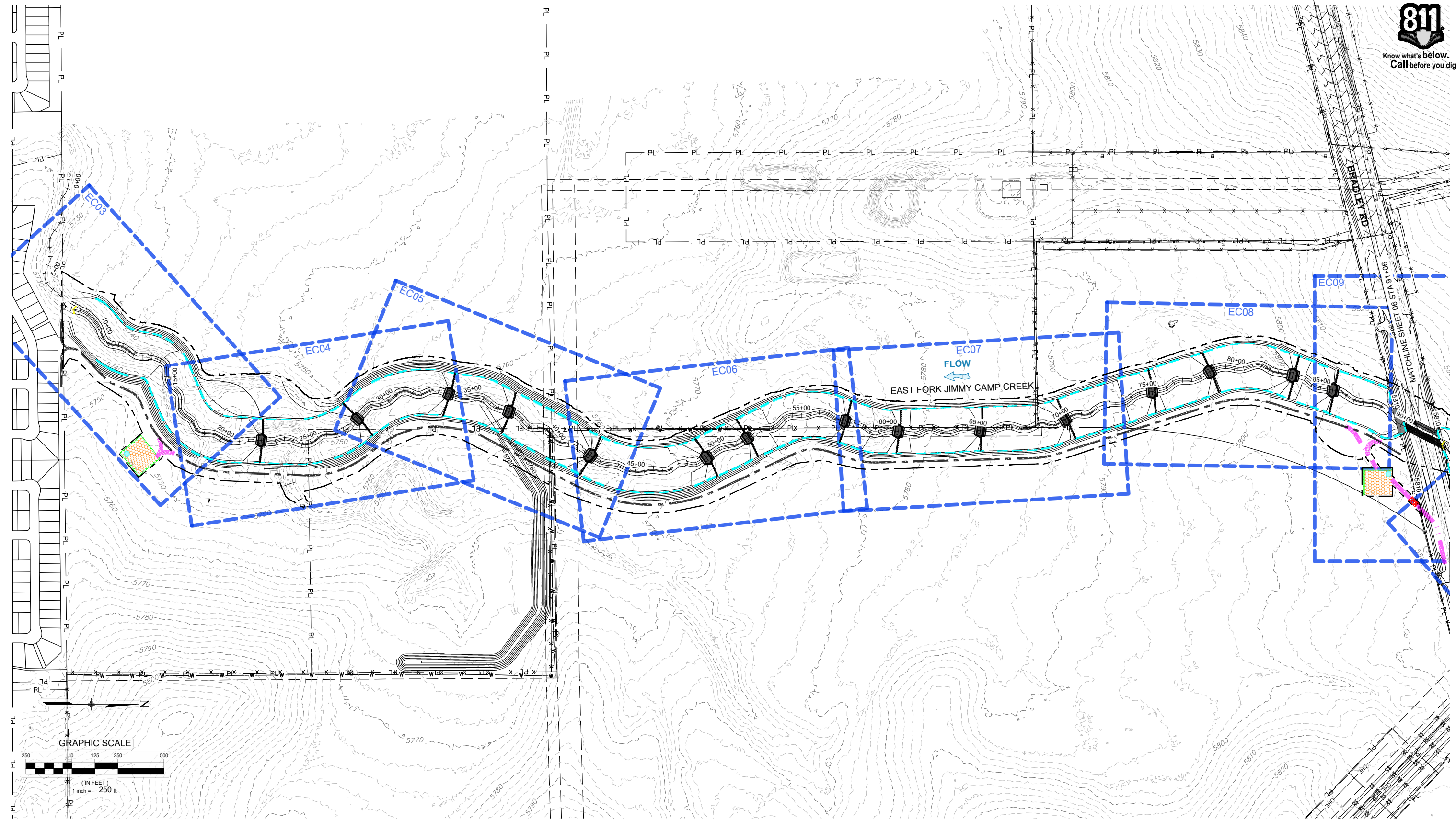
LANDHUIS COMPANY

ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN  
MODIFICATION GRADING AND EROSION CONTROL PLAN

GENERAL NOTES

DESIGNED BY:	JDH	SCALE		DATE ISSUED:	JANUARY 2023	DRAWING No.	
DRAWN BY:	TKM	HORIZ.	N/A				
CHECKED BY:	AJS	VERT.	N/A	SHEET	04 OF 22	GN01	





REFERENCE DRAWINGS			
X-1129-UTILITIES X-1129-PR STRUCT X-1129-PARCELS X-1129-MDS22-34			
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PREPARED BY:

**Matrix**  
Excellence by Design

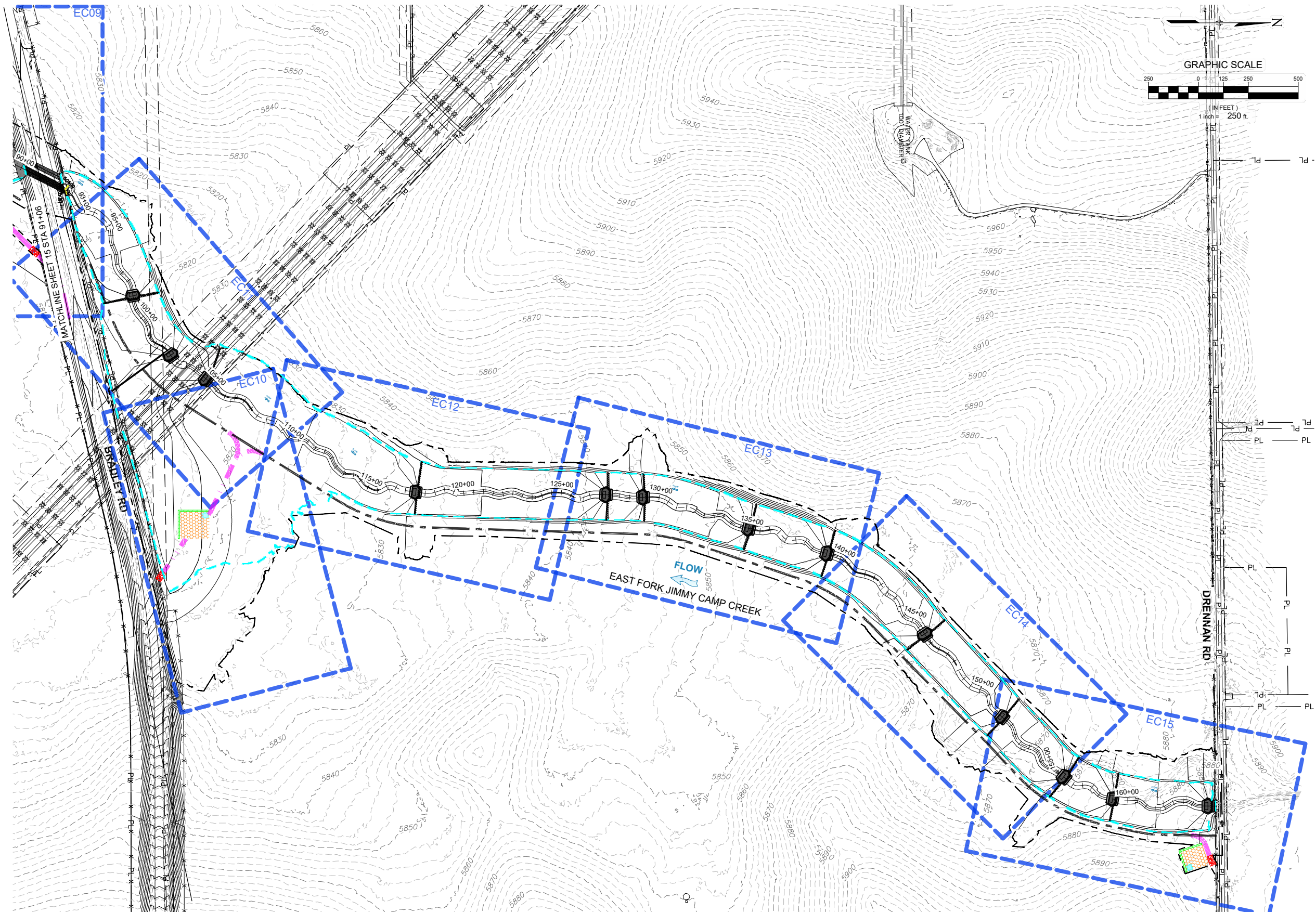
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MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009

LANDHUIS COMPANY			
ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN			
EROSION CONTROL OVERVIEW SHEET 1			
DESIGNED BY: TKM	SCALE: HORIZ 1" = 250'	DATE ISSUED: JANUARY 2023	DRAWING No. EC01
CHECKED BY: AJS	VERT. N/A	SHEET 05 OF 18	





REFERENCE DRAWINGS			
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MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009

LANDHUIS COMPANY			
ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN			
EROSION CONTROL OVERVIEW SHEET 2			
DESIGNED BY: TKM	SCALE: HORIZ 1" = 250'	DATE ISSUED: JANUARY 2023	DRAWING No. EC02
CHECKED BY: AJS	VERT. N/A	SHEET 06 OF 18	





FOR CITY OF COLORADO SPRINGS REVIEW

EROSION CONTROL LEGEND:

SSA

SF

VTC

CD

CWA

LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION

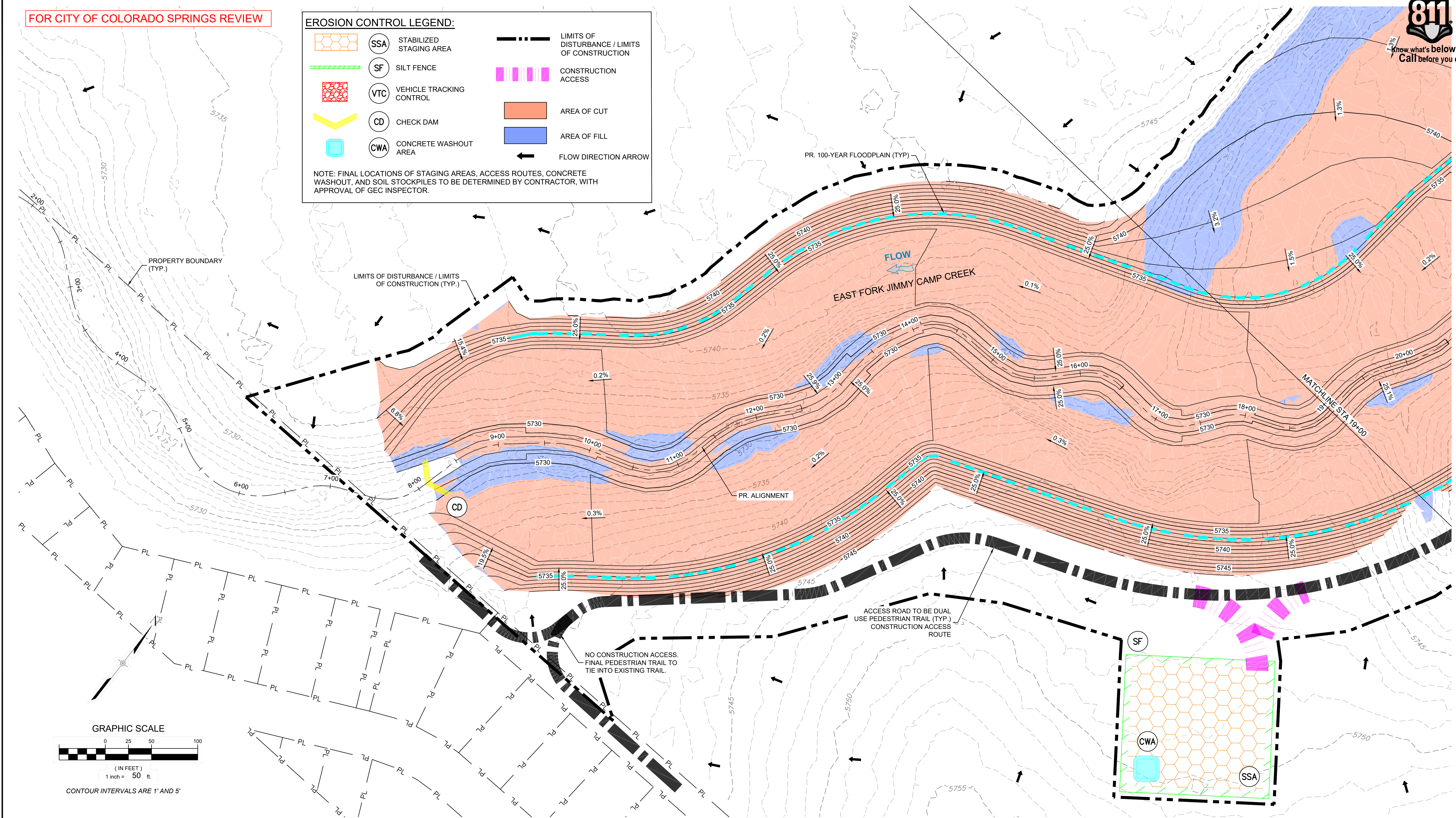
CONSTRUCTION ACCESS

AREA OF CUT

AREA OF FILL

FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



REFERENCE DRAWINGS			
X-1129-UTILITIES X-1129-PR STRUCT X-1129-PARCELS X-1129-MD22x34			
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 **Matrix**  
Excellence by Design

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FOR AND ON BEHALF OF  
MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009

LANDHUIS COMPANY

ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN  
MODIFICATION GRADING AND EROSION CONTROL PLAN

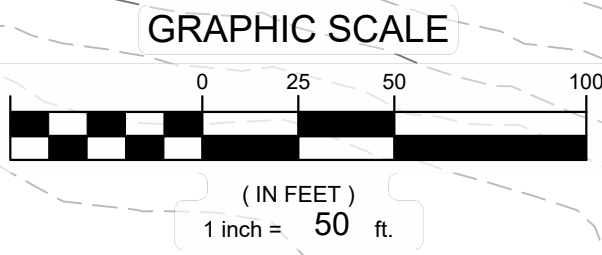
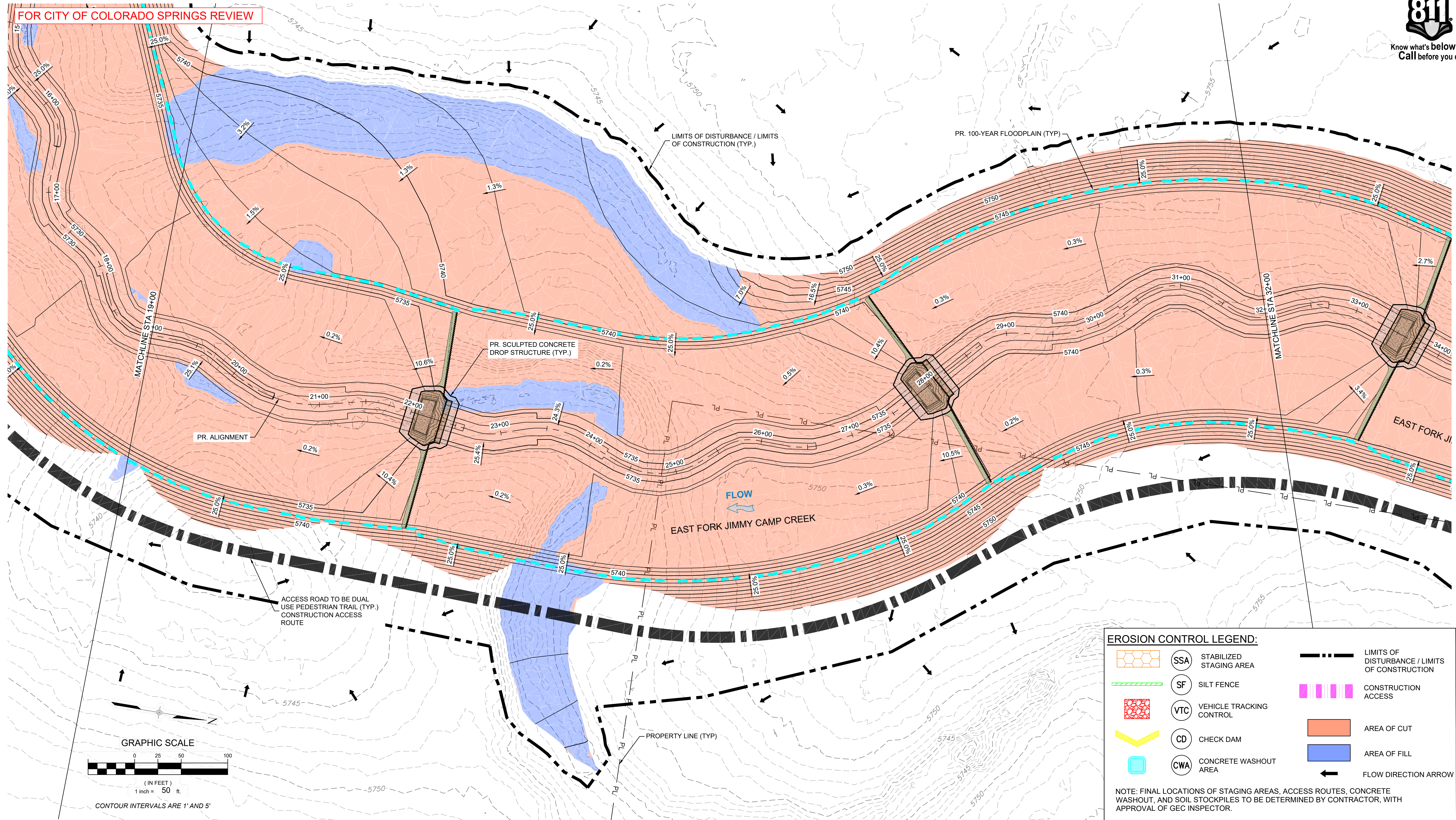
PLAN AND PROFILE  
STA. 7+00 - 19+00

DESIGNED BY: TKM	SCALE: HORIZ 1" = 50'	DATE ISSUED: JANUARY 2023	DRAWING No. EC03
CHECKED BY: AJS	VERT. 1" = 20'	SHEET 07 OF 22	





FOR CITY OF COLORADO SPRINGS REVIEW



**EROSION CONTROL LEGEND:**

	SSA	STABILIZED STAGING AREA		LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION
	SF	SILT FENCE		CONSTRUCTION ACCESS
	VTC	VEHICLE TRACKING CONTROL		AREA OF CUT
	CD	CHECK DAM		AREA OF FILL
	CWA	CONCRETE WASHOUT AREA		FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.

REFERENCE DRAWINGS			
X-1129-UTILITIES X-1129-PR STRUCT X-1129-PARCELS X-1129-MD222x34			
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**60% DESIGN PLANS**

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FOR AND ON BEHALF OF  
MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009

**LANDHUIS COMPANY**

ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN

**PLAN AND PROFILE**  
STA. 19+00 - 32+00

DESIGNED BY:	TKM	SCALE	DATE ISSUED:	JANUARY 2023	DRAWING No.
CHECKED BY:	AJS	HORIZ. 1" = 50' VERT. 1" = 20'	SHEET	08 OF 22	EC04





Know what's below.  
Call before you dig.

FOR CITY OF COLORADO SPRINGS REVIEW - END CITY REVIEW STA 40+00, BEGIN COUNTY REVIEW

EROSION CONTROL LEGEND:

- SSA

STABILIZED STAGING AREA
- SF

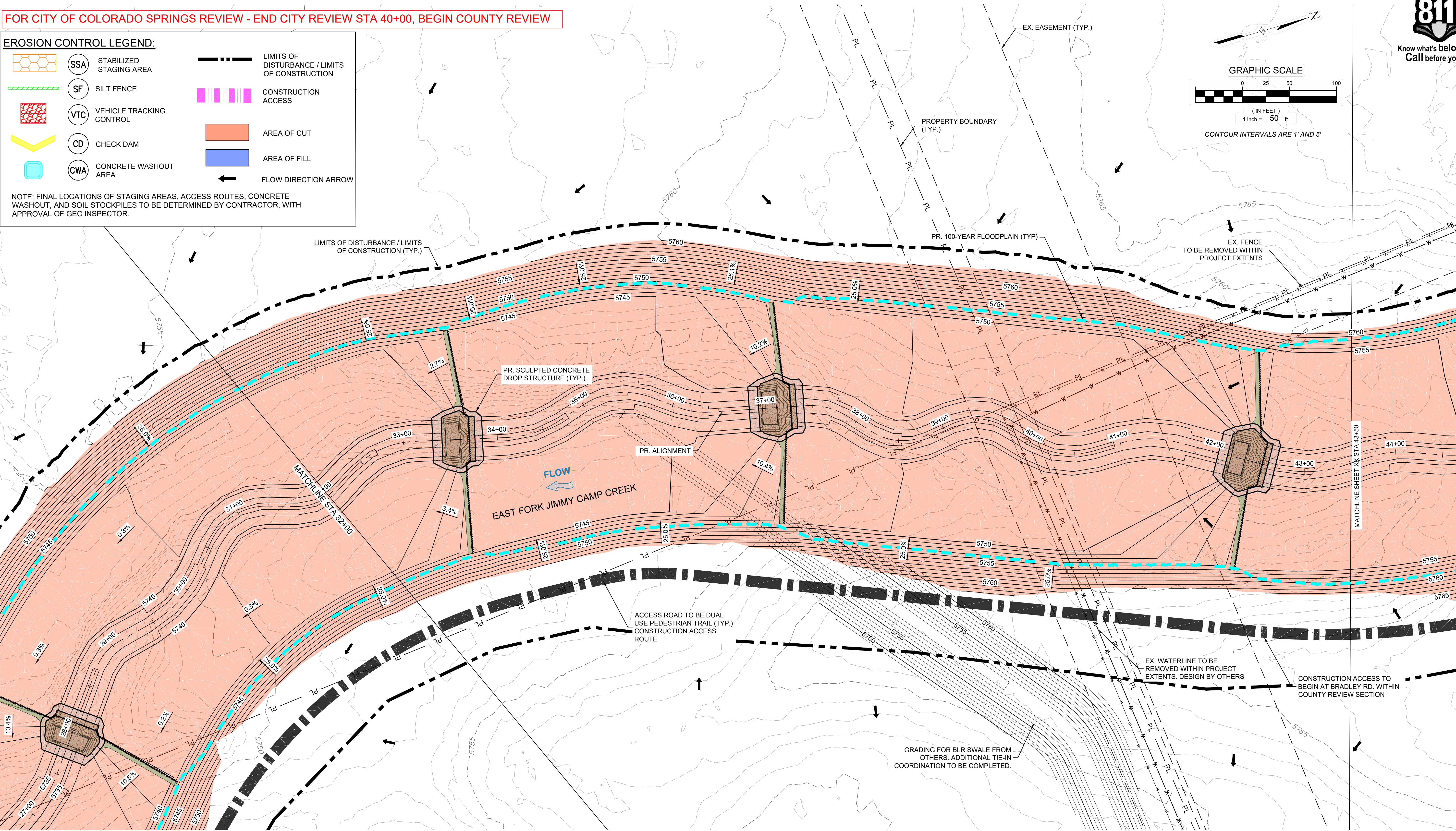
SILT FENCE
- VTC

VEHICLE TRACKING CONTROL
- CD

CHECK DAM
- CWA

CONCRETE WASHOUT AREA
- LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION
- CONSTRUCTION ACCESS
- AREA OF CUT
- AREA OF FILL
- FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



REFERENCE DRAWINGS			
X-1129-UTILITIES X-1129-PR STRUCT X-1129-PARCELS X-1129-MD222x34			
No.	DATE	DESCRIPTION	BY
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THE LANDHUIS COMPANY

PREPARED BY:

Excellence by Design

SEAL

**PRELIMINARY**

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LANDHUIS COMPANY

ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN

PLAN AND PROFILE  
STA. 32+00 - 43+50

DESIGNED BY:	TKM	SCALE	DATE ISSUED:	JANUARY 2023	DRAWING No.
DRAWN BY:	EAL	HORIZ. 1" = 50'			
CHECKED BY:	AJS	VERT. 1" = 20'	SHEET	09 OF 22	EC05





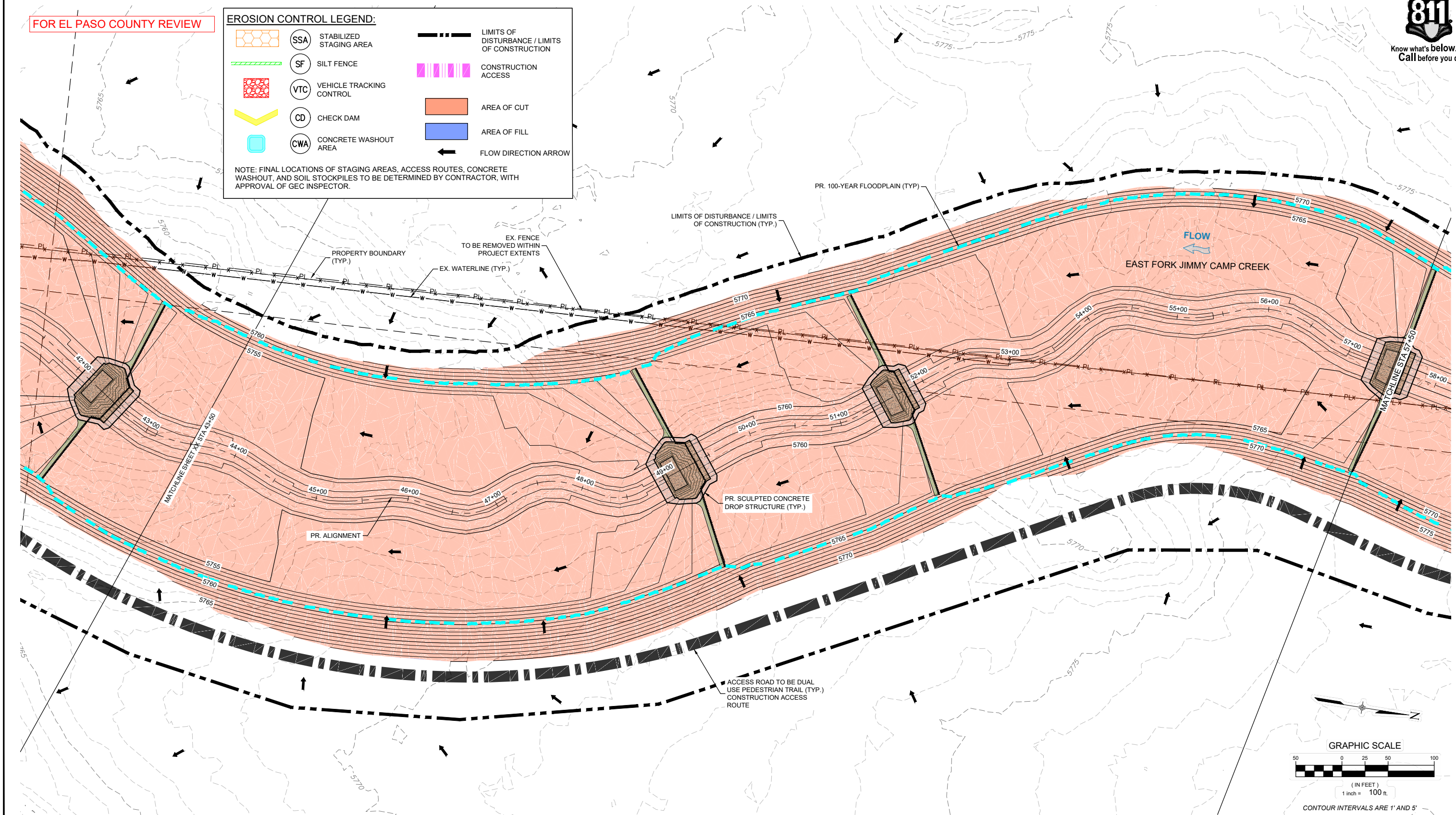
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FOR EL PASO COUNTY REVIEW

EROSION CONTROL LEGEND:

- |  |     |                          |  |  |
|--|-----|--------------------------|--|--|
|  | SSA | STABILIZED STAGING AREA  |  | LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION |
|  | SF  | SILT FENCE               |  | CONSTRUCTION ACCESS                            |
|  | VTC | VEHICLE TRACKING CONTROL |  | AREA OF CUT                                    |
|  | CD  | CHECK DAM                |  | AREA OF FILL                                   |
|  | CWA | CONCRETE WASHOUT AREA    |  | FLOW DIRECTION ARROW                           |

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



REFERENCE DRAWINGS			
X-1129-UTILITIES X-1129-PR STRUCT X-1129-PARCELS X-1129-MD322x34			
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FOR AND ON BEHALF OF  
MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009


LANDHUIS COMPANY			
ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN			
PLAN AND PROFILE STA. 43+50 - 57+50			
DESIGNED BY: TKM	SCALE: 1" = 100'	DATE ISSUED: JANUARY 2023	DRAWING No. EC06
CHECKED BY: AJS	HORIZ: N/A	SHEET 10 OF 22	





FOR EL PASO COUNTY REVIEW


EROSION CONTROL LEGEND:

SSA

SF

VTC

CD

CWA


STABILIZED STAGING AREA


SILT FENCE


VEHICLE TRACKING CONTROL


CHECK DAM

CONCRETE WASHOUT AREA

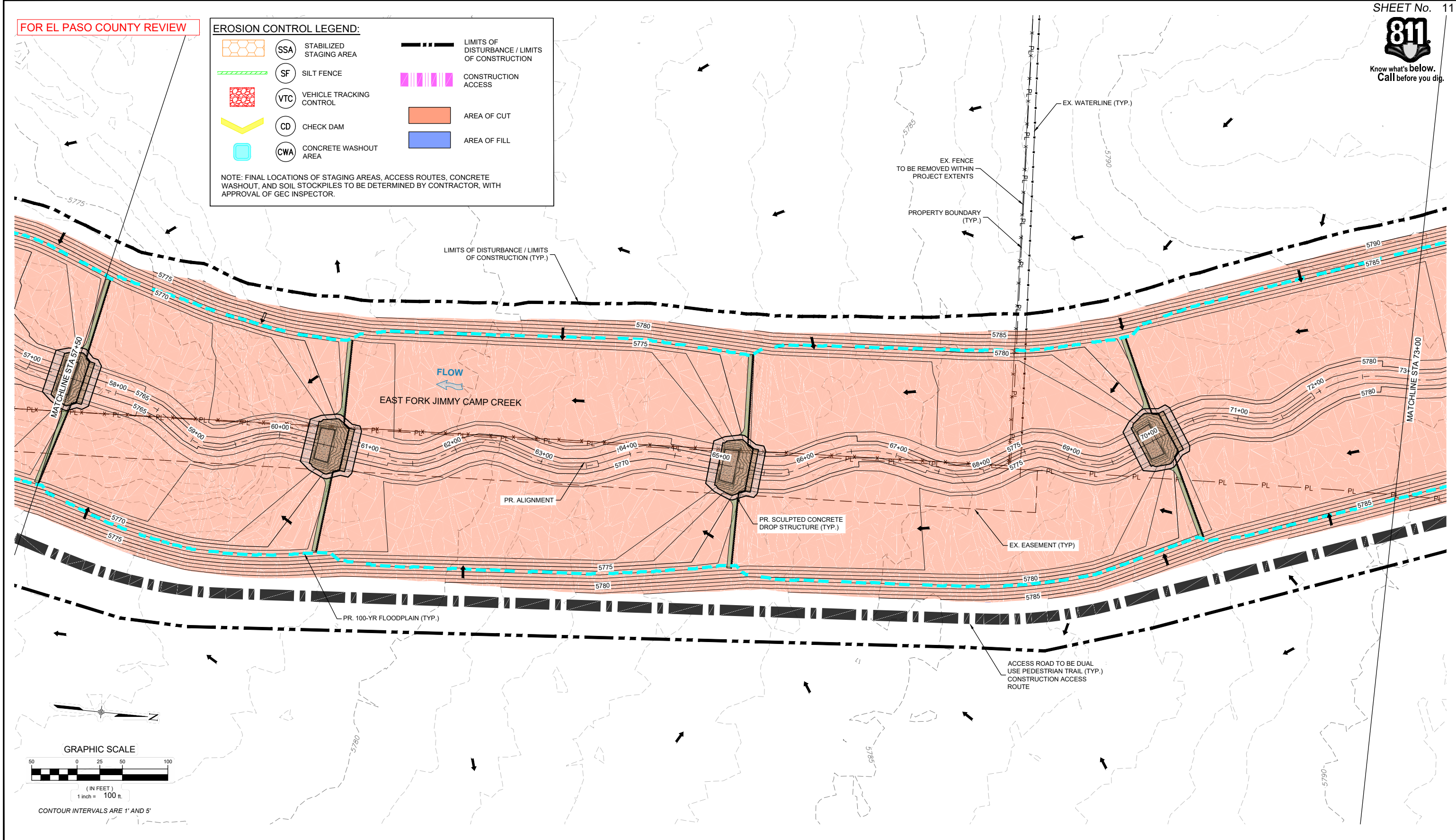
LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION

CONSTRUCTION ACCESS

AREA OF CUT

AREA OF FILL

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



REFERENCE DRAWINGS

X-1129-UTILITIES	
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X-1129-PARCELS	
X-1129-MDG22x34	

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THE LANDHUIS COMPANY

PREPARED BY:

Matrix

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LANDHUIS COMPANY

ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN

PLAN AND PROFILE

STA. 57+50 - 73+00

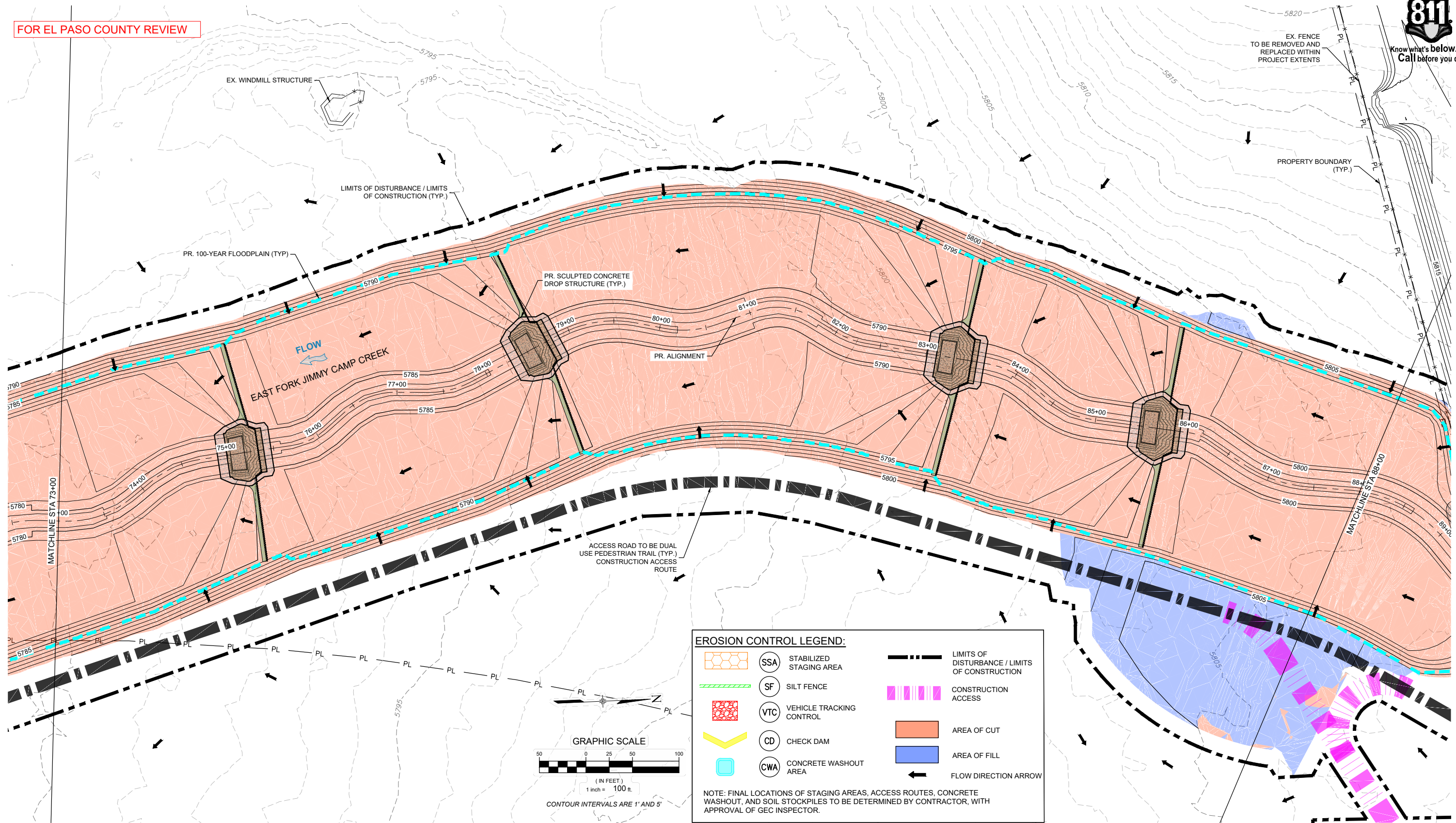
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FOR EL PASO COUNTY REVIEW



**EROSION CONTROL LEGEND:**

	SSA	STABILIZED STAGING AREA		LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION
	SF	SILT FENCE		CONSTRUCTION ACCESS
	VTC	VEHICLE TRACKING CONTROL		AREA OF CUT
	CD	CHECK DAM		AREA OF FILL
	CWA	CONCRETE WASHOUT AREA		FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.

REFERENCE DRAWINGS			
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60% DESIGN PLANS

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FOR AND ON BEHALF OF  
MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009

LANDHUIS COMPANY

ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN  
MODIFICATION GRADING AND EROSION CONTROL PLAN

PLAN AND PROFILE  
STA. 73+02 - 88+26


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



FOR EL PASO COUNTY REVIEW


**EROSION CONTROL LEGEND:**


 **SSA** STABILIZED STAGING AREA


 **SF** SILT FENCE


 **VTC** VEHICLE TRACKING CONTROL


 **CD** CHECK DAM


 **CWA** CONCRETE WASHOUT AREA

 LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION

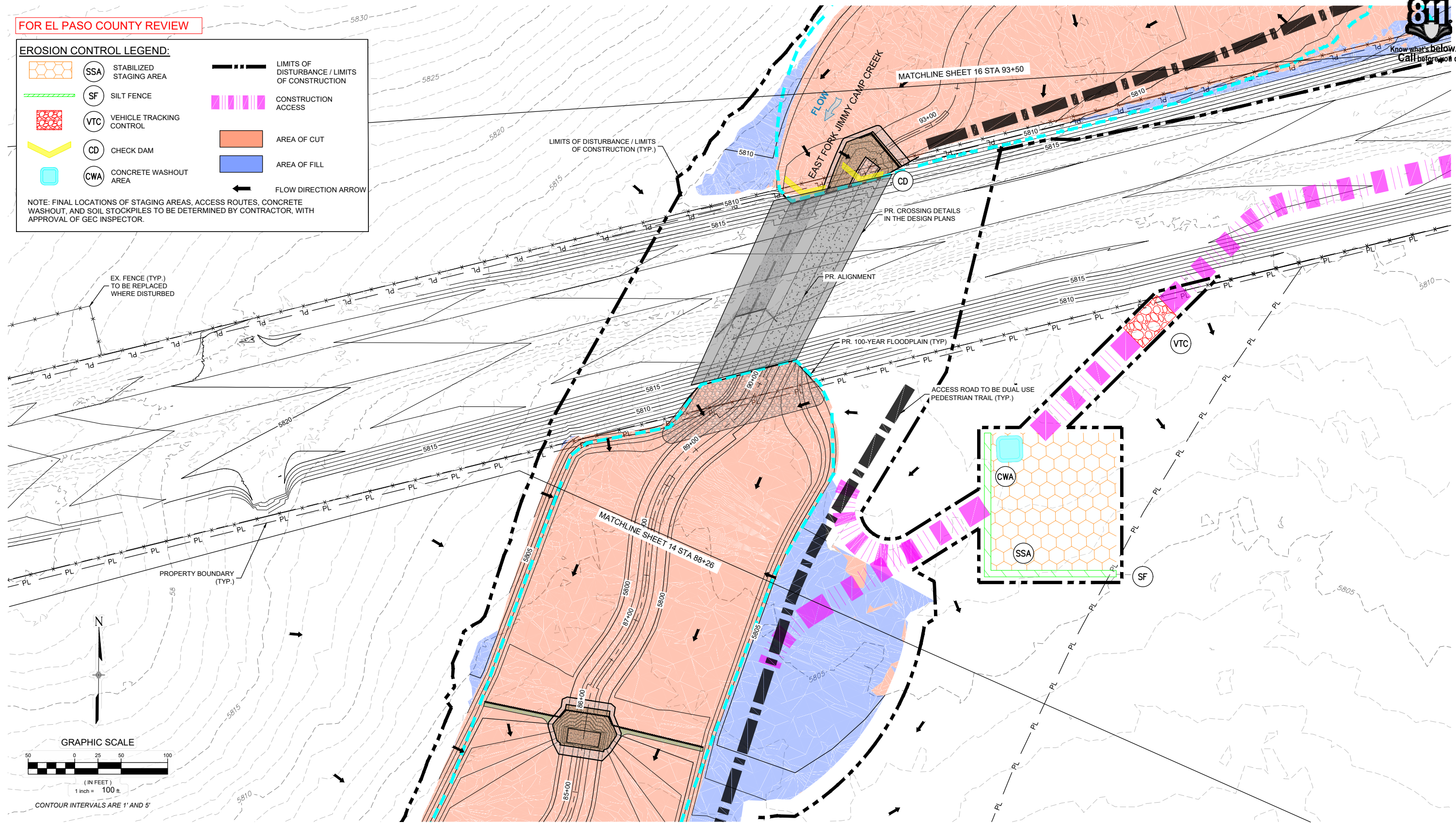
 CONSTRUCTION ACCESS

 AREA OF CUT

 AREA OF FILL

 FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



REFERENCE DRAWINGS			
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PROJECT No. 21.1129.009

LANDHUIS COMPANY			
ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN			
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FOR EL PASO COUNTY REVIEW

EROSION CONTROL LEGEND:

SSA STABILIZED STAGING AREA

SF SILT FENCE

VTC VEHICLE TRACKING CONTROL

CD CHECK DAM

CWA CONCRETE WASHOUT AREA

LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION

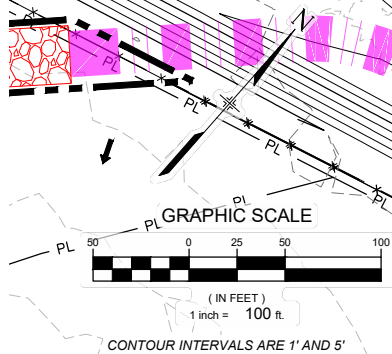
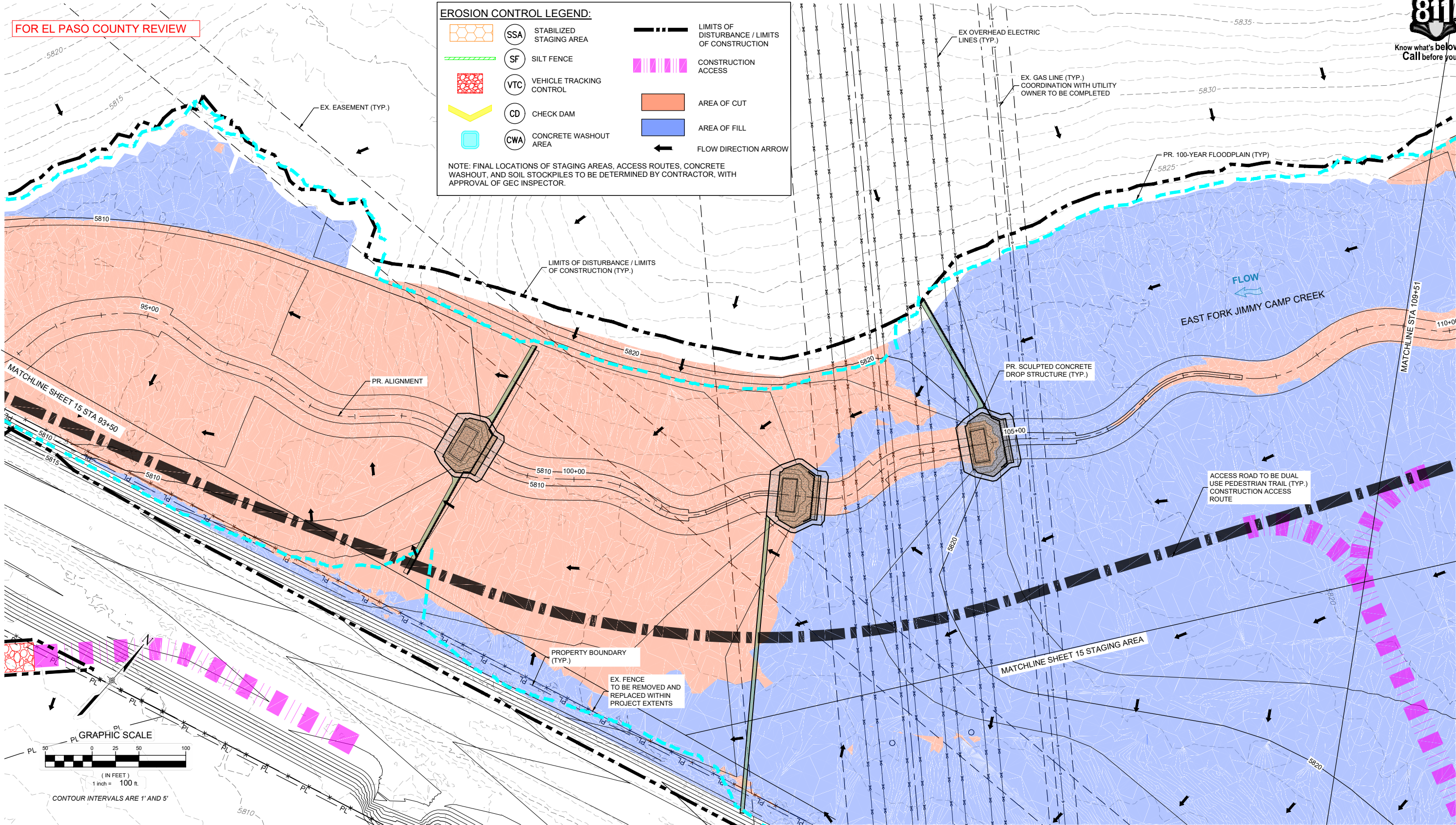
CONSTRUCTION ACCESS

AREA OF CUT

AREA OF FILL

FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



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FOR EL PASO COUNTY REVIEW

EROSION CONTROL LEGEND:

- SSA

STABILIZED STAGING AREA
- SF

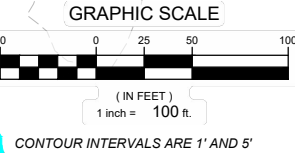
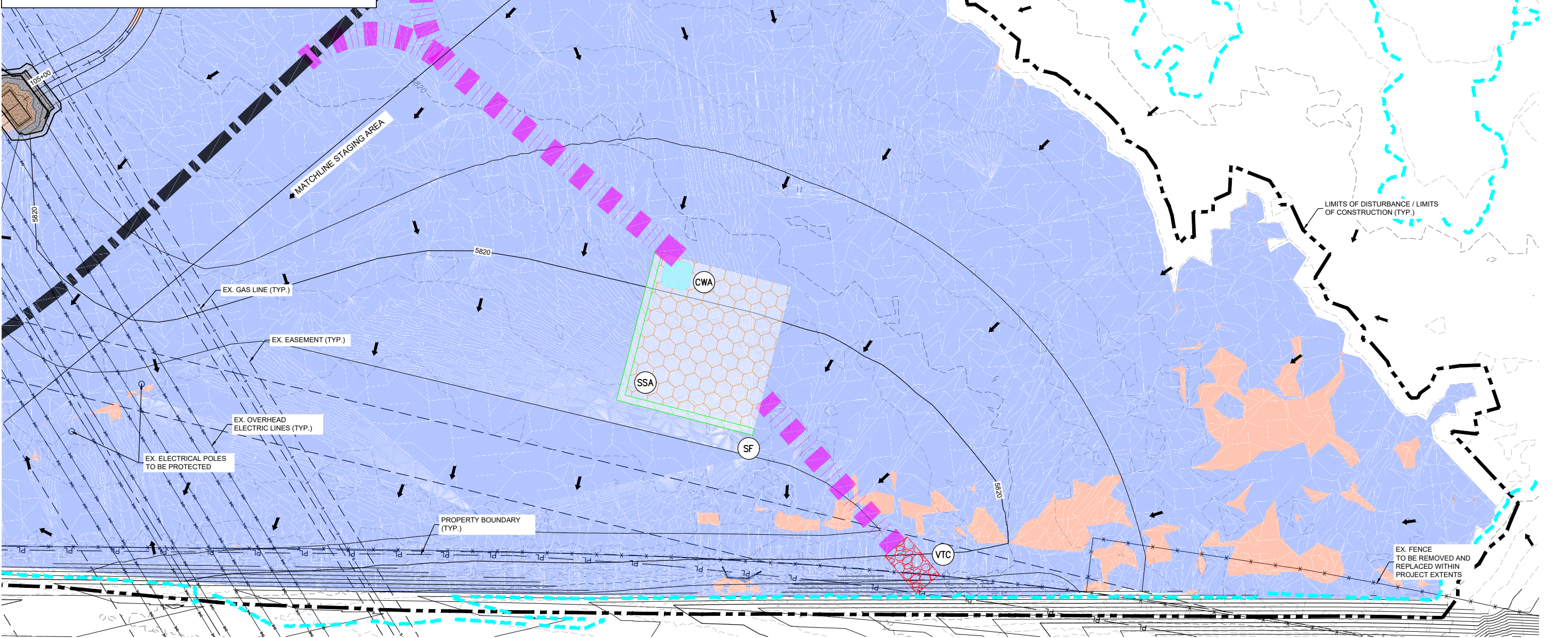
SILT FENCE
- VTC

VEHICLE TRACKING CONTROL
- CD

CHECK DAM
- CWA

CONCRETE WASHOUT AREA
- LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION
- CONSTRUCTION ACCESS
- AREA OF CUT
- AREA OF FILL
- FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



REFERENCE DRAWINGS			
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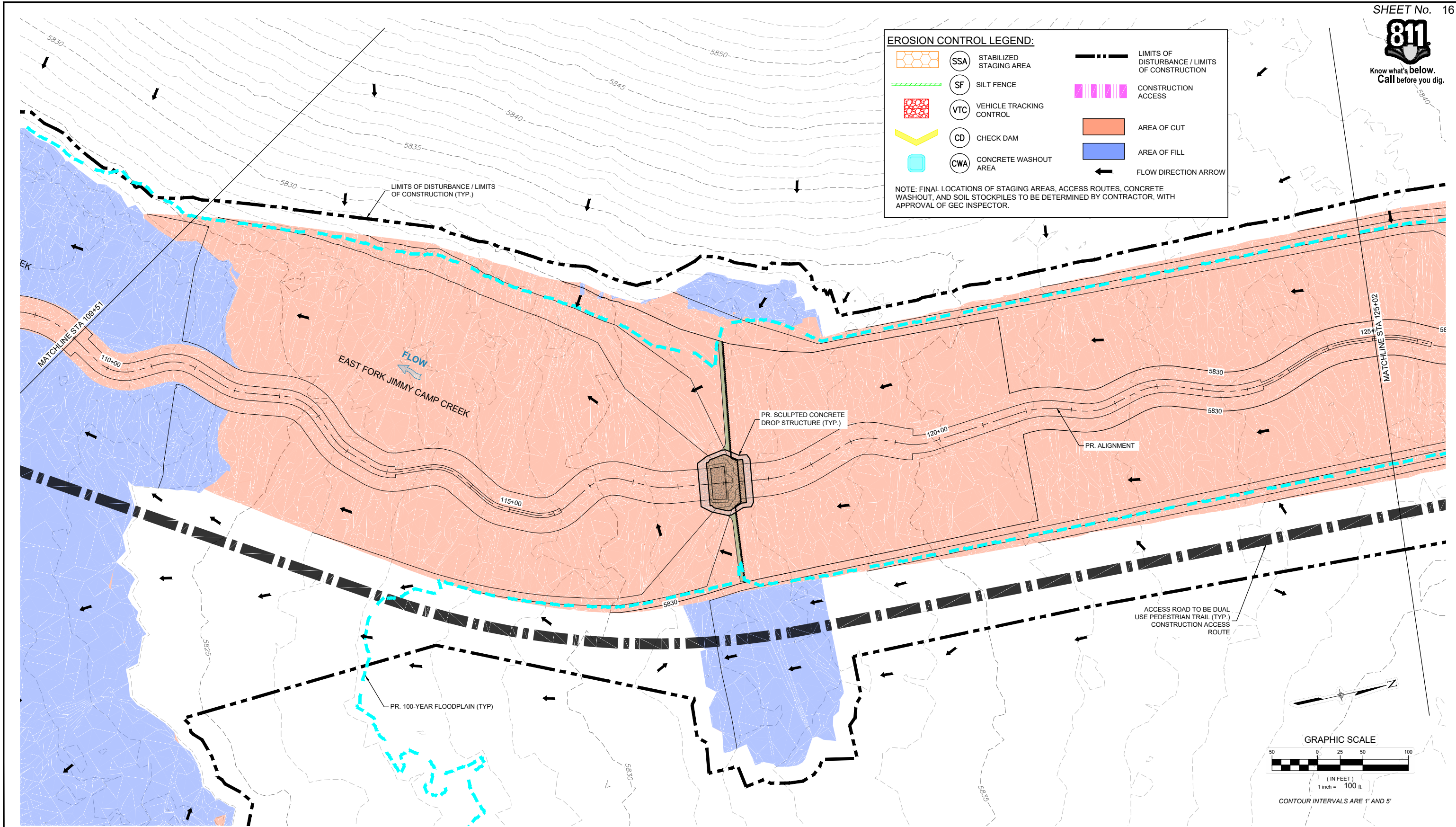
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LANDHUIS COMPANY			
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PLAN AND PROFILE STAGING AREA			
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			SHEET 15 OF 22
			DRAWING No. EC11





**EROSION CONTROL LEGEND:**

	SSA	STABILIZED STAGING AREA		LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION
	SF	SILT FENCE		CONSTRUCTION ACCESS
	VTC	VEHICLE TRACKING CONTROL		AREA OF CUT
	CD	CHECK DAM		AREA OF FILL
	CWA	CONCRETE WASHOUT AREA		FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.

REFERENCE DRAWINGS			
X-1129-UTILITIES			
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X-1129-PARCELS			
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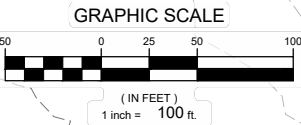
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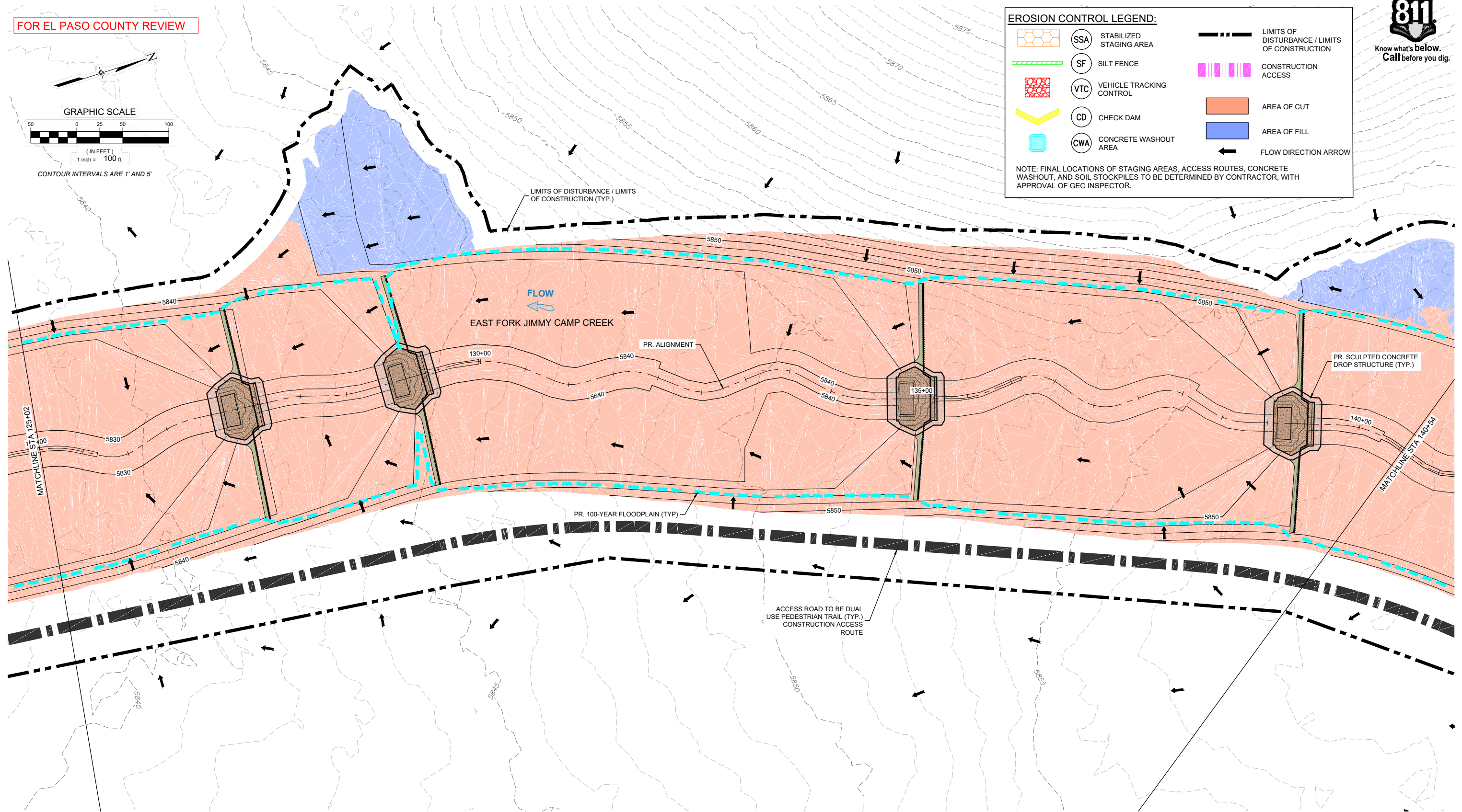


CONTOUR INTERVALS ARE 1' AND 5'

EROSION CONTROL LEGEND:

- |  |     |                          |  |  |
|--|-----|--------------------------|--|--|
|  | SSA | STABILIZED STAGING AREA  |  | LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION |
|  | SF  | SILT FENCE               |  | CONSTRUCTION ACCESS                            |
|  | VTC | VEHICLE TRACKING CONTROL |  | AREA OF CUT                                    |
|  | CD  | CHECK DAM                |  | AREA OF FILL                                   |
|  | CWA | CONCRETE WASHOUT AREA    |  | FLOW DIRECTION ARROW                           |

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



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PROJECT No. 21.1129.009











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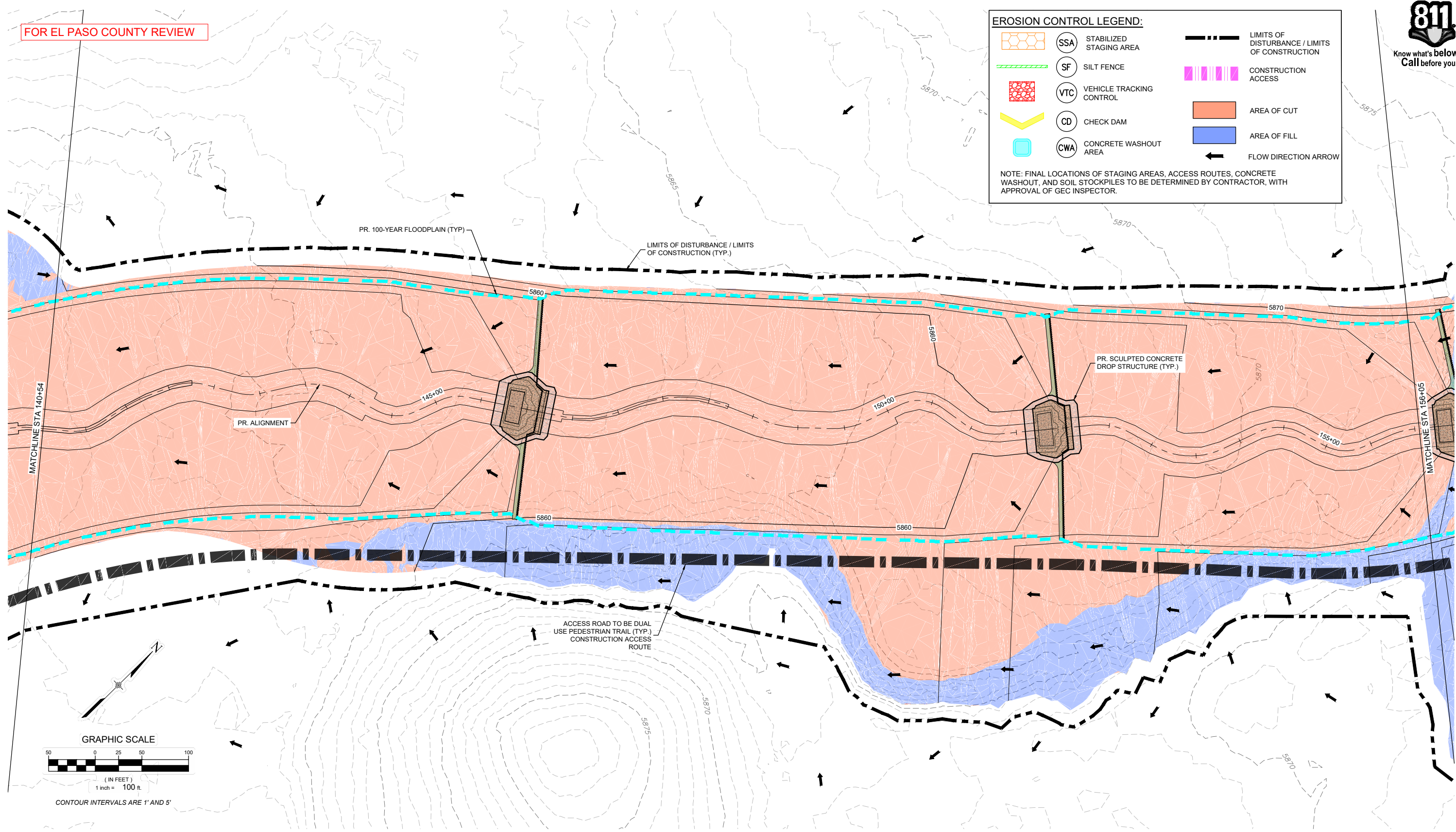


FOR EL PASO COUNTY REVIEW

EROSION CONTROL LEGEND:

-  SSA STABILIZED STAGING AREA
-  SF SILT FENCE
-  VTC VEHICLE TRACKING CONTROL
-  CD CHECK DAM
-  CWA CONCRETE WASHOUT AREA
-  LIMITS OF DISTURBANCE / LIMITS OF CONSTRUCTION
-  CONSTRUCTION ACCESS
-  AREA OF CUT
-  AREA OF FILL
-  FLOW DIRECTION ARROW

NOTE: FINAL LOCATIONS OF STAGING AREAS, ACCESS ROUTES, CONCRETE WASHOUT, AND SOIL STOCKPILES TO BE DETERMINED BY CONTRACTOR, WITH APPROVAL OF GEC INSPECTOR.



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X-1129-PR STRUCT			
X-1129-PARCELS			
X-1129-MD322x34			
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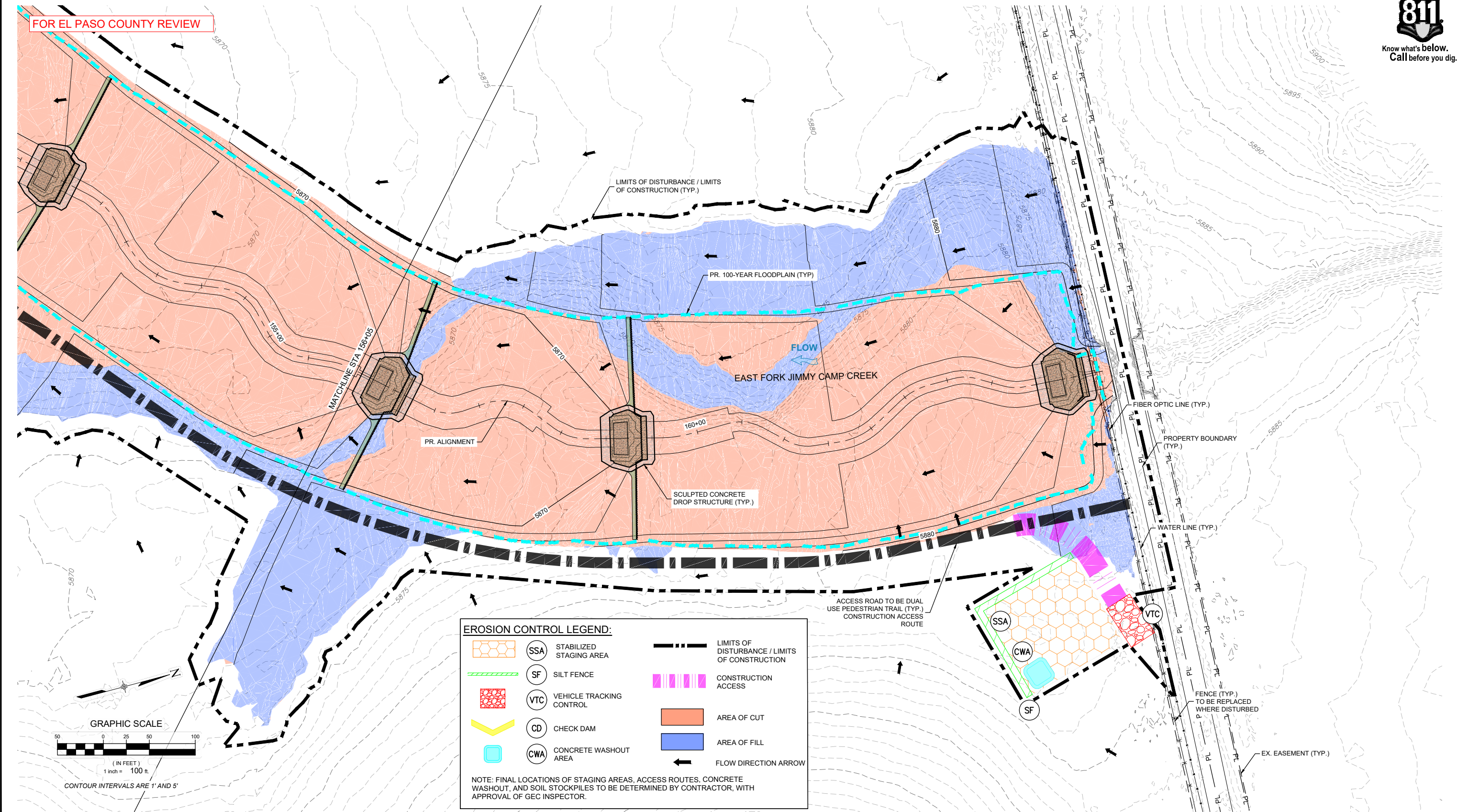
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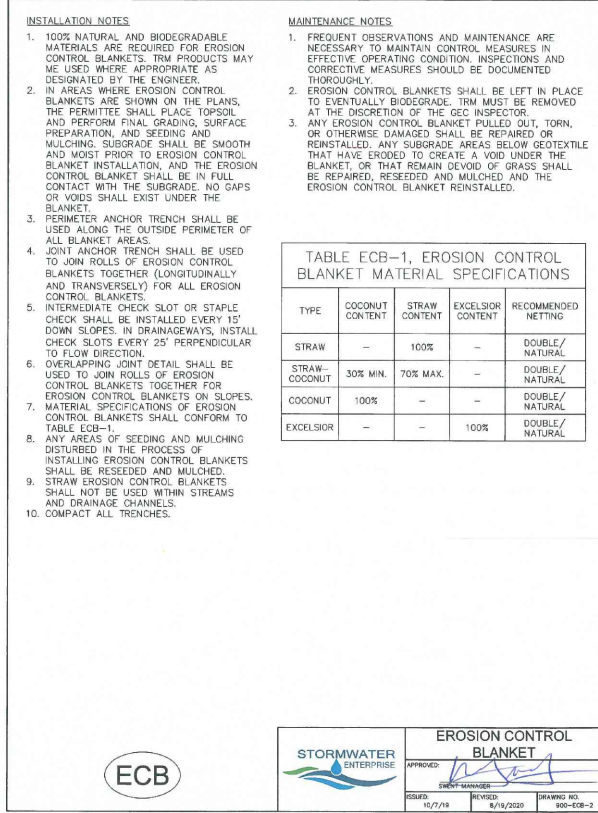
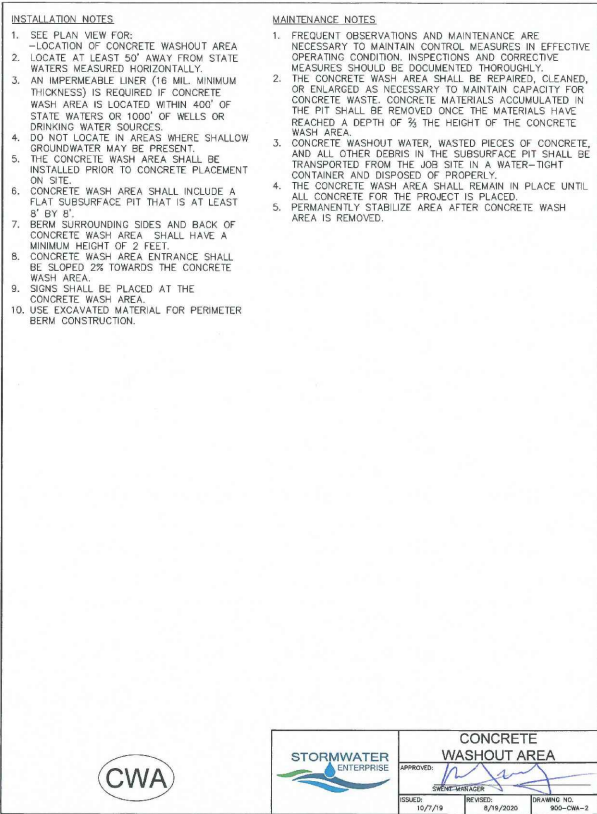
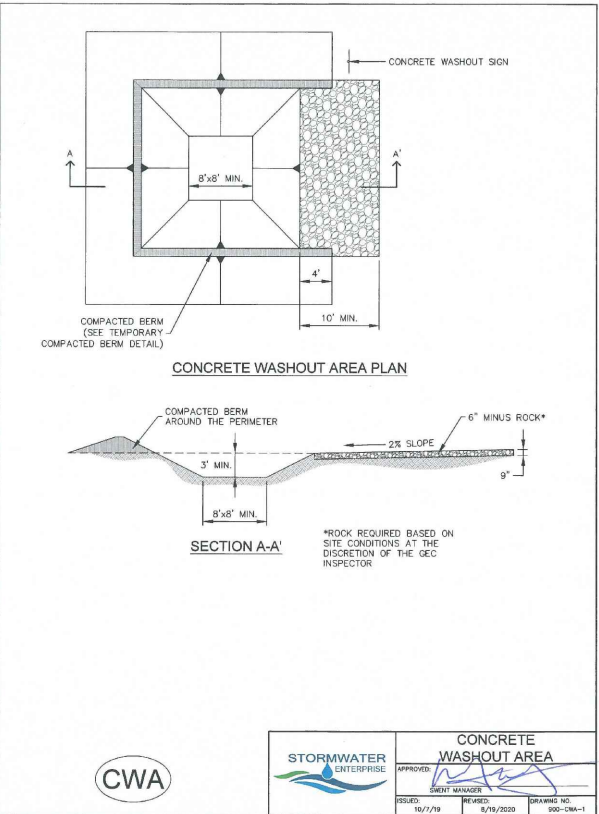
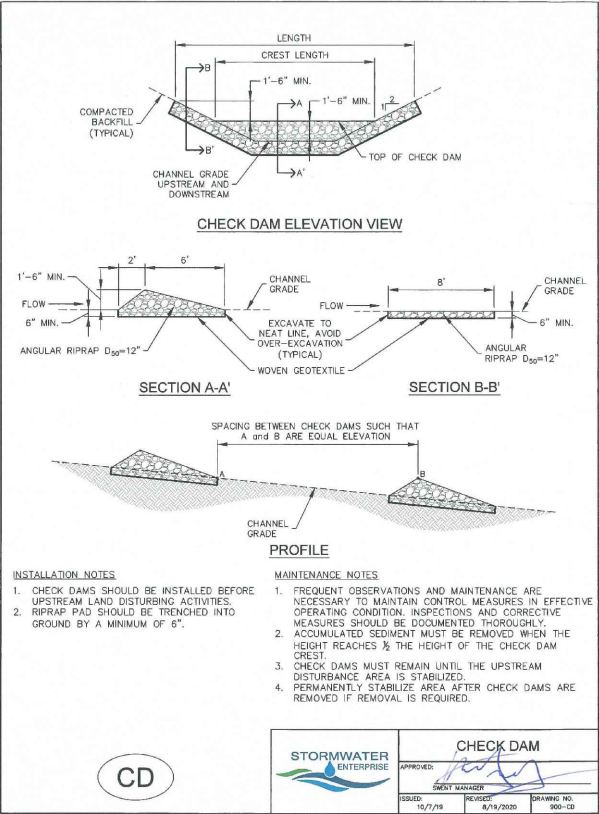
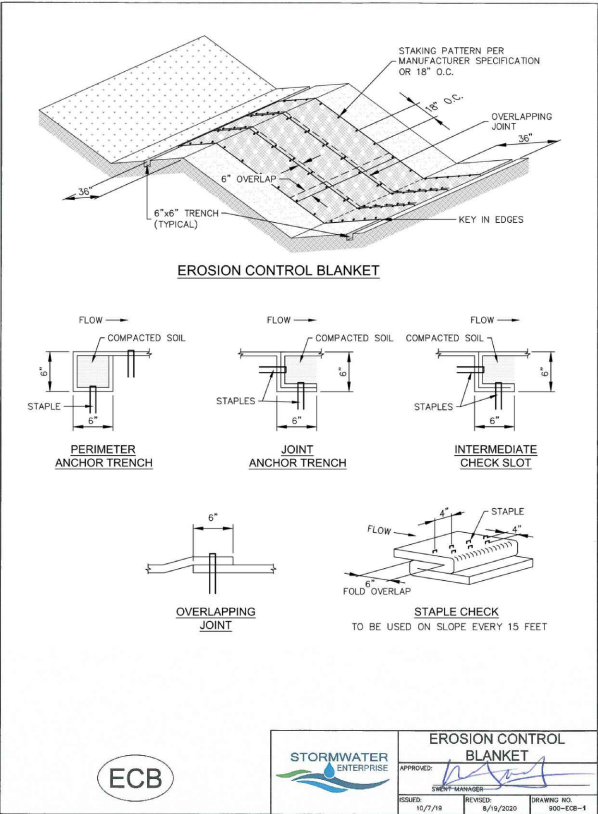
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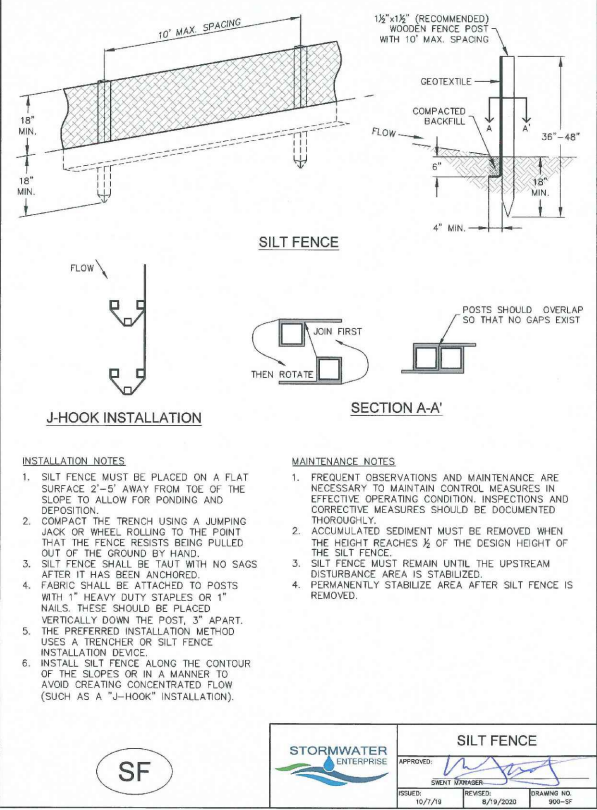
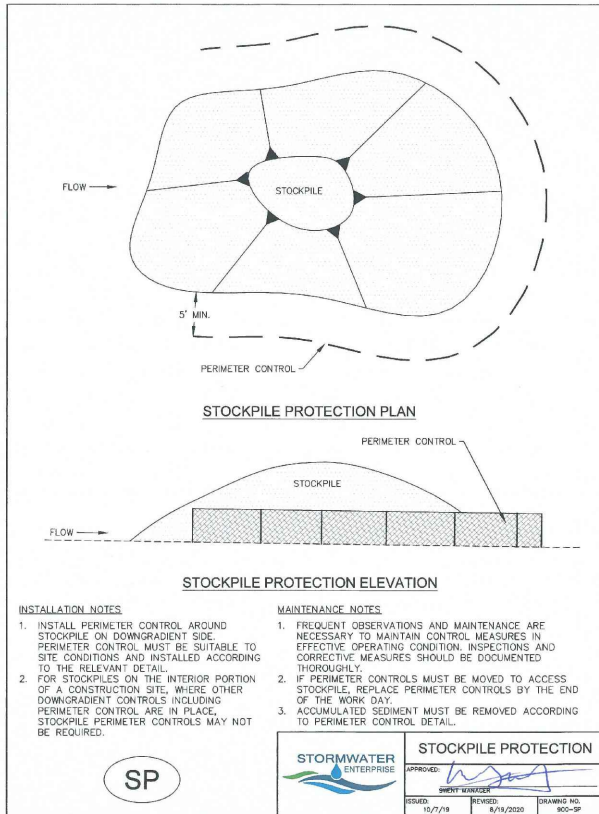
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PROJECT No. 21.1129.009

LANDHUIS COMPANY			
ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN MODIFICATION GRADING AND EROSION CONTROL PLAN			
PLAN AND PROFILE STA. 156+05 - 164+73			
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EROSION CONTROL BLANKET NOT FOR USE IN CREEK INVERT.



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THE LANDHUIS COMPANY

PREPARED BY:

Excellence by Design

FOR AND ON BEHALF OF  
MATRIX DESIGN GROUP, INC.  
PROJECT No. 21.1129.009

DESIGNED BY: TKM  
DRAWN BY: EAL  
CHECKED BY: AJS

SCALE  
HORIZ N/A  
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LANDHUIS COMPANY

ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN  
60% - MODIFICATION GRADING AND EROSION CONTROL PLAN

TYPICAL EROSION CONTROL DETAILS

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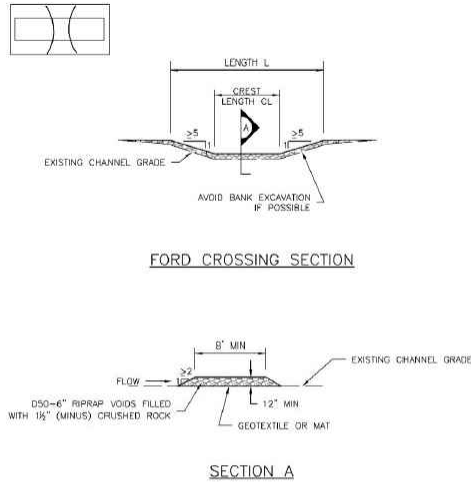
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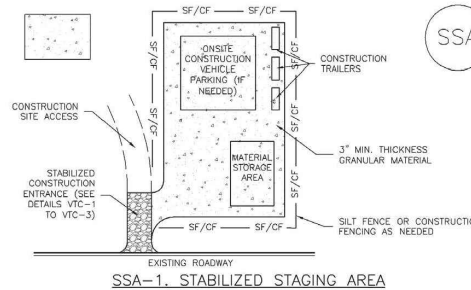
SM-10 Temporary Stream Crossing (TSC)



TSC-2. FORD CROSSING

TSC-4 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 June 2012

Stabilized Staging Area (SSA) SM-6



SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
  - LOCATION OF STAGING AREA(S).
  - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.
5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AXH100 #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED OR REDAGED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

November 2010 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 SSA-3

SM-10 Temporary Stream Crossing (TSC)

TEMPORARY STREAM CROSSING INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
  - LOCATIONS OF TEMPORARY STREAM CROSSINGS.
  - STREAM CROSSING TYPE (FORD, CULVERT, OR FLUME).
  - FOR FORD CROSSING: LENGTH (L), CREST LENGTH (CL), AND DEPTH (D).
  - FOR CULVERT CROSSING: LENGTH (L), CREST LENGTH (CL), CROSSING HEIGHT (H), DEPTH (D), CULVERT DIAMETER (CD), AND NUMBER, TYPE AND CLASS OR GAUGE OF CULVERTS.
2. TEMPORARY STREAM CROSSING DIMENSIONS, DSO, AND NUMBER OF CULVERTS INDICATED (FOR CULVERT CROSSING) SHALL BE CONSIDERED MINIMUM DIMENSIONS. ENGINEER MAY ELECT TO INSTALL LARGER FACILITIES. ANY DAMAGE TO STREAM CROSSING OR EXISTING STREAM CHANNEL DURING BASEFLOW OR FLOOD EVENTS SHALL BE PROMPTLY REPAIRED.
3. SEE MAJOR DRAINAGE CHAPTER FOR RIPRAP GRADATIONS.
4. WHERE FAILURE OF A STREAM CROSSING CAN RESULT IN SIGNIFICANT DAMAGE OR HARM, IT MUST BE DESIGNED BY A STRUCTURAL ENGINEER.

TEMPORARY STREAM CROSSING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. REMOVE SEDIMENT ACCUMULATED UPSTREAM OF CROSSING AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE CROSSING.
5. STREAM CROSSINGS ARE TO REMAIN IN PLACE UNTIL NO LONGER NEEDED AND SHALL BE REMOVED PRIOR TO THE END OF CONSTRUCTION.
6. WHEN STREAM CROSSINGS ARE REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND CITY OF AURORA, COLORADO (SIL. DSWC), NOT AVAILABLE IN AUTOCAD)

TSC-6 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 June 2012

SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

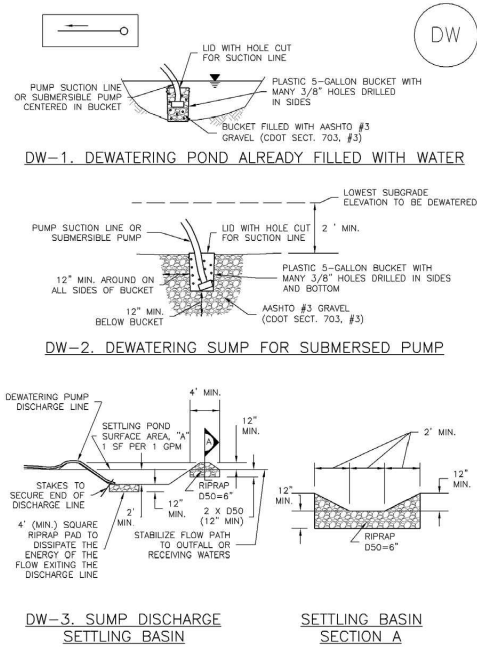
SSA-4 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 November 2010

REFERENCE DRAWINGS				60% DESIGN PLANS				PREPARED BY:  <b>Matrix</b> Excellence by Design		SEAL		LANDHUIS COMPANY											
												ROLLING MEADOWS-BULL HILL CHANNEL & FLOODPLAIN 60% - MODIFICATION GRADING AND EROSION CONTROL PLAN											
												TYPICAL EROSION CONTROL DETAILS											
X-1129-MDG22x34 X-069-EX-TOPO				NOTICE: THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF AARON SUTHERLIN, PE IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.								DESIGNED BY: TKM		SCALE		DATE ISSUED: JANUARY 2023		DRAWING No.					
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Dewatering Operations (DW)

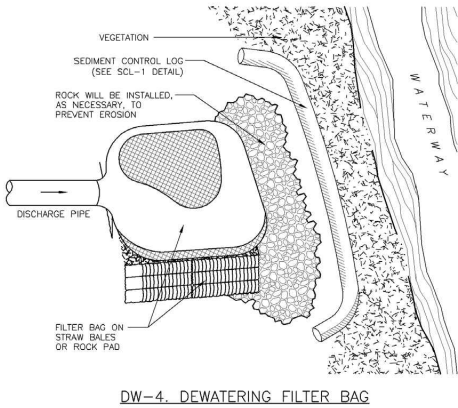
SM-9



November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 DW-3

SM-9

Dewatering Operations (DW)



- DW-4. DEWATERING FILTER BAG**
- DEWATERING INSTALLATION NOTES**
1. SEE PLAN VIEW FOR:
    - LOCATION OF DEWATERING EQUIPMENT.
    - TYPE OF DEWATERING OPERATION (DW-1 TO DW-4).
  2. THE OWNER OR CONTRACTOR SHALL OBTAIN A CONSTRUCTION DISCHARGE (DEWATERING) PERMIT FROM THE STATE PRIOR TO ANY DEWATERING OPERATIONS DISCHARGING FROM THE SITE. ALL DEWATERING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMIT.
  3. THE OWNER OR OPERATOR SHALL PROVIDE, OPERATE, AND MAINTAIN DEWATERING SYSTEMS OF SUFFICIENT SIZE AND CAPACITY TO PERMIT EXCAVATION AND SUBSEQUENT CONSTRUCTION IN DRY CONDITIONS AND TO LOWER AND MAINTAIN THE GROUNDWATER LEVEL A MINIMUM OF 2- FEET BELOW THE LOWEST POINT OF EXCAVATION AND CONTINUOUSLY MAINTAIN EXCAVATIONS FREE OF WATER UNTIL BACK-FILLED TO FINAL GRADE.

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Dewatering Operations (DW)

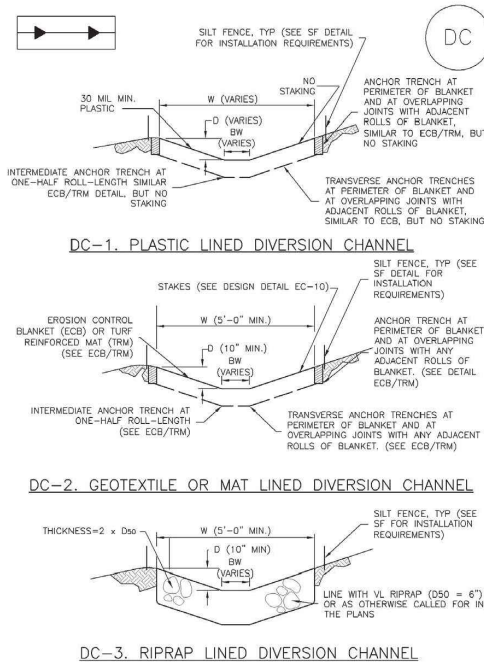
SM-9

- DEWATERING INSTALLATION NOTES**
4. DEWATERING OPERATIONS SHALL USE ONE OR MORE OF THE DEWATERING SUMPS SHOWN ABOVE, WELL POINTS, OR OTHER MEANS APPROVED BY THE LOCAL JURISDICTION TO REDUCE THE PUMPING OF SEDIMENT, AND SHALL PROVIDE A TEMPORARY SEDIMENT BASIN OR FILTRATION BMP TO REDUCE SEDIMENT TO ALLOWABLE LEVELS PRIOR TO RELEASE OFF SITE OR TO A RECEIVING WATER. A SEDIMENT BASIN MAY BE USED IN LIEU OF SUMP DISCHARGE SETTLING BASIN SHOWN ABOVE IF A 4-FOOT-SQUARE RIPRAP PAD IS PLACED AT THE DISCHARGE POINT AND THE DISCHARGE END OF THE LINE IS STAKED IN PLACE TO PREVENT MOVEMENT OF THE LINE.
- DEWATERING MAINTENANCE NOTES**
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
  2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  4. DEWATERING BMPs ARE REQUIRED IN ADDITION TO ALL OTHER PERMIT REQUIREMENTS.
  5. TEMPORARY SETTLING BASINS SHALL BE REMOVED WHEN NO LONGER NEEDED FOR DEWATERING OPERATIONS. ANY DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.
- NOTE:** MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
- (DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 DW-5

SM-8

Temporary Diversion Methods (TDM)



June 2012 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 TDM-12

Temporary Diversion Methods (TDM)

SM-8

- CHANNEL DIVERSION INSTALLATION NOTES**
1. SEE PLAN VIEW FOR:
    - LOCATION OF DIVERSION CHANNEL
    - TYPE OF CHANNEL (UNLINED, GEOTEXTILE OR MAT LINED, PLASTIC LINE, OR RIPRAP LINED)
    - LENGTH OF EACH TYPE OF CHANNEL
    - DEPTH, D, WIDTH, W, AND BOTTOM WIDTH, BW
    - FOR RIPRAP LINED CHANNEL, SIZE OF RIPRAP, D50, SHALL BE SHOWN ON PLANS.
  2. SEE DRAINAGE PLANS FOR DETAILS OF PERMANENT CONVEYANCE FACILITIES.
  3. DIVERSION CHANNELS INDICATED ON THE SHMP PLAN SHALL BE INSTALLED PRIOR TO WORK IN DOWNGRADIENT AREAS OR NATURAL CHANNELS.
  4. FOR GEOTEXTILE OR MAT LINED CHANNELS, INSTALLATION OF GEOTEXTILE OR MAT SHALL CONFORM TO THE REQUIREMENTS OF DETAIL ECB. FOR PLASTIC LINED CHANNELS, INSTALLATION OF ANCHOR TRENCHES SHALL CONFORM TO THE REQUIREMENTS OF DETAIL ECB.
  5. WHERE CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION CHANNEL, THE PERMITTEE SHALL INSTALL A TEMPORARY STREAM CROSSING CONFORMING TO THE REQUIREMENTS OF DETAIL TSC.
- DIVERSION CHANNEL MAINTENANCE NOTES**
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
  2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  4. DIVERSION CHANNELS ARE TO REMAIN IN PLACE UNTIL WORK IN THE DOWNGRADIENT AREA OR NATURAL CHANNEL IS NO LONGER REQUIRED. IF APPROVED BY LOCAL JURISDICTION DIVERSION CHANNEL MAY BE LEFT IN PLACE.
  5. IF DIVERSION CHANNELS ARE REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.
- (DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO)
- NOTE:** MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

June 2012 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 TDM-13

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## **CSWMP Inspection & Maintenance Log**

## City Stormwater Management Plan Inspection and Maintenance Log

### *Rolling Meadows Channel Improvements*

(Record inspections, items found maintenance and corrective actions taken. Also, record any training received by Contractor personnel with regard to erosion control, materials handling and any inspections by outside agencies)

[illegible]

## **Soil Survey of El Paso County Area Soils Map**





United States  
Department of  
Agriculture

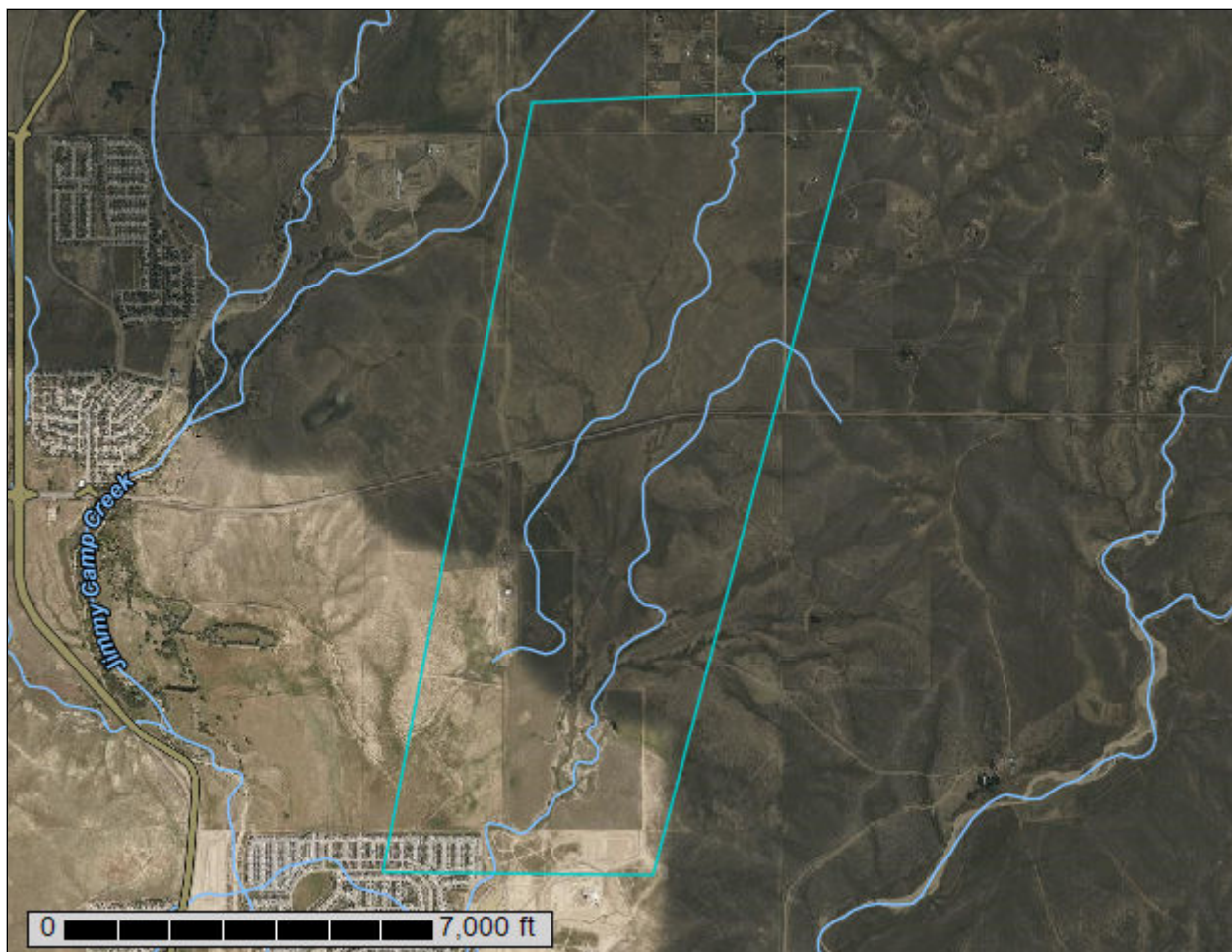
**NRCS**

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 **El Paso County Area, Colorado**

## Rolling Meadows



August 2, 2022

# Preface

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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](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

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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

## Custom Soil Resource Report

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

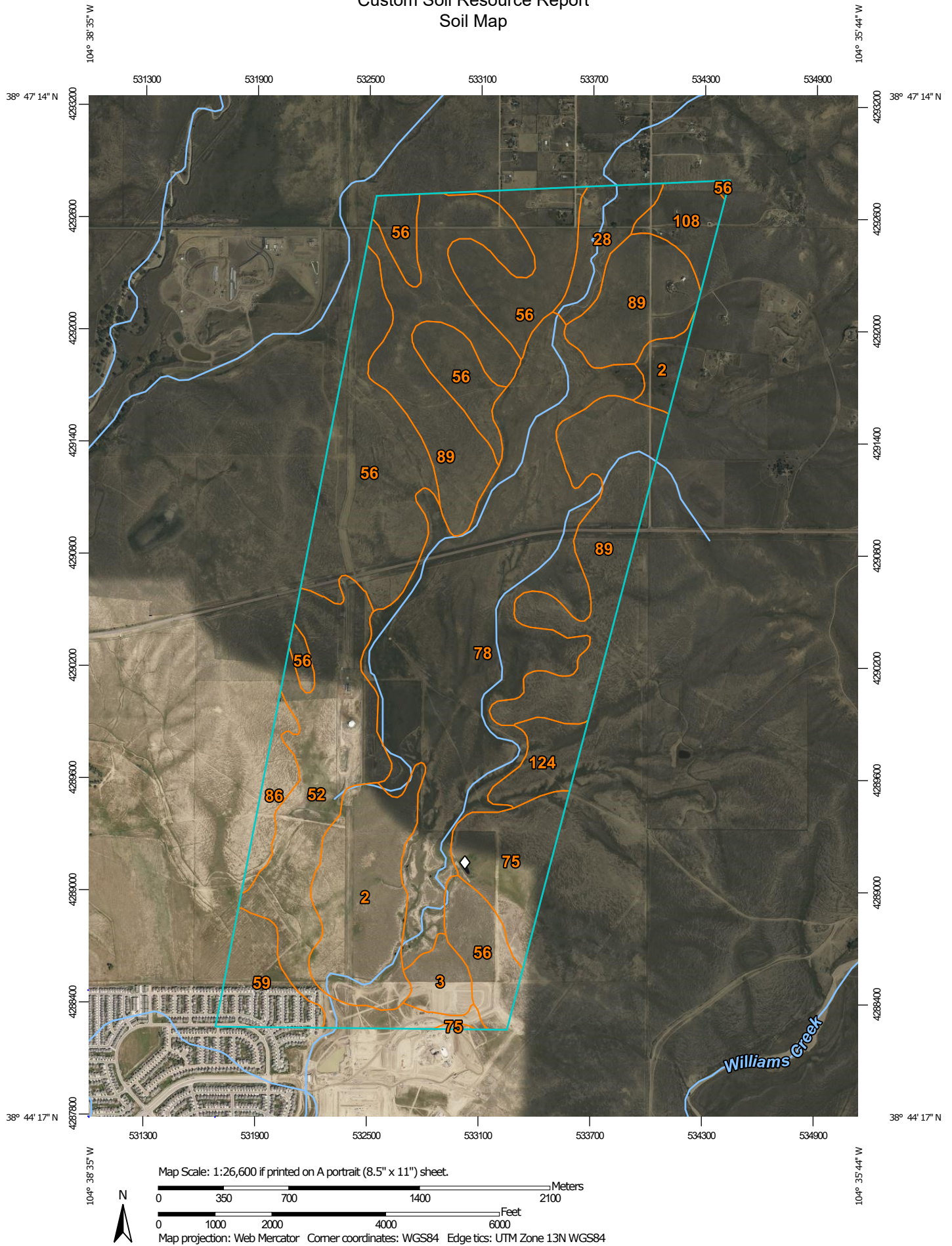
# Soil Map

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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



## Custom Soil Resource Report

### 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: El Paso County Area, Colorado

Survey Area Data: Version 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Aug 14, 2018—Oct 20, 2018

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
2	Ascalon sandy loam, 1 to 3 percent slopes	154.3	8.0%
3	Ascalon sandy loam, 3 to 9 percent slopes	27.3	1.4%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	44.5	2.3%
52	Manzanst clay loam, 0 to 3 percent slopes	206.2	10.7%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	375.2	19.5%
59	Nunn clay loam, 0 to 3 percent slopes	53.1	2.8%
75	Razor-Midway complex	78.1	4.1%
78	Sampson loam, 0 to 3 percent slopes	477.5	24.9%
86	Stoneham sandy loam, 3 to 8 percent slopes	29.2	1.5%
89	Tassel fine sandy loam, 3 to 18 percent slopes	404.6	21.1%
108	Wiley silt loam, 3 to 9 percent slopes	35.6	1.9%
124	Olneat sandy loam, 0 to 3 percent slopes	35.7	1.9%
<b>Totals for Area of Interest</b>		<b>1,921.3</b>	<b>100.0%</b>

## 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

## Custom Soil Resource Report

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.

## El Paso County Area, Colorado

### 2—Ascalon sandy loam, 1 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 367q  
*Elevation:* 5,500 to 6,500 feet  
*Mean annual precipitation:* 14 to 16 inches  
*Mean annual air temperature:* 47 to 50 degrees F  
*Frost-free period:* 130 to 150 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

*Ascalon and similar soils:* 98 percent  
*Minor components:* 2 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Ascalon

##### Setting

*Landform:* Flats  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Mixed alluvium and/or eolian deposits

##### Typical profile

*A - 0 to 8 inches:* sandy loam  
*Bt - 8 to 21 inches:* sandy clay loam  
*BC - 21 to 27 inches:* sandy loam  
*Ck1 - 27 to 48 inches:* sandy loam  
*Ck2 - 48 to 60 inches:* loamy sand

##### Properties and qualities

*Slope:* 1 to 3 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  
(0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Moderate (about 7.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* R069XY026CO - Sandy Plains LRU's A and B  
*Other vegetative classification:* SANDY PLAINS (069BY026CO)  
*Hydric soil rating:* No

**Minor Components**

**Other soils**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

**3—Ascalon sandy loam, 3 to 9 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 2tlny

*Elevation:* 3,870 to 5,960 feet

*Mean annual precipitation:* 13 to 18 inches

*Mean annual air temperature:* 46 to 54 degrees F

*Frost-free period:* 95 to 155 days

*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Ascalon and similar soils:* 85 percent

*Minor components:* 15 percent

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

**Description of Ascalon**

**Setting**

*Landform:* Interfluves

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Wind-reworked alluvium and/or calcareous sandy eolian deposits

**Typical profile**

*Ap - 0 to 6 inches:* sandy loam

*Bt1 - 6 to 12 inches:* sandy clay loam

*Bt2 - 12 to 19 inches:* sandy clay loam

*Bk1 - 19 to 35 inches:* fine sandy loam

*Bk2 - 35 to 80 inches:* fine sandy loam

**Properties and qualities**

*Slope:* 3 to 9 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.60 to 5.98 in/hr)

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*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Maximum salinity:* Nonsaline (0.1 to 1.9 mmhos/cm)  
*Sodium adsorption ratio, maximum:* 1.0  
*Available water supply, 0 to 60 inches:* Moderate (about 7.1 inches)

### Interpretive groups

*Land capability classification (irrigated):* 6e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY024CO - Sandy Plains  
*Hydric soil rating:* No

### Minor Components

#### Olnest

*Percent of map unit:* 10 percent  
*Landform:* Interfluves  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* R067BY024CO - Sandy Plains  
*Hydric soil rating:* No

#### Vona

*Percent of map unit:* 5 percent  
*Landform:* Interfluves  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* R067BY024CO - Sandy Plains  
*Hydric soil rating:* No

## 28—Ellicott loamy coarse sand, 0 to 5 percent slopes

### Map Unit Setting

*National map unit symbol:* 3680  
*Elevation:* 5,500 to 6,500 feet  
*Mean annual precipitation:* 13 to 15 inches  
*Mean annual air temperature:* 47 to 50 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Ellicott and similar soils:* 97 percent  
*Minor components:* 3 percent



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

### Description of Ellicott

#### Setting

*Landform:* Flood plains, stream terraces  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Sandy alluvium

#### Typical profile

*A - 0 to 4 inches:* loamy coarse sand  
*C - 4 to 60 inches:* stratified coarse sand to sandy loam

#### Properties and qualities

*Slope:* 0 to 5 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:* FrequentNone  
*Frequency of ponding:* None  
*Available water supply, 0 to 60 inches:* Low (about 4.1 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7w  
*Hydrologic Soil Group:* A  
*Ecological site:* R069XY031CO - Sandy Bottomland LRU's A and B  
*Other vegetative classification:* SANDY BOTTOMLAND (069AY031CO)  
*Hydric soil rating:* No

### Minor Components

#### Fluvaquentic haplaquoll

*Percent of map unit:* 1 percent  
*Landform:* Swales  
*Hydric soil rating:* Yes

#### Other soils

*Percent of map unit:* 1 percent  
*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:* 1 percent  
*Landform:* Depressions  
*Hydric soil rating:* Yes

## 52—Manzanst clay loam, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 2w4nr  
*Elevation:* 4,060 to 6,660 feet  
*Mean annual precipitation:* 14 to 16 inches  
*Mean annual air temperature:* 50 to 54 degrees F  
*Frost-free period:* 130 to 170 days  
*Farmland classification:* Prime farmland if irrigated

### Map Unit Composition

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

### Description of Manzanst

#### Setting

*Landform:* Terraces, drainageways  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear, concave  
*Parent material:* Clayey alluvium derived from shale

#### Typical profile

*A - 0 to 3 inches:* clay loam  
*Bt - 3 to 12 inches:* clay  
*Btk - 12 to 37 inches:* clay  
*Bk1 - 37 to 52 inches:* clay  
*Bk2 - 52 to 79 inches:* clay

#### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 15 percent  
*Gypsum, maximum content:* 3 percent  
*Maximum salinity:* Slightly saline (4.0 to 7.0 mmhos/cm)  
*Sodium adsorption ratio, maximum:* 10.0  
*Available water supply, 0 to 60 inches:* High (about 9.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 4c  
*Hydrologic Soil Group:* C

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*Ecological site:* R067BY037CO - Saline Overflow

*Hydric soil rating:* No

### Minor Components

#### Ritoazul

*Percent of map unit:* 7 percent

*Landform:* Drainageways, interfluves

*Landform position (three-dimensional):* Rise

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Ecological site:* R067BY042CO - Clayey Plains

*Hydric soil rating:* No

#### Arvada

*Percent of map unit:* 6 percent

*Landform:* Drainageways, interfluves

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Ecological site:* R067BY033CO - Salt Flat

*Hydric soil rating:* No

#### Wiley

*Percent of map unit:* 2 percent

*Landform:* Interfluves

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Ecological site:* R067BY002CO - Loamy Plains

*Hydric soil rating:* No

## 56—Nelson-Tassel fine sandy loams, 3 to 18 percent slopes

### Map Unit Setting

*National map unit symbol:* 3690

*Elevation:* 5,600 to 6,400 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 48 to 52 degrees F

*Frost-free period:* 135 to 155 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Nelson and similar soils:* 55 percent

*Tassel and similar soils:* 40 percent

*Minor components:* 5 percent

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

### Description of Nelson

#### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope, crest

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*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Calcareous residuum weathered from interbedded sedimentary rock

### Typical profile

*A - 0 to 5 inches:* fine sandy loam

*Ck - 5 to 23 inches:* fine sandy loam

*Cr - 23 to 27 inches:* weathered bedrock

### Properties and qualities

*Slope:* 3 to 12 percent

*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high (0.06 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 10 percent

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* Very low (about 2.8 inches)

### Interpretive groups

*Land capability classification (irrigated):* 4e

*Land capability classification (nonirrigated):* 6e

*Hydrologic Soil Group:* B

*Ecological site:* R067BY045CO - Shaly Plains

*Other vegetative classification:* SHALY PLAINS (069AY046CO)

*Hydric soil rating:* No

## Description of Tassel

### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope, crest

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Calcareous slope alluvium over residuum weathered from sandstone

### Typical profile

*A - 0 to 4 inches:* fine sandy loam

*C - 4 to 10 inches:* fine sandy loam

*Cr - 10 to 14 inches:* weathered bedrock

### Properties and qualities

*Slope:* 3 to 18 percent

*Depth to restrictive feature:* 6 to 20 inches to paralithic bedrock

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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*Calcium carbonate, maximum content:* 10 percent

*Available water supply, 0 to 60 inches:* Very low (about 1.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* D

*Ecological site:* R067BY045CO - Shaly Plains

*Other vegetative classification:* SHALY PLAINS (069AY046CO)

*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

## 59—Nunn clay loam, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 3693

*Elevation:* 5,400 to 6,500 feet

*Mean annual precipitation:* 13 to 15 inches

*Mean annual air temperature:* 46 to 50 degrees F

*Frost-free period:* 135 to 155 days

*Farmland classification:* Prime farmland if irrigated

### Map Unit Composition

*Nunn and similar soils:* 95 percent

*Minor components:* 5 percent

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

### Description of Nunn

#### Setting

*Landform:* Fans, terraces

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Mixed alluvium

#### Typical profile

*A - 0 to 12 inches:* clay loam

*Bt - 12 to 26 inches:* clay loam

*BC - 26 to 30 inches:* clay loam

*Bk - 30 to 58 inches:* sandy clay loam

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*C - 58 to 72 inches: clay*

### **Properties and qualities**

*Slope: 0 to 3 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 low to moderately high (0.06 to 0.20 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*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 9.8 inches)*

### **Interpretive groups**

*Land capability classification (irrigated): 2e*

*Land capability classification (nonirrigated): 3c*

*Hydrologic Soil Group: C*

*Ecological site: R069XY042CO - Clayey Plains LRU's A and B*

*Other vegetative classification: CLAYEY PLAINS (069AY042CO)*

*Hydric soil rating: No*

### **Minor Components**

#### **Other soils**

*Percent of map unit: 4 percent*

*Hydric soil rating: No*

#### **Pleasant**

*Percent of map unit: 1 percent*

*Landform: Depressions*

*Hydric soil rating: Yes*

## **75—Razor-Midway complex**

### **Map Unit Setting**

*National map unit symbol: 369p*

*Elevation: 5,300 to 6,100 feet*

*Mean annual precipitation: 12 to 14 inches*

*Mean annual air temperature: 48 to 52 degrees F*

*Frost-free period: 135 to 155 days*

*Farmland classification: Not prime farmland*

### **Map Unit Composition**

*Razor and similar soils: 60 percent*

*Midway and similar soils: 35 percent*

*Minor components: 5 percent*

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

## Description of Razor

### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear, concave

*Across-slope shape:* Linear

*Parent material:* Clayey slope alluvium over residuum weathered from shale

### Typical profile

*A - 0 to 4 inches:* stony clay loam

*Bw - 4 to 22 inches:* cobbly clay loam

*Bk - 22 to 29 inches:* cobbly clay

*Cr - 29 to 33 inches:* weathered bedrock

### Properties and qualities

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 15 percent

*Gypsum, maximum content:* 5 percent

*Maximum salinity:* Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)

*Sodium adsorption ratio, maximum:* 15.0

*Available water supply, 0 to 60 inches:* Low (about 4.7 inches)

### Interpretive groups

*Land capability classification (irrigated):* 6e

*Land capability classification (nonirrigated):* 6e

*Hydrologic Soil Group:* D

*Ecological site:* R069XY047CO - Alkaline Plains LRU's A and B

*Other vegetative classification:* ALKALINE PLAINS (069AY047CO)

*Hydric soil rating:* No

## Description of Midway

### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Slope alluvium over residuum weathered from shale

### Typical profile

*A - 0 to 4 inches:* clay loam

*C - 4 to 13 inches:* clay

*Cr - 13 to 17 inches:* weathered bedrock

### Properties and qualities

*Slope:* 3 to 25 percent

*Depth to restrictive feature:* 6 to 20 inches to paralithic bedrock

*Drainage class:* Well drained

## Custom Soil Resource Report

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 15 percent

*Gypsum, maximum content:* 15 percent

*Maximum salinity:* Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)

*Sodium adsorption ratio, maximum:* 15.0

*Available water supply, 0 to 60 inches:* Very low (about 2.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* D

*Ecological site:* R069XY046CO - Shaly Plains LRU's A and B

*Other vegetative classification:* SHALY PLAINS (069AY045CO)

*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

## 78—Sampson loam, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 369s

*Elevation:* 5,500 to 6,500 feet

*Mean annual precipitation:* 13 to 15 inches

*Mean annual air temperature:* 47 to 50 degrees F

*Frost-free period:* 135 to 155 days

*Farmland classification:* Prime farmland if irrigated

### Map Unit Composition

*Sampson and similar soils:* 95 percent

*Minor components:* 5 percent

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

### Description of Sampson

#### Setting

*Landform:* Depressions, alluvial fans, terraces



## Custom Soil Resource Report

*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

### Typical profile

*A - 0 to 15 inches:* loam  
*Bt - 15 to 34 inches:* clay loam  
*Bk - 34 to 60 inches:* sandy clay loam

### Properties and qualities

*Slope:* 0 to 3 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  
(0.60 to 2.00 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:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* High (about 9.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* 2e  
*Land capability classification (nonirrigated):* 3c  
*Hydrologic Soil Group:* B  
*Ecological site:* R049XB202CO - Loamy Foothill  
*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:* 4 percent  
*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:* 1 percent  
*Landform:* Depressions  
*Hydric soil rating:* Yes

## 86—Stoneham sandy loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 36b2  
*Elevation:* 5,100 to 6,500 feet  
*Mean annual precipitation:* 13 to 15 inches  
*Mean annual air temperature:* 48 to 52 degrees F  
*Frost-free period:* 135 to 155 days  
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Stoneham and similar soils: 95 percent*

*Minor components: 5 percent*

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

**Description of Stoneham**

**Setting**

*Landform: Hills*

*Landform position (three-dimensional): Side slope*

*Down-slope shape: Linear*

*Across-slope shape: Linear*

*Parent material: Calcareous loamy alluvium*

**Typical profile**

*A - 0 to 4 inches: sandy loam*

*Bt - 4 to 8 inches: sandy clay loam*

*Btk - 8 to 11 inches: sandy clay loam*

*Ck - 11 to 60 inches: loam*

**Properties and qualities**

*Slope: 3 to 8 percent*

*Depth to restrictive feature: More than 80 inches*

*Drainage class: Well drained*

*Runoff class: Medium*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.60 to 2.00 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: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)*

*Available water supply, 0 to 60 inches: High (about 9.5 inches)*

**Interpretive groups**

*Land capability classification (irrigated): 3e*

*Land capability classification (nonirrigated): 4e*

*Hydrologic Soil Group: B*

*Ecological site: R067BY024CO - Sandy Plains*

*Other vegetative classification: SANDY PLAINS (069AY026CO)*

*Hydric soil rating: No*

**Minor Components**

**Other soils**

*Percent of map unit: 4 percent*

*Hydric soil rating: No*

**Pleasant**

*Percent of map unit: 1 percent*

*Landform: Depressions*

*Hydric soil rating: Yes*

## 89—Tassel fine sandy loam, 3 to 18 percent slopes

### Map Unit Setting

*National map unit symbol:* 36b5  
*Elevation:* 5,600 to 6,400 feet  
*Mean annual precipitation:* 13 to 15 inches  
*Mean annual air temperature:* 47 to 51 degrees F  
*Frost-free period:* 135 to 155 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Tassel

#### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Calcareous slope alluvium over residuum weathered from sandstone

#### Typical profile

*A - 0 to 4 inches:* fine sandy loam  
*C - 4 to 10 inches:* sandy loam  
*Cr - 10 to 14 inches:* weathered bedrock

#### Properties and qualities

*Slope:* 3 to 18 percent  
*Depth to restrictive feature:* 6 to 20 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Available water supply, 0 to 60 inches:* Very low (about 1.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* D  
*Ecological site:* R067BY024CO - Sandy Plains  
*Other vegetative classification:* SANDY PLAINS (069AY026CO)  
*Hydric soil rating:* No

**Minor Components**

**Other soils**

*Percent of map unit: 5 percent*

*Hydric soil rating: No*

**108—Wiley silt loam, 3 to 9 percent slopes**

**Map Unit Setting**

*National map unit symbol: 367b*

*Elevation: 5,200 to 6,200 feet*

*Mean annual precipitation: 12 to 14 inches*

*Mean annual air temperature: 48 to 52 degrees F*

*Frost-free period: 135 to 155 days*

*Farmland classification: Not prime farmland*

**Map Unit Composition**

*Wiley and similar soils: 95 percent*

*Minor components: 5 percent*

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

**Description of Wiley**

**Setting**

*Landform: Hills*

*Landform position (three-dimensional): Side slope*

*Down-slope shape: Linear*

*Across-slope shape: Linear*

*Parent material: Calcareous silty eolian deposits*

**Typical profile**

*A - 0 to 4 inches: silt loam*

*Bt - 4 to 16 inches: silt loam*

*Bk - 16 to 60 inches: silt loam*

**Properties and qualities**

*Slope: 3 to 9 percent*

*Depth to restrictive feature: More than 80 inches*

*Drainage class: Well drained*

*Runoff class: Medium*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.60 to 2.00 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: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)*

*Available water supply, 0 to 60 inches: High (about 11.5 inches)*

**Interpretive groups**

*Land capability classification (irrigated): 4e*  
*Land capability classification (nonirrigated): 6e*  
*Hydrologic Soil Group: B*  
*Ecological site: R067BY002CO - Loamy Plains*  
*Other vegetative classification: LOAMY PLAINS (069AY006CO)*  
*Hydric soil rating: No*

**Minor Components**

**Other soils**

*Percent of map unit: 4 percent*  
*Hydric soil rating: No*

**Pleasant**

*Percent of map unit: 1 percent*  
*Landform: Depressions*  
*Hydric soil rating: Yes*

**124—Olnest sandy loam, 0 to 3 percent slopes**

**Map Unit Setting**

*National map unit symbol: 2t51j*  
*Elevation: 4,500 to 6,100 feet*  
*Mean annual precipitation: 14 to 16 inches*  
*Mean annual air temperature: 50 to 54 degrees F*  
*Frost-free period: 130 to 170 days*  
*Farmland classification: Prime farmland if irrigated*

**Map Unit Composition**

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

**Description of Olnest**

**Setting**

*Landform: Sand sheets*  
*Parent material: Eolian sands*

**Typical profile**

*A - 0 to 4 inches: sandy loam*  
*Bt - 4 to 20 inches: sandy clay loam*  
*Bk1 - 20 to 48 inches: sandy loam*  
*Bk2 - 48 to 79 inches: very fine sandy loam*

**Properties and qualities**

*Slope: 0 to 3 percent*  
*Depth to restrictive feature: More than 80 inches*  
*Drainage class: Well drained*  
*Runoff class: Low*

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*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.20 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 14 percent

*Maximum salinity:* Very slightly saline (2.0 to 3.9 mmhos/cm)

*Available water supply, 0 to 60 inches:* Moderate (about 7.4 inches)

### Interpretive groups

*Land capability classification (irrigated):* 3e

*Land capability classification (nonirrigated):* 4c

*Hydrologic Soil Group:* B

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

### Minor Components

#### Udic haplusterts, ponded

*Percent of map unit:* 5 percent

*Landform:* Closed depressions

*Landform position (three-dimensional):* Dip

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Ecological site:* R067BY010CO - Closed Upland Depression

*Hydric soil rating:* No

#### Otero

*Percent of map unit:* 5 percent

*Landform:* Hillslopes

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

#### Vona

*Percent of map unit:* 5 percent

*Landform:* Sand sheets

*Ecological site:* R067BY024CO - Sandy Plains

*Hydric soil rating:* No

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# **Geotechnical Report**

Architectural  
Structural  
Geotechnical



Materials Testing  
Forensic  
Civil/Planning

## **SOILS AND GEOLOGY STUDY**

**Rolling Meadows  
Bradley Road  
El Paso County, Colorado**

### **PREPARED FOR:**

**Landhuis Company  
212 N. Wahsatch Ave. Ste 301  
Colorado Springs, CO**

**JOB NO. 187746**

**August 5, 2022**

**Respectfully Submitted,**

**RMG – Rocky Mountain Group**

**Kelli Zigler  
Project Geologist**

**Reviewed by,**

**RMG – Rocky Mountain Group**

**Tony Munger, P.E.  
Geotechnical Project Manager**



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# 1.0 GENERAL SITE AND PROJECT DESCRIPTION

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## 1.1 Project Location

The project lies in Section 1, Section 12, the east and southeast portion of Section 2, and the northeast ¼ of Section 11 and Section 13, Township 15 South, Range 65 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

## 1.2 Existing Land Use

The site is to be comprised of 18 existing parcels. The total area of the proposed site is to be approximately 1,564 acres, as denoted on the *Overall Conceptual Layout* provided by Matrix, dated October 25, 2021. The parcels included are:

- El Paso County Parcel No. 5500000385. This parcel currently consists of a total of approximately 802.42 acres and is currently undeveloped.
- El Paso County Parcel No. 5500000383. This parcel currently consists of a total of approximately 124.76 acres and is currently undeveloped.
- El Paso County Parcel No. 5500000324. This parcel currently consists of a total of approximately 593.51 acres and is currently undeveloped.
- Power line easement and open space parcels range in order from El Paso County Parcel No. 5500000314 to 5500000323 and 5500000325 to 5500000329. These parcels consist of a total of approximately 43.31 acres and contain the existing overhead power lines that traverse the property from southeast to northwest.

The parcel is to maintain the current zoning "PUD" (Planned Unit Development), but a transition from PUD to PUDSP has been requested. It is our understanding the name of the subdivision is to be Rolling Meadows.

## 1.3 Project Description

The proposed site development is to consist of approximately 7,785 residential units, comprised of a mixture of single-family to multi-family structures. The lots reportedly are to range from 2,975 to 6,600 square feet. Entrance into the subdivision is to be provided from the east and west by the existing Bradley Road by extending the existing Meridian Road, and from the north by the existing Drennan Road. Additional proposed land usage includes four elementary schools, one middle school, fire station, substations, parks, detention ponds, power line and open space easements, floodplain/channel easements, and a water tank. It is our understanding the existing powerline easement is to remain an open space. The Test Boring Location Plan is presented in Figure 2.

The streets within the subdivision are to be planned as Residential Collector with 60' R.O.W, and a Non-Residential Collector with an 80' R.O.W and constructed to El Paso County standards. Drennan Road and Meridian Road are planned as Collector Roads in EPC 2040 MTCP. Bradley Road is planned as Minor Arterial in EPC 2040 MTCP. The streets are to be maintained by El Paso County.

The development is to utilize sewer and water services provided by Widefield Water and Sanitation District. Neither individual wells nor on-site wastewater treatment systems are proposed.

## 2.0 QUALIFICATIONS OF PREPARERS

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This Soils and Geology Study was prepared by a professional geologist as defined by Colorado Revised Statutes section 34-1-201(3) and by a qualified geotechnical engineer as defined by policy statement 15, "Engineering in Designated Natural Hazards Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. (Ord. 96-74; Ord. 01-42)

The principle investigators for this study are Kelli Zigler P.G., and Tony Munger, P.E. Ms. Zigler is a Professional Geologist as defined by State Statute (C.R.S 34-1-201) with over 21 years of experience in the geological and geotechnical engineering field. Ms. Kelli Zigler holds a B.S. in Geology from the University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations throughout Colorado.

Tony Munger is a licensed professional engineer with over 21 years of experience in the construction engineering (residential) field. Mr. Munger holds a Bachelor of Science in Architectural Engineering from the University of Wyoming.

## 3.0 STUDY OVERVIEW

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The purpose of this investigation is to characterize the general geotechnical and geologic site conditions, and present our opinions of the potential effect of these conditions on the proposed development of single-family residences within the referenced site. As such, our services exclude evaluation of the environmental and/or human, health-related work products or recommendations previously prepared, by others, for this project.

Revisions to the conclusions presented in this report may be issued based upon submission of the Development Plan. This study has been prepared in accordance with the requirements outlined in the El Paso County Land Development Code (LDC) specifically Chapter 8 last updated August 27, 2019 applicable sections include 8.4.8 and 8.4.9. and the Engineering Criteria Manual (ECM), specifically Appendix C last updated July 9, 2019.

This report presents the findings of the study performed by RMG relating to the geotechnical and geologic conditions of the above-referenced site. Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report.



### 3.1 Scope and Objective

The scope of this study is to include a physical reconnaissance of the site and a review of pertinent, publically available documents including (but not limited to) previous geologic and geotechnical reports, overhead and remote sensing imagery, published geology and/or hazard maps, design documents, etc. Our services exclude the evaluation of the environmental and/or human, health-related work products or recommendations previously prepared, by others, for this project.

The objectives of our study are to:

- Identify geologic conditions that are present on this site,
- Analyze the potential negative impacts of these conditions on the proposed site development,
- Analyze the potential negative impacts to the surrounding properties and/or public services resulting from the proposed site development as it relates to existing geologic hazards,
- Provide our opinion of suitable techniques that may be utilized to mitigate the potential negative impacts identified herein.

This report presents the findings of the study performed by RMG relating to the geologic conditions of the above-referenced site. Revisions and modifications to this report may be issued subsequently by RMG, based upon:

- Additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report,
- Review of pertinent documents (development plans, plat maps, drainage reports/plans, etc.) not available at the time of this study,
- Comments received from the governing jurisdiction and/or their consultants subsequent to submission of this document.

### 3.2 Site Evaluation Techniques

The information included in this report has been compiled from:

- Field reconnaissance
- Geologic and topographic maps
- Review of selected publicly available, pertinent engineering reports
- Available aerial photographs
- Exploratory soil test borings by RMG
- Laboratory testing of representative site soil and rock samples by RMG
- Geologic research and analysis
- Site development plans prepared by others

Geophysical investigations were not considered necessary for characterization of the site geology. Monitoring programs, which typically include instrumentation and/or observations for changes in groundwater, surface water flows, slope stability, subsidence, and similar conditions, are not known to exist and were not considered applicable for the scope of this report.

### **3.3 Additional Documents**

Additional documents reviewed during the performance of this study are included in Appendix A.

## **4.0 SITE CONDITIONS**

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### **4.1 Existing Site Conditions**

The entire site is undeveloped. Overhead power lines that traverse the property from southeast to northwest are to reside within a power line easement, which is to be designated as open space. Construction of a water tank and detention pond was observed near the northern boundary off of Drennan Road at the time of site reconnaissance.

### **4.2 Topography**

Based on our site reconnaissance and the 2022 USGS topographic maps of the Corral Bluffs, Elsmere, Fountain, and Fountain NE quadrangles, the site topography is generally flat with rolling hills. The elevation varies by approximately 147 feet across the site, sloping generally downwards from the northwest to the southeast.

### **4.3 Vegetation**

The majority of the site consists of native prairie grasses and weeds, and generally remains in an undisturbed (native) state.

### **4.4 Aerial photographs and remote-sensing imagery**

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1999, CGS surficial geologic mapping, and historical photos by [historicaerials.com](http://historicaerials.com) dating back to 1947. Historically, the site has remained generally undisturbed since 1947. The construction of the overhead power lines occurred prior to 1969. Since 1969, the site has remained vacant.

## **5.0 FIELD INVESTIGATION AND LABORATORY TESTING**

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The subsurface conditions within the property were explored by drilling a total of 70 exploratory test borings to depths of approximately 20 to 35 feet below the existing ground surface. The test boring locations are presented on the Test Boring Location Plan, Figure 2.

The number of borings is in excess of the minimum one test boring per 10 acres of development up to 100 acres and one additional boring for every 25 acres of development above 100 acres as required by the ECM, Section C.3.3.

The test borings were drilled with a power-driven, continuous-flight auger drill rig. Samples were obtained during drilling of the test boring in general accordance with ASTM D-1586 and D-3550, utilizing a 2-inch O.D. Split Barrel Sampler and a 2½-inch O.D. California sampler, respectively.

Results of the penetration tests are shown on the drilling logs. The proposed lot layout is shown on the Proposed Lot Layout, Figure 3. An Explanation of Test Boring Logs is shown in Figure 4, and the Test Boring Logs are shown in Figures 5 through 39.

## **5.1 Laboratory Testing**

Soil laboratory testing was performed as part of this investigation. The laboratory tests included moisture content, dry density, grain-size analyses, Atterberg Limits and Swell/Consolidation tests. A Summary of Laboratory Test Results is presented in Figure 40. Soils Classification Data is presented in Figures 41 through 55. Swell/Consolidation Test Results are presented in Figures 56 through 78.

# **6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY**

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The site is located within the western flank of the Colorado Piedmont section of the Great Plains physiographic province. The Colorado Piedmont, formed during Late Tertiary and Early Quaternary time (approximately 2,000,000 years ago), is a broad, erosional trench which separates the Southern Rocky Mountains from the High Plains. During the Late Mesozoic and Early Cenozoic Periods (approximately 70,000,000 years ago), intense tectonic activity occurred, causing the uplifting of the Front Range and associated downwarping of the Denver Basin to the east. Relatively flat uplands and broad valleys characterize the present-day topography of the Colorado Piedmont in this region.

## **6.1 Subsurface Soil Conditions**

The subsurface materials encountered in the test borings performed for this study were classified within the laboratory using the Unified Soil Classification System (USCS). The majority of the laboratory testing focused on the Swell/Consolidation test results for the subexcavation recommendations and limited classifications (gradations and atterberg limits) were completed on the clay and claystone materials. The soils were identified and classified as clayey sand (SC), silty sand (SM), silty to clayey sand (SM-SC), sandy clay (CL), claystone, and sandstone.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The classifications shown on the logs are based upon the engineer's classification of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

## **6.2 Bedrock Conditions**

In general, the bedrock (as mapped by Colorado Geologic Survey - CGS) beneath the site is considered to be part of the Pierre Shale formation. Bedrock was encountered in the majority of test borings performed for this investigation. Bedrock conditions are anticipated to be encountered in the excavations and utility trenches for the proposed development.

### 6.3 U.S. Soil Conservation Service

The U.S. Soil Conservation Service along with United States Department of Agriculture (USDA) has identified the soils on the property as:

- 56 – Nelson-Tassel fine sandy loam, 3 to 18 percent slopes. Properties of the sandy loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include hills.
- 108 – Wiley silt loam, 3 to 9 percent slopes. Properties of the silt loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include hills.
- 2 – Ascalon sandy loam, 1 to 3 percent slopes. Properties of the sandy loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be low, frequency of flooding and/or ponding is none, and landforms include flats.
- 28 – Ellicott loamy coarse sand, 0 to 5 percent slopes. Properties of the loamy coarse sand include, somewhat excessively drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be very low, frequency of flooding is frequent, frequency of ponding is none, and landforms include flood plains and stream terraces.
- 43 – Kim loam, 1 to 8 percent slopes. Properties of the loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include fans and hills.
- 52 – Manzanst clay loam, 0 to 3 percent slopes. Properties of the clay loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, frequency of flooding and/or ponding is none, and landforms include terraces and drainageways.
- 75 – Razor-Midway Complex. Properties of the complex include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include hills.
- 78 – Sampson loam, 0 to 3 percent slopes. Properties of the loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be low, frequency of flooding and/or ponding is none, and landforms include depressions, alluvial fans, and terraces.
- 86 – Stoneham sandy loam, 3 to 8 percent slopes. Properties of the sandy loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include hills.
- 89 – Tassel fine sandy loam, 3 to 18 percent slopes. Properties of the fine sandy loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include hills.

- 124 – Oldest sandy loam, 0 to 3 percent slopes. Properties of the sandy loam include, well-drained soils, depth of the water table is anticipated to be greater than 80 inches, Runoff is anticipated to be low, frequency of flooding and/or ponding is none, and landforms include sand sheets.

The USDA Soil Survey Map is presented in Figure 82 and the FEMA Map is presented in Figure 83.

#### 6.4 General Geologic Conditions

Based on our field observations, the USDA map, the Geologic Map of the Corral Bluffs Quadrangle, the Geologic Map of the Pueblo 1-degree by 2-degrees Quadrangle, the Geologic Map of the Elsmere Quadrangle, and the Generalized Surficial Geologic Map of the Pueblo 1-degree by 2-degree Quadrangle, an interpreted geologic map of significant surficial deposits and features was mapped for the site. The identified geologic conditions affecting the development are presented in the General Geologic Map, Figure 81.

The site generally consists of alluvial sand, silt and clay deposits underlain by claystone bedrock of the Pierre Shale formation. 14 geologic units were mapped at the site as:

- *es* – Eolian sand
- *asa* – Alluvial sand, silt, clay, and gravel (post-Piney Creek alluvium, Piney Creek Alluvium, and pre-Piney Creek alluvium of Hunt, 1954, and Scott, 1960; Broadway Alluvium)
- *xch* – Clayey, calcareous disintegration residuum
- *Qam* – *Middle alluvium (Late Pleistocene)* – Light-brownish-gray, pale-brown, light-yellowish-brown, and grayish-brown, poorly sorted sand and subordinate amounts of gravel. Estimated thickness is 20-50 feet.
- *Qav* – *Valley-side alluvium, undivided (Holocene and late Pleistocene)* – Brown to light-yellowish-brown, extremely poorly sorted sand, silty and clayey sand, and minor amounts of mostly pebble-size gravel. Unit exists primarily on valley-side slopes and alluvial fans and consists of sheetwash and re-worked wind-deposited sediment. Estimated thickness is 3-25 feet.
- *Kpc* – *Cone-in-cone of Lavington (1933)* - Dark-gray clayey or silty shale containing reddish-brown siderite ironstone concretions, gray iron-stained limestone concretions, thin bentonite beds, and concretions with cone-in-cone structure.
- *Kpts* – *Lower part of upper transition member* – yellowish-gray, medium- to coarse-grained cross-bedded sandstone with thin shale interbeds.
- *Qay2* – *Young alluvium two (late and middle? Holocene)* – Includes several thin beds and lenses of dark-grayish-brown to very dark-grayish-brown sediment. The unit blankets large areas on broad valley floors. Upper surface of unit is 15-20 feet higher than stream channels

in the southern part of the quadrangle. A very weak, 6 to 18 inch thick soil is developed in this unit. Unit is subject to infrequent large floods and is estimated to be 10-20 feet thick.

- *Qs – Slocum Alluvium (Sangamon Interglaciation or Illinoian Glaciation)* – Weathered gravel on cut surface about 100 feet above modern streams.
- *Kps – Pierre Shale, Sandstone at or just above base of upper transition member* – Grayish-yellow except light-yellowish-gray to dark-yellowish-orange in about lower 30 feet, medium- coarse-grained, some thin shale interbeds and laminae, mostly crossbedded. Unit is about 160 to 190 feet thick.
- *Kp – Pierre Shale, Main part of formation* – Shale, minor siltstone and sandstone beds, and thin concretionary limestone beds; marine fossils in some beds; mostly dark to light gray and olive gray. Poorly exposed in general. Unit is about 1,200 feet exposed in Elsmere quadrangle. Total formation thickness is about 5,000 feet.
- *Qpc – Piney Creek Alluvium* – Alluvial and pond or bog deposits. Mostly clayey sandy silt and silty sand; very clayey in pond and bog deposits, gravelly along main stream and in areas of high relief; yellowish-brown and brownish-gray to dark-yellowish-brown, commonly has alternating darker and lighter colored flat even beds a few inches to a foot thick. Thickness is generally 5 to 15 feet, maximum of 50 feet possible.
- *Qal – Alluvium* - Sand, gravel, and silt mainly in present stream channels but includes deposits that form terraces as much as 4 feet high; mostly grayish yellow. Thickness generally less than 25 feet.
- *Kpt – Pierre Shale, Main part of upper transition member* - Gray to yellowish-gray shale, siltstone, and thin beds of very fine- to fine-grained sandstone; beds of concretionary limestone or limestone concretions ½- to 1-foot thick dispersed throughout; small phosphate nodules locally. The unit is poorly exposed and is about 400 feet thick.

## 6.5 Structural Features

Structural features such as schistosity, folds, zones of contortion or crushing, joints, shear zones or faults were not observed on the site, in the surrounding area, or in the soil samples collected for laboratory testing.

## 6.6 Surficial (Unconsolidated) Deposits

Lake and pond sediments, swamp accumulations, sand dunes, marine terrace deposits, talus accumulations, creep, or slope wash were not observed on the site. Slump and slide debris were also not observed on the site.

## 6.7 Engineering Geology

Charles Robinson and Associates (1977) have mapped 16 environmental engineering units at the site as:

- 1A – Stable alluvium, colluvium and bedrock on flat to gentle slopes (0-5%).
- 2A – Stable alluvium, colluvium and bedrock on gentle to moderate slopes (5 to 12%).
- 2D – Eolian deposits generally on flat to gentle slopes of upland areas.
- 2E – Low terraces and valleys of minor tributary streams.
- 3B – Expansive and potentially expansive soil and bedrock on flat to moderate slopes (0-12%).
- 5D – Debris fans
- 7A – Physiographic floodplain where erosion and deposition presently occur and is generally subject to recurrent flooding. Includes 100-year floodplain along major streams where floodplain studies have been conducted.
- al – Alluvium
- a Qp – Piney Creek Alluvium
- Soil Conservation Service (SCS) Floodplain
- c Kp – Colluvium, Pierre Shale (locally subdivided)
- c Kps – Colluvium, Pierre Shale (locally subdivided)
- pfp – Physiographic Floodplain
- df – Debris Fan
- Qes – Eolian Sand
- p Qs – Slocum Alluvium

The potential geologic hazards and surficial deposits as mapped by Robinson and Associates is presented in the Engineering Map of Potential Geologic Hazards and Surficial Deposits, Figure 79. The environmental and engineering conditions as mapped by Robinson and Associates is presented in the Environmental and Engineering Geologic Map for Land Use, Figure 80.

## **6.8 Features of Special Significance**

Features of special significance such as accelerated erosion, (advancing gully head, badlands, or cliff reentrants) were not observed on the property. Features indicating settlement or subsidence such as fissures, scarplets, and offset reference features were not observed on the property or surrounding areas.

Features indicating creep, slump, or slide masses in bedrock and surficial deposits were not observed on the property.

## **6.9 Drainage of Water and Groundwater**

The overall topography varies by approximately 147 feet across the site, sloping generally downwards from the northwest to the southeast. It is anticipated the direction of groundwater is towards Jimmy Camp Creek located to the west of the site.

Groundwater was encountered in two test borings during the field exploration, test boring TB-11 and TB-15 at depths of 17 feet and 14 feet, respectively. Based on the water contents for the samples collected at the time of drilling, moistures were not elevated and do not indicate an elevated groundwater condition.

Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels. Based on our knowledge of the area and engineering design and construction techniques commonly employed in the El Paso County area at this time, it is our opinion that there is insufficient reason to preclude full-depth basements on any of the lots in this subdivision at this time.

## 7.0 ECONOMIC MINERAL RESOURCES

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Under the provision of House Bill 1529, it was made a policy by the State of Colorado to preserve for extraction commercial mineral resources located in a populous county. Review of the *El Paso Aggregate Resource Evaluation Map, Master Plan for Mineral Extraction, Map 1* indicates the site is identified as floodplain deposits consisting of sand and gravel with minor amounts of silt and clay deposited by water along present stream courses, valley fill consisting of sand and gravel with silt and clay deposited by water in one or a series of stream valleys, eolian deposits consisting of wind blown sand and upland deposits consisting of sand, gravel with silt and clay; remnants of older streams desisted on topographic highs or bench like features. The extraction of the clay and claystone resources are not considered to be economical compared to materials available elsewhere within the county.

According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands*, the site is mapped within the southern part of the Denver Basin Coal Region with a tract identifier of 41-59. However, the area of the site does not contain coal resources. The tract is underlain primarily by the Pierre Shale of Cretaceous age. No wells are drilled within the tract. Grand Union Oil Company drilled a well in the vicinity of the tract to a depth of 1,250 feet in 1901. No shows of hydrocarbons were recorded. The well was plugged and abandoned. The sedimentary rocks in this area appear to contain all of the essential elements; however, existing geological control is insufficient to determine the presence of a trap or reservoir. The tract is not prospective for metallic mineral resources. There are no mines in the Pierre Shale within ten miles of the tract, but the tract has some potential to contain useful clay and shale resources.

## 8.0 IDENTIFICATION AND MITIGATION OF POTENTIAL GEOLOGIC CONDITIONS

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The El Paso County Engineering Criteria Manual recognizes and delineates the difference between hazards and constraints. A geologic hazard is one of several types of adverse geologic conditions capable of causing significant damage or loss of property and life. Geologic hazards are defined in Section C.2.2 Sub-section E.1 of the ECM. A geologic constraint is one of several types of adverse geologic conditions capable of limiting or restricting construction on a particular site. Geologic constraints are defined in Section C.2.2 Sub-section E.2 of the ECM (1.15 Definitions



of Specific Terms and Phrases). The following geologic constraints were considered in the preparation of this report, and are not anticipated to pose a significant risk to the proposed development:

- Avalanches
- Debris Flow-Fans/Mudslides
- Ground Subsidence
- Landslides
- Rockfall
- Groundwater Springs or Seeps
- Ponding water
- Steeply Dipping Bedrock
- Unstable or Potentially Unstable Slopes
- Scour, Erosion, Accelerated Erosion Along Creek Banks and Drainageways
- History of Landfill or Uncontrolled/Undocumented Fill Placement
- Valley Fill
- Downhill/Down-Slope Creep
- Soil Slumps and Undercutting
- Corrosive Minerals

The following sections present geologic constraints that have been identified on the property:

## **8.1 Expansive Soils and Bedrock**

Shallow foundations are anticipated for the majority of the development, and it is our understanding a mass subexcavation is proposed for mitigation of unsuitable soils. Subexcavation and replacement with moisture-conditioned structural fill is a commonly utilized method of mitigating expansive soils. Based on the test borings performed by RMG for this investigation, the on-site soils and bedrock generally possess low to very high swell potential.

### Mitigation

Our subexcavation recommendations are presented in Section **13.0 Subexcavation and Replacement** of this report.

Note, the recommended subexcavation and replacement process does not guarantee that the swell potential will be reduced to acceptable levels. It is possible that the expansive material will retain swell potential in excess of the allowable value presented herein, even after processing and moisture-conditioning. If (at the time of the lot-specific subsurface soil investigation and/or the open excavation observation) the soil is found to possess swell potential in excess of acceptable levels for the foundation system and design parameters proposed for construction at that time, overexcavation and replacement of some or all of the previously placed fill material may be required.

Provided that appropriate mitigations and/or foundation design adjustments are implemented, the presence of expansive soils or bedrock is not considered to pose a risk to the proposed structures.

## 8.2 Compressible Soils

Shallow foundations are anticipated for the majority of the development, and it is our understanding a mass subexcavation is proposed for mitigation of unsuitable soils. Subexcavation and replacement with moisture-conditioned structural fill is a commonly utilized method of mitigating expansive soils. Based on the test borings performed by RMG for this investigation, the on-site soils and bedrock generally possess low to moderate compressibility potential.

### Mitigation

Our subexcavation recommendations are presented in Section **13.0 Subexcavation and Replacement** of this report.

If loose soils are encountered during the Open Excavation Observation, they may require additional compaction to achieve the allowable bearing pressure indicated in this report. Fluctuations in material density may occur. In some cases, removal and recompaction of up to 2 feet of soil may be required. The removal and recompaction shall extend a minimum of the same distance beyond the building perimeter, and at least that same distance beyond the perimeter of counterfort and "T" wall footings. The use of track-mounted excavation equipment, or other low ground pressure equipment, is recommended on loose soils to reduce the likelihood of loss of stability during excavation.

## 8.3 Shallow Groundwater Tables

Groundwater was encountered in TB-11 and TB-15 at depths of 17 feet and 14 feet, respectively. It is anticipated that groundwater will not affect shallow foundations for the structures or shallow buried utilities proposed on the site. Groundwater may affect areas depending upon grading cuts and within deeper excavations made for installation of utilities. It should be noted that groundwater levels, other than those observed at the time of the subsurface soil investigation, could change due to season variations, changes in land runoff characteristics and future development of nearby areas.

It should be noted that in granular soils and bedrock, some subsurface water conditions might be encountered due to the variability of the soil profile. Isolated sand and gravel layers within the soil, even those of limited thickness and width, can convey subsurface water. Subsurface water may also flow atop the interface between the upper soils and the underlying bedrock. While not indicative of a "groundwater" condition, these occurrences of subsurface water migration can (especially in times of heavy rainfall or snowmelt) result in water migration into the excavation or (once construction is complete) the building envelope. Builders and planners should be cognizant of the potential for the occurrence of subsurface water conditions during on-site construction, and be prepared to evaluate and mitigate each individual occurrence as necessary.

### Mitigation

Seasonal variations in groundwater conditions are expected. It is assumed groundwater beneath the subject site predominates in fractured weathered consolidated sedimentary bedrock located at depth. If shallow groundwater conditions are encountered during the site-specific Subsurface Soil Investigations and/or Open Excavation Observations, mitigations may include a combination of surface and subsurface drainage systems, vertical drainboard, etc.

In general, if groundwater was encountered within 4 to 6 feet of the proposed foundation slab elevation, an underslab drain should be anticipated in conjunction with the perimeter drain. Perimeter drains are anticipated for each individual lot to prevent the infiltration of water and to help control wetting of potentially expansive and compressible soils in the immediate vicinity of foundation elements. It must be understood that the drain is designed to intercept some types of subsurface moisture and not others. Therefore, the drain could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

#### **8.4 Floodplain/Floodway**

Based on our review of the available Federal Emergency Management (FEMA) Community Panel No. 08041C0790G, 08041C0769G, and the online ArcGIS El Paso County Risk Map, the site lies within a 100-year floodplain (Zone AE) and regulatory floodway. The floodplain traverses the site down-gradient from the northeast to the southwest.

##### Mitigation

As indicated on the *Conceptual Layout 03* map prepared by Matrix Design Group, the proposed build areas of the development are to be located outside of the designated channel/floodplain as shown on the Proposed Lot Layout, Figure 3.

#### **8.5 Faults and Seismicity**

Based on review of the Earthquake and Late Cenozoic Fault and Fold Map Server provided by CGS located at <http://dnrwebmapgdev.state.co.us/CGSOnline/> and the recorded information dating back to November of 1900, Colorado Springs has not experienced a recorded earthquake with a magnitude greater than 1.6 during that time period. The nearest recorded earthquakes over 1.6 occurred in December of 1995 in Manitou Springs, which experienced magnitudes ranging between 2.8 to 3.5. Additional earthquakes over 1.6 occurred between 1926 and 2001 in Woodland Park, which experienced magnitudes ranging from 2.7 to 3.3. Both of these locations are in the vicinity of the Ute Pass Fault, which is greater than 10 miles from the subject site.

Earthquakes felt at this site will most likely result from minor shifting of the granite mass within the Pikes Peak Batholith, which includes pull from minor movements along faults found in the Denver basin. It is our opinion that ground motions resulting from minor earthquakes may affect structures (and the surrounding area) at this site if minor shifting were to occur.

##### Mitigation

The Pikes Peak Regional Building Code, 2017 Edition, indicates maximum considered earthquake spectral response accelerations of 0.181g for a short period ( $S_s$ ) and 0.055g for a 1-second period ( $S_1$ ). Based on the results of our experience with similar subsurface conditions, we recommend the site be classified as Site Class B, with average shear wave velocities ranging from 2,500 to 5,000 feet per second for the materials in the upper 100 feet.

## 8.6 Radon

*"Radon Act 51 passed by Congress set the natural outdoor level of radon gas (0.4 pCi/L) as the target radon level for indoor radon levels.*

Southern El Paso County and the 80929 zip code located in Rolling Meadows has an EPA assigned Radon Zone of 1. A radon zone of 1 predicts an average indoor radon screening level greater than 4 pCi/L, which is above the recommended levels assigned by the EPA. Rolling Meadows is located in a high risk area of the country. *The EPA recommends you take corrective measures to reduce your exposure to radon gas.*

Most of Colorado is generally considered to have the potential of high levels of radon gas, based on the information provided at:

<https://www.elpasocountyhealth.org/sites/default/files/CDPHERadonMap.pdf>. There is not believed to be unusual hazardous levels of radon from naturally occurring sources at this site.

### Mitigation

Radon hazards are best mitigated at the building design and construction phases. Providing increased ventilation of basements, crawlspaces, creating slightly positive pressures within structures, and sealing of joints and cracks in the foundations and below-grade walls can help mitigate radon hazards. Radon hazards are best mitigated at the building design and construction phases. Providing increased ventilation of basements, crawlspaces, creating slightly positive pressures within structures, and sealing of joints and cracks in the foundations and below-grade walls can help mitigate radon hazards. Passive radon mitigation systems are also available.

Passive and active mitigation procedures are commonly employed in this region to effectively reduce the buildup of radon gas. Measures that can be taken after the residence is enclosed during construction include installing a blower connected to the foundation drain and sealing the joints and cracks in concrete floors and foundation walls. If the occurrence of radon is a concern, it is recommended that the residence be tested after they are enclosed and commonly utilized techniques are in place to minimize the risk.

## 8.7 Proposed Grading, Erosion Control, Cuts and Masses of Fill and Erosion Control

Based on the test borings for this investigation, the excavations are anticipated to encounter silty to clayey sand, claystone and sandstone. The on-site soils can generally be used as site-grading fill.

Prior to placement of overlot fill or removal and re-compaction of the existing materials, topsoil, low-density native soil, fill and organic matter should be removed from the fill area. The subgrade should be scarified, moisture conditioned to within 2% of the optimum moisture content, and recompacted to the same degree as the overlying fill to be placed. The placement and compaction of fill should be periodically observed and tested by a representative of RMG during construction.

If unsuitable fill soils are encountered at the time of construction for the single-family residences, they should be removed (overexcavated) and replaced with compacted structural fill. The zone of

overexcavation shall extend to the bottom of the unsuitable fill zone and shall extend at least that same distance beyond the building perimeter (or lateral extent of any fill, if encountered first). Provided that this recommendation is implemented, the presence of this fill is not considered to pose a risk to proposed structures.

We anticipate that the deepest excavation cuts for crawlspace and garage level construction will be approximately 3 to 4 feet below the existing ground surface, and for basement level construction will be approximately 6 to 8 feet below the existing ground surface, not including subexcavation where performed.

We believe the sandy clay and claystone will classify as Type A material and the clayey sand, silty sand, silty to clayey sand, and sandstone will classify as Type C materials as defined by OSHA in 29 CFR Part 1926. OSHA requires that temporary excavations made in Type A materials be laid back at ratios no steeper than 3/4:1 (horizontal to vertical) and temporary excavations made in Type C materials be laid back at ratios no steeper than 1 1/2:1 (horizontal to vertical), unless the excavation is shored and braced. Excavations deeper than 20 feet, or when water is present, should always be braced or the slope designed by a professional engineer. Long term cut slopes in the upper soil should be limited to no steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should groundwater conditions occur. It is recommended that long term fill slopes be no steeper than 3:1 (horizontal to vertical).

#### Erosion Control

Erosion generally refers to lowering the ground surface over a wide area. The soils on-site are mildly to moderately susceptible to wind and water erosion. Temporary problems may arise due to minor wind erosion and dust during and immediately after construction. Watering of the cut areas or the use of chemical palliatives may be needed to control dust. However, once construction has been completed and vegetation reestablished, the potential for wind erosion and dust will be considerably reduced.

Loose soils are the most susceptible to water erosion. The residually weathered sands on site were encountered at medium densities and overlaid medium hard to very hard sandstone bedrock which is increasingly less susceptible to water erosion.

Cut and fill areas may be subjected to sheetwash (surface) erosion. Unchecked erosion could eventually lead to concentrated flows of water. Generally, the most effective means to control erosion is to re-vegetate the cut and fill slopes with native vegetation.

**Guideline Site Grading Specifications are included in the Appendix B.**

## 9.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

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Geologic hazards (as described in Section 8 of this report) were not found to be present at this site. Geologic constraints (also as described in section 8 of this report) such as: expansive soils and bedrock, compressible soils, potentially shallow groundwater, faults/seismicity,

floodplain/floodways, and radon were found on the site. Where avoidance is not readily achievable, it is our opinion that the existing geologic and engineering conditions can be satisfactorily mitigated through proper engineering, design, and construction practices.

## 10.0 BURIED UTILITIES

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Based upon the conditions encountered in the test borings, we anticipate that the soils encountered in individual utility trench excavations will consist mostly of native or moisture conditioned and recompacted clayey sand, silty to clayey sand, sandstone, silty sand, sandy clay and claystone. It is anticipated the sandy clay will be encountered at medium stiff to very stiff densities, the claystone at medium hard to very hard relative densities, the sandstone at hard to very hard relative densities, and the clayey sand soils at loose to very dense densities. Bedrock conditions are anticipated within the utility trenches.

We believe the sandy clay and claystone will classify as Type A material and the clayey sand, silty sand, silty to clayey sand, and sandstone will classify as Type C materials as defined by OSHA in 29 CFR Part 1926. OSHA requires that temporary excavations made in Type A materials be laid back at ratios no steeper than 3/4:1 (horizontal to vertical) and temporary excavations made in Type C materials be laid back at ratios no steeper than 1 1/2:1 (horizontal to vertical), unless the excavation is shored and braced. Excavations deeper than 20 feet, or when water is present, should always be braced or the slope designed by a professional engineer.

## 11.0 PRELIMINARY PAVEMENTS

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The proposed roadways within this development will require a new pavement design prepared in accordance with the El Paso County regulations. The interior roadways, as indicated by the *Conceptual Layout* map prepared by Matrix Design Group are to be classified as Residential Collector with 60' R.O.W, and Non-Residential Collector with an 80' R.O.W.

***The actual pavement section design for individual streets will be completed following overlot grading and rough cutting of the street subgrade.***

The developer of the proposed site, Landhuis Company, has generally preferred to construct the roadways with a composite roadway section consisting of Hot Mix Asphalt over Cement-Treated Subgrade (CTS). For purposes of this report, we anticipate the subgrade soils will primarily have American Association of State Highway and Transportation Officials (AASHTO) Soil Classifications of A-2-4, A-2-6, A-4, A-6, A-7-6, and A-2-7, with indices ranging between 0 and 51, with estimated design subgrade "CBR-values" on the order of approximately 5 to 40.

The ECM notes that mitigation measures may be required for expansive soils, shallow ground water, subgrade instability, etc. Based on the AASHTO classification of the soils in the subdivision and laboratory swell testing, the subgrade soils are expected to encounter low to very high expansive potential. Therefore, special mitigation measures may be necessary for subgrade preparation.

Pavement materials should be selected, prepared, and placed in accordance with the El Paso County specification and the Pikes Peak Region Asphalt Paving Specifications. Tests should be performed in accordance with the applicable procedures presented in the final design.

## 12.0 ANTICIPATED FOUNDATION SYSTEMS

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Based on the information presented previously, conventional shallow spread-footing foundation systems are anticipated to be suitable for the proposed residential structures. It is our understanding a combination of crawlspace and basement excavations is proposed for the lots. Typical foundation cuts are anticipated to be approximately 3 to 4 feet below the final ground surface for crawlspace and garage foundations and 6 to 8 feet below the final ground surface for basement foundations, not including subexcavation where performed.

Expansive soils and/or bedrock are anticipated to be encountered in a majority of the excavations at foundation and floor slab bearing levels. Removal and replacement with structural fill is anticipated. This can be accomplished through "mass" subexcavation and replacement with moisture-conditioned expansive soils/bedrock during land development operations, lot-specific overexcavation and replacement with structural fill during construction, or a combination of the two. However, it should be noted that the use of subexcavated and moisture-conditioned expansive soils as fill below foundations may result in a condition that is not suitable for all types of shallow foundations.

If loose sands are encountered, they may require additional compaction to achieve the allowable bearing pressure as indicated in a site specific subsurface soil investigation. In some cases, removal and recompaction may be required for loose soils.

It must be understood that the subexcavation and replacement process does not guarantee that the swell potential will be reduced to acceptable levels. It is possible that the expansive material will retain swell potential in excess of the allowable value presented herein, even after processing and moisture-conditioning. In such a case, the material will need to be removed, reconditioned, and replaced until the swell potential is reduced to the stated value.

If (at the time of the lot-specific subsurface soil investigation and/or the open excavation observation) the soil is found to possess swell potential in excess of acceptable levels for the foundation system and design parameters proposed for construction at that time, overexcavation and replacement of some or all of the previously placed fill material may be required.

It is also possible that material that was properly conditioned, placed, and compacted during the subexcavation process will require removal (overexcavation) and replacement at the time of construction. The swell potential of the moisture-conditioned structural fill is dependent on many factors, including (but not limited to) density/degree of compaction, moisture content (particularly changes that occur in the moisture content from the time of placement to the time of actual foundation construction), etc. Additionally, various construction processes which can adversely affect the performance of moisture-conditioned structural fill are completed at times before and after our observations, as well as between the time of land development and when the lot-specific foundation is constructed.

While the subexcavation and replacement process is generally considered suitable for use with shallow foundation types, it may result in design parameters that are not consistent with the future builder(s)' pre-existing foundation designs. In such a case, the builder would either need to obtain a foundation designed for parameters consistent with the subsurface soil conditions present at that time, or perform additional mitigation (in most cases, this consists of overexcavation and replacement with material suitable to provide the design parameters utilized in that pre-existing foundation design).

The final foundation design parameters are to be determined based on lot-specific subsurface soil investigations performed at the time of construction. However, for a structure supported atop moisture-conditioned structural fill, the maximum allowable bearing pressures are anticipated to be in the range of 2,000 to 3,000 psf with minimum dead loads in the range of 800 to 1,500 psf. For a structure supported atop granular, non-expansive structural fill, the maximum allowable bearing pressures are anticipated to range from 2,000 to 2,400 psf with no minimum dead load requirement.

The foundation designs should be prepared by a qualified Colorado Registered Professional Engineer using the recommendations presented in this report. This foundation system should be designed to span a minimum of 10 feet under the design loads. The bottoms of exterior foundations should be at least 30 inches below finished grade for frost protection.

## **12.1 Foundation Drains**

A subsurface perimeter drain is recommended around portions of the structures which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas but not the walkout trench, if applicable.

Shallow groundwater conditions were not encountered in the test boring performed for this study. Depending on the conditions encountered during the site-specific subsurface soil investigations and the conditions observed at the time of the open excavation observations, additional subsurface drainage systems may be recommended.

It must be understood that the drain systems are designed to intercept some types of subsurface moisture and not others. Therefore, the drains could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

## **13.0 SUBEXCAVATION AND REPLACEMENT**

---

The proposed lots within Rolling Meadows contain expansive soils and bedrock at depths that are anticipated to effect the performance of foundations, floor slabs, and roadways. It is our understanding that subexcavation and replacement of moisture conditioned and recompacted on-site material is the preferred alternative to reduce heave risk and enhance the performance of the foundations, roadways and flatwork. This type of subexcavation and replacement is commonly utilized throughout this region and is generally considered an acceptable alternative to the typical lot-by-lot overexcavation.



### 13.1 Subexcavation

Where subexcavation is to be performed, vegetation, organic and deleterious material shall be cleared and disposed of in accordance with applicable requirements prior to performing excavation and/or filling operations. Subexcavation depths are anticipated to range between 6 and 10 feet below the bottom of foundations, floor slabs, and roadways, and at least those same distances (laterally) beyond the proposed "buildable" area on each lot. Before the placement of moisture-conditioned fill, the underlying subgrade shall be scarified, moisture conditioned to within 2% of the optimum moisture content and compacted to the degree specified for the overlying fill material.

### 13.2 Moisture-Conditioned Structural Fill

Subexcavation and replacement with moisture-conditioned (on-site) structural fill is commonly utilized throughout the region. This approach may be combined with the use of an intermittent (voided) spread-footing foundation system or with a post-tensioned slab-on-grade foundation system.

Areas to receive moisture-conditioned expansive soils used as structural fill should have topsoil, organic material, or debris removed. After subexcavation to the recommended depth below the bottom of all foundation components, the upper 6 inches of exposed soil should be scarified and moisture-conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) or to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) prior to placing structural fill.

Moisture-conditioned structural fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

Replacement structural fill shall consist of a moisture-conditioned, on-site cohesive fill material. The fill material shall be moisture conditioned and replaced as follows:

- Fill shall be free of deleterious material and shall not contain rocks or cobbles greater than 6 inches in diameter.
- Claystone fill shall be thoroughly "pulverized" and shall not contain claystone chunks greater than 1 1/2 inches in diameter if being processed and/or placed by a loader, or not greater than 3 inches in diameter if being processed/placed as part of "mass" fill (scrapers and disking) operations.
- When claystone is to be incorporated using a loader, the fill materials shall be processed in a stockpile (**processing these materials in the excavations will not be permitted**). These stockpiled fill materials shall be moisture-conditioned to a minimum of 1 percent to 4 percent above optimum moisture content (as determined by the Standard Proctor test, ASTM D-698), with an average of not less than 1 1/2 percent above optimum

moisture content. These materials, once moisture conditioned and thoroughly mixed, should rest in the stockpile a minimum of 24 hours to ensure proper distribution of the moisture through the material. After resting, the materials should be re-wet and re-mixed to replace the surficial moisture lost to evaporation during the resting period.

- Fill materials not containing claystone and/or fill materials being processed/placed as part of "mass" fill (scrapers and disking) operations do not require processing in a stockpile, but shall be moisture-conditioned to a minimum of 1 percent to 4 percent above optimum moisture content (as determined by the Standard Proctor test, ASTM D-698), with an average of not less than 1 1/2 percent above optimum moisture content.
- The moisture-conditioned materials should be placed in maximum 6" compacted lifts. These materials should be compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). Material not meeting the above requirements shall be reprocessed.

Material not meeting the above requirements shall be reprocessed.

Materials used for moisture-conditioned structural fill should be approved by RMG prior to use. Moisture-conditioned structural fill should not be placed on frozen subgrade or allowed to freeze during moisture-conditioning and placement.

**To verify the condition of the compacted soils, density tests should be performed during placement. The first density tests should be conducted when 24 inches of fill have been placed.**

The existing soils will require the addition of water to achieve the required moisture content. The fill soils should be thoroughly mixed or disked to provide uniform moisture content through the fill. It should be noted that clay and claystone materials compacted at the above moisture contents are likely to result in wet, slick conditions. We recommend that the excavation contractor retained to perform this work have significant experience processing subexcavated and moisture-conditioned soils.

Frequent moisture content and density tests shall be performed in the field to verify conformance with the above specifications. Furthermore, representative samples of the moisture-conditioned fill shall be obtained by personnel of RMG on a daily basis for follow-up swell testing to demonstrate that the swell potential has been reduced to not more than 1 percent swell when saturated under a 1,000 psf surcharge pressure. Areas where the follow-up swell tests indicate swells higher than that value shall have the fill material removed, reprocessed, recompacted, and retested.

RMG should be contacted a minimum of 3 days prior to initiation of subexcavation and moisture conditioning processes in order to schedule appropriate field services. Fill shall not be placed on frozen subgrade or allowed to freeze during processing. The time of the year when night temperatures are above freezing are the most optimal period for a subexcavation operation.

Following completion of the subexcavation and moisture conditioning process, it is imperative that the "as-compacted" moisture content be maintained prior to construction and establishment of landscape irrigation. This may require reprocessing of materials and addition of supplemental water to prevent remobilization of swell potential within the fill.

### **13.3 Granular Structural Fill**

Areas to receive granular (non-expansive) structural fill should have topsoil, organic material, or debris removed. The upper 6 inches of the exposed surface soils should be scarified and moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) or to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) prior to placing structural fill.

Structural fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

Structural fill shall consist of granular, non-expansive material. It should be placed in loose lifts not exceeding 8 to 12 inches, moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test, ASTM D-1557. The materials should be compacted by mechanical means.

Materials used for structural fill should be approved by RMG prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

## **14.0 DETENTION STORAGE CRITERIA**

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This section has been prepared in accordance with the requirements outlined in the El Paso County Land Development Code (LDC), the Engineering Criteria Manual (ECM) Section 2.2.6 and Appendix C.3.2.B, and the El Paso County (EPC) Drainage Criteria Manual, Volume 1 Section 11.3.3.

### **14.1 Soil and Rock Design Parameters**

It is unknown at this time if detention ponds, retention ponds or a combination of both are proposed for the Rolling Meadows development. A site grading plan with retention/retention pond specifications has not been provided to RMG by Landhuis Company.

RMG has performed laboratory tests of soil from across the proposed development. Based upon field and laboratory testing, the following soil and rock parameters are typical for the soils likely to be encountered, and are recommended for use in detention/retention pond embankment design.

Soil Description	Unit Weight (lb/ft <sup>3</sup> )	Friction Angle (degree)	Active Earth Pressure, K <sub>a</sub>	Passive Earth Pressure, K <sub>p</sub>	At Rest Earth Pressure, K <sub>o</sub>
Clay to Sandy Clay	115	17	0.548	1.826	0.708
Claystone	125	17	0.548	1.826	0.708
Silty to Clayey Sand	120	28	0.361	2.770	0.531
Sandstone	130	30	0.333	3.000	0.500

## 14.2 Detention Pond Considerations

It is uncertain if above-ground embankment construction is anticipated. All pond side slopes are to be constructed with a maximum 3:1 (horizontal:vertical) slope. Side slopes should be constructed in accordance with applicable sections of the El Paso County Engineering Criteria Manual, the El Paso County Drainage Criteria Manual, and the El Paso County Land Development Code.

## 15.0 ADDITIONAL STUDIES

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The findings, conclusions and recommendations presented in this report were provided to evaluate the suitability of the site for future development. Unless indicated otherwise, the test borings, laboratory test results, conclusions and recommendations presented in this report are not intended for use for design and construction. **We recommend that a lot-specific subsurface soil investigation be performed for the proposed structures.** The extent of any fill soils encountered during the lot-specific investigation(s) should be evaluated for suitability to support the proposed structures prior to construction.

Additionally, the groundwater conditions encountered in the lot-specific investigation should be evaluated to determine the feasibility of basement construction on that lot.

The lot-specific subsurface soil investigations should consider the proposed structure type, anticipated foundation loading conditions, location within the property, and local construction methods. Recommendations resulting from the investigations should be used for design and confirmed by on-site observation and testing during development and construction.

## 16.0 CONCLUSIONS

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Based upon our evaluation of the geologic conditions, it is our opinion that the proposed development is feasible. The geologic conditions identified (expansive soils and bedrock, compressible soils, potentially shallow groundwater, faults/seismicity, floodplain/floodways, and radon) are not considered unusual for the Front Range region of Colorado. Mitigation of geologic conditions is most effectively accomplished by avoidance. However, where avoidance is not a

practical or acceptable alternative, geologic conditions should be mitigated by implementing appropriate planning, engineering, and local construction practices.

In addition to the previously identified mitigation alternatives, surface and subsurface drainage systems should be implemented. Exterior, perimeter foundation drains should be installed around below-grade habitable or storage spaces. Surface water should be efficiently removed from the building area to prevent ponding and infiltration into the subsurface soil.

**The foundation systems for the proposed single-family structures should be designed and constructed based upon recommendations developed in a site-specific subsurface soil investigation.**

Foundation selection and design should consider the potential for subsurface expansive soil-related movements. Mitigation techniques commonly used in the El Paso County area include overexcavation and replacement with structural fill, subexcavation and replacement with on-site moisture-conditioned soils, and/or the installation of deep foundation systems all of which are considered common construction practices for this area.

The foundation and floor slabs of each structure should be designed using the recommendations provided in the lot-specific subsurface soil investigation performed for each lot. In addition, appropriate surface drainage should be established during construction and maintained by the homeowner.

Irrigation devices should not be placed within 5 feet of the foundation. Irrigation should be limited to the amount sufficient to maintain vegetation. Application of more water will increase the likelihood of slab and foundation movements.

Additionally, the ground surface should be sloped from the building with a minimum gradient of 10 percent for the first 10 feet. This is equivalent to 12 inches of fall across this 10-foot zone. If a 10-foot zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum 5 feet from the foundation and sloped parallel with the wall with a minimum slope of 2 percent to intercept the surface water and transport it around and away from the structure. Roof drains should extend across backfill zones and landscaped areas to a region that is graded to direct flow away from the structure. Owners should maintain the surface grading and drainage recommended in this report to help prevent water from being directed toward and/or ponding near the foundations.

Landscaping should be selected to reduce irrigation requirements. Plants used close to foundation walls should be limited to those with low moisture requirements and irrigated grass should not be located within 5 feet of the foundation. To help control weed growth, geotextiles should be used below landscaped areas adjacent to foundations. Impervious plastic membranes are not recommended.

The recommendations listed in this report are intended to address normal surface drainage conditions, assuming the presence of groundcover (established vegetation, paved surfaces, and/or structures) throughout the regions upslope from this structure. However, groundcover may not be

present due to a variety of factors (ongoing construction/development, wildfires, etc.). During periods when groundcover is not present in the "upslope" regions, higher than normal surface drainage conditions may occur, resulting in perched water tables, excess runoff, flash floods, etc. In these cases, the surface drainage recommendations presented herein (even if properly maintained) may not mitigate all groundwater problems or moisture intrusion into the structure. We recommend that the site plan be prepared with consideration of increased runoff during periods when groundcover is not present on the upslope areas.

We believe the sandy clay and claystone will classify as Type A material and the clayey sand, silty sand, silty to clayey sand, and sandstone will classify as Type C materials as defined by OSHA in 29 CFR Part 1926. OSHA requires that temporary excavations made in Type A materials be laid back at ratios no steeper than 3/4:1 (horizontal to vertical) and temporary excavations made in Type C materials be laid back at ratios no steeper than 1 1/2:1 (horizontal to vertical), unless the excavation is shored and braced. Flatter slopes will likely be necessary should groundwater conditions occur.

Long term cut slopes in the upper soil should be limited to no steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should groundwater conditions occur. It is recommended that long term fill slopes be no steeper than 3:1 (horizontal to vertical).

Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

It is important for the Owner(s) of these properties read and understand this report, as well as the previous reports referenced above, and too carefully familiarize themselves with the geologic constraints associated with construction in this area. This report only addresses the geologic constraints contained within the boundaries of the site referenced above.

## 17.0 CLOSING

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This report is for the exclusive purpose of providing geologic hazards information and preliminary geotechnical engineering recommendations. The scope of services did not include, either specifically or by implication, evaluation of wild fire hazards, environmental assessment of the site, or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to, biological or toxicological issues, are beyond the scope of this report. If the owner is concerned about the potential for such contamination or conditions, other studies should be undertaken.

This report has been prepared for **Landhuis Company** in accordance with generally accepted geotechnical engineering and engineering geology practices. The conclusions and recommendations in this report are based in part upon data obtained from review of available topographic and geologic maps, review of available reports of previous studies conducted in the site vicinity, a site reconnaissance, and research of available published information, soil test

borings, soil laboratory testing, and engineering analyses. The nature and extent of variations may not become evident until construction activities begin. If variations then become evident, RMG should be retained to re-evaluate the recommendations of this report, if necessary.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers and engineering geologists practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied, is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

If we can be of further assistance in discussing the contents of this report or analysis of the proposed development, from a geotechnical engineering point-of-view, please feel free to contact us.

## FIGURES





NOT TO SCALE

Architecture  
Structural  
Geotechnical



**Engineers / Architects**

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SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

Materials Testing  
Forensics  
Civil / Planning

## SITE VICINITY MAP

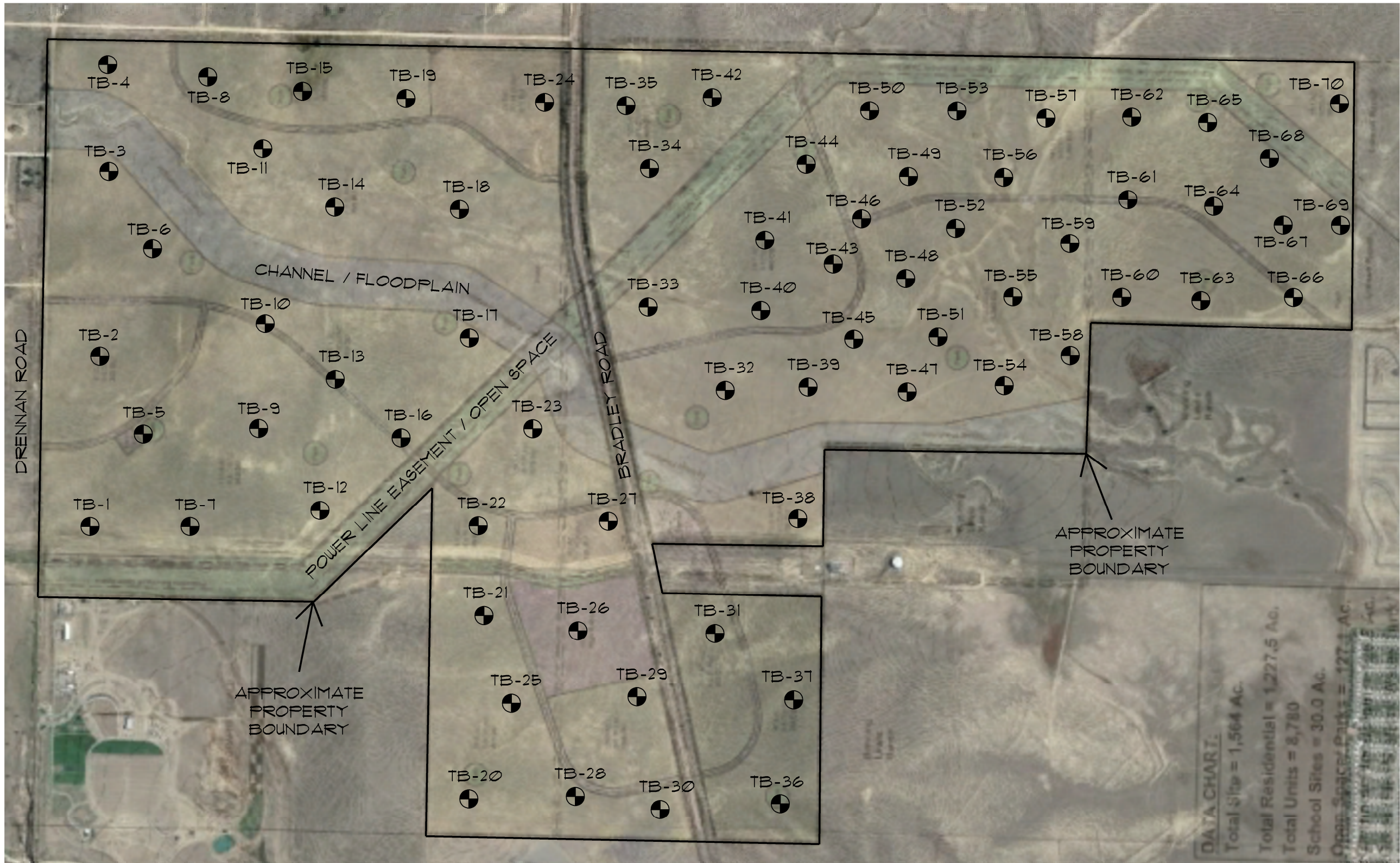
ROLLING MEADOWS  
BRADLEY ROAD  
EL PASO COUNTY, COLORADO  
LANDHUIS COMPANY

JOB No. 187746

FIG No. 1

DATE 8-5-2022





JOB No. 187746

Materials Testing  
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Engineers / Architects

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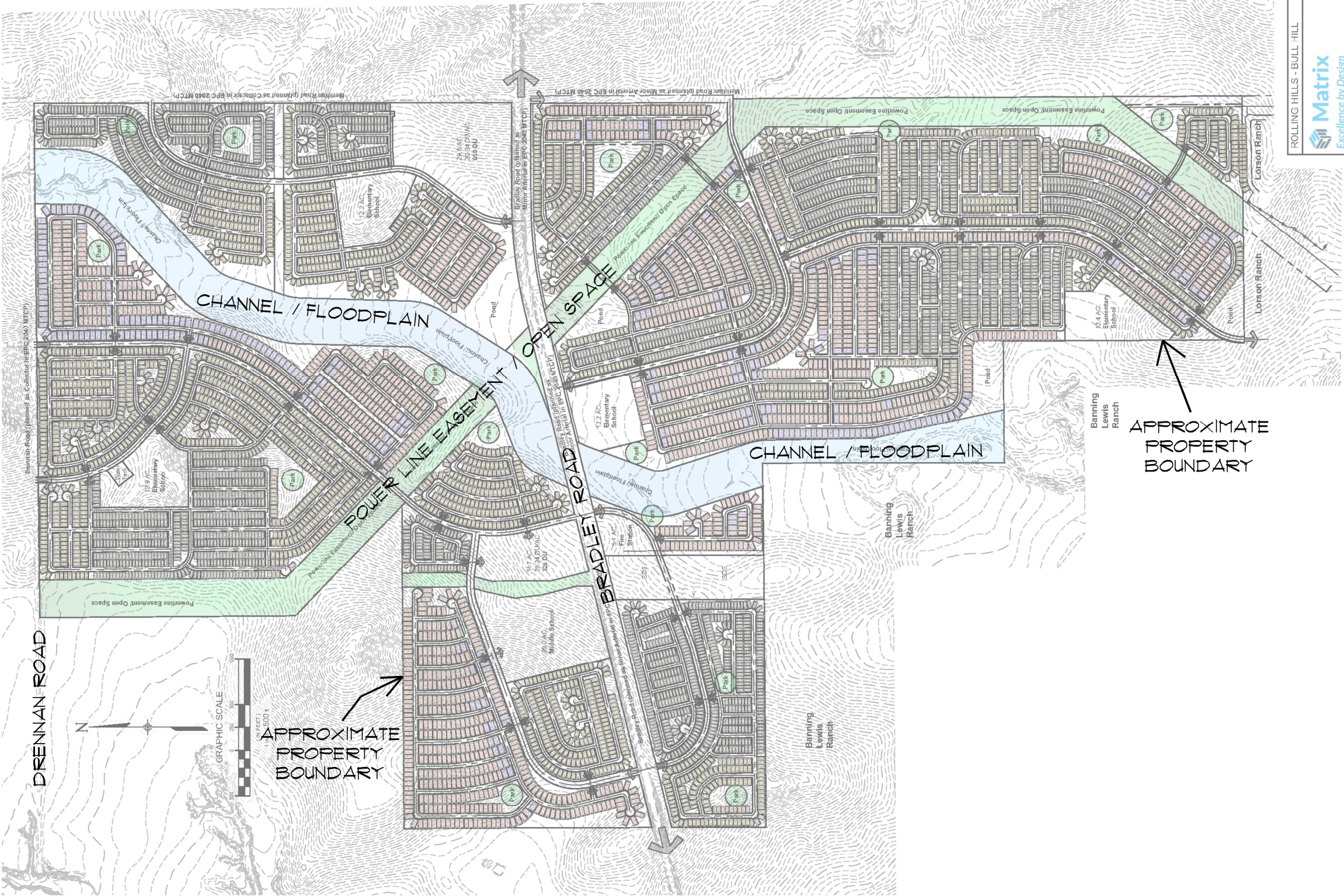
ROLLING MEADOWS  
BRADLEY ROAD  
EL PASO COUNTY, COLORADO  
LANDUIS COMPANY

ENGINEER:	TFM
DRAWN BY:	KCR
CHECKED BY:	TFM
ISSUED:	8-5-2022

TEST BORING  
LOCATION PLAN

SHEET No.  
**FIG-2**





ROLLING HILLS - BULL HILL

**Matrix**  
Excellence by Design

2435 Research Parkway, Suite 300  
Colorado Springs, CO 80920  
Contact: Jason A. White  
Phone: (719) 575-0100 | Fax: (719) 575-0209  
S:\111291-011 Rolling Hills Ranch & Bull Hill\1100 Dwg\003 Exhibit  
Rolling Hills\_Lot Layout.dwg

Lorson Ranch

CONCEPTUAL LAYOUT 03

01 / 27 / 2022

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BRADLEY ROAD  
EL PASO COUNTY, COLORADO  
LANDUIS COMPANY

ENGINEER:	TFM
DRAWN BY:	KCR
CHECKED BY:	TFM
ISSUED:	8-5-2022

PROPOSED LOT  
LAYOUT

SHEET No.  
**FIG-3**



## SOILS DESCRIPTION



CLAYEY SAND



CLAYSTONE



SANDSTONE



SANDY CLAY



SILTY SAND



SILTY TO CLAYEY SAND

UNLESS NOTED OTHERWISE, ALL LABORATORY  
TESTS PRESENTED HEREIN WERE PERFORMED BY:  
RMG - ROCKY MOUNTAIN GROUP  
2910 AUSTIN BLUFFS PARKWAY  
COLORADO SPRINGS, COLORADO

## SYMBOLS AND NOTES



XX

STANDARD PENETRATION TEST - MADE BY DRIVING A SPLIT-BARREL SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-1586. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).



XX

UNDISTURBED CALIFORNIA SAMPLE - MADE BY DRIVING A RING-LINED SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-3550. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).



FREE WATER TABLE



DEPTH AT WHICH BORING CAVED



BULK DISTURBED BULK SAMPLE



AUG AUGER "CUTTINGS"

4.5

WATER CONTENT (%)

ROCKY MOUNTAIN GROUP

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Structural  
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Materials Testing  
Civil, Planning

## EXPLANATION OF TEST BORING LOGS

JOB No. 187746

FIGURE No. 4

DATE Aug/05/2022

TEST BORING: 1	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 2	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
SAND, CLAYEY, light brown to brown, medium dense, moist	5			20	5.3	CLAY, SANDY, tan to brown, very stiff, moist	5			30	6.5
	10			20	6.8	SANDSTONE, CLAYEY, tan to brown and olive, very hard, moist	10			50/5"	13.6
CLAY, SANDY, brown, stiff to very stiff, moist	15			20	8.4	CLAYSTONE, SANDY, reddish brown to gray, hard to very hard, moist	15			50/8"	13.1
	20			16	11.5		20			50/3"	9.8
	25			23	12.4						
SAND, CLAYEY, tan, medium dense, moist	30			20	11.1						

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 5

DATE Aug/05/2022

TEST BORING: 3	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 4	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/11/22 NO GROUNDWATER ON 2/11/22					
SANDSTONE, CLAYEY, with interbedded claystone, tan to gray, hard to very hard, moist	5			50/6"	3.4	CLAY, SANDY, brown, stiff, moist	5			15	7.7
	10			50/6"	10.9		10			15	9.3
	15			10/0"	6.8	SANDSTONE, CLAYEY, with interbedded claystone seams, brown to olive, medium hard to very hard, moist	15			50/9"	12.7
AUGER REFUSAL AT 17 FEET DUE TO VERY HARD BEDROCK	20						20			50/7"	15.4
							25			10/0"	10.2

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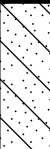

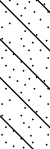

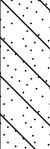

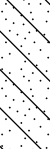







Geotechnical  
Materials Testing  
Civil, Planning

## TEST BORING LOG

JOB No. 187746

FIGURE No. 6

DATE Aug/05/2022

TEST BORING: 5	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 6	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
SAND, CLAYEY, light brown, loose to medium dense, moist	5			17	7.4	SAND, CLAYEY, brown, loose to medium dense, moist	5			13	5.7
	10			15	7.9		10			15	6.1
	15			16	8.6		15			13	8.4
	20			17	6.1		20			13	9.5

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Materials Testing  
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## TEST BORING LOG

JOB No. 187746

FIGURE No. 7

DATE Aug/05/2022

TEST BORING: 7	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 8	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/11/22 NO GROUNDWATER ON 2/11/22					
SAND, SILTY TO CLAYEY, brown to olive, loose to medium dense, moist	5			18	-	SAND, CLAYEY, with gravel, tan, dense, moist	5			50/10"	6.2
	10			16	4.2	CLAYSTONE, SANDY, brown, hard to very hard, moist	10			50/4"	8.8
	15			19	5.1		15			50/4"	14.7
CLAY, SANDY, dark brown, very stiff, moist	20			34	14.1		20			50/6"	19.1

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 8

DATE Aug/05/2022



TEST BORING: 9	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 10	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
CLAY, SANDY, tan to brown, stiff, moist	5			16	6.2	CLAY, SANDY, tan to olive, very stiff, moist	5			25	7.7
	10			15	10.7	CLAYSTONE, SANDY, tan to olive, medium hard to very hard, moist	10			50/10"	12.1
CLAYSTONE, SANDY, tan to brown and olive, hard to very hard, moist	15			50/6"	13.3		15			50/6"	15.9
	20			50/4"	11.8		20			50/4"	13.7

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
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## TEST BORING LOG

JOB No. 187746

FIGURE No. 9

DATE Aug/05/2022

TEST BORING: 11					TEST BORING: 12				
DATE DRILLED: 2/11/22 GROUNDWATER @ 17.0 ' 2/11/22					DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22				
DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
CLAY, SANDY, brown to dark brown, soft to stiff, moist to wet					CLAYSTONE, SANDY, brown, with rust staining, medium hard to very hard, moist				
5			14	5.9	5			50	12.2
10			8	11.0	10			50/8"	12.7
15			6	16.7	15			50/6"	12.7
20			4	29.0	20			50/5"	11.6

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 10

DATE Aug/05/2022

TEST BORING: 13	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 14	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/11/22 NO GROUNDWATER ON 2/11/22					
SAND, CLAYEY, tan, moist						CLAY, SANDY, brown, stiff, moist					
CLAY, SANDY, light brown to brown, stiff to very stiff, moist	5			15	8.4		5			17	5.3
	10			16	9.5	SAND, CLAYEY, with gravel, brown, loose, moist	10			9	0.9
	15			21	9.7	CLAY, SANDY, brown, moist	15			13	2.9
	20			21	10.2	SAND, CLAYEY, with gravel, tan, loose to medium dense, moist	20			10	3.6
	25			26	9.5						
CLAYSTONE, SANDY, brown to olive, very hard, moist	30			50/4"	10.7						

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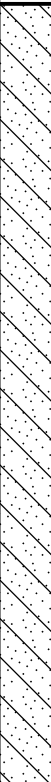









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## TEST BORING LOG

JOB No. 187746

FIGURE No. 11

DATE Aug/05/2022

TEST BORING: 15						TEST BORING: 16					
DATE DRILLED: 2/11/22 GROUNDWATER @ 14.0 ' 2/11/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %		DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	
SAND, CLAYEY, with gravel, brown to dark brown, loose to medium dense, moist to wet						CLAY, SANDY, light brown to brown, stiff to very stiff, moist					
5			32	7.8		5			13	5.8	
10			18	10.2		10			20	8.7	
15			9	24.8		15			34	10.8	
20			25	12.4		20			50/4"	11.8	
						CLAYSTONE, SANDY, brown to olive, firm to very hard, moist					

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 12

DATE Aug/05/2022



TEST BORING: 17	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 18	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/11/22 NO GROUNDWATER ON 2/11/22						DATE DRILLED: 2/11/22 NO GROUNDWATER ON 2/11/22					
CLAY, SANDY, light brown, moist						CLAY, SANDY, tan to dark brown and olive, stiff, moist					
CLAYSTONE, SANDY, olive to gray, medium hard to very hard, moist	5			10/0"	11.3		5		14		8.7
	10			50/9"	16.0		10		14		14.6
	15			50/8"	17.1		15		17		7.4
	20			50/7"	17.8		20		12		14.0

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 13

DATE Aug/05/2022

TEST BORING: 19	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 20	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/11/22 NO GROUNDWATER ON 2/11/22						DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22					
CLAY, SANDY, brown, stiff to very stiff, moist	5			17	4.7	CLAY, SANDY, light brown to tan, medium stiff to very stiff, moist	5		7	8.4	
	10			15	7.9		10		17	7.3	
	15			21	10.8	SAND, CLAYEY, brown, medium dense, moist	15		16	5.2	
	20			17	8.5	CLAY, SANDY, brown, very stiff, moist	20		20	16.3	
	25			20	7.0						
SAND, CLAYEY, tan to olive, moist											
CLAY, SANDY, brown, very stiff, moist	30			25	12.3						

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 14

DATE Aug/05/2022

TEST BORING: 21		DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 22		DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22							DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22						
SAND, CLAYEY, tan, moist							CLAY, SANDY, tan, with rust staining, stiff to very stiff, moist						
CLAY, SANDY, tan to olive, stiff to very stiff, moist		5			22	11.1			5			18	4.8
		10			18	9.3			10			20	9.7
		15			16	6.3			15			28	14.5
		20			15	8.9	CLAYSTONE, SANDY, light brown, weathered, moist		20			16	10.0

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JOB No. 187746

FIGURE No. 15

DATE Aug/05/2022

TEST BORING: <b>23</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>24</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22						DATE DRILLED: 2/11/22 NO GROUNDWATER ON 2/11/22					
CLAY, SANDY, tan, stiff to very stiff, moist	5			12	7.8	CLAY, SANDY, brown, stiff to very stiff, moist	5			18	7.2
	10			24	7.7		10			25	8.5
	15			34	8.1		15			27	8.6
	20			28	9.6	CLAYSTONE, SANDY, olive to gray, medium hard, moist	20			40	12.6

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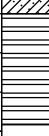


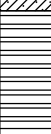

## TEST BORING LOG

JOB No. 187746

FIGURE No. 16

DATE Aug/05/2022



TEST BORING: 25					TEST BORING: 26						
DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
CLAY, SANDY, tan, stiff to very stiff, moist	5			9	7.8	CLAY, SANDY, light brown, with rust staining, very stiff to hard, moist	5			18	8.3
	10			10	9.6		10			30	9.3
	15			20	7.7		15			38	9.0
	20			24	7.9		20			50/10"	9.1
	25			20	7.0		CLAYSTONE, SANDY, brown, hard, moist				
CLAYSTONE, SANDY, tan, medium hard, moist	30			31	8.2						

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 17

DATE Aug/05/2022

TEST BORING: 27	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 28	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22						DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22					
CLAY, SANDY, brown, very stiff, moist	5			21	7.3	CLAY, SANDY, tan, very stiff, moist	5			18	8.5
	10			31	14.0		10			22	9.4
	15			33	12.4		15			32	9.8
	20			27	8.9	CLAYSTONE, SANDY, tan to olive, hard, moist	20			50	13.0

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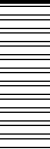



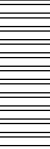





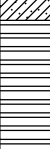





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## TEST BORING LOG

JOB No. 187746

FIGURE No. 18

DATE Aug/05/2022

TEST BORING: 29	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 30	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22						DATE DRILLED: 2/9/22 NO GROUNDWATER ON 2/9/22					
CLAYSTONE, SANDY, brown, with rust staining, medium hard to hard, moist	5			50	14.3	CLAY, SANDY, light brown, stiff to very stiff, moist	5			13	7.6
	10			50/11"	12.9		10			20	8.0
	15			50/10"	13.2		15			21	6.9
	20			50/11"	11.3	CLAYSTONE, SANDY, brown to olive, firm, moist	20			37	14.5

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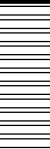



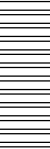



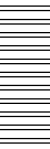







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## TEST BORING LOG

JOB No. 187746

FIGURE No. 19

DATE Aug/05/2022

TEST BORING: 31	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 32	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/14/22 NO GROUNDWATER ON 3/14/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
CLAYSTONE, SANDY, brown and olive to gray, firm to hard, moist	5			40	10.2	CLAY, SANDY, brown, very stiff, moist	5			19	13.4
	10			40	11.6	SAND, SILTY, with gravel, tan to brown, loose, moist	10			9	4.7
	15			50/8"	12.5		15			9	7.0
	20			50/9"	14.4		20			6	6.8

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## TEST BORING LOG

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FIGURE No. 20

DATE Aug/05/2022



TEST BORING: 33	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 34	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
SAND, SILTY, with gravel, tan to brown, medium dense, moist	5			11	5.6	SAND, SILTY TO CLAYEY, brown, medium dense, moist	5			12	5.5
	10			10	3.4		10			9	14.6
	15			11	1.5	CLAY, SANDY, brown, stiff to very stiff, moist	15			10	16.0
	20			14	1.8		20			21	13.5

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## TEST BORING LOG

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FIGURE No. 21

DATE Aug/05/2022

TEST BORING: <b>35</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>36</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 3/14/22 NO GROUNDWATER ON 3/14/22					
CLAY, SANDY, brown, medium stiff, moist	5			8	9.7	CLAY, SANDY, light brown, stiff to very stiff, moist	5			15	6.0
CLAYSTONE, SANDY, brown, medium hard to hard, moist	10			40	12.5		10			21	6.3
	15			50/6"	11.2		15			20	6.8
SANDSTONE, SILTY, brown, hard, moist	20			50/6"	10.8	CLAYSTONE, SANDY, olive to gray, hard, moist	20			50/8"	10.1
CLAYSTONE, SANDY, brown, hard, moist	25										
	30			50/10"	19.2						

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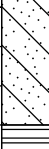









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## TEST BORING LOG

JOB No. 187746

FIGURE No. 22

DATE Aug/05/2022

TEST BORING: 37					TEST BORING: 38						
DATE DRILLED: 3/14/22 NO GROUNDWATER ON 3/14/22					DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						
CLAY, SANDY, light brown to brown and olive, stiff to very stiff, moist	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	
	5			15	7.3	SAND, SILTY, brown, moist	5			38	11.0
	10			18	6.0	CLAY, SANDY, brown, stiff to hard, moist	10			35	20.4
	15			25	10.2		15			19	17.6
	20			20	10.9	SAND, CLAYEY, brown, medium dense, moist	20			13	16.6
SAND, CLAYEY, brown, dense, moist	25			25	13.1	CLAYSTONE, SANDY, brown, medium hard, moist	25				
	30			35	13.7		30			50/11"	17.5

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## TEST BORING LOG

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FIGURE No. 23

DATE Aug/05/2022

TEST BORING: <b>39</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>40</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
SAND, SILTY TO CLAYEY, with gravel, light brown to tan, loose to medium dense, moist	5			12	10.6	SAND, SILTY, with gravel, tan to brown, medium dense, moist	5			12	6.3
	10			10	3.3	CLAY, SANDY, brown, very stiff, moist	10			16	20.0
	15			9	5.2	SAND, SILTY, with gravel, brown, loose to medium dense, moist	15			6	4.1
	20			19	2.6		20			19	2.6

ROCKY MOUNTAIN GROUP

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 24

DATE Aug/05/2022



TEST BORING: 41	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 42	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22					
CLAY, SANDY, brown, stiff to very stiff, moist	5			9	7.4	CLAY, SANDY, brown, very stiff, moist	5			19	18.2
	10			23	12.2	CLAYSTONE, SANDY, gray, medium hard to hard, moist	10			50/8"	13.0
CLAYSTONE, SANDY, brown, medium hard to very hard, moist	15			50/7"	12.8		15			50/8"	14.5
AUGER REFUSAL AT 18 FEET DUE TO VERY HARD BEDROCK	20						20			50/8"	14.3

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 25

DATE Aug/05/2022

TEST BORING: <b>43</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>44</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
SAND, SILTY, light brown, moist						CLAY, SANDY, brown, very stiff, moist					
CLAY, SANDY, light brown to dark brown, stiff to very stiff, moist	5			39	12.9		5			33	12.6
	10			16	10.2		10			41	13.2
	15			17	15.5	CLAYSTONE, SANDY, brown, medium hard, moist	15			50/9"	11.9
CLAYSTONE, SANDY, brown, firm, moist	20			48	18.6		20			50/9"	12.6

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




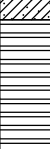

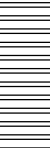

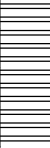

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 26

DATE Aug/05/2022

TEST BORING: <b>45</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>46</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
SAND, SILTY, brown, loose to medium dense, moist	5			9	3.8	CLAY, SANDY, brown, very stiff, moist	5			21	8.9
	10			25	7.7	CLAYSTONE, SANDY, brown, firm, moist	10			41	9.2
CLAYSTONE, SANDY, brown, medium hard to hard, moist	15			50/9"	13.6		15			45	9.6
	20			50/6"	13.9		20			46	9.3

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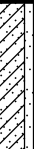













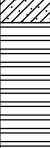

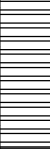


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## TEST BORING LOG

JOB No. 187746

FIGURE No. 27

DATE Aug/05/2022

TEST BORING: 47						TEST BORING: 48					
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
SAND, SILTY TO CLAYEY, tan to brown, loose, moist	5			10	3.9	CLAY, SANDY, brown, stiff to very stiff, moist	5			12	9.4
	10			10	6.2		10			18	10.8
	15			9	11.7		15			16	9.5
	20			6	18.1		20			25	13.6
						CLAYSTONE, SANDY, brown, medium hard, moist	25				
							30			50/7"	13.7

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 28

DATE Aug/05/2022



TEST BORING: <b>49</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>50</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
CLAYSTONE, SANDY, brown, firm to medium hard, moist	5			33	14.8	CLAY, SANDY, brown, stiff to very stiff, moist	5			13	7.1
	10			50/10"	13.3		10			21	10.3
	15			50/7"	14.5	CLAYSTONE, SANDY, brown, firm to medium hard, moist	15			45	11.0
	20				16.0		20			50/8"	12.6

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 29

DATE Aug/05/2022

TEST BORING: 51	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 52	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
CLAY, SANDY, brown to dark brown and olive, stiff, moist	5			13	3.8	CLAY, SANDY, with gravel, light brown to dark brown and olive to gray, stiff, moist	5			18	6.2
	10			16	15.9	SAND, CLAYEY, with gravel, brown, loose, moist	10			14	2.9
	15			12	6.0	CLAY, SANDY, brown, very stiff, moist	15			20	10.0
	20			7	18.9		20			20	18.9

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 30

DATE Aug/05/2022

TEST BORING: <b>53</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>54</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
CLAY, SANDY, brown to dark brown, stiff to very stiff, moist	5			15	6.2	CLAY, SANDY, brown, stiff, moist	5			13	12.9
	10			32	17.4		10			14	11.1
	15			14	8.2		15			17	16.2
	20			11	5.6	SAND, CLAYEY, light brown, loose, moist	20			8	4.4
SAND, CLAYEY, brown, loose to medium dense, moist	25			7	13.0						
CLAY, SANDY, brown to olive, stiff, moist	30			15	18.4						

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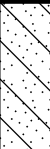

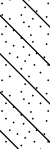

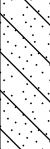









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Civil, Planning

## TEST BORING LOG

JOB No. 187746

FIGURE No. 31

DATE Aug/05/2022

TEST BORING: <b>55</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>56</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
SAND, CLAYEY, brown to dark brown, loose, moist	5			10	5.4	SAND, CLAYEY, brown, loose, moist	5			8	5.3
	10			13	7.5		10			8	8.6
	15			10	5.5		15			8	9.1
CLAY, SANDY, dark brown, stiff, moist	20			14	15.4		20			5	12.6

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 32

DATE Aug/05/2022



TEST BORING: 57					TEST BORING: 58				
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22				
DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
CLAYSTONE, SANDY, olive to gray, medium hard to hard, moist					SAND, SILTY TO CLAYEY, light brown to brown, medium dense, moist				
5			50/6"	13.5	5			19	6.0
10			50/6"	13.7	10			22	5.9
15			50/7"	14.5	15			27	6.5
20			50	13.4	20			10	9.4
					CLAY, SANDY, olive, medium stiff to stiff, moist				
					25			7	11.8
					30			9	19.7

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 33

DATE Aug/05/2022

TEST BORING: <b>59</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>60</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
CLAY, SANDY, brown, moist						CLAY, SANDY, brown to olive, stiff, moist					
CLAYSTONE, SANDY, brown and olive to gray, firm to hard, moist	5			35	11.4		5		11	9.1	
	10			50/7"	11.9		10		13	13.8	
	15			50/6"	13.2		15		14	15.9	
	20			50/8"	12.5		20		13	15.7	

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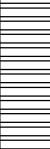







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## TEST BORING LOG

JOB No. 187746

FIGURE No. 34

DATE Aug/05/2022

TEST BORING: 61					TEST BORING: 62				
DATE DRILLED: 3/8/22 NO GROUNDWATER ON 3/8/22					DATE DRILLED: 3/8/22 NO GROUNDWATER ON 3/8/22				
DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
5			29	8.4	5			26	9.4
10			50/8"	12.2	10			32	10.9
15			50/6"	12.6	15			50/8"	11.9
20			50/7"	11.5	20			50/5"	11.7
25			50/6"	20.6					

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 35

DATE Aug/05/2022

TEST BORING: <b>63</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: <b>64</b>	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22						DATE DRILLED: 3/12/22 NO GROUNDWATER ON 3/12/22					
CLAY, SANDY, brown to olive, stiff to hard, moist	5			24	10.9	CLAY, SANDY, olive, very stiff, moist	5			40	12.2
	10			50/9"	13.4	CLAYSTONE, SANDY, brown to olive, hard to very hard, moist	10			42	14.5
	15			50/8"	14.5		15			50/6"	10.7
	20			12	16.5		20			50/7"	11.6

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 36

DATE Aug/05/2022



TEST BORING: 65					TEST BORING: 66						
DATE DRILLED: 3/8/22 NO GROUNDWATER ON 3/8/22					DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						
CLAYSTONE, SANDY, brown to olive, medium hard to very hard, moist	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	CLAYSTONE, SANDY, brown and olive to dark gray, firm to very hard, moist	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	5			50/11"	11.0		5			41	12.6
	10			50/7"	10.8		10			50/6"	12.3
	15			50/6"	10.4		15			50/6"	12.4
	20			50/7"	13.2		20			50/6"	13.4
							25			50/5"	12.3

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 37

DATE Aug/05/2022

TEST BORING: 67	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 68	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 3/8/22 NO GROUNDWATER ON 3/8/22						DATE DRILLED: 3/8/22 NO GROUNDWATER ON 3/8/22					
CLAY, SANDY, brown, stiff, moist	5			12	13.4	CLAY, SANDY, brown, very stiff, moist	5			22	8.4
CLAYSTONE, SANDY, brown to dark brown and olive, firm to hard, moist	10			45	13.8		10			35	10.0
	15			50/9"	10.7	CLAYSTONE, SANDY, dark brown, medium hard, moist	15			50	14.9
	20			50/10"	10.5		20			49	14.4

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 38

DATE Aug/05/2022

TEST BORING: 69	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 70	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
DATE DRILLED: 2/14/22 NO GROUNDWATER ON 2/14/22						DATE DRILLED: 3/8/22 NO GROUNDWATER ON 3/8/22					
CLAY, SANDY, brown to olive, very stiff, moist	5			25	8.9	CLAY, SANDY, brown, very stiff, moist	5			25	13.8
CLAYSTONE, SANDY, brown to olive, firm to hard, moist	10			33	10.1	CLAYSTONE, SANDY, brown to dark brown and olive, medium hard to very hard, moist	10			50/8"	15.3
	15			50/9"	12.0		15			50/9"	14.6
	20			50/6"	10.5		20			38	12.0
							25				
							30			50/4"	11.4

ROCKY MOUNTAIN GROUP

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## TEST BORING LOG

JOB No. 187746

FIGURE No. 39

DATE Aug/05/2022

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
1	4.0	5.3	103.2	23	8	0.0	25.8		- 1.3	SC
1	9.0	6.8								
1	14.0	8.4								
1	19.0	11.5								
1	24.0	12.4	110.1	25	10				- 0.9	
1	29.0	11.1				0.3	21.7			
2	4.0	6.5								
2	9.0	13.6	107.4			1.9	32.3		- 0.7	
2	14.0	13.1								
2	19.0	9.8								
3	4.0	3.4				0.0	7.9			
3	9.0	10.9								
3	14.0	6.8								
3	19.0	5.5								
4	4.0	7.7								
4	9.0	9.3								
4	14.0	12.7		30	13	0.4	28.9			SC
4	19.0	15.4								
4	24.0	10.2								
5	4.0	7.4								
5	9.0	7.9	102.1				32.7		- 2.4	
5	14.0	8.6								
5	19.0	6.1								
6	4.0	5.7								
6	9.0	6.1								
6	14.0	8.4	102.5	24	10		38.8		- 2.3	SC
6	19.0	9.5								
7	9.0	4.2		NP	NP	0.0	22.6			SM
7	14.0	5.1								
7	19.0	14.1								
8	4.0	6.2				0.5	14.3			
8	9.0	8.8								
8	14.0	14.7								
8	19.0	19.1								

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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746

FIGURE No. 40

PAGE 1 OF 9

DATE Aug/05/2022

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
9	4.0	6.2		30	19	0.0	54.6			CL
9	9.0	10.7								
9	14.0	13.3								
9	19.0	11.8								
10	4.0	7.7								
10	9.0	12.1	118.5	42	25	0.0	67.9		0.9	CL
10	14.0	15.9								
10	19.0	13.7								
11	4.0	5.9								
11	9.0	11.0	103.7	29	18	0.0	54.6		- 0.7	CL
11	14.0	16.7								
11	19.0	29.0								
12	4.0	12.2	115.8				74.4		6.8	
12	9.0	12.7								
12	14.0	12.7								
12	19.0	11.6								
13	4.0	8.4								
13	9.0	9.5	107.5				57.3		1.6	
13	14.0	9.7								
13	19.0	10.2								
13	24.0	9.5	99.5	38	24		77.8		0.0	CL
13	29.0	10.7								
14	4.0	5.3								
14	9.0	0.9				0.2	3.0			SP
14	14.0	2.9								
14	19.0	3.6								
15	4.0	7.8	111.2	32	21		41.6		1.9	SC
15	9.0	10.2								
15	14.0	24.8								
15	19.0	12.4								
16	4.0	5.8		27	8	0.0	54.8			CL
16	9.0	8.7								
16	14.0	10.8								
16	19.0	11.8								

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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746  
FIGURE No. 40  
PAGE 2 OF 9  
DATE Aug/05/2022



Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
17	4.0	11.3								
17	9.0	16.0	115.3	73	54				4.1	
17	14.0	17.1								
17	19.0	17.8								
18	4.0	8.7	91.3	36	22				- 1.8	
18	9.0	14.6								
18	14.0	7.4								
18	19.0	14.0								
19	4.0	4.7								
19	9.0	7.9								
19	14.0	10.8								
19	19.0	8.5					61.1			
19	24.0	7.0	99.4						- 3.7	
19	29.0	12.3	109.9	32	17		64.5		- 0.7	CL
20	4.0	8.4		35	25		76.7			CL
20	9.0	7.3								
20	14.0	5.2								
20	19.0	16.3								
21	4.0	11.1								
21	9.0	9.3		33	19	0.0	65.6			CL
21	14.0	6.3								
21	19.0	8.9								
22	4.0	4.8					60.2			
22	9.0	9.7								
22	14.0	14.5								
22	19.0	10.0								
23	4.0	7.8								
23	9.0	7.7	103.1	36	25		70.1		0.8	CL
23	14.0	8.1								
23	19.0	9.6								
24	4.0	7.2								
24	9.0	8.5								
24	14.0	8.6	113.3	34	19				2.3	
24	19.0	12.6								

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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746  
FIGURE No. 40  
PAGE 3 OF 9  
DATE Aug/05/2022

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
25	4.0	7.8								
25	9.0	9.6								
25	14.0	7.7	106.0	32	17				0.7	
25	19.0	7.9								
25	24.0	7.0		32	17		61.7			CL
25	29.0	8.2		35	22		61.0			CL
26	4.0	8.3								
26	9.0	9.3	114.8	33	22		71.9		0.8	CL
26	14.0	9.0								
26	19.0	9.1								
27	4.0	7.3	85.0				58.2		4.3	
27	9.0	14.0								
27	14.0	12.4								
27	19.0	8.9								
28	4.0	8.5								
28	9.0	9.4				0.0	82.4			
28	14.0	9.8								
28	19.0	13.0								
29	4.0	14.3	117.0				98.1		4.9	
29	9.0	12.9								
29	14.0	13.2								
29	19.0	11.3								
30	4.0	7.6								
30	9.0	8.0		31	14		70.0			CL
30	14.0	6.9								
30	19.0	14.5								
31	4.0	10.2								
31	9.0	11.6	127.4	49	32		87.5		4.8	CL
31	14.0	12.5								
31	19.0	14.4								
32	4.0	13.4	96.4	49	30	0.0	86.6		- 0.4	CL
32	9.0	4.7								
32	14.0	7.0								
32	19.0	6.8								

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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746  
FIGURE No. 40  
PAGE 4 OF 9  
DATE Aug/05/2022

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
33	4.0	5.6								
33	9.0	3.4				2.1	26.4			
33	14.0	1.5								
33	19.0	1.8								
34	4.0	5.5								
34	9.0	14.6		33	19		89.3			CL
34	14.0	16.0								
34	19.0	13.5								
35	4.0	9.7		38	23		73.0			CL
35	9.0	12.5								
35	14.0	11.2								
35	19.0	10.8								
35	29.0	19.2		59	39	0.0	92.2			CH
36	4.0	6.0	101.6	27	9		53.4		- 1.5	CL
36	9.0	6.3								
36	14.0	6.8								
36	19.0	10.1								
37	4.0	7.3								
37	9.0	6.0								
37	14.0	10.2	106.2				84.2		1.2	
37	19.0	10.9								
37	24.0	13.1								
37	29.0	13.7		45	30		79.3			CL
38	4.0	11.0								
38	9.0	20.4	102.5				98.0		2.2	
38	14.0	17.6								
38	19.0	16.6								
38	29.0	17.5	108.9				97.4		- 0.8	
39	4.0	10.6								
39	9.0	3.3		59	36	0.5	24.9			SC
39	14.0	5.2								
39	19.0	2.6								
40	4.0	6.3								
40	9.0	20.0		40	24	0.0	85.3			CL

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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746  
FIGURE No. 40  
PAGE 5 OF 9  
DATE Aug/05/2022

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
40	14.0	4.1								
40	19.0	2.6								
41	4.0	7.4		29	10	0.0	64.2			CL
41	9.0	12.2								
41	14.0	12.8								
42	4.0	18.2	111.8	48	32	0.0	71.7		4.7	CL
42	9.0	13.0								
42	14.0	14.5								
42	19.0	14.3								
43	4.0	12.9	112.0	48	32		82.0		5.6	CL
43	9.0	10.2								
43	14.0	15.5								
43	19.0	18.6								
44	4.0	12.6								
44	9.0	13.2	118.6				90.7		6.2	
44	14.0	11.9								
44	19.0	12.6								
45	4.0	3.8				0.5	31.4			
45	9.0	7.7								
45	14.0	13.6								
45	19.0	13.9								
46	4.0	8.9								
46	9.0	9.2								
46	14.0	9.6	118.9			0.0	80.6		4.3	
46	19.0	9.3								
47	4.0	3.9				0.1	25.4			
47	9.0	6.2								
47	14.0	11.7								
47	19.0	18.1								
48	4.0	9.4								
48	9.0	10.8		36	22		73.4			CL
48	14.0	9.5								
48	19.0	13.6								
48	29.0	13.7	121.2	47	31		92.8		4.9	CL

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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746  
FIGURE No. 40  
PAGE 6 OF 9  
DATE Aug/05/2022

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
49	4.0	14.8		54	35		82.7			CH
49	9.0	13.3								
49	14.0	14.5								
49	19.0	16.0								
50	4.0	7.1								
50	9.0	10.3	111.1	36	24				1.6	
50	14.0	11.0								
50	19.0	12.6								
51	4.0	3.8								
51	9.0	15.9	119.2	46	31		50.3		0.8	CL
51	14.0	6.0								
51	19.0	18.9								
52	4.0	6.2				0.0	39.7			
52	9.0	2.9								
52	14.0	10.0								
52	19.0	18.9								
53	4.0	6.2								
53	9.0	17.4	106.6	58	39	0.0	97.7		3.3	CH
53	14.0	8.2								
53	19.0	5.6								
53	24.0	13.0				2.0	48.1			
53	29.0	18.4								
54	4.0	12.9	89.0				84.9		- 0.4	
54	9.0	11.1								
54	14.0	16.2								
54	19.0	4.4								
55	4.0	5.4								
55	9.0	7.5				0.0	38.1			
55	14.0	5.5								
55	19.0	15.4								
56	4.0	5.3								
56	9.0	8.6				0.0	42.0			
56	14.0	9.1								
56	19.0	12.6								

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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746

FIGURE No. 40

PAGE 7 OF 9

DATE Aug/05/2022



Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
57	4.0	13.5								
57	9.0	13.7								
57	14.0	14.5	116.4	49	34				2.1	
57	19.0	13.4								
58	4.0	6.0								
58	9.0	5.9								
58	14.0	6.5	99.6	19	7	0.0	40.1		- 5.5	SC-SM
58	19.0	9.4								
58	24.0	11.8								
58	29.0	19.7								
59	4.0	11.4								
59	9.0	11.9	116.6	46	32		89.5		6.1	CL
59	14.0	13.2								
59	19.0	12.5								
60	4.0	9.1				0.0	69.2			
60	9.0	13.8								
60	14.0	15.9								
60	19.0	15.7								
61	4.0	8.4								
61	9.0	12.2	124.4	42	28	0.0	97.5		3.6	CL
61	14.0	12.6								
61	19.0	11.5								
61	24.0	20.6								
62	4.0	9.4								
62	9.0	10.9	117.2	38	26	1.9	84.6		2.5	CL
62	14.0	11.9								
62	19.0	11.7								
63	4.0	10.9	111.1	37	22				3.3	
63	9.0	13.4								
63	14.0	14.5								
63	19.0	16.5								
64	4.0	12.2								
64	9.0	14.5		47	34		76.0			CL
64	14.0	10.7								

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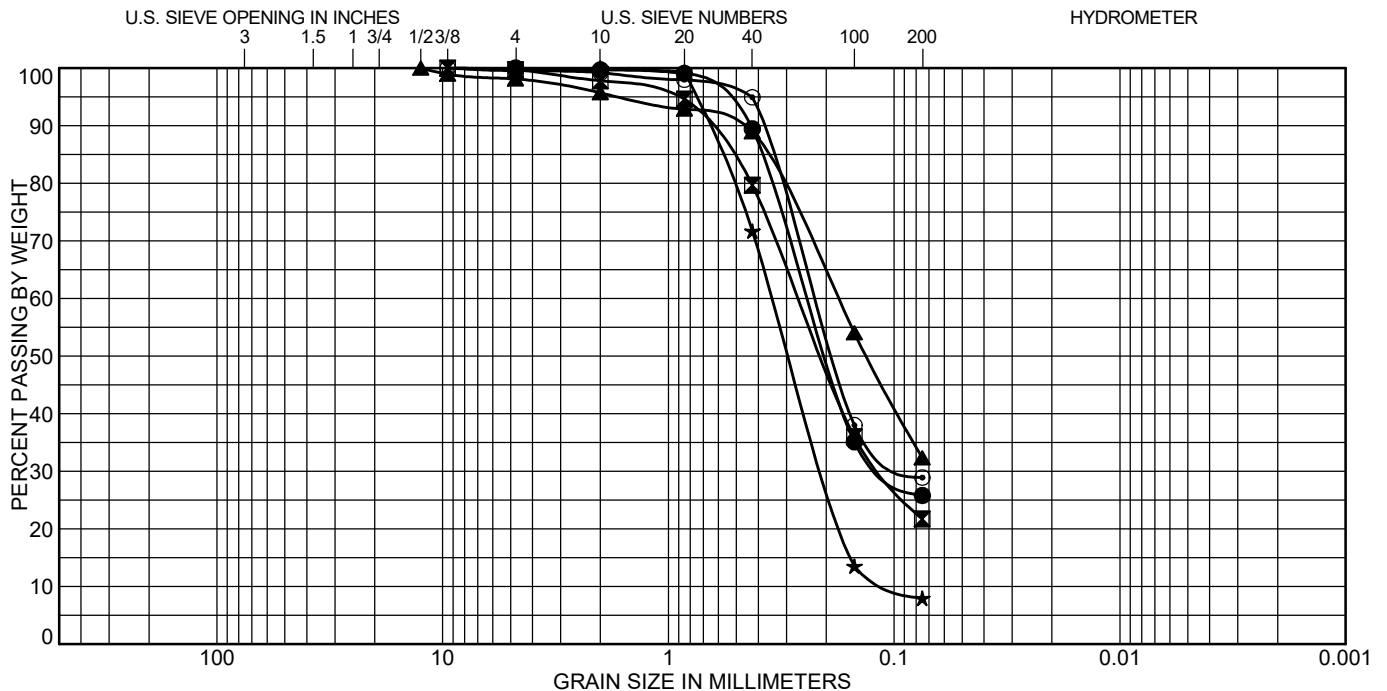
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## SUMMARY OF LABORATORY TEST RESULTS

JOB No. 187746  
FIGURE No. 40  
PAGE 8 OF 9  
DATE Aug/05/2022

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
64	19.0	11.6								
65	4.0	11.0								
65	9.0	10.8								
65	14.0	10.4	118.5			0.0	91.9		5.4	
65	19.0	13.2								
66	4.0	12.6								
66	9.0	12.3	122.2	48	32		90.4		2.3	CL
66	14.0	12.4								
66	19.0	13.4								
66	24.0	12.3								
67	4.0	13.4								
67	9.0	13.8		44	31	0.0	95.6			CL
67	14.0	10.7								
67	19.0	10.5								
68	4.0	8.4		33	20	0.0	85.3			CL
68	9.0	10.0								
68	14.0	14.9								
68	19.0	14.4								
69	4.0	8.9								
69	9.0	10.1	102.4				80.9		1.2	
69	14.0	12.0								
69	19.0	10.5								
70	4.0	13.8								
70	9.0	15.3		62	47	0.0	99.0			CH
70	14.0	14.6								
70	19.0	12.0								
70	29.0	11.4								



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification			LL	PL	PI
● 1	4.0	CLAYEY SAND(SC)			23	15	8
☒ 1	29.0						
▲ 2	9.0						
★ 3	4.0						
⊙ 4	14.0	CLAYEY SAND(SC)			30	17	13
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay		
● 1	4.0	0.0	74.2	25.8			
☒ 1	29.0	0.3	78.0	21.7			
▲ 2	9.0	1.9	65.8	32.3			
★ 3	4.0	0.0	92.1	7.9			
⊙ 4	14.0	0.4	70.7	28.9			

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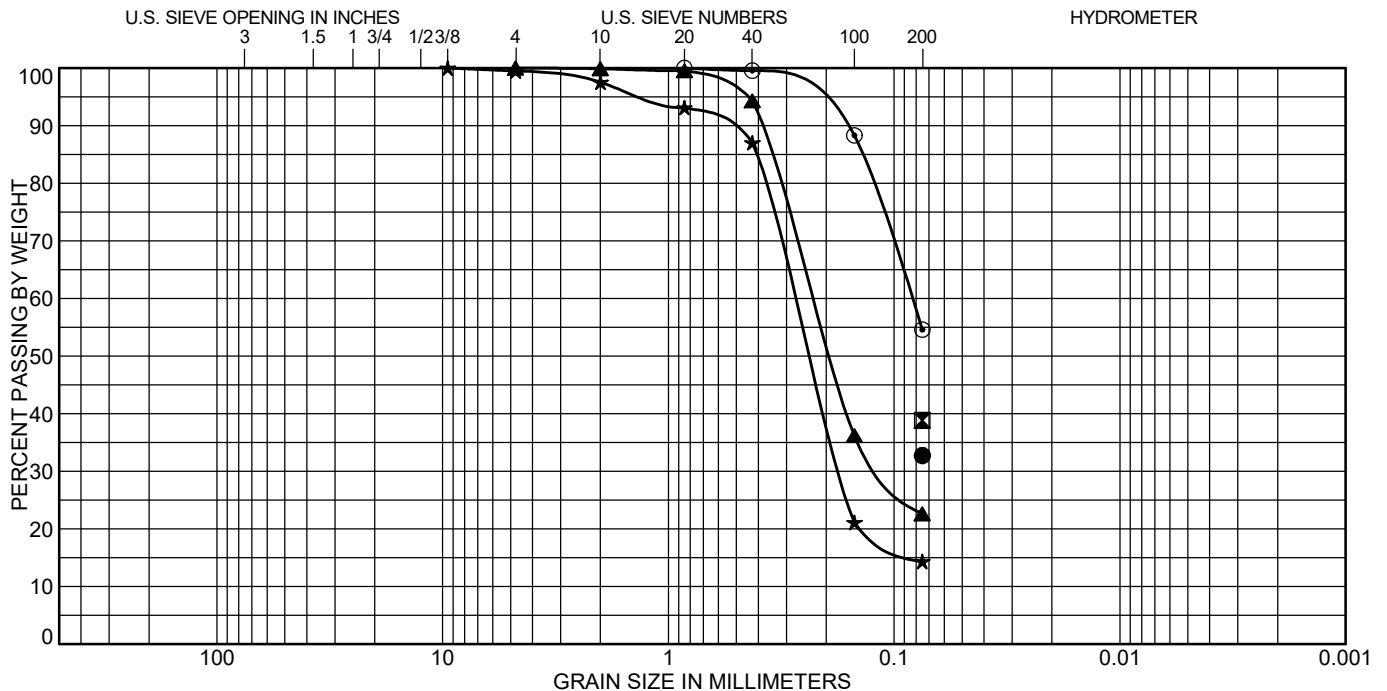
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## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 41

DATE Aug/05/2022



Test Boring	Depth (ft)	Classification	LL	PL	PI
● 5	9.0				
▣ 6	14.0	CLAYEY SAND(SC)	24	14	10
▲ 7	9.0	SILTY SAND(SM)	NP	NP	NP
★ 8	4.0				
⊙ 9	4.0	SANDY LEAN CLAY(CL)	30	11	19

Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 5	9.0			32.7	
▣ 6	14.0			38.8	
▲ 7	9.0	0.0	77.4	22.6	
★ 8	4.0	0.5	85.2	14.3	
⊙ 9	4.0	0.0	45.4	54.6	

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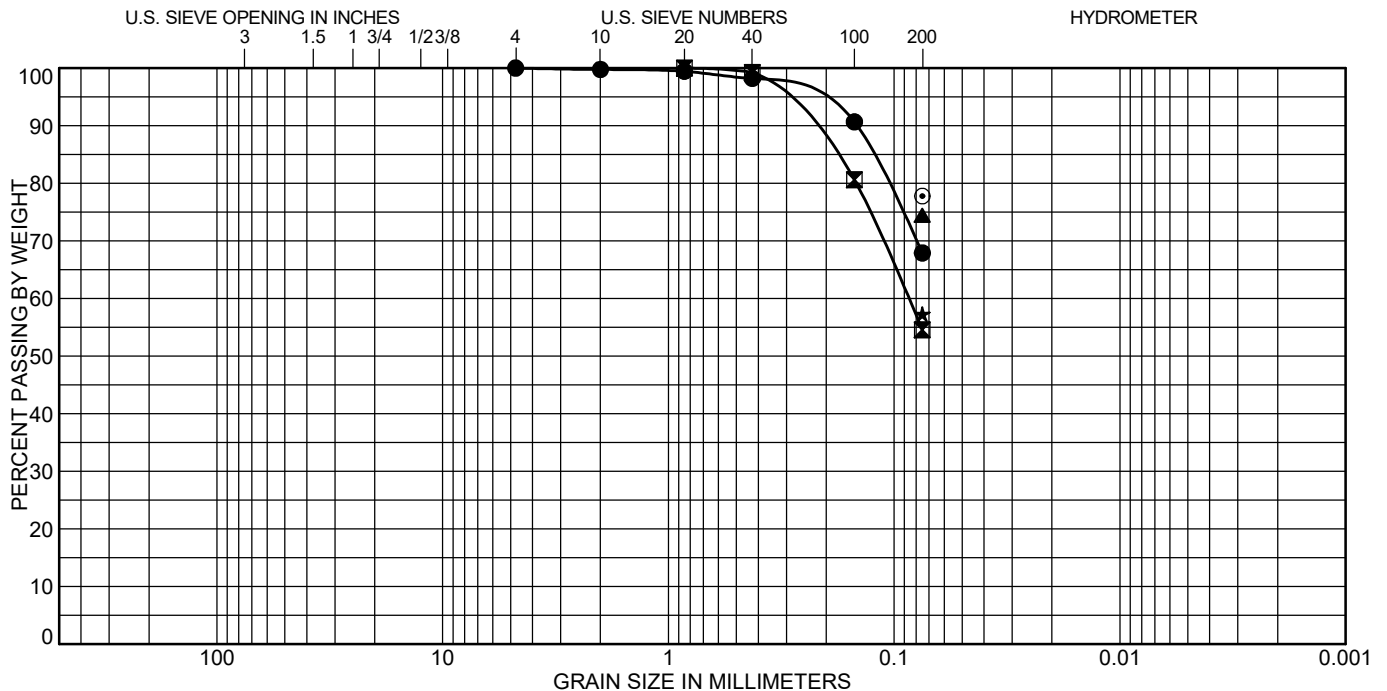
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## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 42

DATE Aug/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification				LL	PL	PI
● 10	9.0	SANDY LEAN CLAY(CL)				42	17	25
⊠ 11	9.0	SANDY LEAN CLAY(CL)				29	11	18
▲ 12	4.0							
★ 13	9.0							
⊙ 13	24.0	LEAN CLAY with SAND(CL)				38	14	24
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay			
● 10	9.0	0.0	32.1	67.9				
⊠ 11	9.0	0.0	45.4	54.6				
▲ 12	4.0			74.4				
★ 13	9.0			57.3				
⊙ 13	24.0			77.8				

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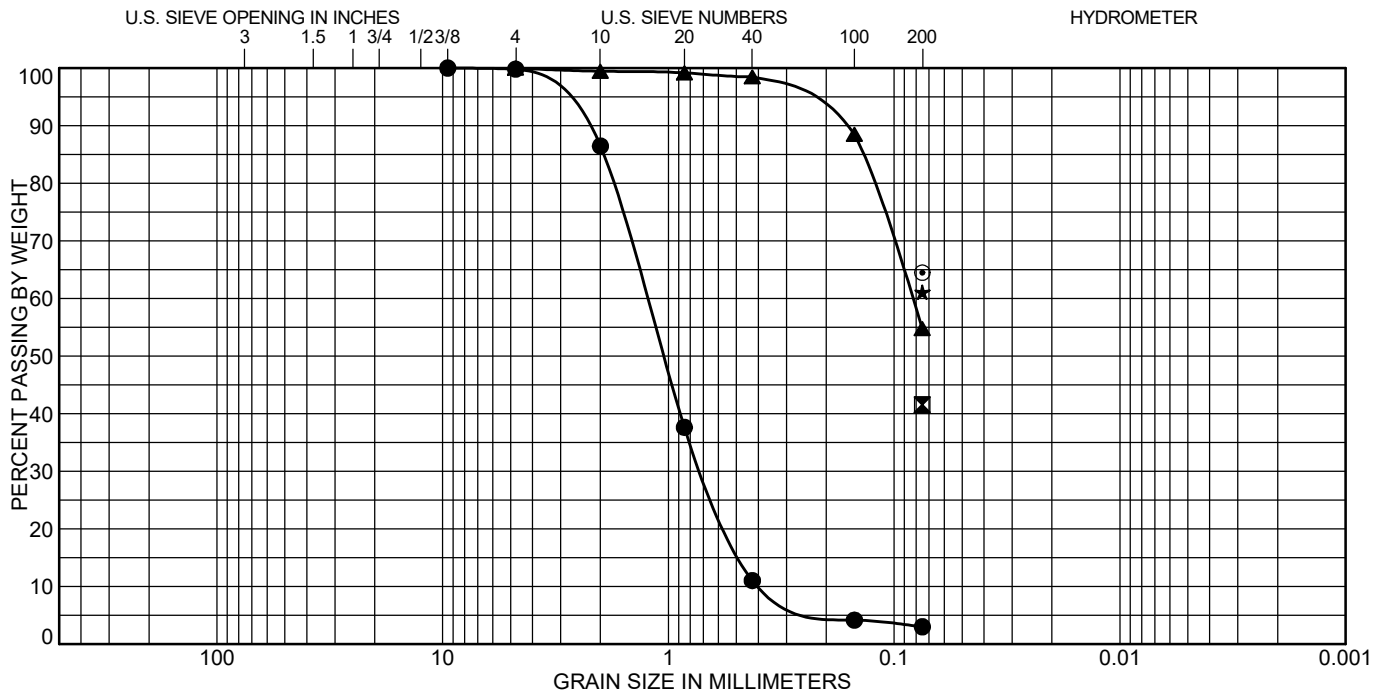
## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 43

DATE Aug/05/2022





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification				LL	PL	PI
● 14	9.0	POORLY GRADED SAND(SP)						
⊠ 15	4.0	CLAYEY SAND(SC)				32	11	21
▲ 16	4.0	SANDY LEAN CLAY(CL)				27	19	8
★ 19	19.0							
⊙ 19	29.0	SANDY LEAN CLAY(CL)				32	15	17
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay			
● 14	9.0	0.2	96.8	3.0				
⊠ 15	4.0			41.6				
▲ 16	4.0	0.0	45.2	54.8				
★ 19	19.0			61.1				
⊙ 19	29.0			64.5				

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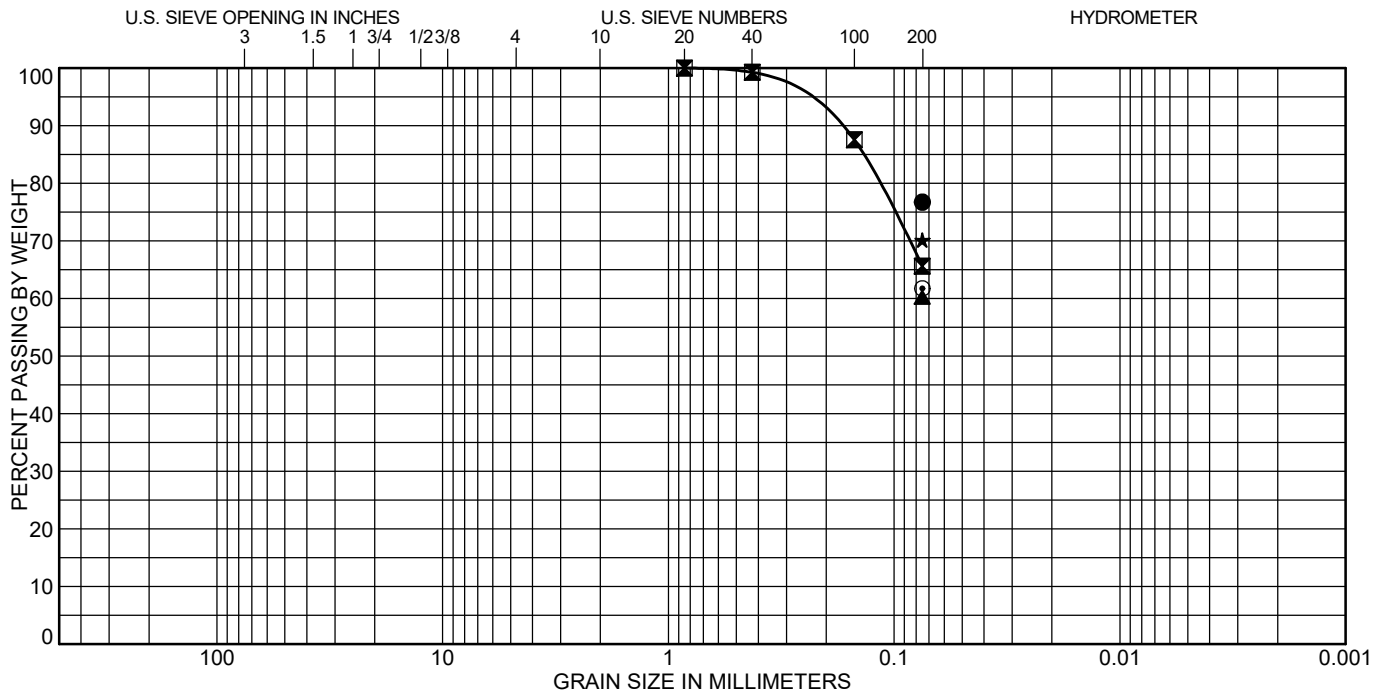
Geotechnical  
Materials Testing  
Civil, Planning

## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 44

DATE Aug/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification	LL	PL	PI
● 20	4.0	LEAN CLAY with SAND(CL)	35	10	25
⊠ 21	9.0	SANDY LEAN CLAY(CL)	33	14	19
▲ 22	4.0				
★ 23	9.0	LEAN CLAY with SAND(CL)	36	11	25
⊙ 25	24.0	SANDY LEAN CLAY(CL)	32	15	17

Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 20	4.0			76.7	
⊠ 21	9.0	0.0	34.4	65.6	
▲ 22	4.0			60.2	
★ 23	9.0			70.1	
⊙ 25	24.0			61.7	

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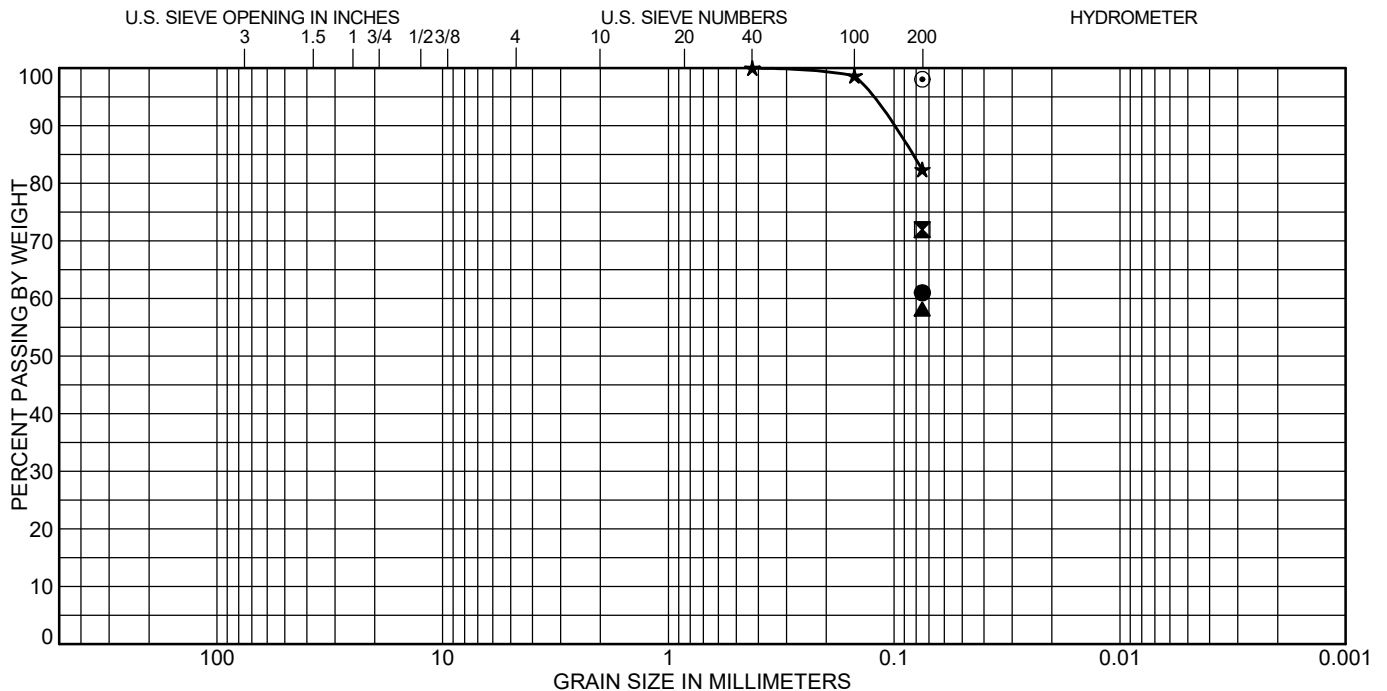
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Materials Testing  
Civil, Planning

## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 45

DATE Aug/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification	LL	PL	PI
● 25	29.0	<b>SANDY LEAN CLAY(CL)</b>	<b>35</b>	<b>13</b>	<b>22</b>
⊠ 26	9.0	<b>LEAN CLAY with SAND(CL)</b>	<b>33</b>	<b>11</b>	<b>22</b>
▲ 27	4.0				
★ 28	9.0				
⊙ 29	4.0				

Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 25	29.0			<b>61.0</b>	
⊠ 26	9.0			<b>71.9</b>	
▲ 27	4.0			<b>58.2</b>	
★ 28	9.0	<b>0.0</b>	<b>17.6</b>	<b>82.4</b>	
⊙ 29	4.0			<b>98.1</b>	

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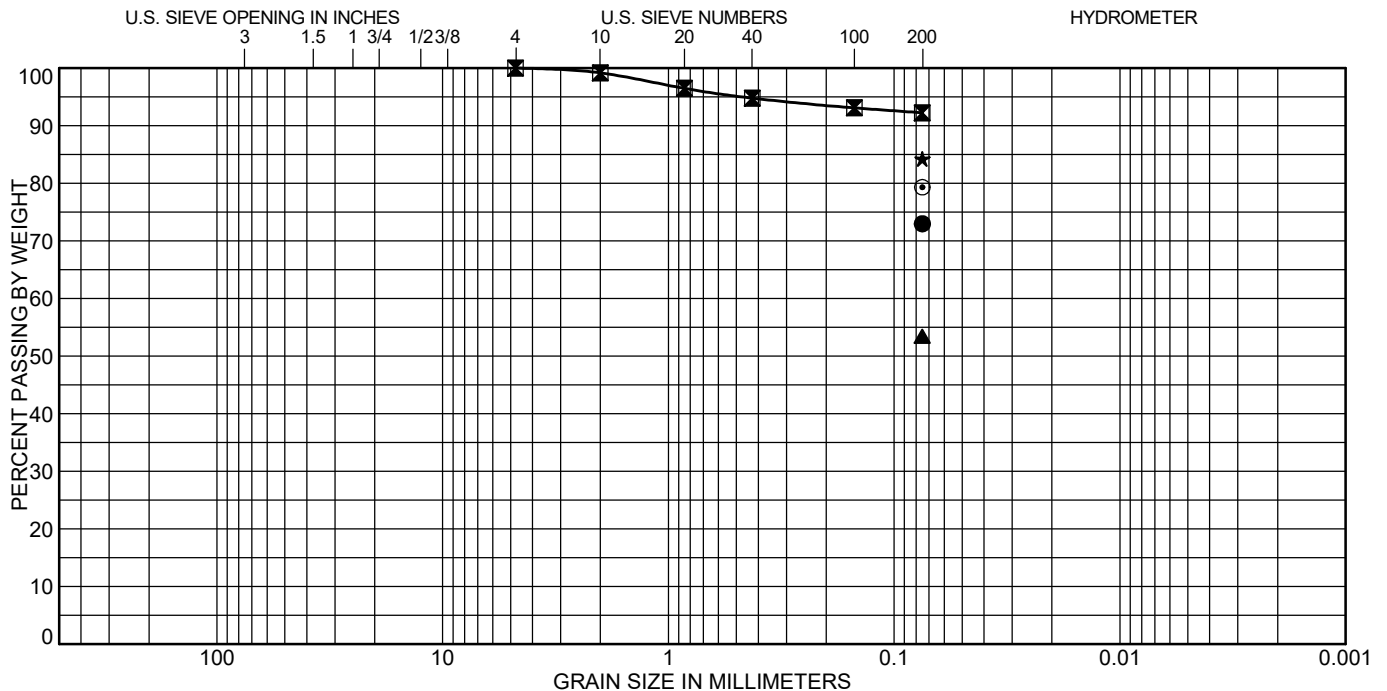
## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 46

DATE Aug/05/2022





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification	LL	PL	PI
● 35	4.0	LEAN CLAY with SAND(CL)	38	15	23
⊠ 35	29.0	FAT CLAY(CH)	59	20	39
▲ 36	4.0	SANDY LEAN CLAY(CL)	27	18	9
★ 37	14.0				
⊙ 37	29.0	LEAN CLAY with SAND(CL)	45	15	30
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 35	4.0			73.0	
⊠ 35	29.0	0.0	7.8	92.2	
▲ 36	4.0			53.4	
★ 37	14.0			84.2	
⊙ 37	29.0			79.3	

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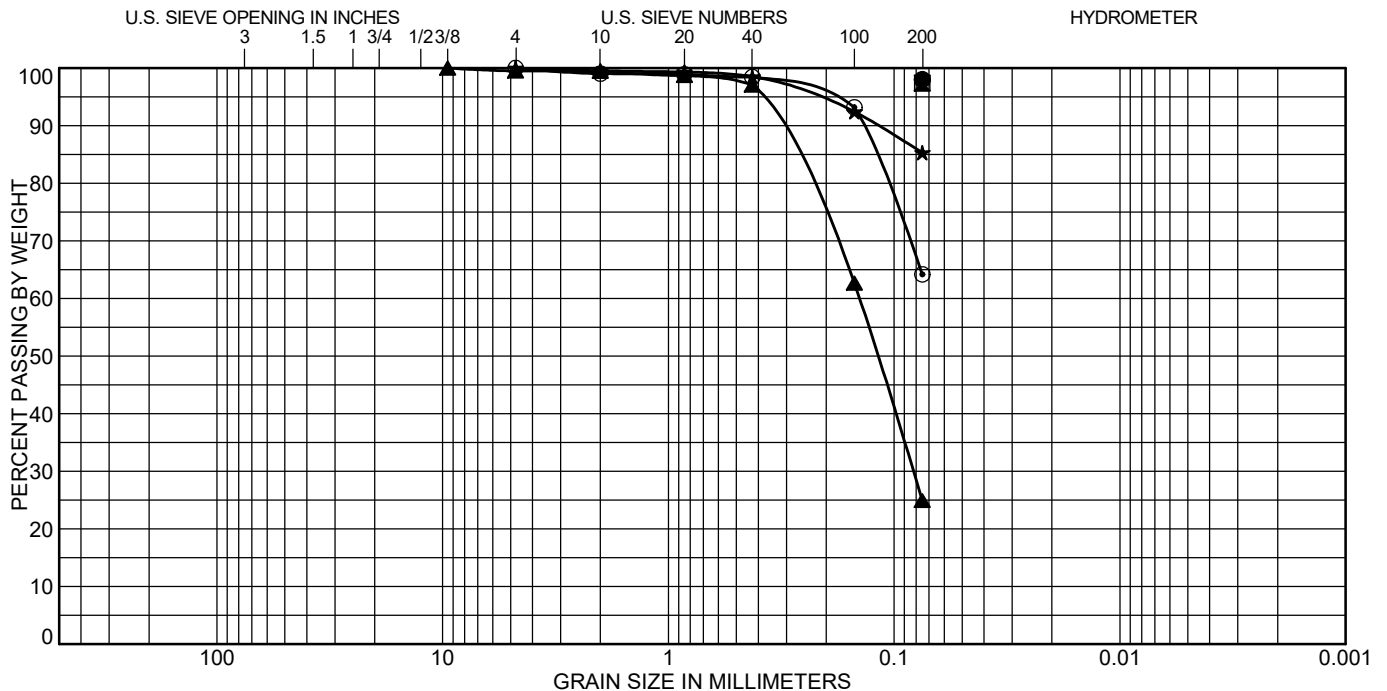
## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 48

DATE Aug/05/2022





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification			LL	PL	PI
● 38	9.0						
☒ 38	29.0						
▲ 39	9.0	CLAYEY SAND(SC)			59	23	36
★ 40	9.0	LEAN CLAY(CL)			40	16	24
⊙ 41	4.0	SANDY LEAN CLAY(CL)			29	19	10
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay		
● 38	9.0			98.0			
☒ 38	29.0			97.4			
▲ 39	9.0	0.5	74.6	24.9			
★ 40	9.0	0.0	14.7	85.3			
⊙ 41	4.0	0.0	35.8	64.2			

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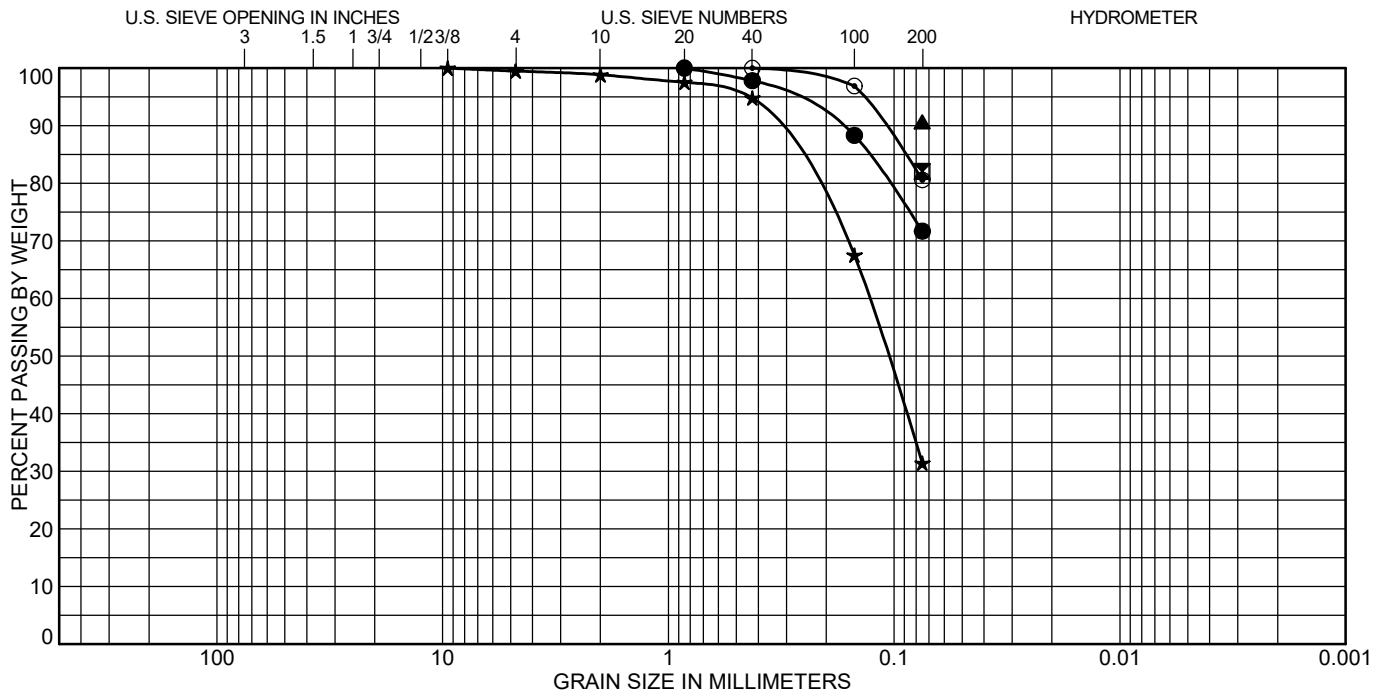
Geotechnical  
Materials Testing  
Civil, Planning

## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 49

DATE Aug/05/2022



Test Boring	Depth (ft)	Classification			LL	PL	PI
● 42	4.0	LEAN CLAY with SAND(CL)			48	16	32
☒ 43	4.0	LEAN CLAY with SAND(CL)			48	16	32
▲ 44	9.0						
★ 45	4.0						
⊙ 46	14.0						
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay		
● 42	4.0	0.0	28.3	71.7			
☒ 43	4.0			82.0			
▲ 44	9.0			90.7			
★ 45	4.0	0.5	68.1	31.4			
⊙ 46	14.0	0.0	19.4	80.6			

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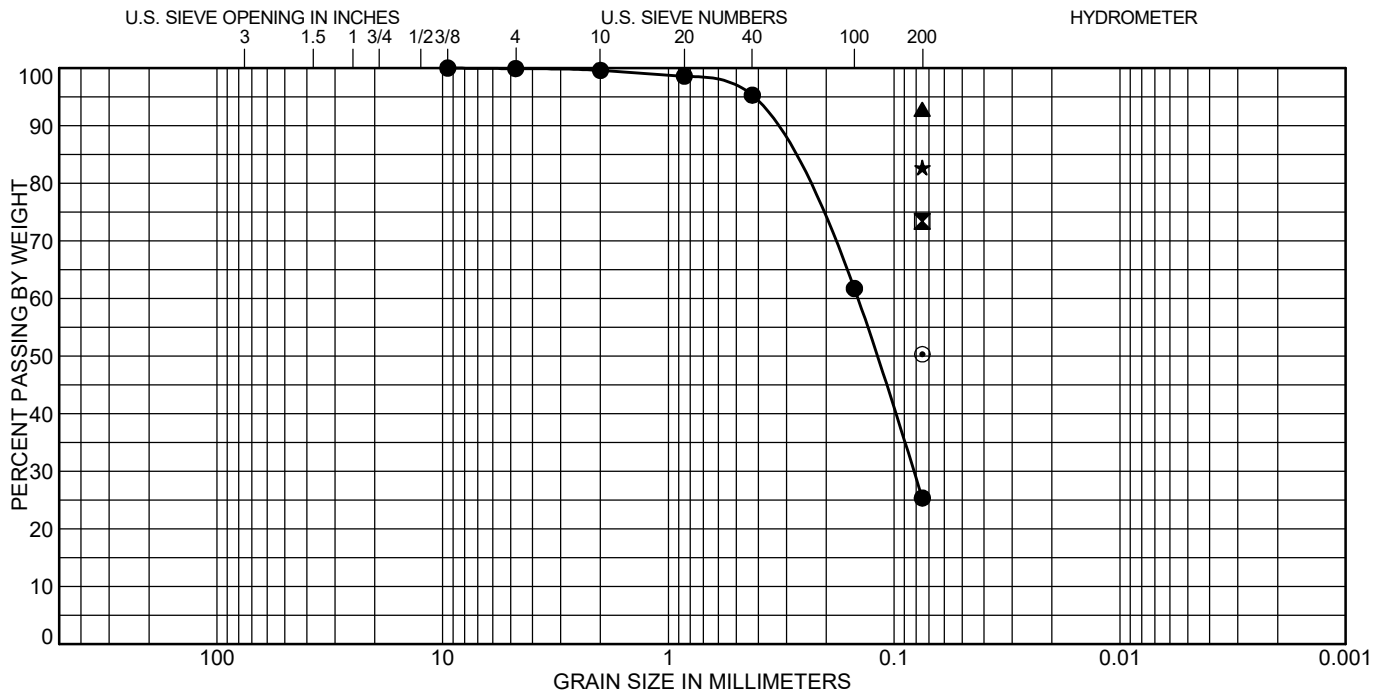
Geotechnical  
Materials Testing  
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## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 50

DATE Aug/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification				LL	PL	PI
● 47	4.0							
⊠ 48	9.0	LEAN CLAY with SAND(CL)				36	14	22
▲ 48	29.0	LEAN CLAY(CL)				47	16	31
★ 49	4.0	FAT CLAY with SAND(CH)				54	19	35
⊙ 51	9.0	SANDY LEAN CLAY(CL)				46	15	31
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay			
● 47	4.0	0.1	74.5	25.4				
⊠ 48	9.0			73.4				
▲ 48	29.0			92.8				
★ 49	4.0			82.7				
⊙ 51	9.0			50.3				

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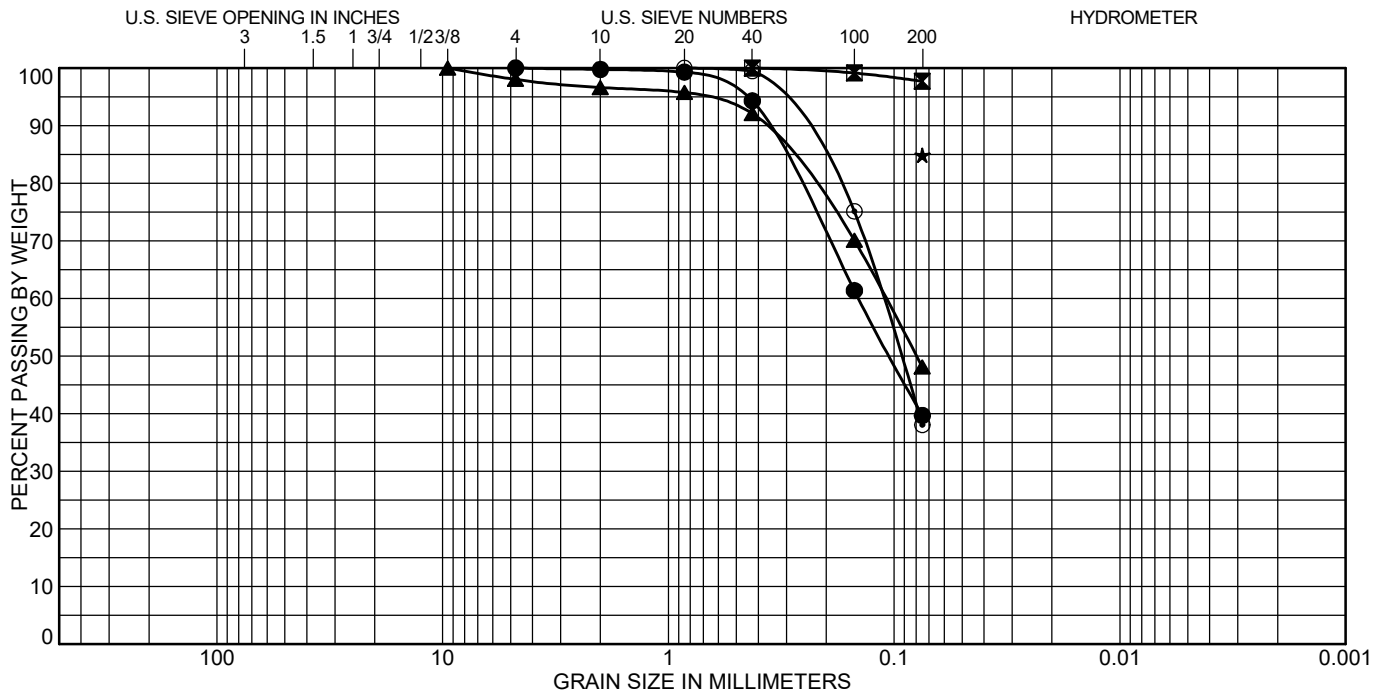
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## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 51

DATE Aug/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification				LL	PL	PI
● 52	4.0							
☒ 53	9.0	FAT CLAY(CH)				58	19	39
▲ 53	24.0							
★ 54	4.0							
⊙ 55	9.0							
Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay			
● 52	4.0	0.0	60.3	39.7				
☒ 53	9.0	0.0	2.3	97.7				
▲ 53	24.0	2.0	49.9	48.1				
★ 54	4.0			84.9				
⊙ 55	9.0	0.0	61.9	38.1				

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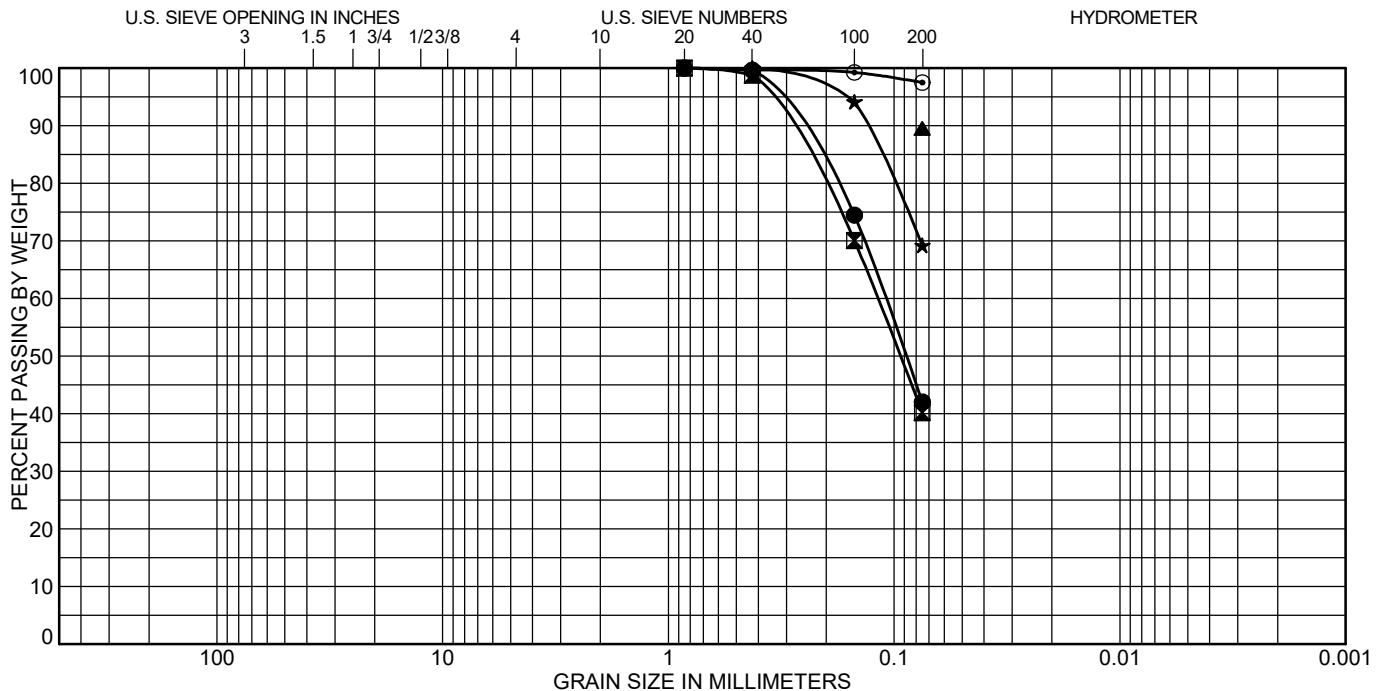
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Materials Testing  
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## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 52

DATE Aug/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification	LL	PL	PI
● 56	9.0				
☒ 58	14.0	SILTY, CLAYEY SAND(SC-SM)	19	12	7
▲ 59	9.0	LEAN CLAY(CL)	46	14	32
★ 60	4.0			14	
⊙ 61	9.0	LEAN CLAY(CL)	42	14	28

Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 56	9.0	0.0	58.0	42.0	
☒ 58	14.0	0.0	59.9	40.1	
▲ 59	9.0			89.5	
★ 60	4.0	0.0	30.8	69.2	
⊙ 61	9.0	0.0	2.5	97.5	

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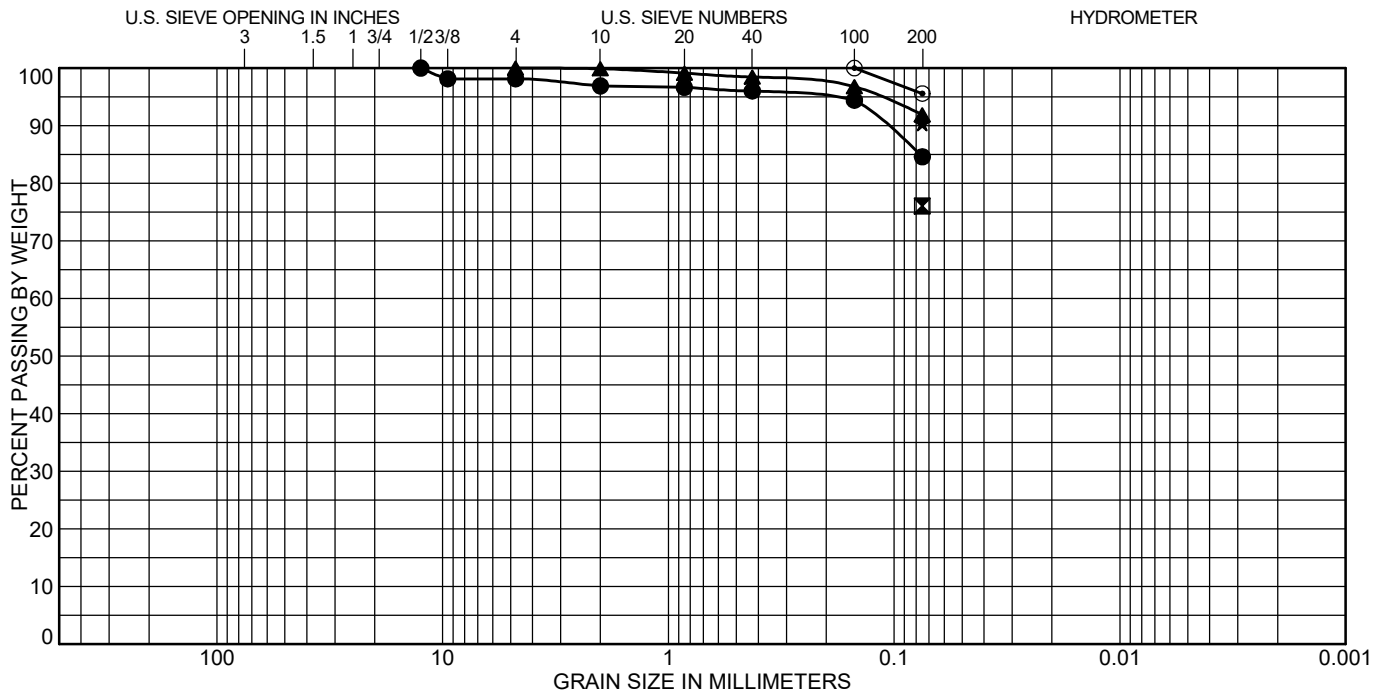
## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 53

DATE Aug/05/2022





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification	LL	PL	PI
● 62	9.0	LEAN CLAY with SAND(CL)	38	12	26
⊠ 64	9.0	LEAN CLAY with SAND(CL)	47	13	34
▲ 65	14.0				
★ 66	9.0	LEAN CLAY(CL)	48	16	32
⊙ 67	9.0	LEAN CLAY(CL)	44	13	31

Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 62	9.0	1.9	13.5	84.6	
⊠ 64	9.0			76.0	
▲ 65	14.0	0.0	8.1	91.9	
★ 66	9.0			90.4	
⊙ 67	9.0	0.0	4.4	95.6	

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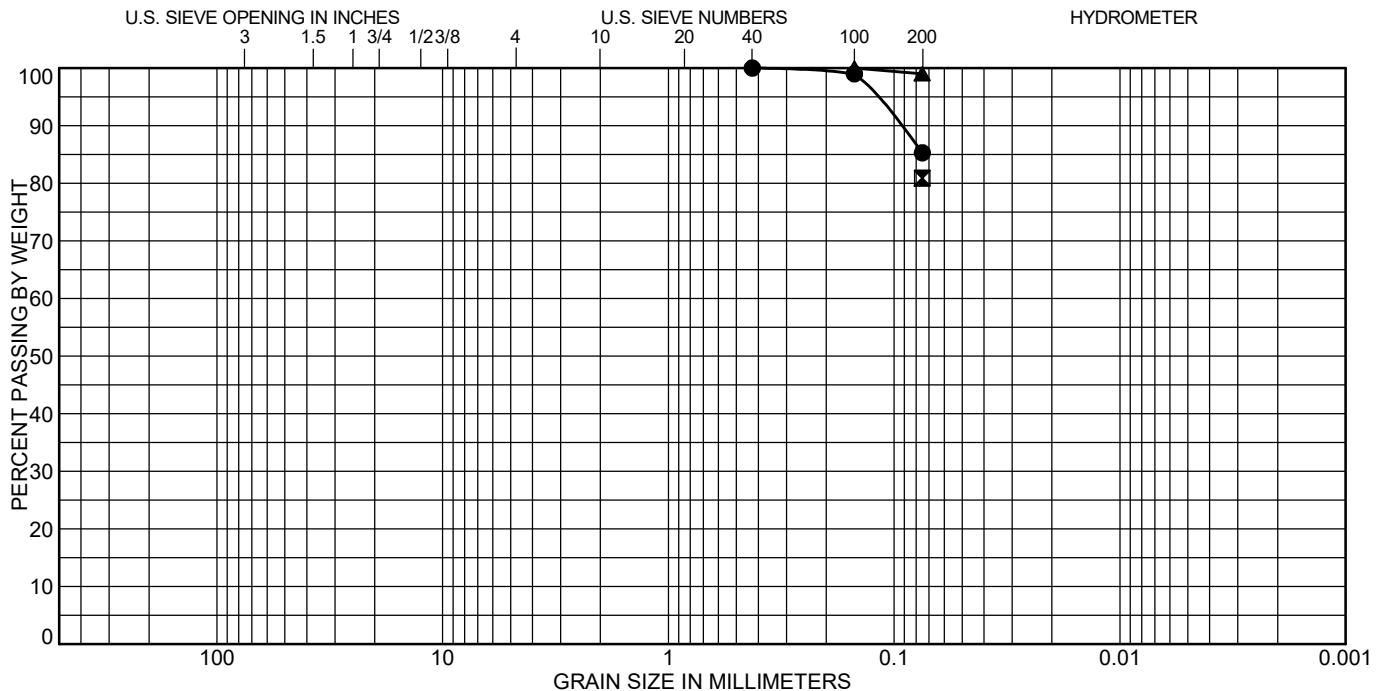
Geotechnical  
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Civil, Planning

## SOIL CLASSIFICATION DATA

JOB No. 187746

FIGURE No. 54

DATE Aug/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification	LL	PL	PI
● 68	4.0	LEAN CLAY(CL)	33	13	20
☒ 69	9.0				
▲ 70	9.0	FAT CLAY(CH)	62	15	47

Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 68	4.0	0.0	14.7	85.3	
☒ 69	9.0			80.9	
▲ 70	9.0	0.0	1.0	99.0	

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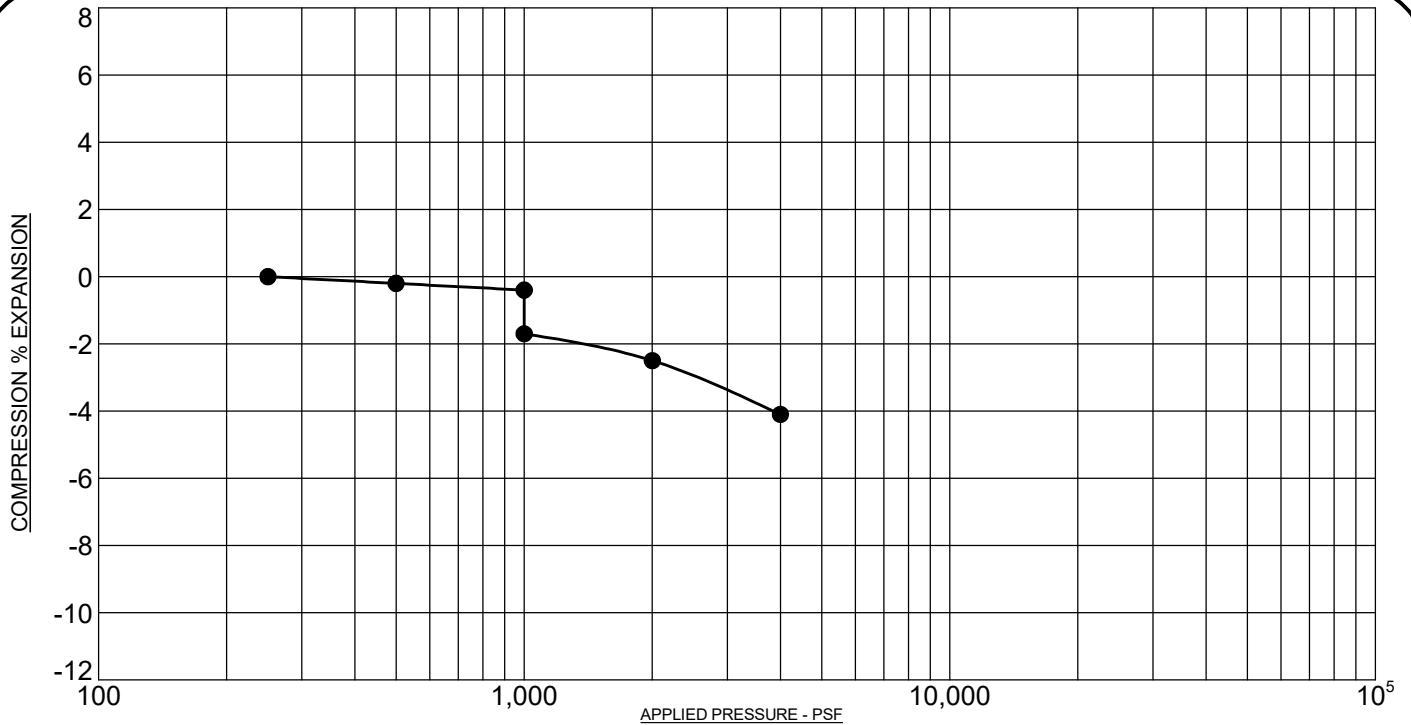
Geotechnical  
Materials Testing  
Civil, Planning

## SOIL CLASSIFICATION DATA

JOB No. 187746

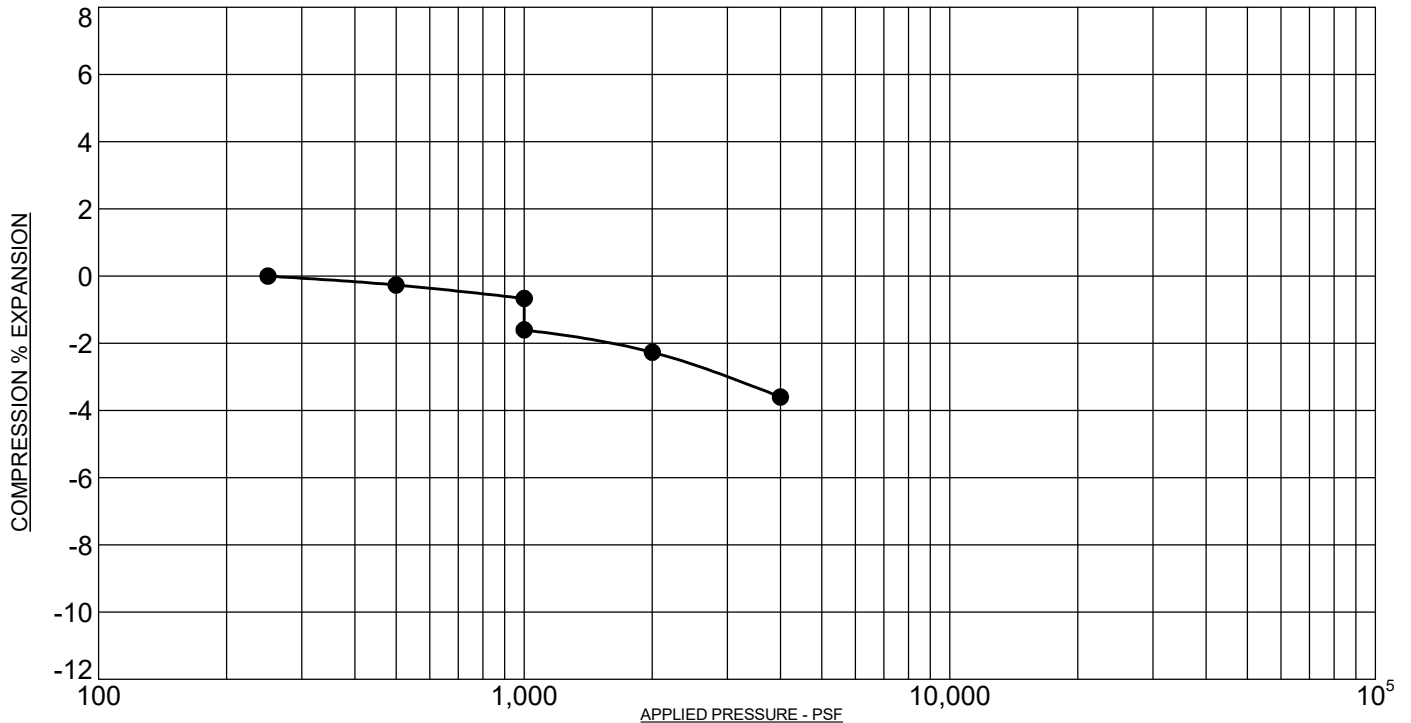
FIGURE No. 55

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **SAND, CLAYEY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **1 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **103.2 PCF**  
 NATURAL MOISTURE CONTENT: **5.3%**  
 PERCENT SWELL/COMPRESSION: **- 1.3**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **1 @ 24 FT**  
 NATURAL DRY UNIT WEIGHT: **110.1 PCF**  
 NATURAL MOISTURE CONTENT: **12.4%**  
 PERCENT SWELL/COMPRESSION: **- 0.9**

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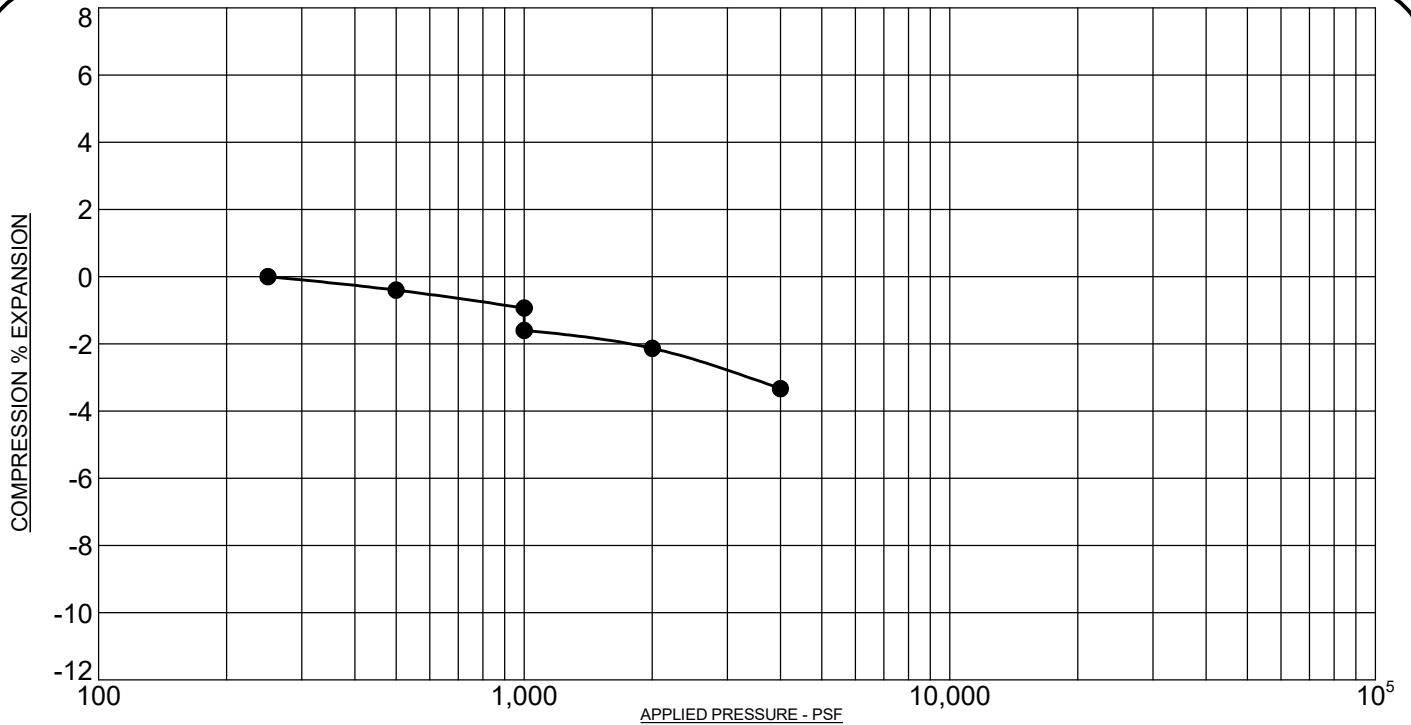
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

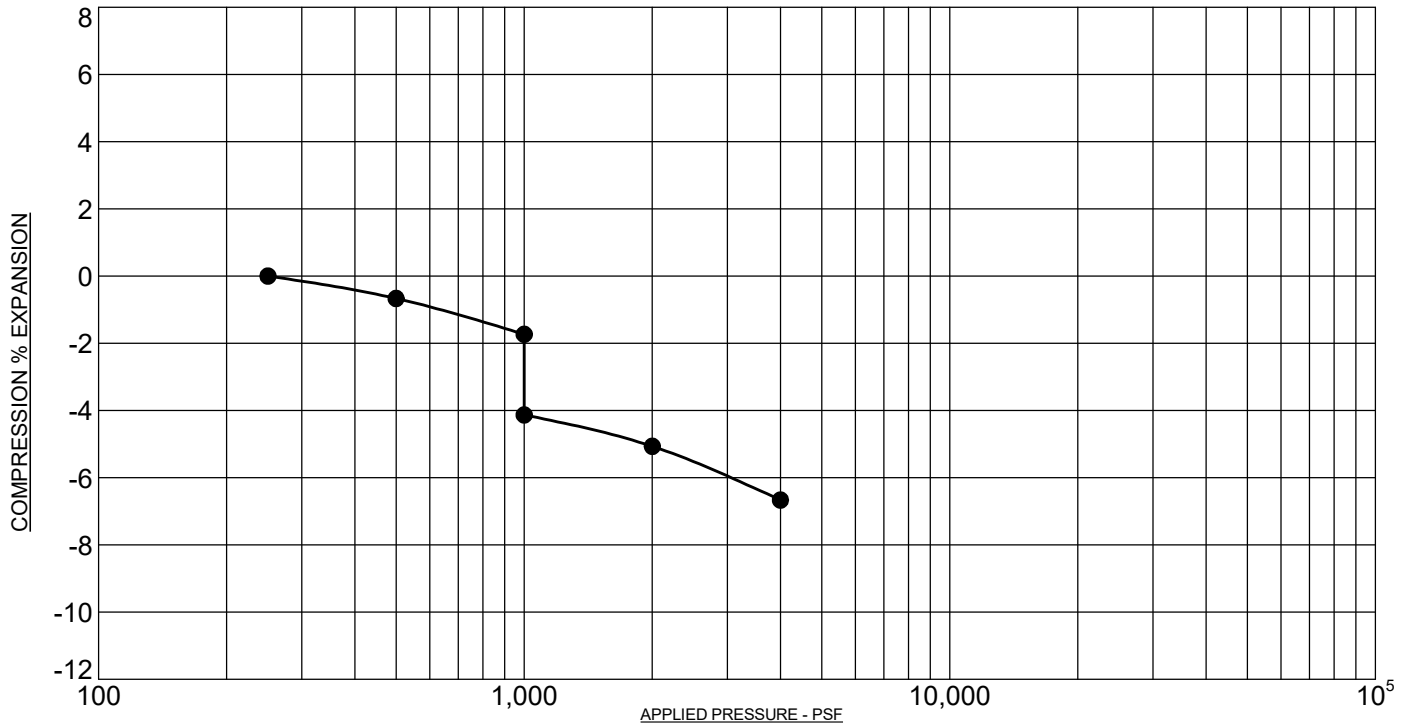
FIGURE No. 56

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **SANDSTONE, CLAYEY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **2 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **107.4 PCF**  
 NATURAL MOISTURE CONTENT: **13.6%**  
 PERCENT SWELL/COMPRESSION: **- 0.7**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **SAND, CLAYEY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **5 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **102.1 PCF**  
 NATURAL MOISTURE CONTENT: **7.9%**  
 PERCENT SWELL/COMPRESSION: **- 2.4**

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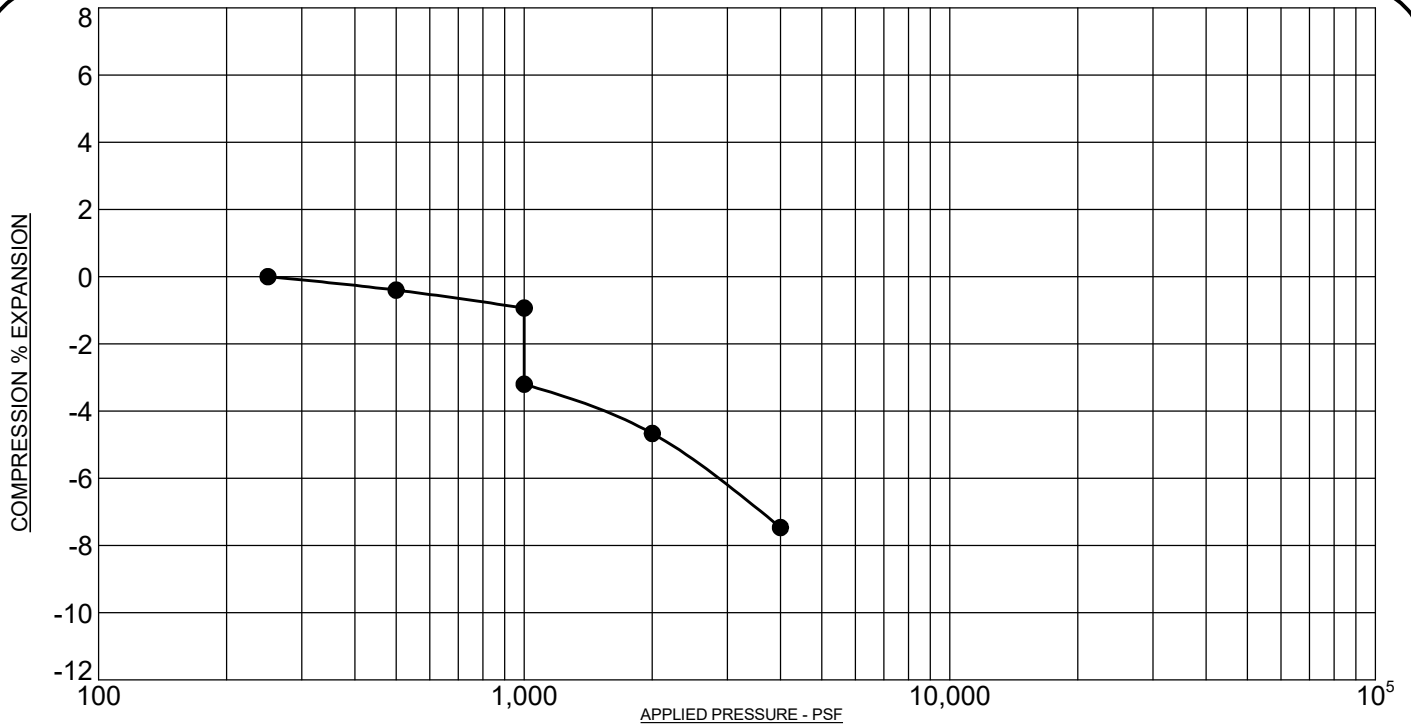
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

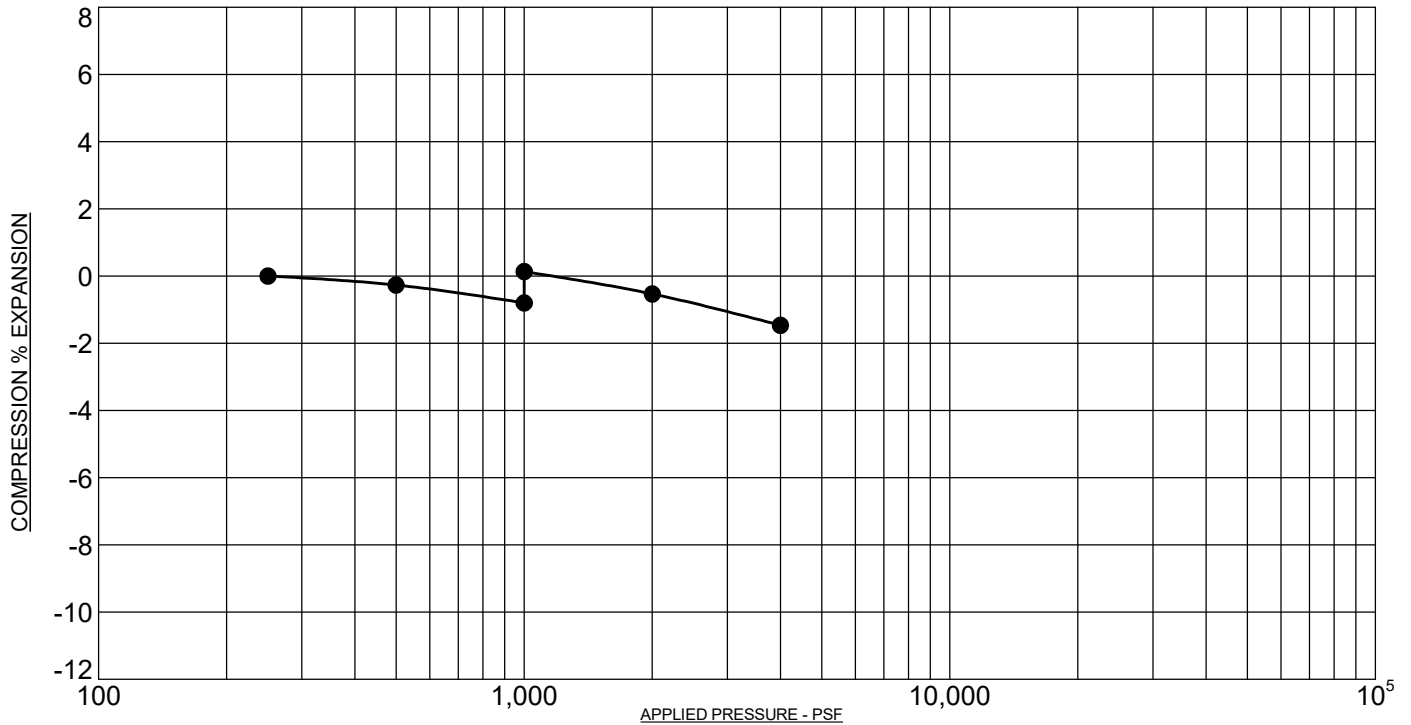
FIGURE No. 57

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **SAND, CLAYEY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **6 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **102.5 PCF**  
 NATURAL MOISTURE CONTENT: **8.4%**  
 PERCENT SWELL/COMPRESSION: **- 2.3**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **10 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **118.5 PCF**  
 NATURAL MOISTURE CONTENT: **12.1%**  
 PERCENT SWELL/COMPRESSION: **0.9**

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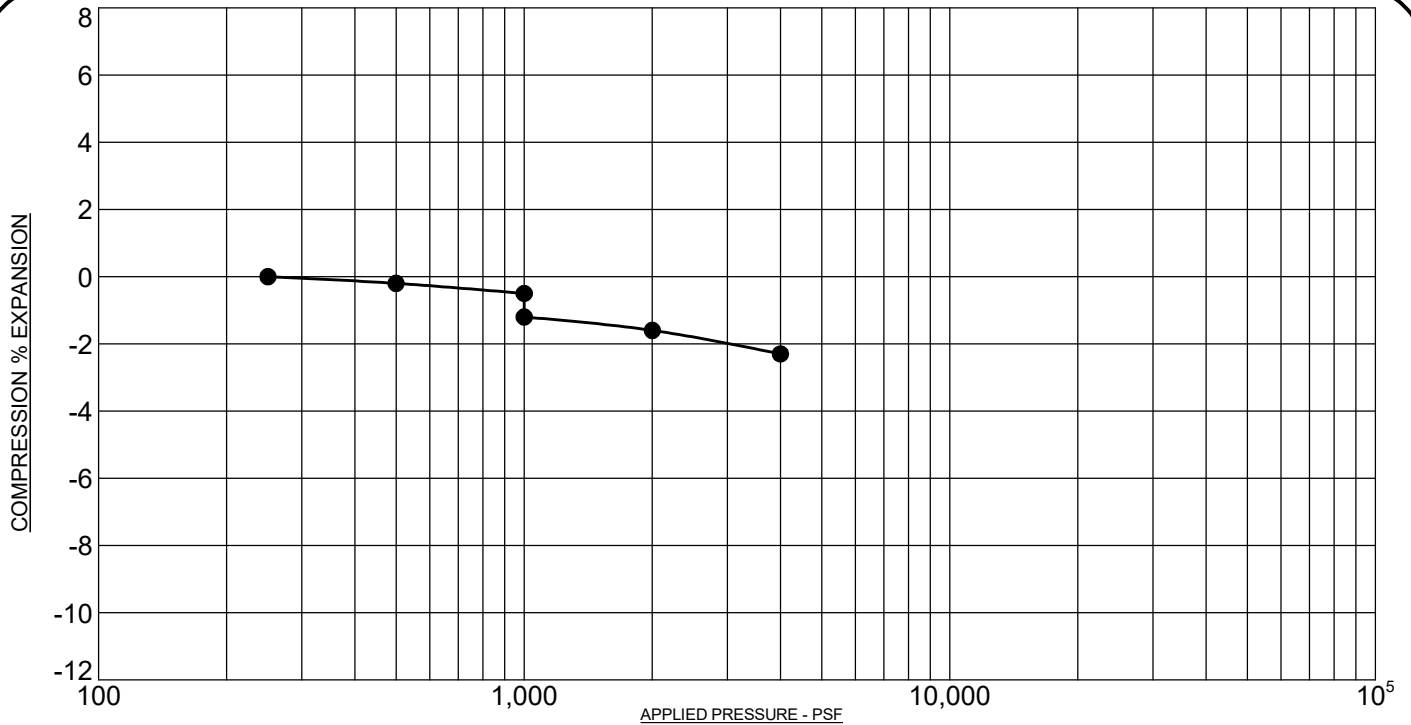
## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

FIGURE No. 58

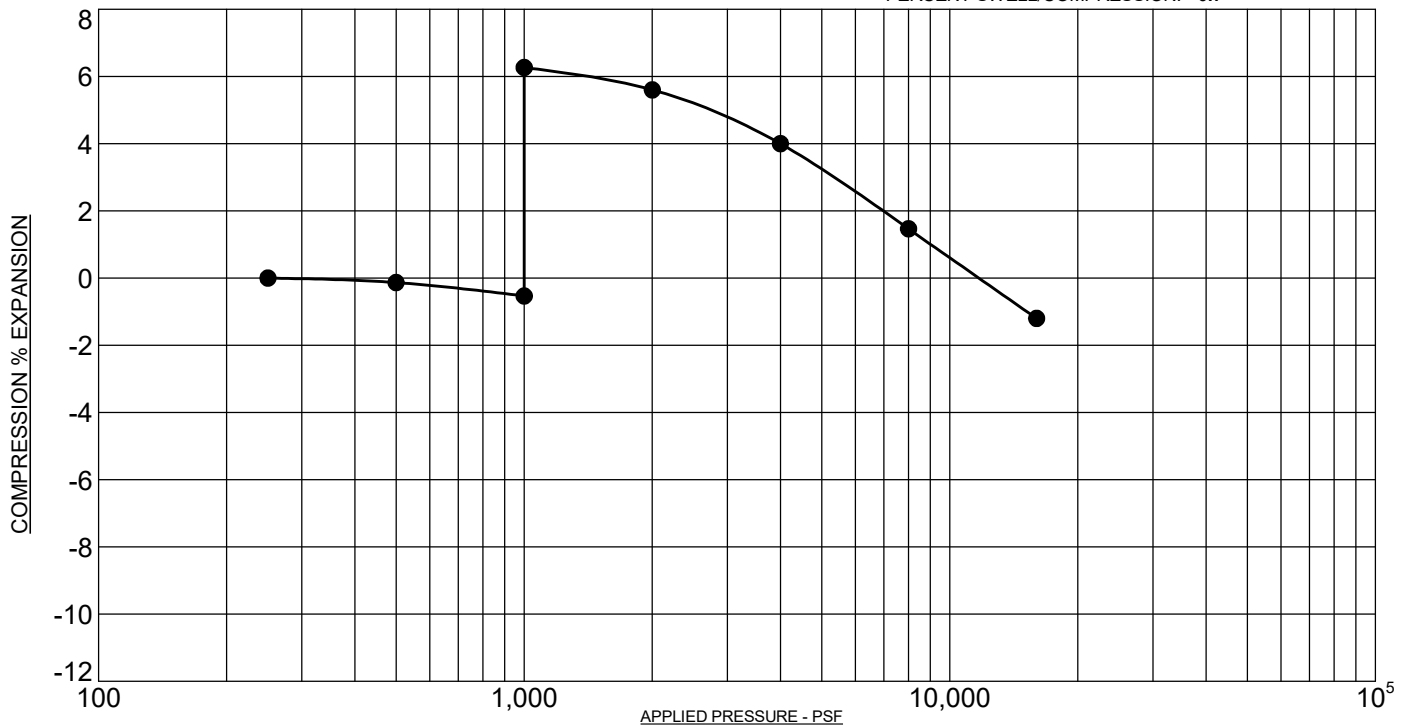
DATE Aug/05/2022





PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **11 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **103.7 PCF**  
 NATURAL MOISTURE CONTENT: **11.5%**  
 PERCENT SWELL/COMPRESSION: **- 0.7**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **12 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **115.8 PCF**  
 NATURAL MOISTURE CONTENT: **12.4%**  
 PERCENT SWELL/COMPRESSION: **6.8**

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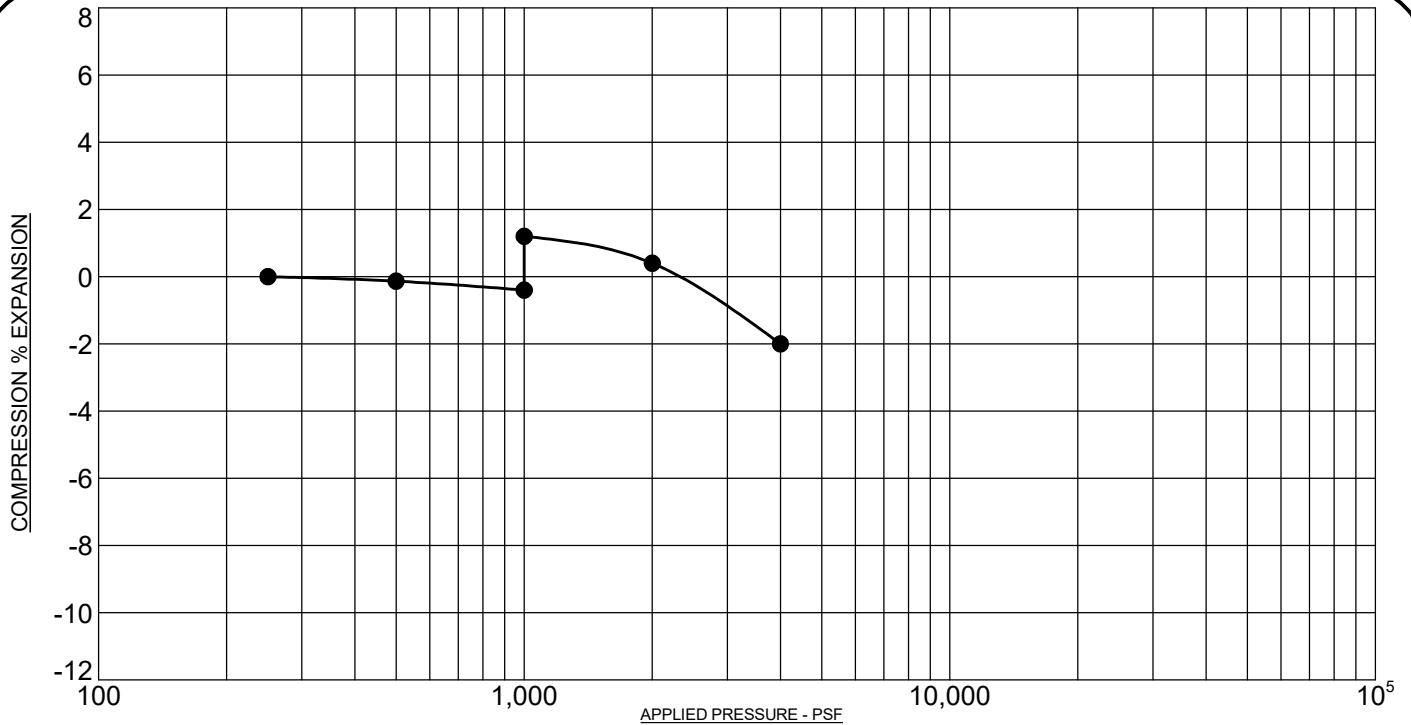
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## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

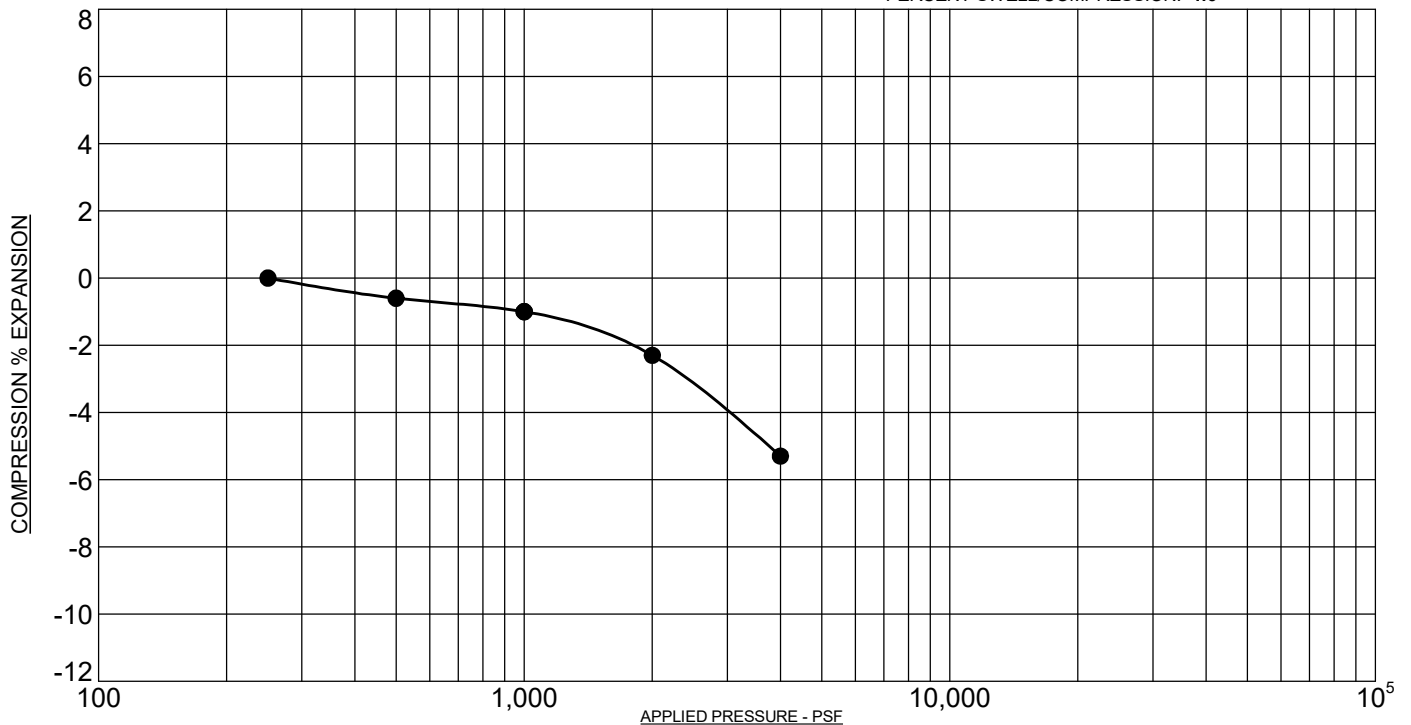
FIGURE No. 59

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **13 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **107.5 PCF**  
 NATURAL MOISTURE CONTENT: **9.5%**  
 PERCENT SWELL/COMPRESSION: **1.6**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **13 @ 24 FT**  
 NATURAL DRY UNIT WEIGHT: **99.5 PCF**  
 NATURAL MOISTURE CONTENT: **9.5%**  
 PERCENT SWELL/COMPRESSION: **0.0**

ROCKY MOUNTAIN GROUP

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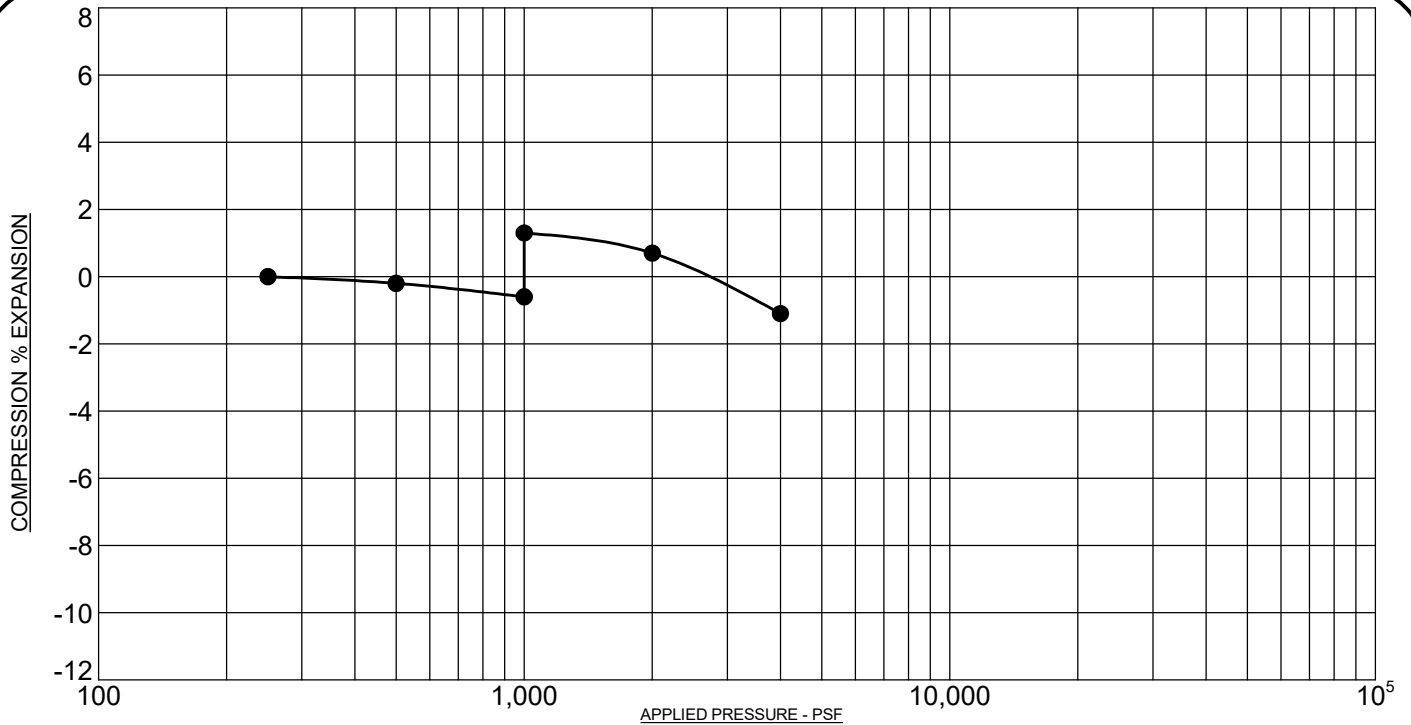
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

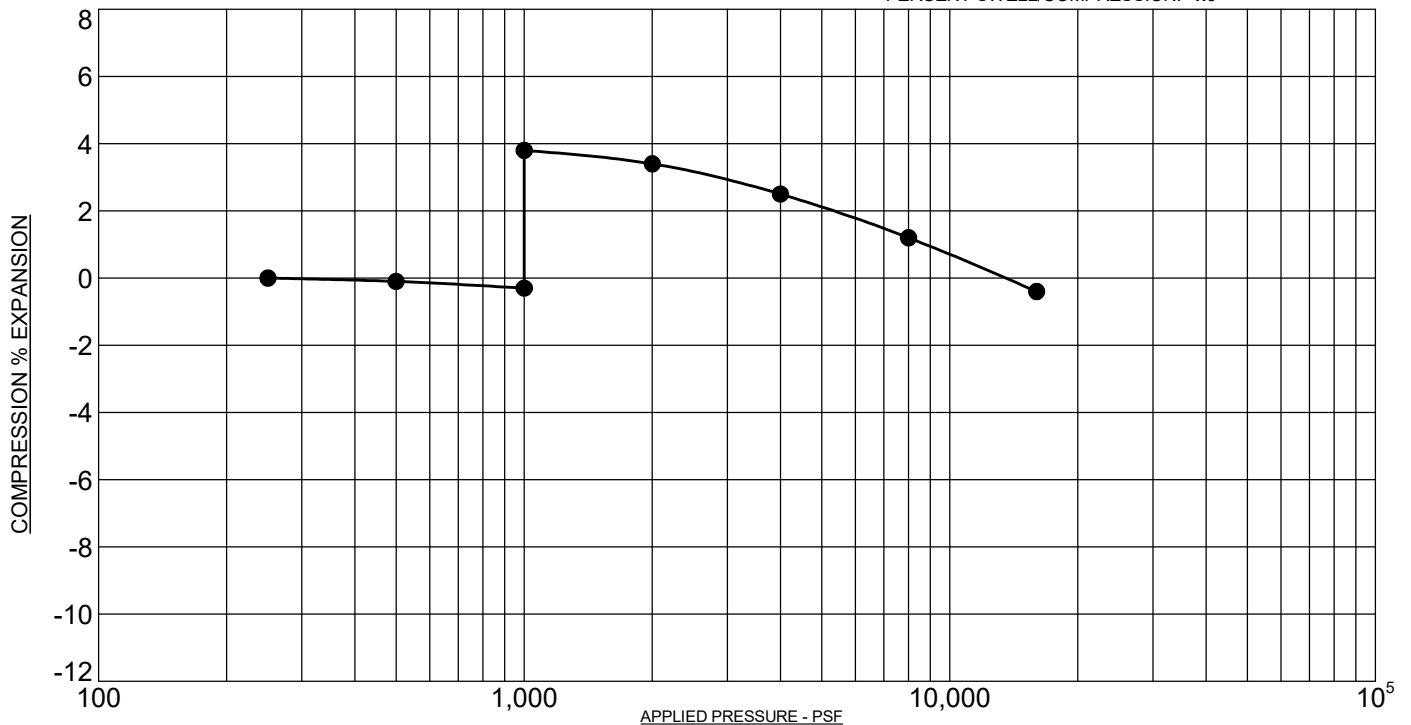
FIGURE No. 60

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **SAND, CLAYEY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **15 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **111.2 PCF**  
 NATURAL MOISTURE CONTENT: **7.8%**  
 PERCENT SWELL/COMPRESSION: **1.9**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **17 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **115.3 PCF**  
 NATURAL MOISTURE CONTENT: **16.0%**  
 PERCENT SWELL/COMPRESSION: **4.1**

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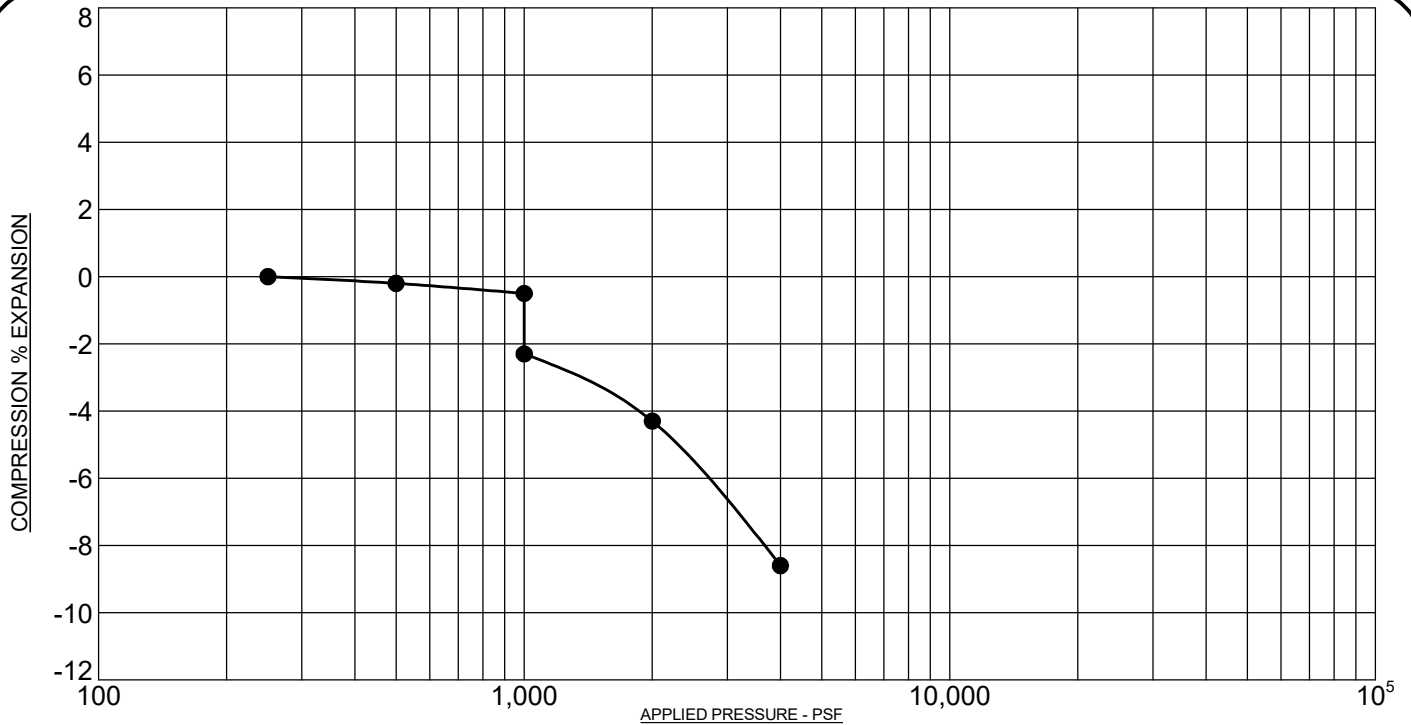
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

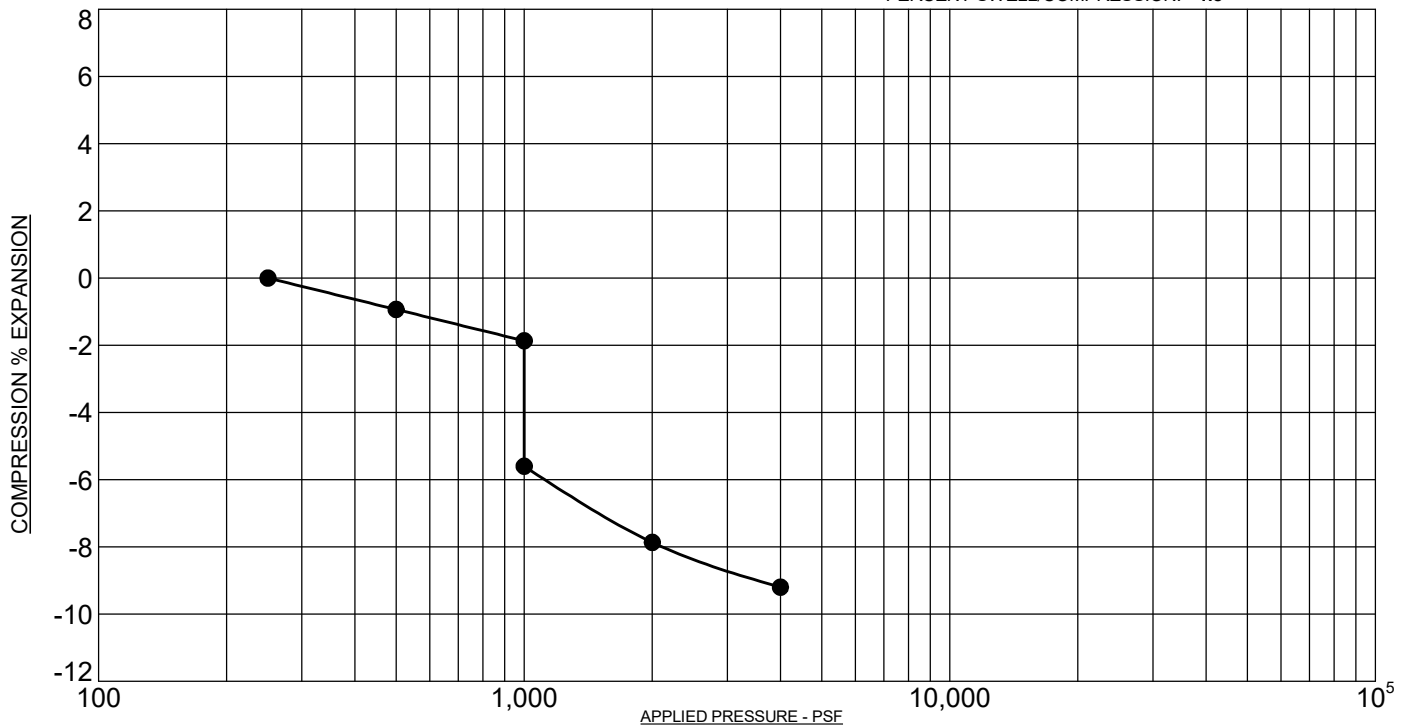
FIGURE No. 61

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **18 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **91.3 PCF**  
 NATURAL MOISTURE CONTENT: **8.7%**  
 PERCENT SWELL/COMPRESSION: **- 1.8**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **19 @ 24 FT**  
 NATURAL DRY UNIT WEIGHT: **99.4 PCF**  
 NATURAL MOISTURE CONTENT: **7.0%**  
 PERCENT SWELL/COMPRESSION: **- 3.7**

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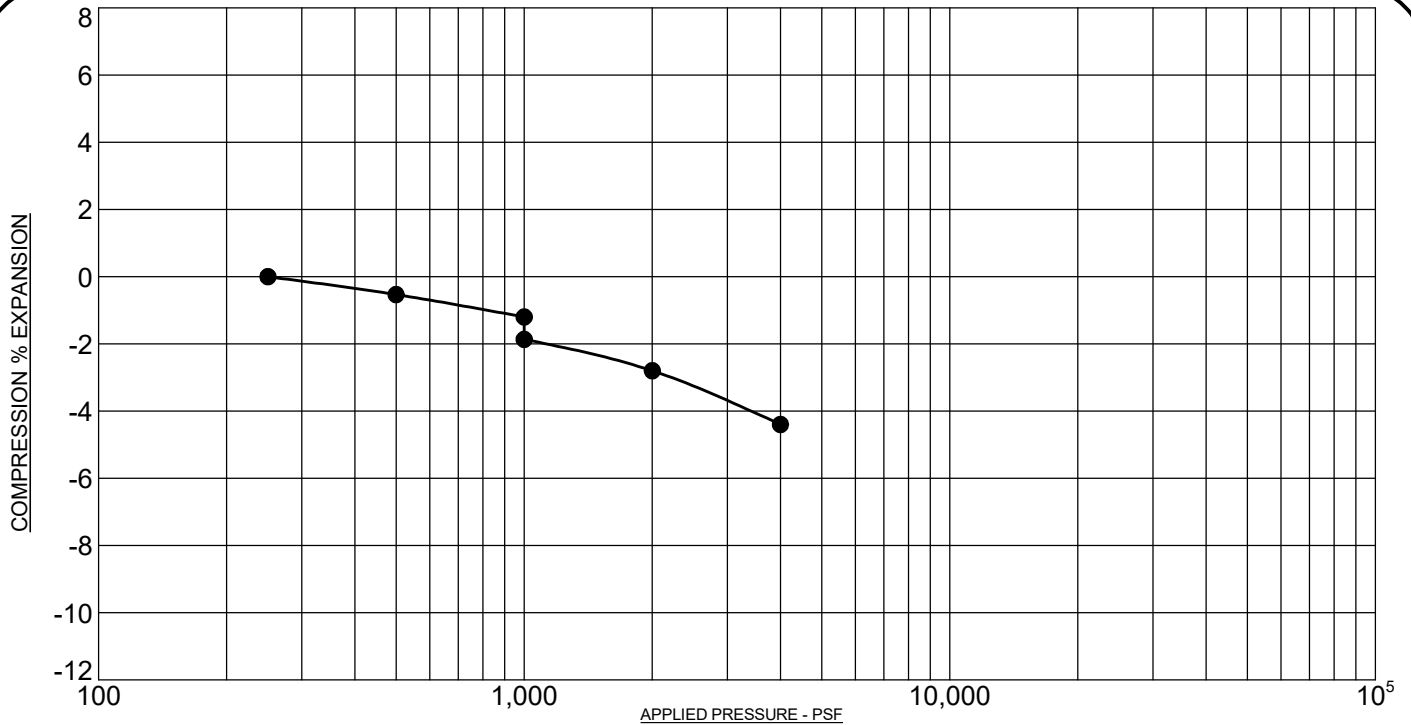
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

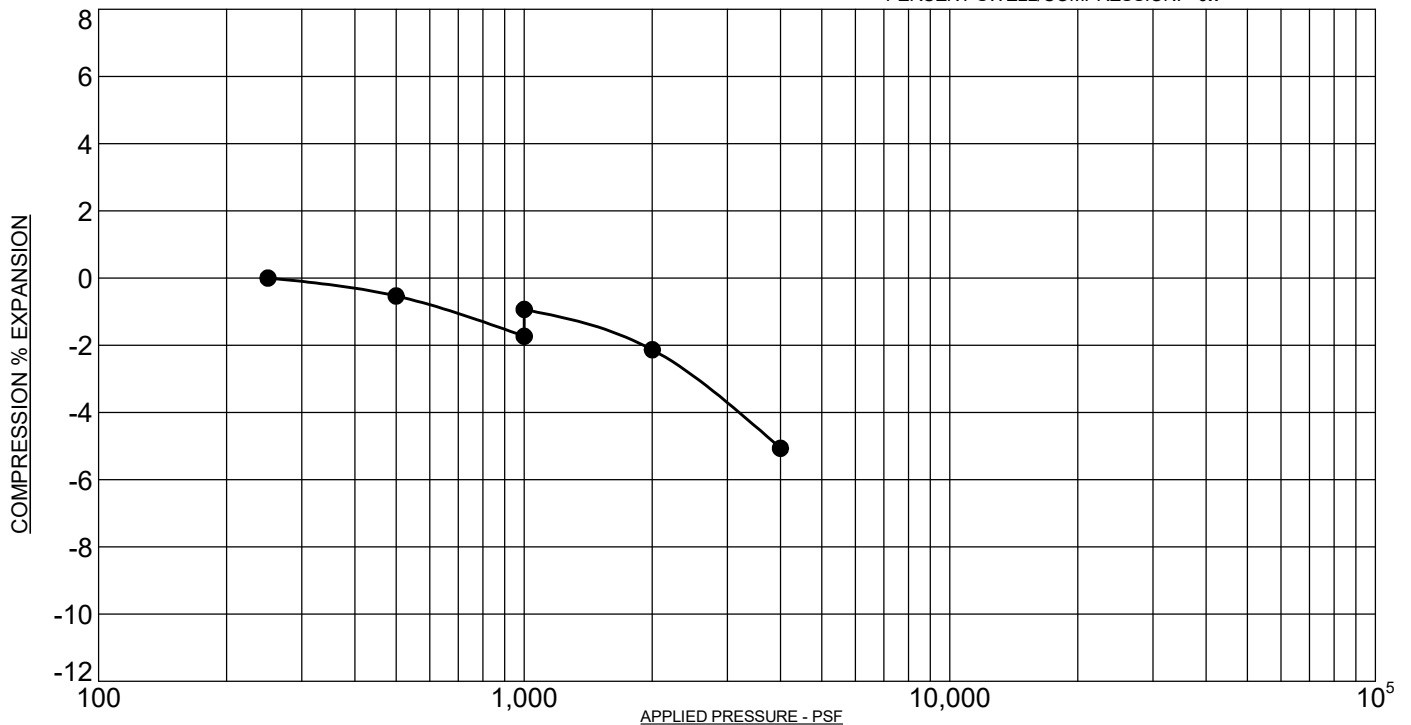
FIGURE No. 62

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **19 @ 29 FT**  
 NATURAL DRY UNIT WEIGHT: **109.9 PCF**  
 NATURAL MOISTURE CONTENT: **12.3%**  
 PERCENT SWELL/COMPRESSION: **- 0.7**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **23 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **103.1 PCF**  
 NATURAL MOISTURE CONTENT: **7.7%**  
 PERCENT SWELL/COMPRESSION: **0.8**

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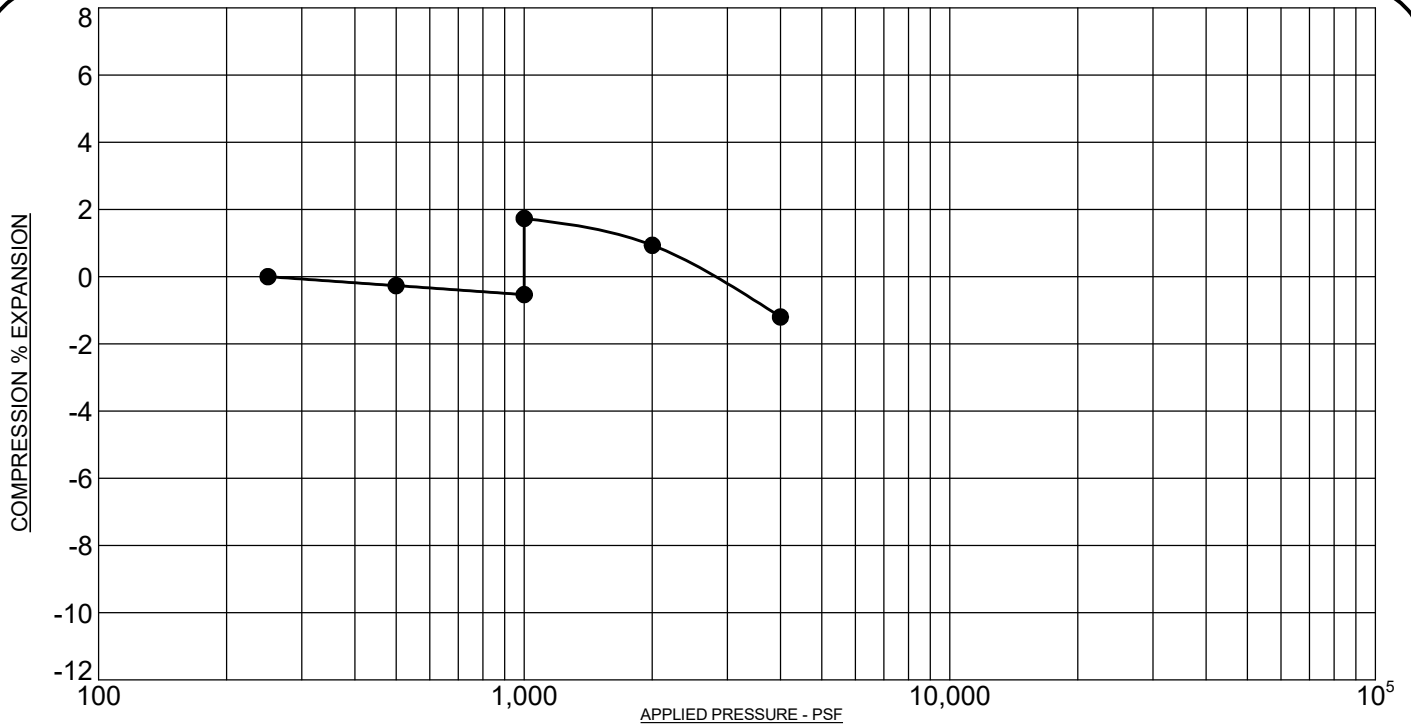
## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

FIGURE No. 63

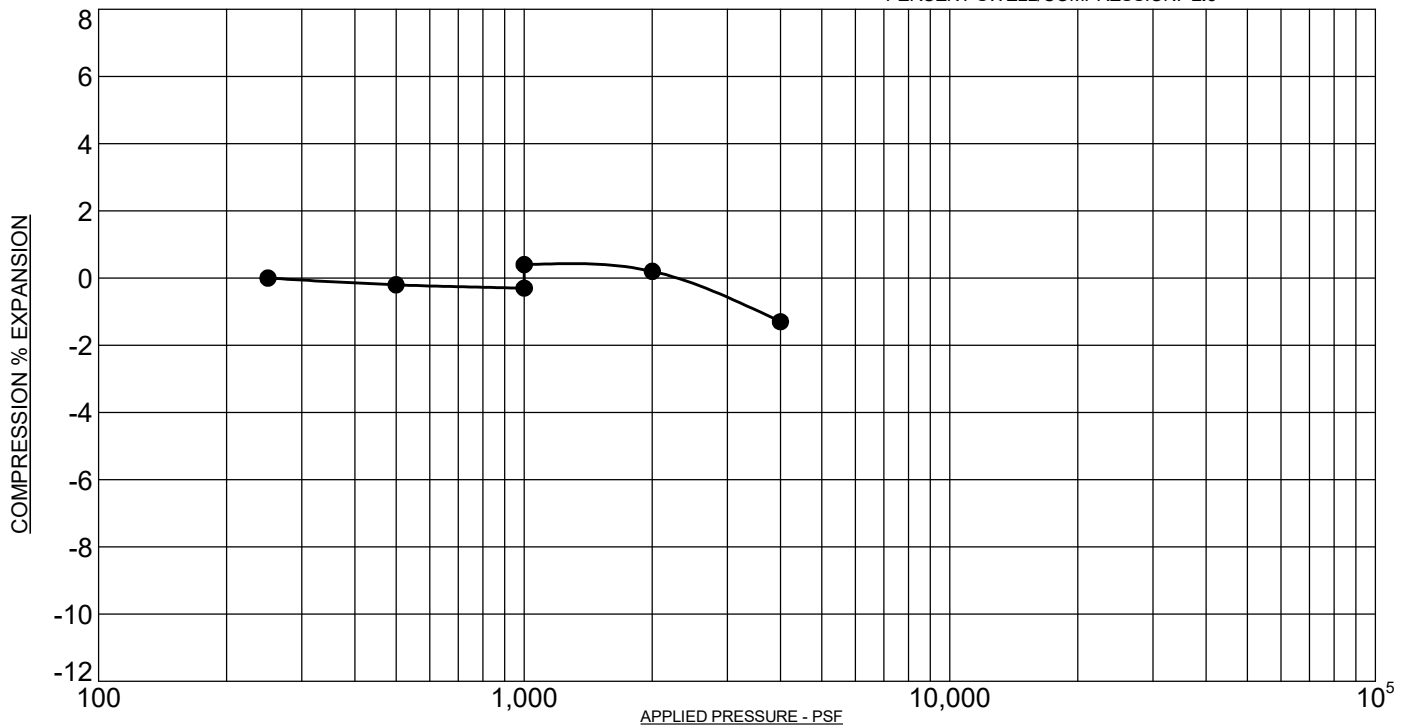
DATE Aug/05/2022





PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **24 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **113.3 PCF**  
 NATURAL MOISTURE CONTENT: **8.6%**  
 PERCENT SWELL/COMPRESSION: **2.3**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **25 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **106.0 PCF**  
 NATURAL MOISTURE CONTENT: **7.7%**  
 PERCENT SWELL/COMPRESSION: **0.7**

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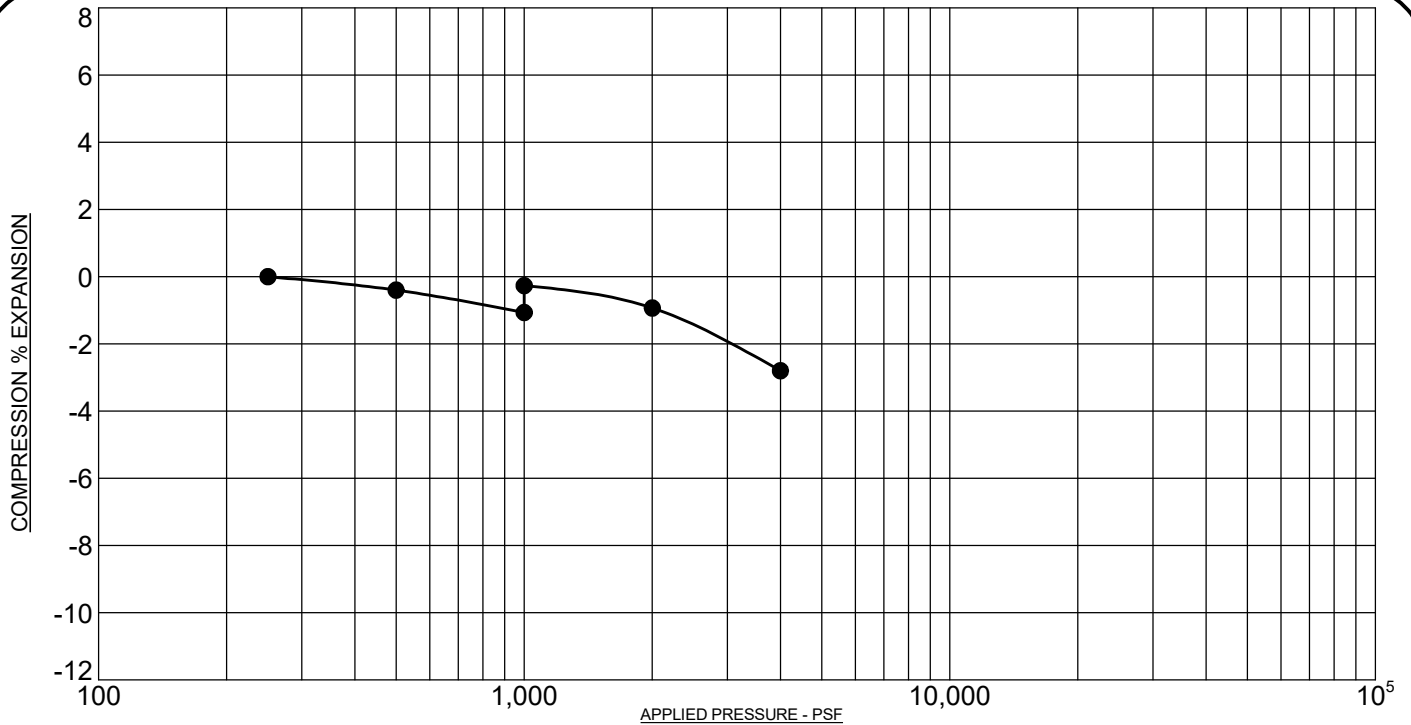
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

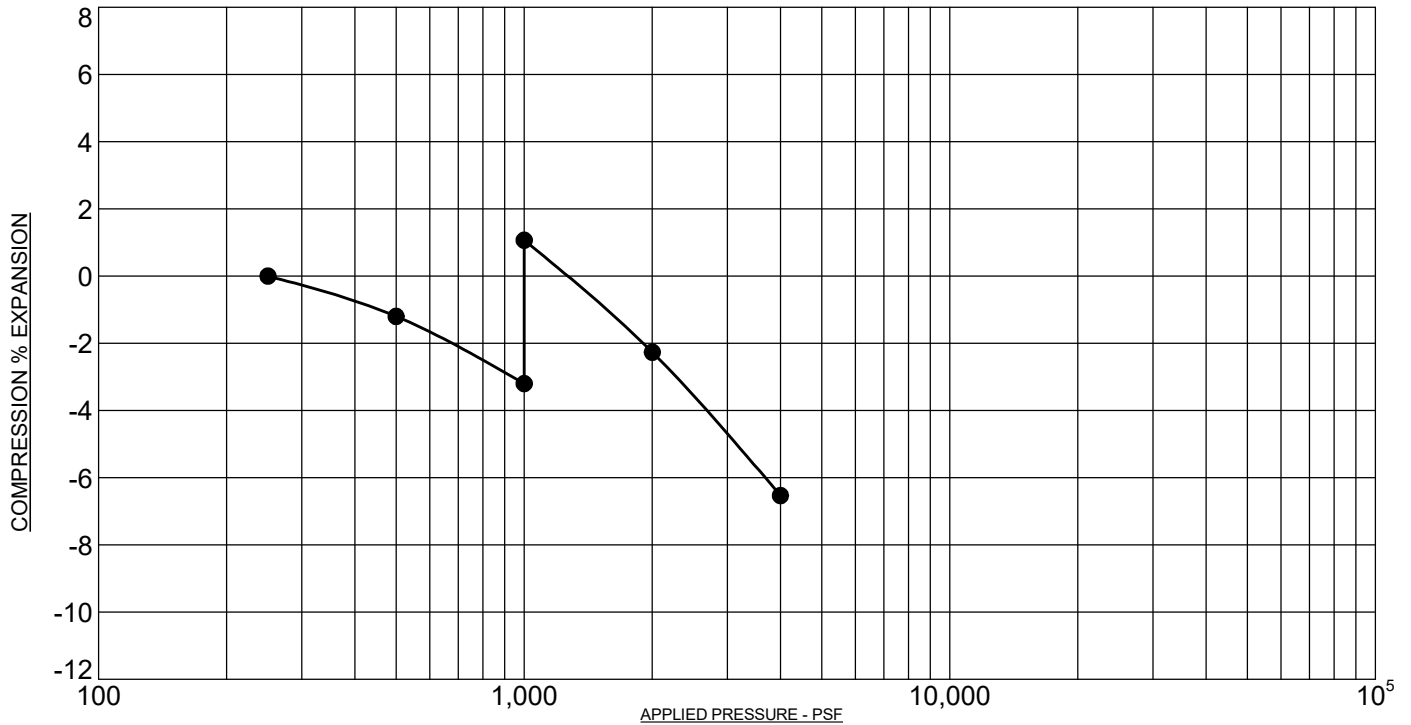
FIGURE No. 64

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **26 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **114.8 PCF**  
 NATURAL MOISTURE CONTENT: **9.3%**  
 PERCENT SWELL/COMPRESSION: **0.8**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **27 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **85.0 PCF**  
 NATURAL MOISTURE CONTENT: **7.3%**  
 PERCENT SWELL/COMPRESSION: **4.3**

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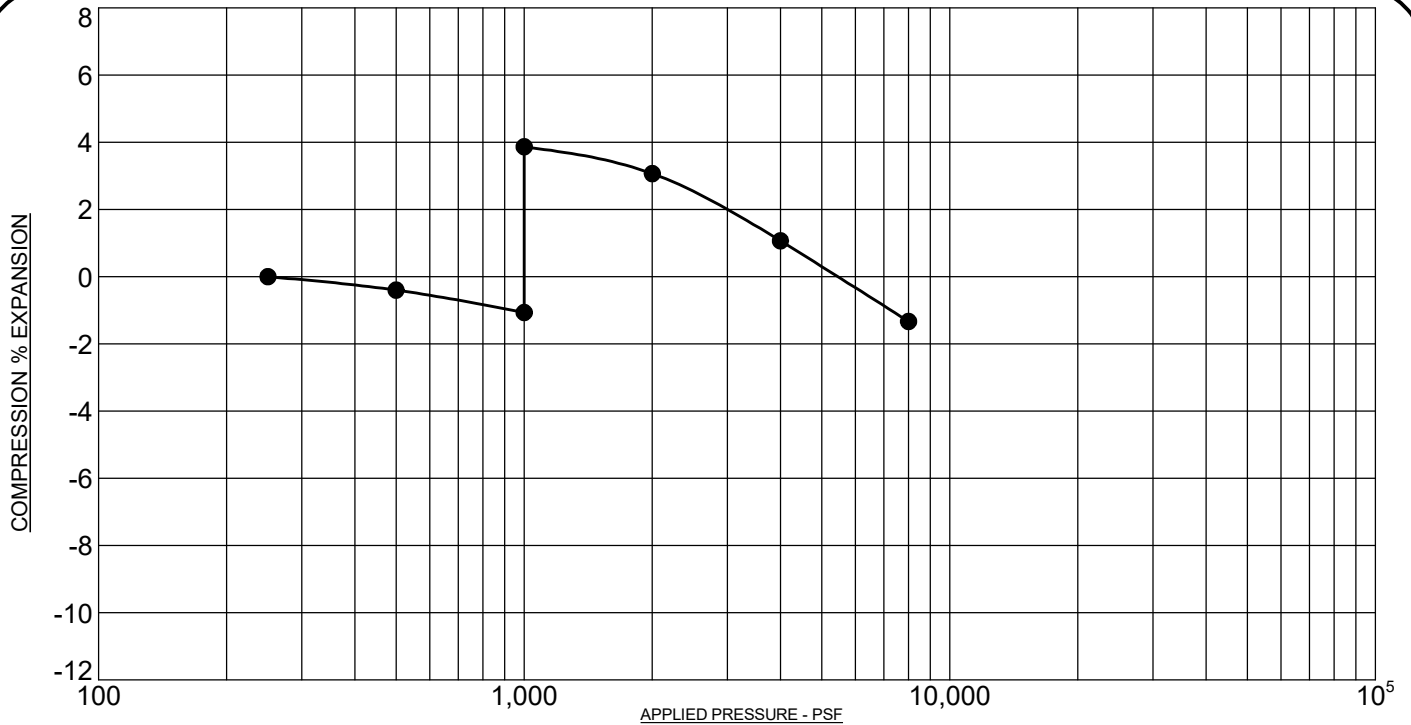
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

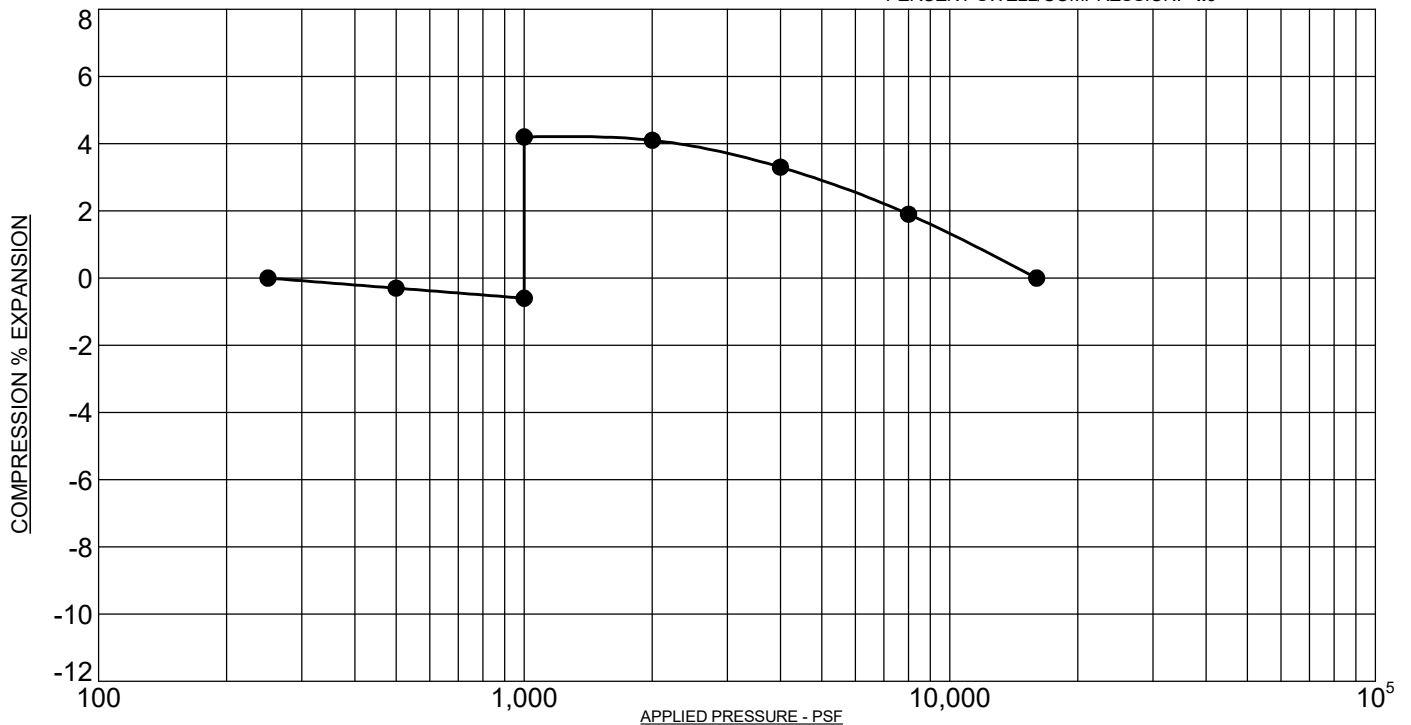
FIGURE No. 65

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **29 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **117.0 PCF**  
 NATURAL MOISTURE CONTENT: **14.3%**  
 PERCENT SWELL/COMPRESSION: **4.9**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **31 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **127.4 PCF**  
 NATURAL MOISTURE CONTENT: **5.5%**  
 PERCENT SWELL/COMPRESSION: **4.8**

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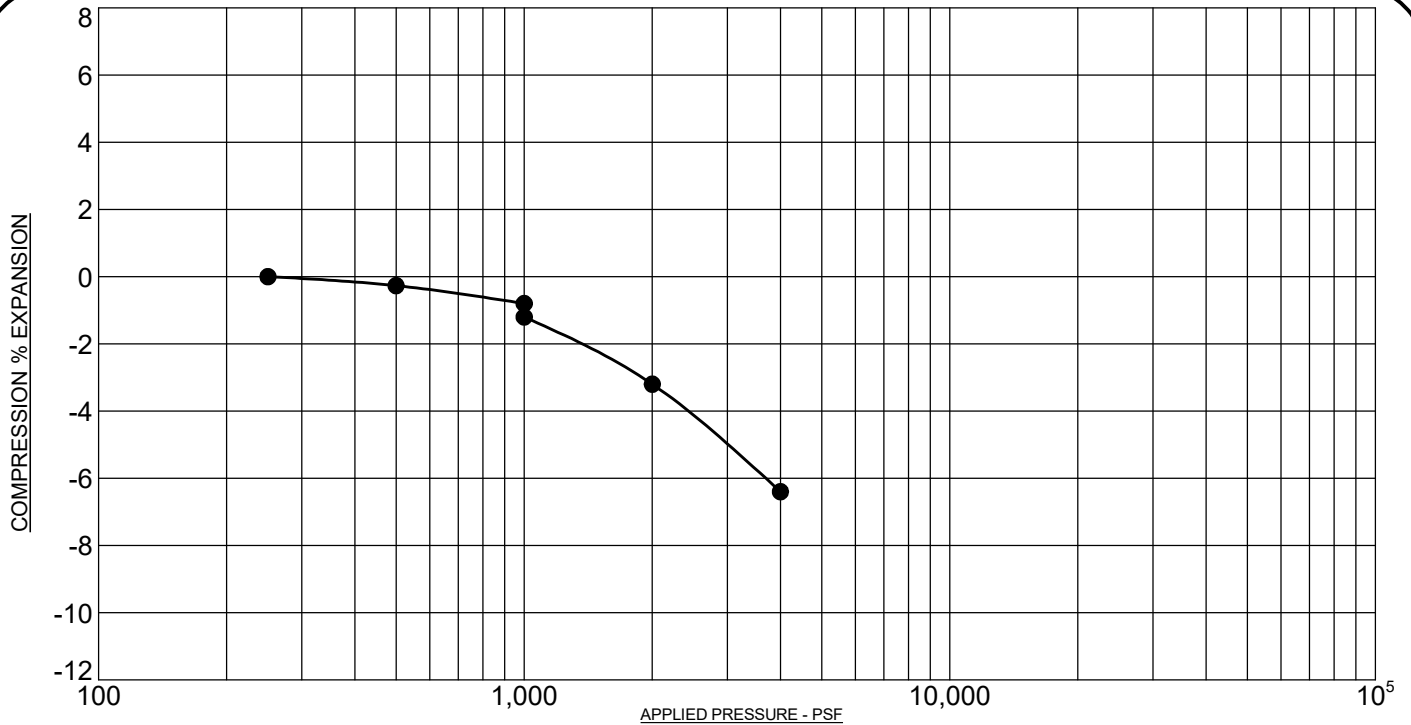
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

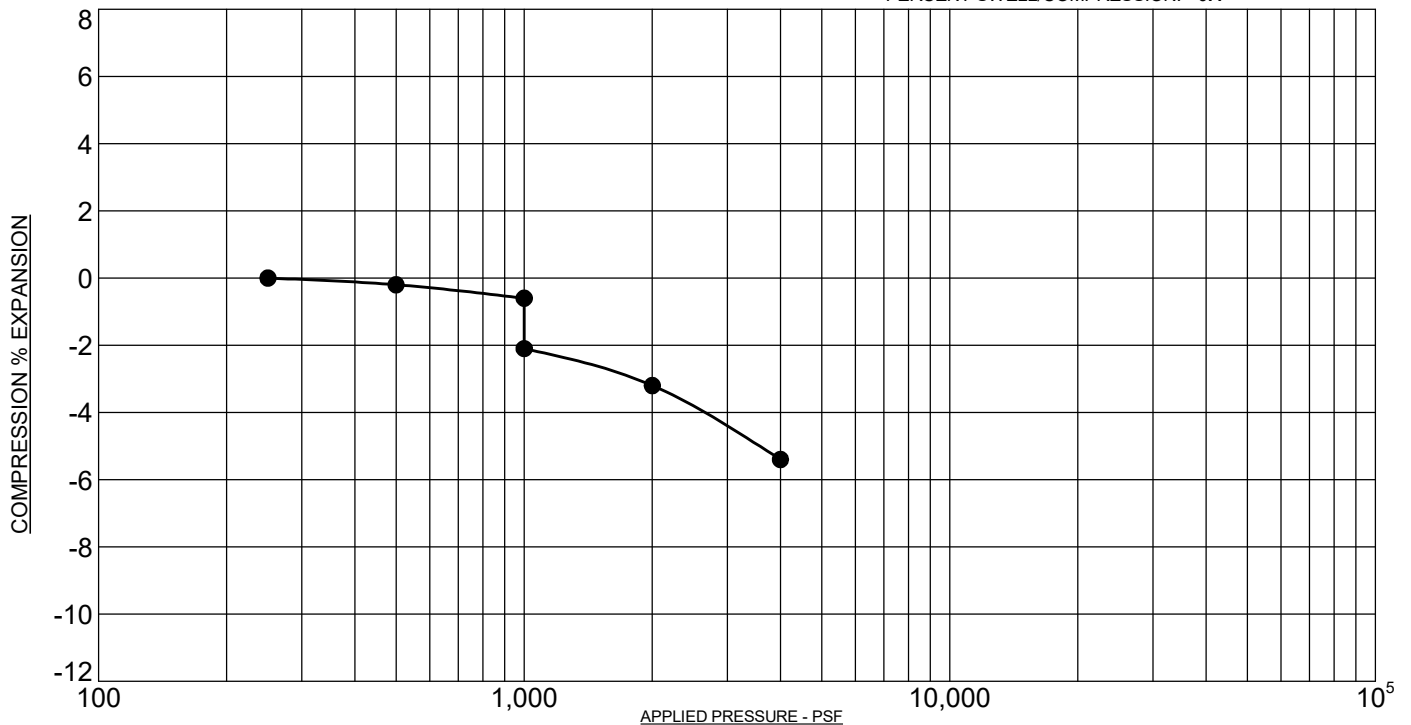
FIGURE No. 66

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **32 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **96.4 PCF**  
 NATURAL MOISTURE CONTENT: **13.4%**  
 PERCENT SWELL/COMPRESSION: **- 0.4**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **36 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **101.6 PCF**  
 NATURAL MOISTURE CONTENT: **6.0%**  
 PERCENT SWELL/COMPRESSION: **- 1.5**

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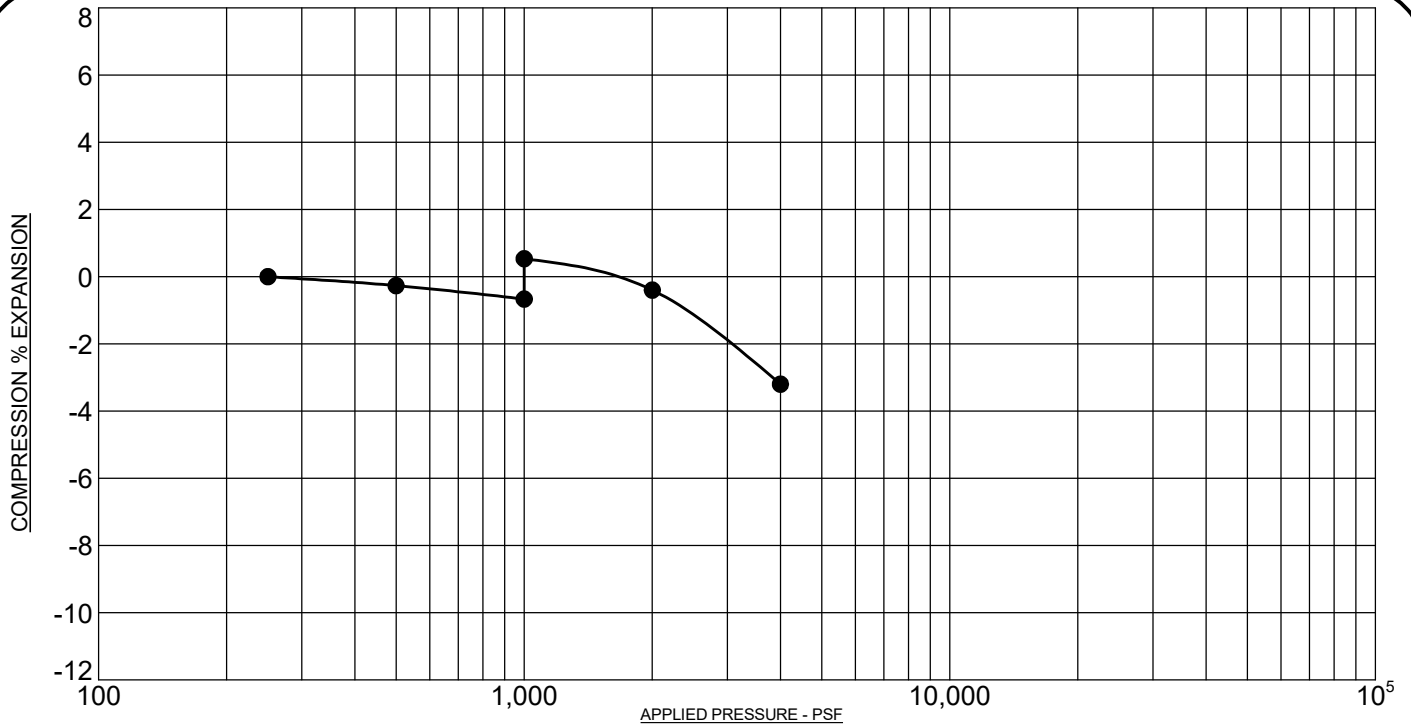
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

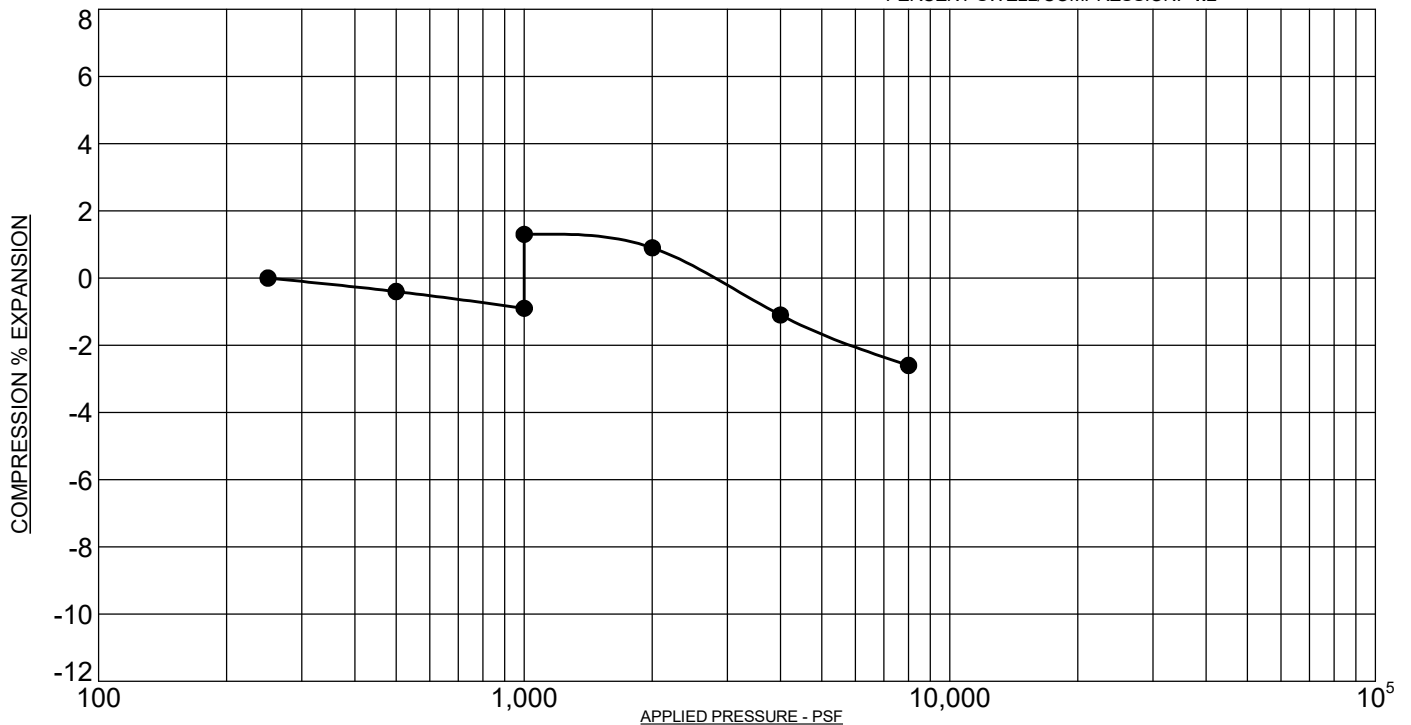
FIGURE No. 67

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **37 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **106.2 PCF**  
 NATURAL MOISTURE CONTENT: **10.2%**  
 PERCENT SWELL/COMPRESSION: **1.2**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **38 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **102.5 PCF**  
 NATURAL MOISTURE CONTENT: **20.4%**  
 PERCENT SWELL/COMPRESSION: **2.2**

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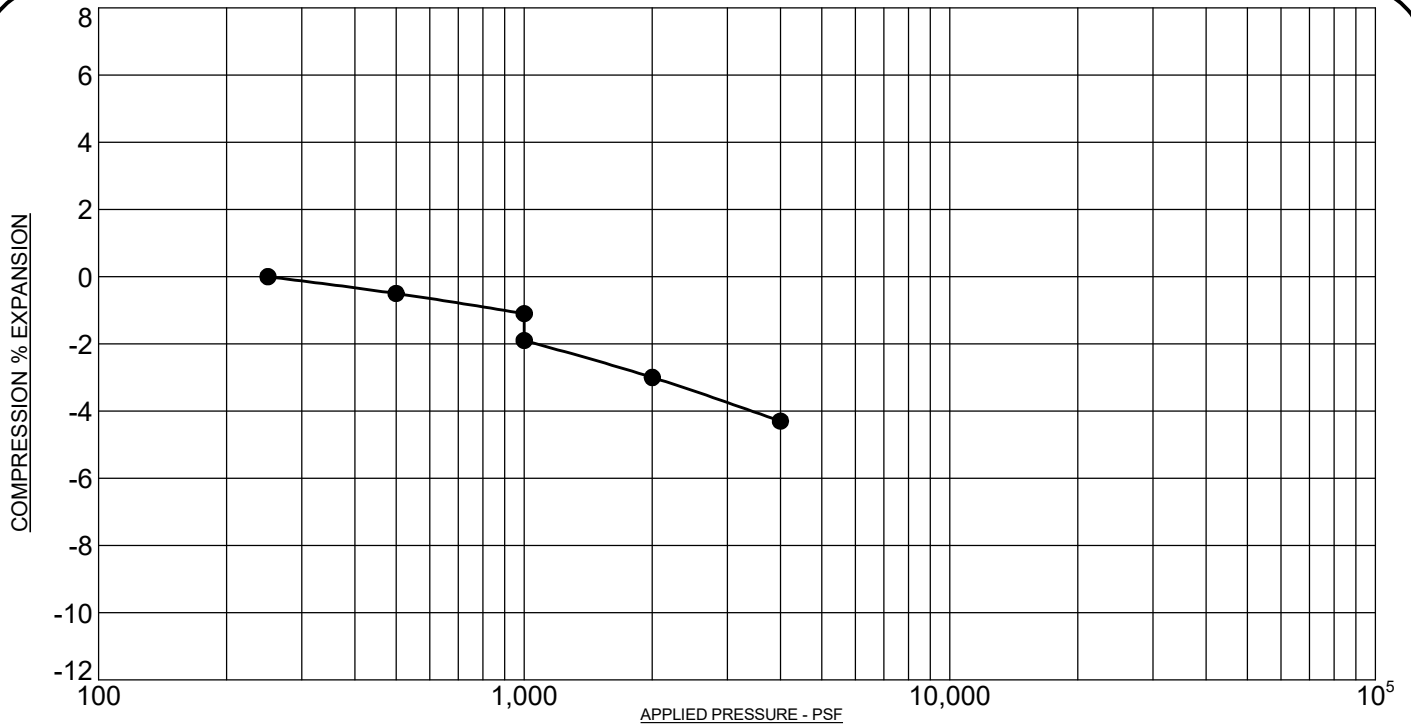
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

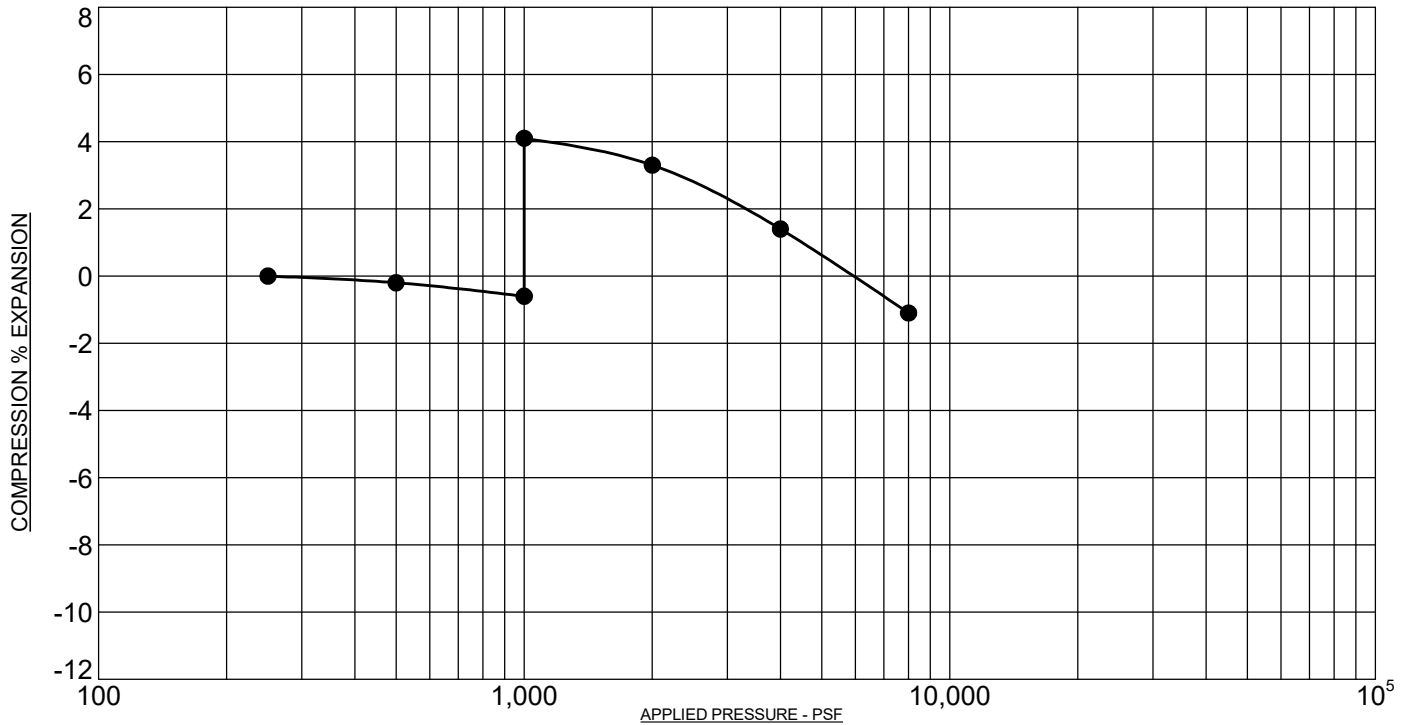
FIGURE No. 68

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **38 @ 29 FT**  
 NATURAL DRY UNIT WEIGHT: **108.9 PCF**  
 NATURAL MOISTURE CONTENT: **17.5%**  
 PERCENT SWELL/COMPRESSION: **- 0.8**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **42 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **111.8 PCF**  
 NATURAL MOISTURE CONTENT: **10.2%**  
 PERCENT SWELL/COMPRESSION: **4.7**

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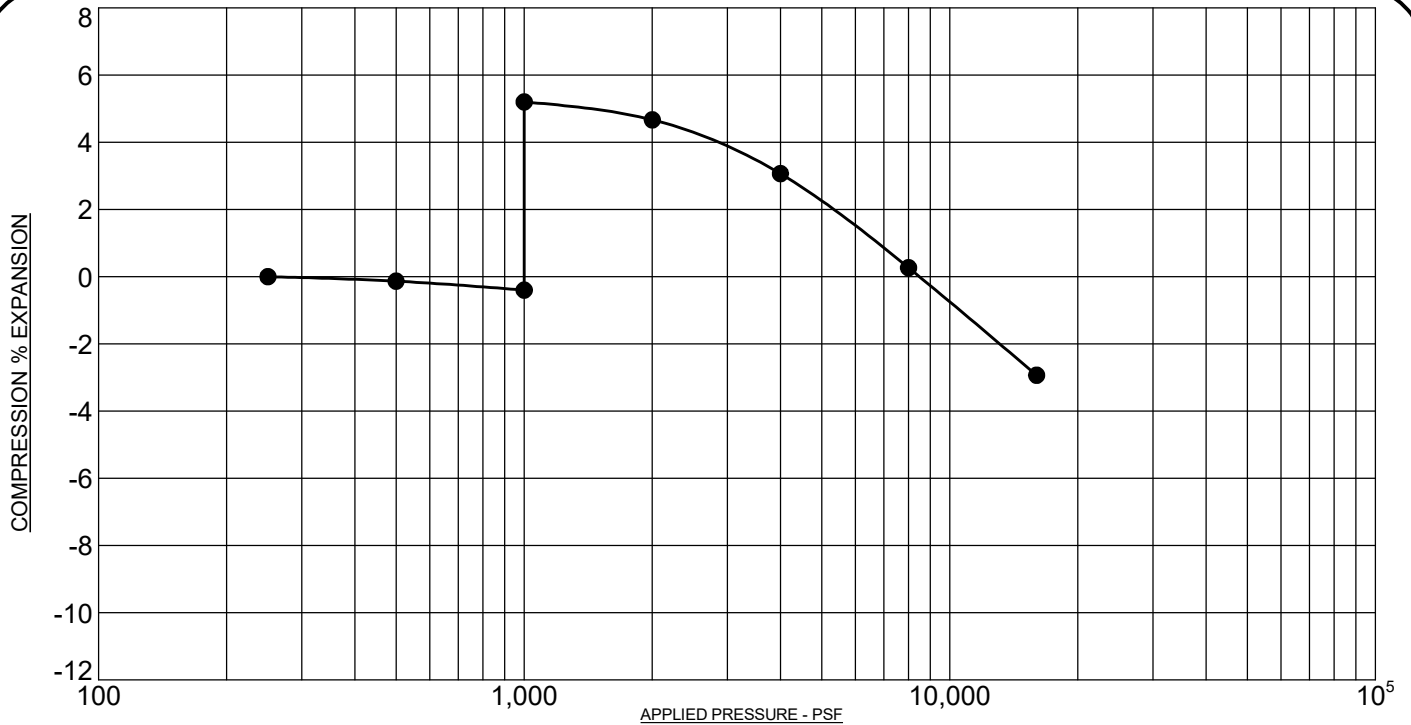
## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

FIGURE No. 69

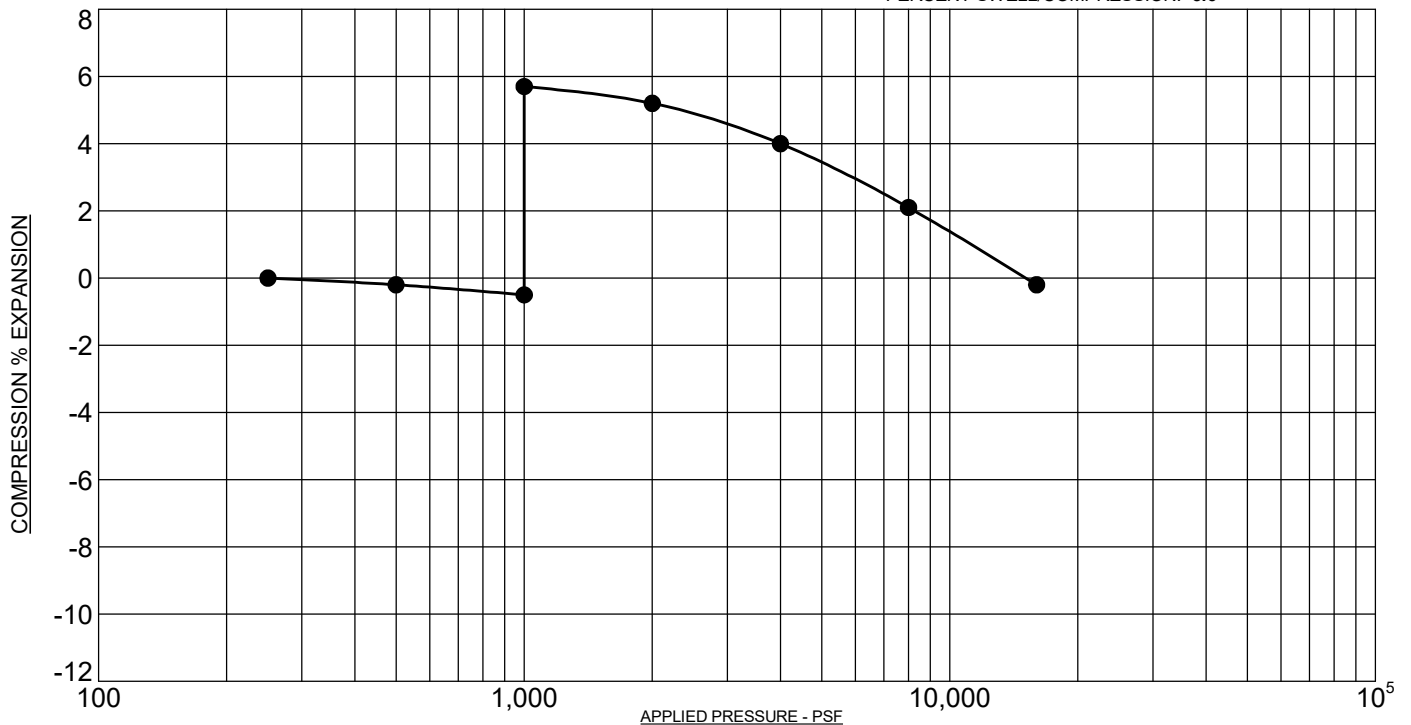
DATE Aug/05/2022





PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **43 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **112.0 PCF**  
 NATURAL MOISTURE CONTENT: **12.9%**  
 PERCENT SWELL/COMPRESSION: **5.6**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **44 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **118.6 PCF**  
 NATURAL MOISTURE CONTENT: **13.2%**  
 PERCENT SWELL/COMPRESSION: **6.2**

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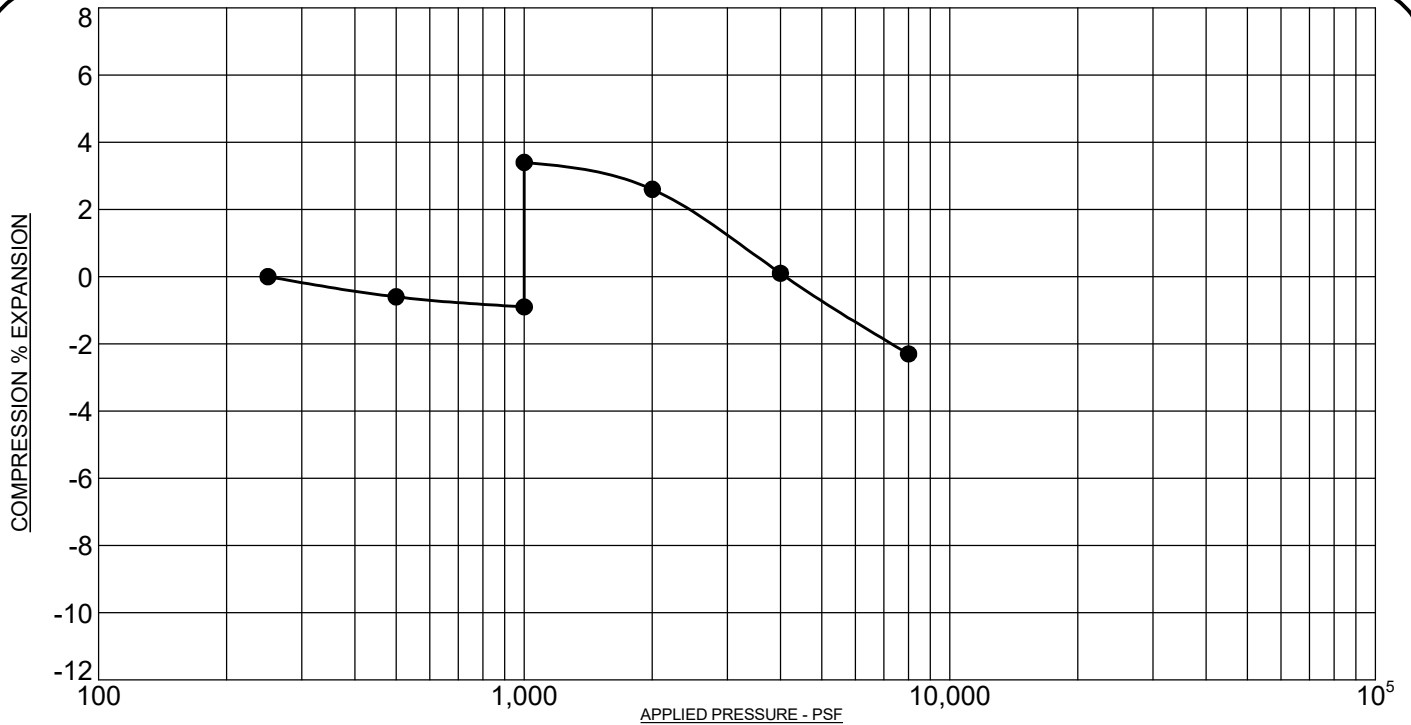
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

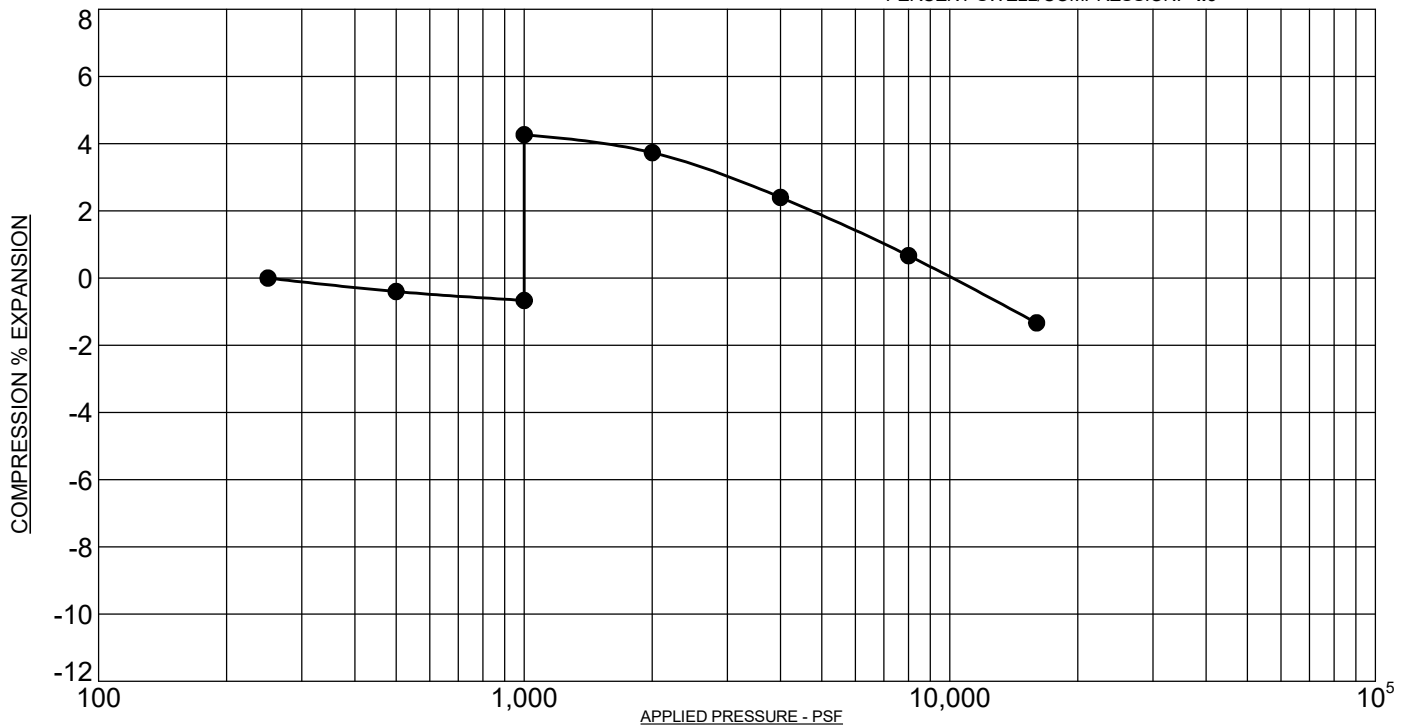
FIGURE No. 70

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **46 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **118.9 PCF**  
 NATURAL MOISTURE CONTENT: **9.6%**  
 PERCENT SWELL/COMPRESSION: **4.3**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **48 @ 29 FT**  
 NATURAL DRY UNIT WEIGHT: **121.2 PCF**  
 NATURAL MOISTURE CONTENT: **13.7%**  
 PERCENT SWELL/COMPRESSION: **4.9**

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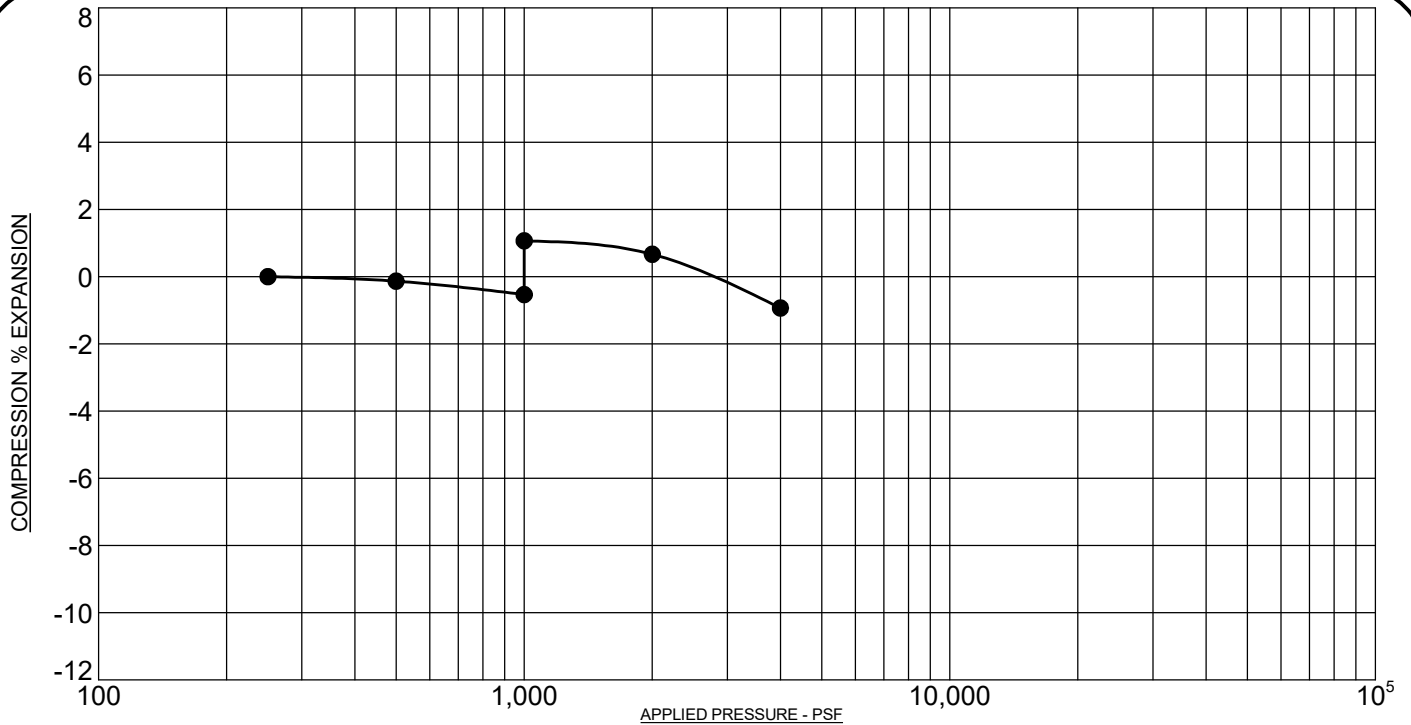
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

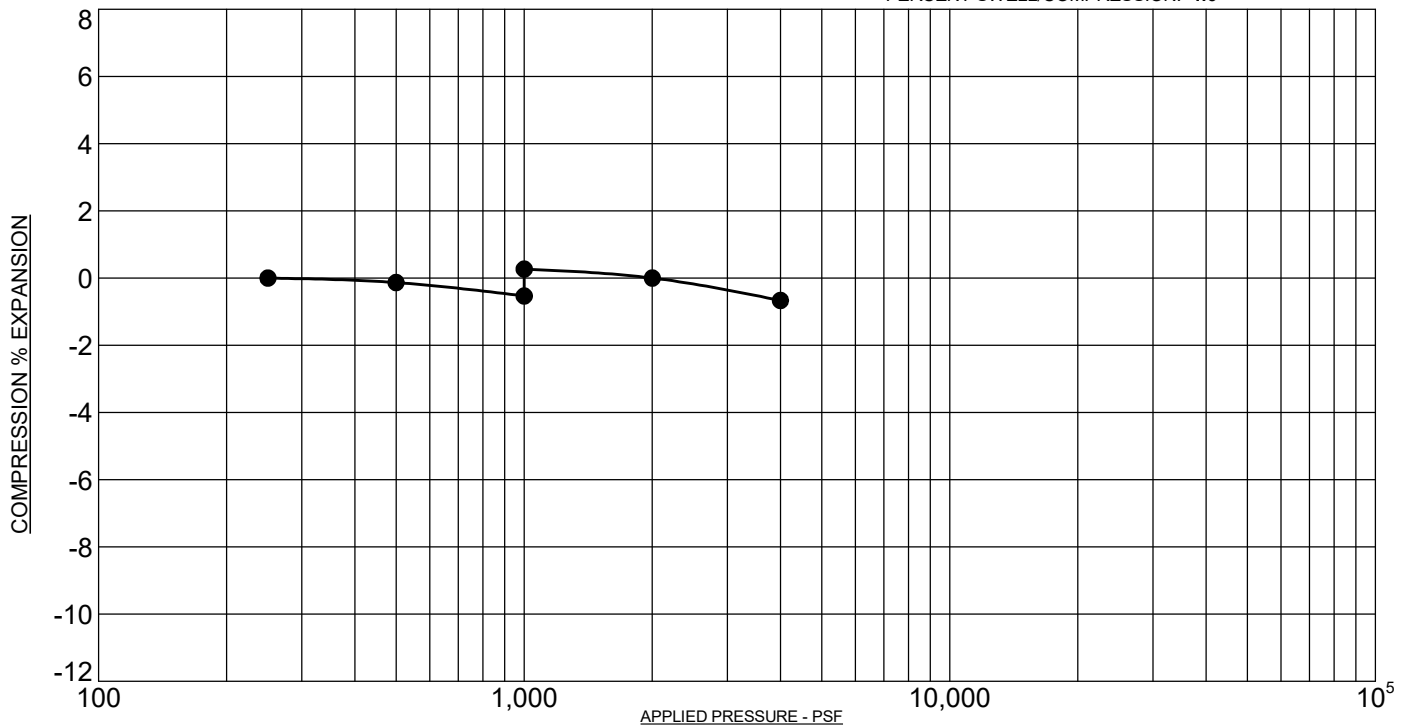
FIGURE No. 71

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **50 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **111.1 PCF**  
 NATURAL MOISTURE CONTENT: **10.3%**  
 PERCENT SWELL/COMPRESSION: **1.6**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **51 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **119.2 PCF**  
 NATURAL MOISTURE CONTENT: **6.1%**  
 PERCENT SWELL/COMPRESSION: **0.8**

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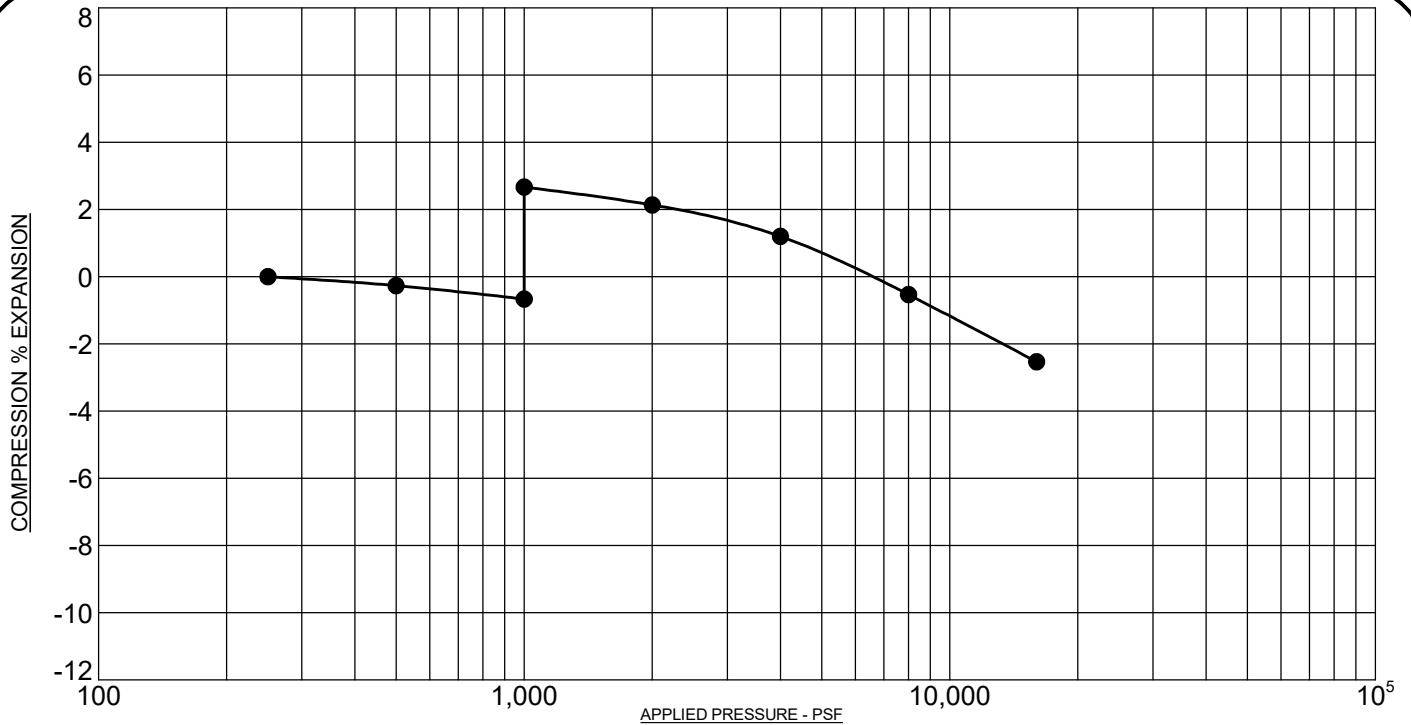
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

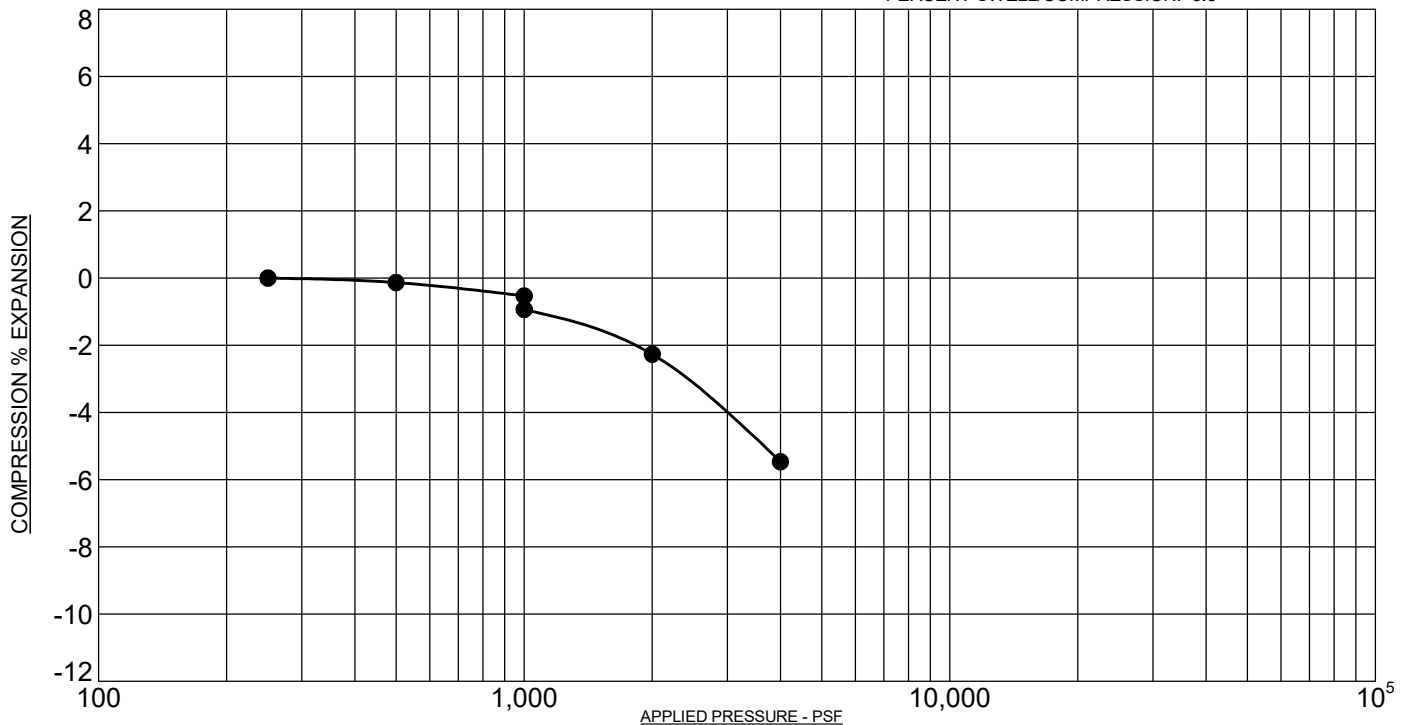
FIGURE No. 72

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **53 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **106.6 PCF**  
 NATURAL MOISTURE CONTENT: **17.4%**  
 PERCENT SWELL/COMPRESSION: **3.3**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **54 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **89.0 PCF**  
 NATURAL MOISTURE CONTENT: **12.9%**  
 PERCENT SWELL/COMPRESSION: **- 0.4**

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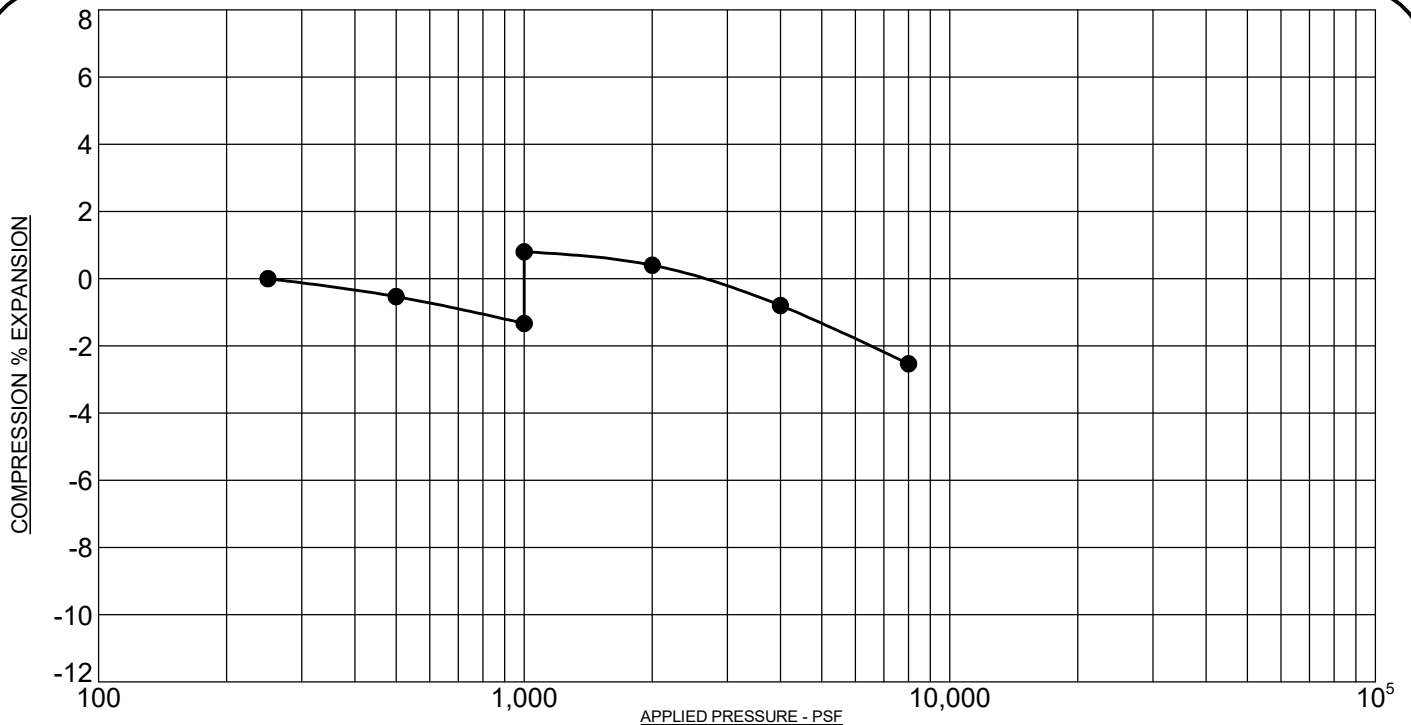
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

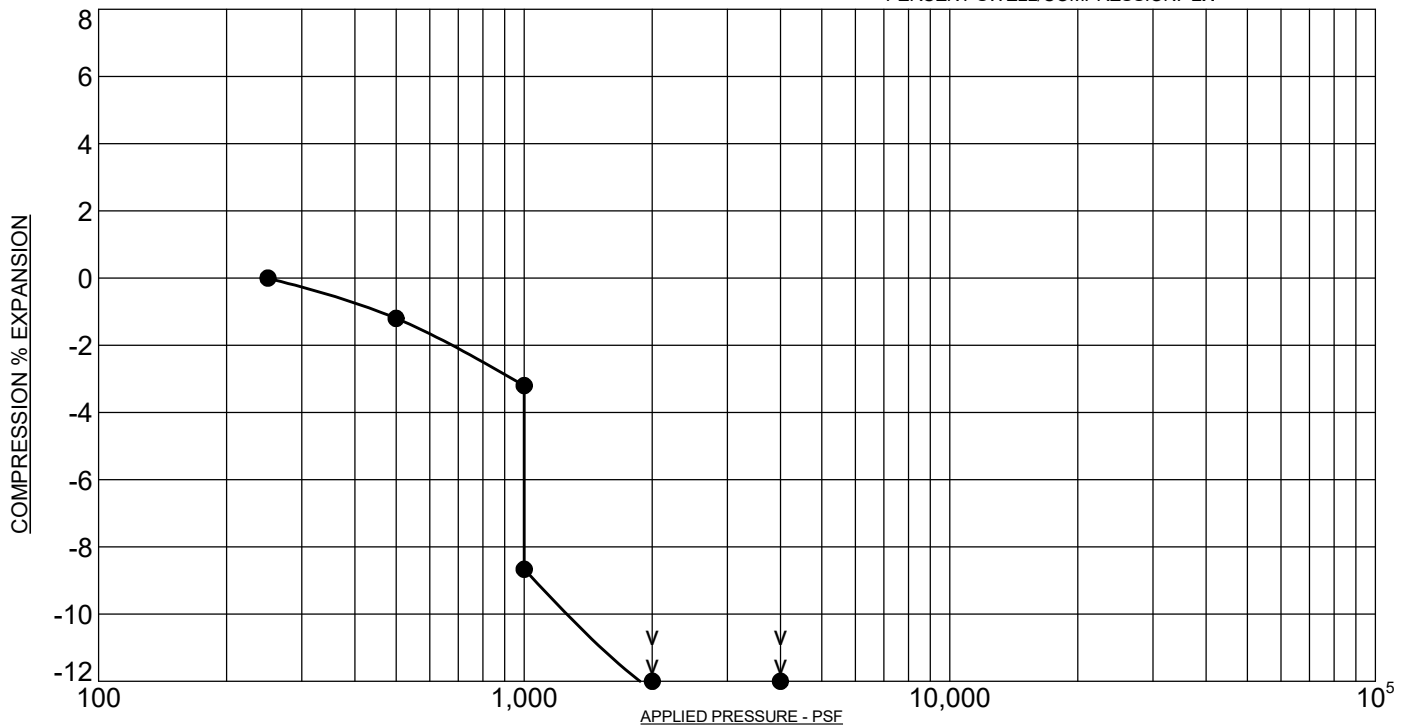
FIGURE No. 73

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **57 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **116.4 PCF**  
 NATURAL MOISTURE CONTENT: **14.5%**  
 PERCENT SWELL/COMPRESSION: **2.1**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **SAND, SILTY TO CLAYEY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **58 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **99.6 PCF**  
 NATURAL MOISTURE CONTENT: **6.5%**  
 PERCENT SWELL/COMPRESSION: **- 5.5**

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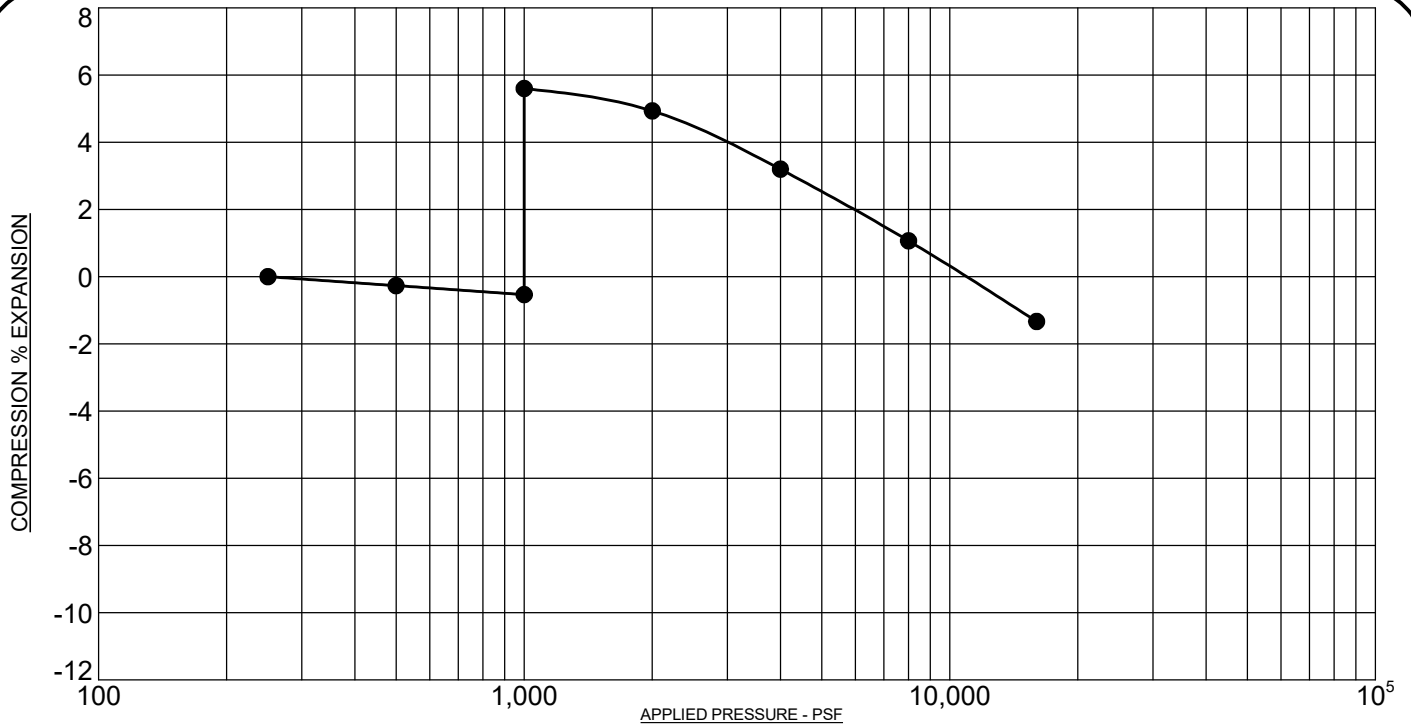
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

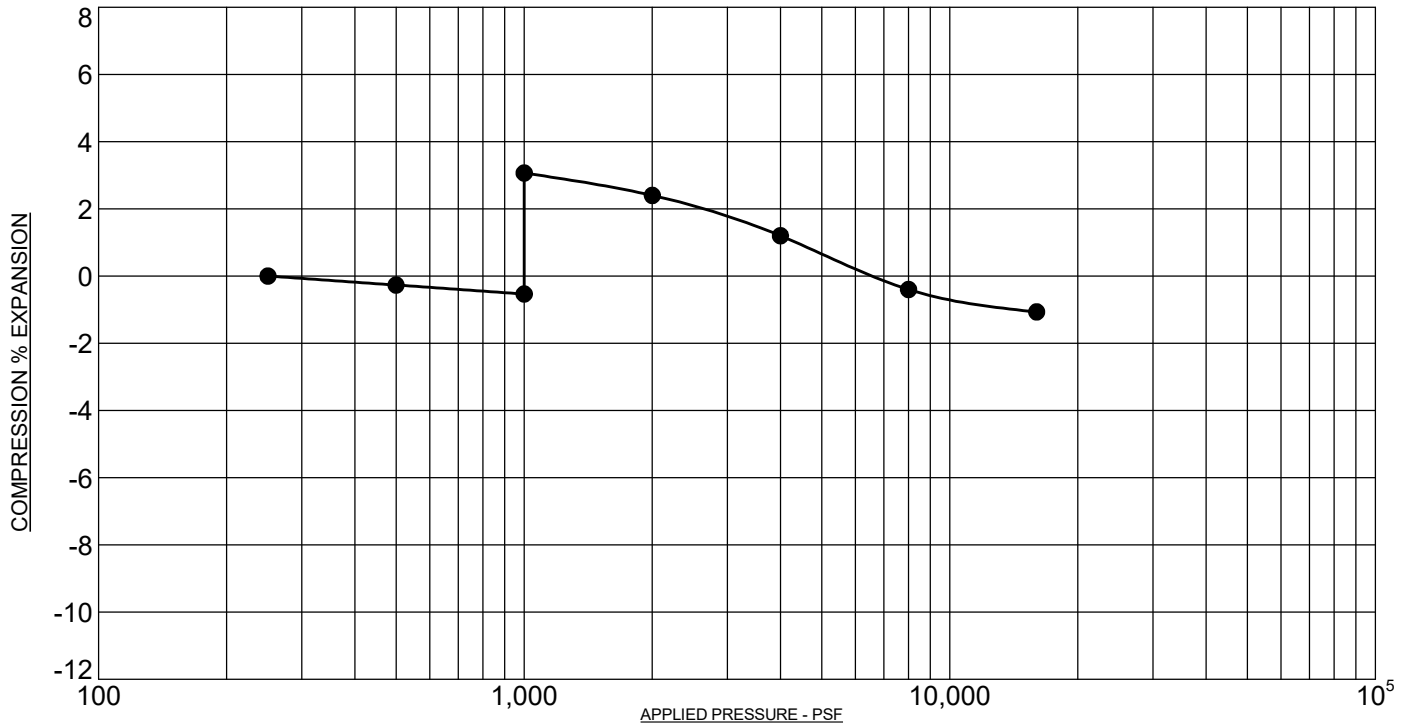
FIGURE No. 74

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **59 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **116.6 PCF**  
 NATURAL MOISTURE CONTENT: **11.9%**  
 PERCENT SWELL/COMPRESSION: **6.1**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **61 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **124.4 PCF**  
 NATURAL MOISTURE CONTENT: **9.5%**  
 PERCENT SWELL/COMPRESSION: **3.6**

ROCKY MOUNTAIN GROUP

Architectural  
Structural  
Forensics



Engineers / Architects

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Colorado Springs, CO 80918  
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Materials Testing  
Civil, Planning

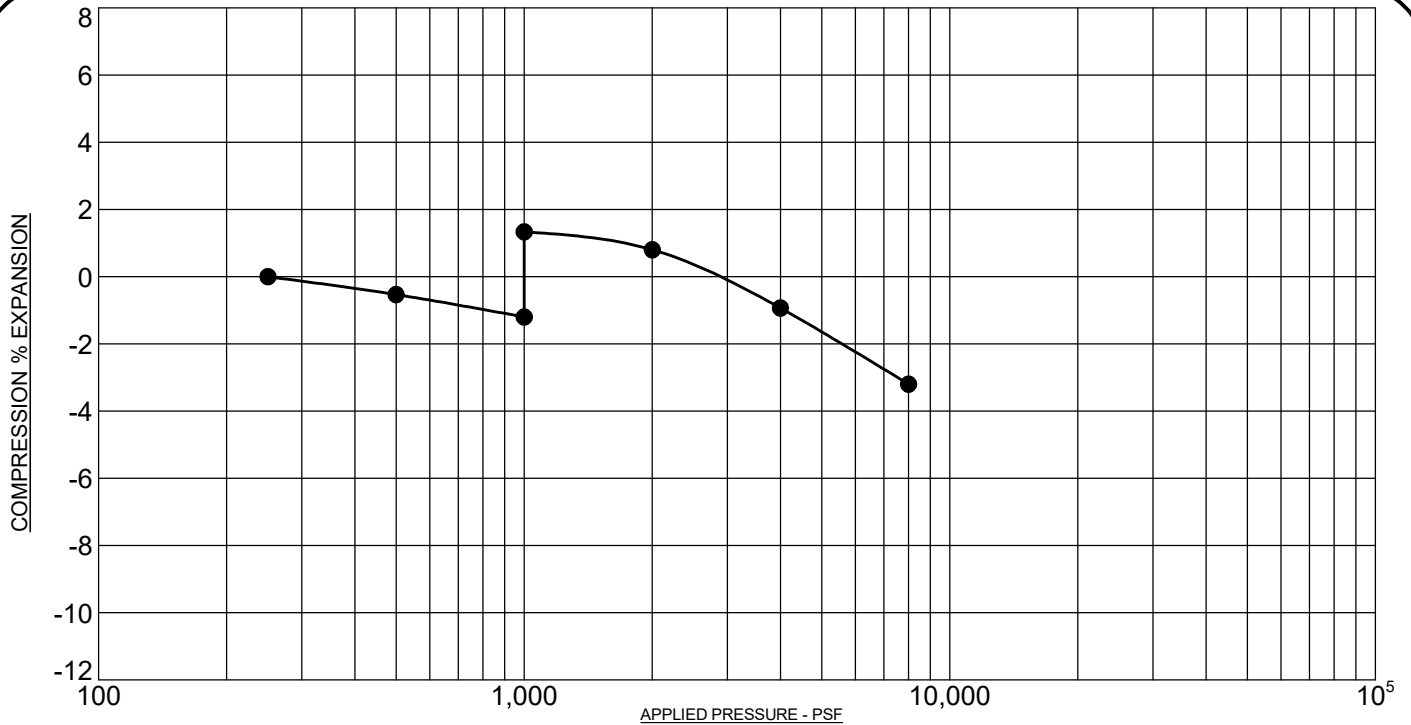
## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

FIGURE No. 75

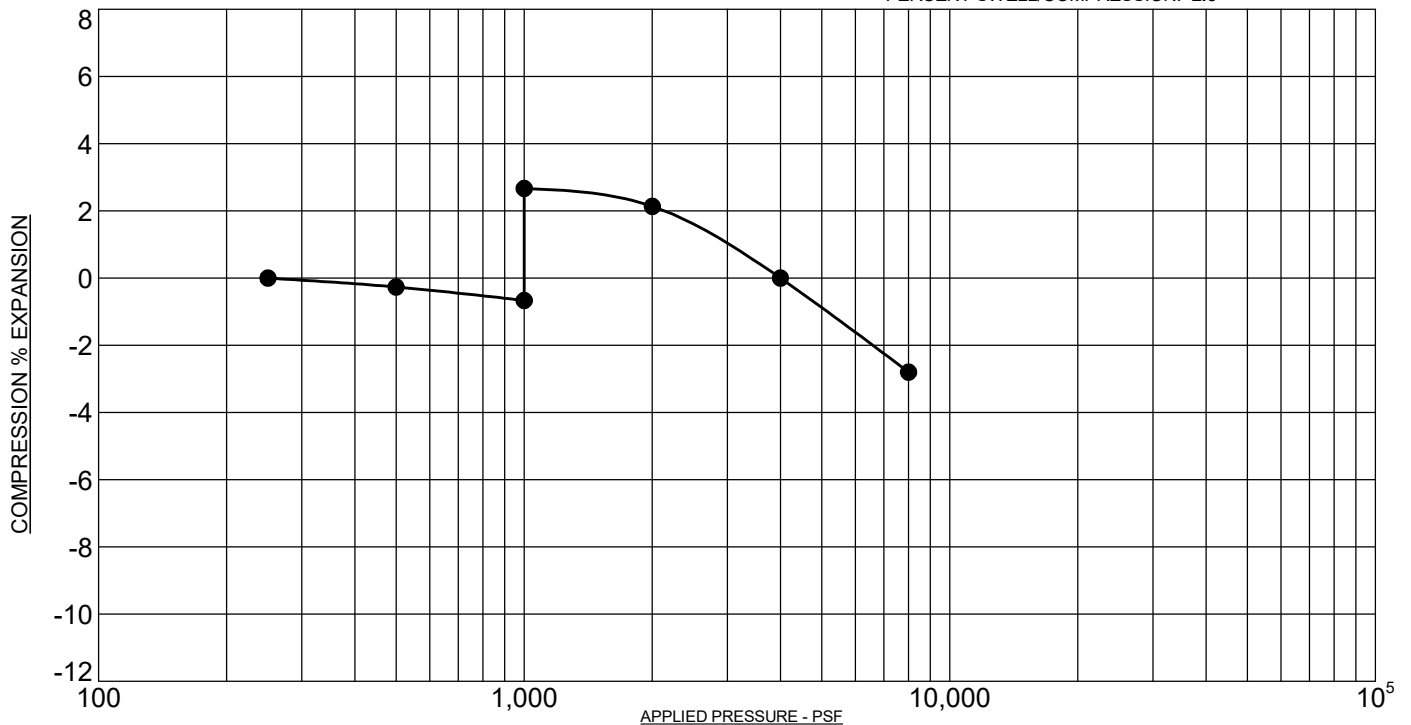
DATE Aug/05/2022





PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **62 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **117.2 PCF**  
 NATURAL MOISTURE CONTENT: **10.9%**  
 PERCENT SWELL/COMPRESSION: **2.5**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAY, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **63 @ 4 FT**  
 NATURAL DRY UNIT WEIGHT: **111.1 PCF**  
 NATURAL MOISTURE CONTENT: **10.9%**  
 PERCENT SWELL/COMPRESSION: **3.3**

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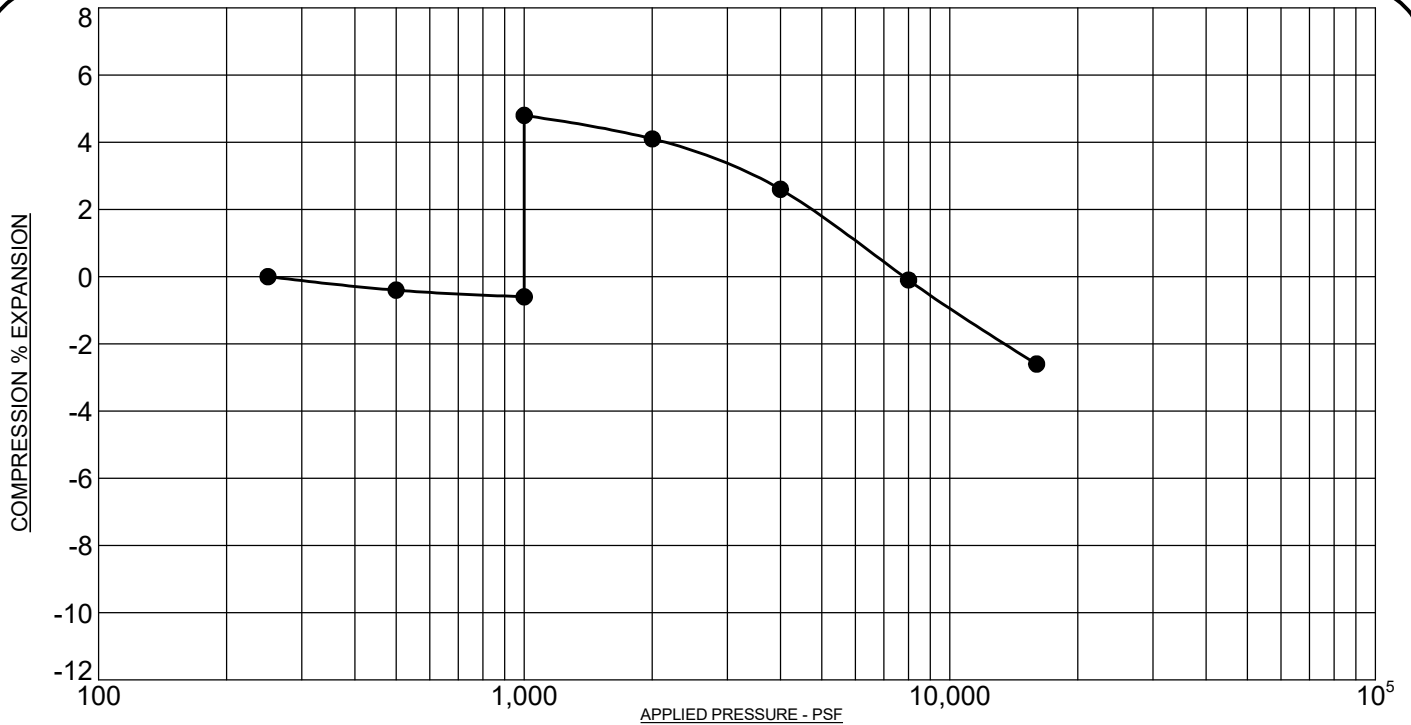
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

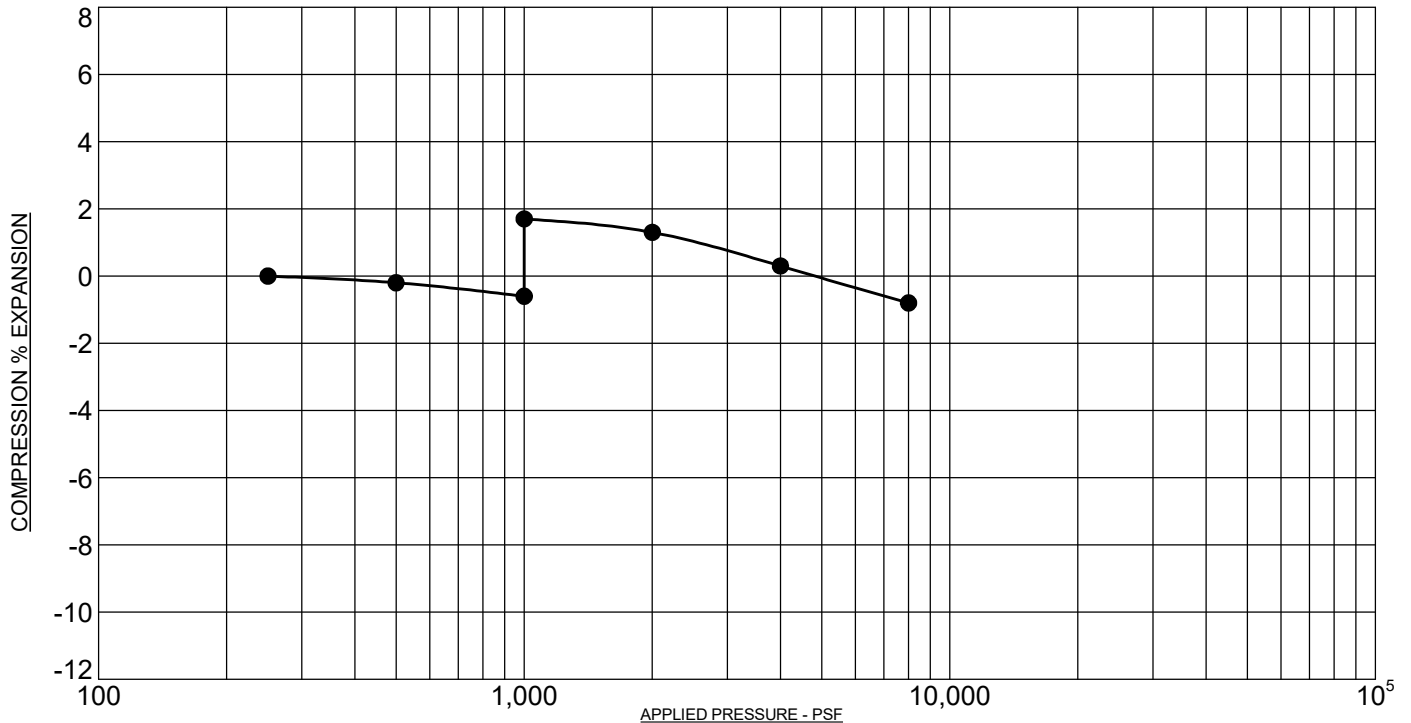
FIGURE No. 76

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **65 @ 14 FT**  
 NATURAL DRY UNIT WEIGHT: **118.5 PCF**  
 NATURAL MOISTURE CONTENT: **10.4%**  
 PERCENT SWELL/COMPRESSION: **5.4**



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **66 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **122.2 PCF**  
 NATURAL MOISTURE CONTENT: **12.3%**  
 PERCENT SWELL/COMPRESSION: **2.3**

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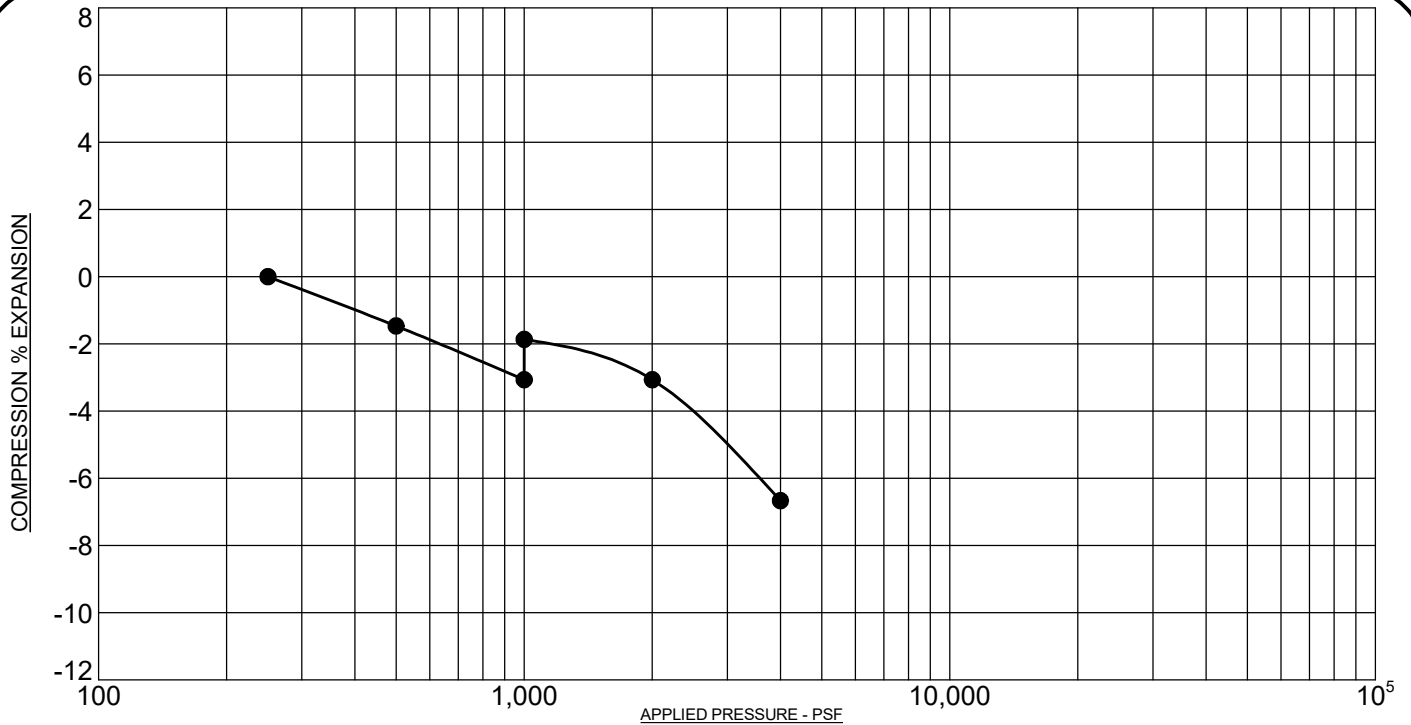
Geotechnical  
Materials Testing  
Civil, Planning

## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

FIGURE No. 77

DATE Aug/05/2022



PROJECT: **Rolling Hills El Paso County, Colorado**  
 SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**  
 NOTE: **SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF**

SAMPLE LOCATION: **69 @ 9 FT**  
 NATURAL DRY UNIT WEIGHT: **102.4 PCF**  
 NATURAL MOISTURE CONTENT: **10.2%**  
 PERCENT SWELL/COMPRESSION: **1.2**

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## SWELL/CONSOLIDATION TEST RESULTS

JOB No. 187746

FIGURE No. 78

DATE Aug/05/2022

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Structural  
Geotechnical

**RMG**

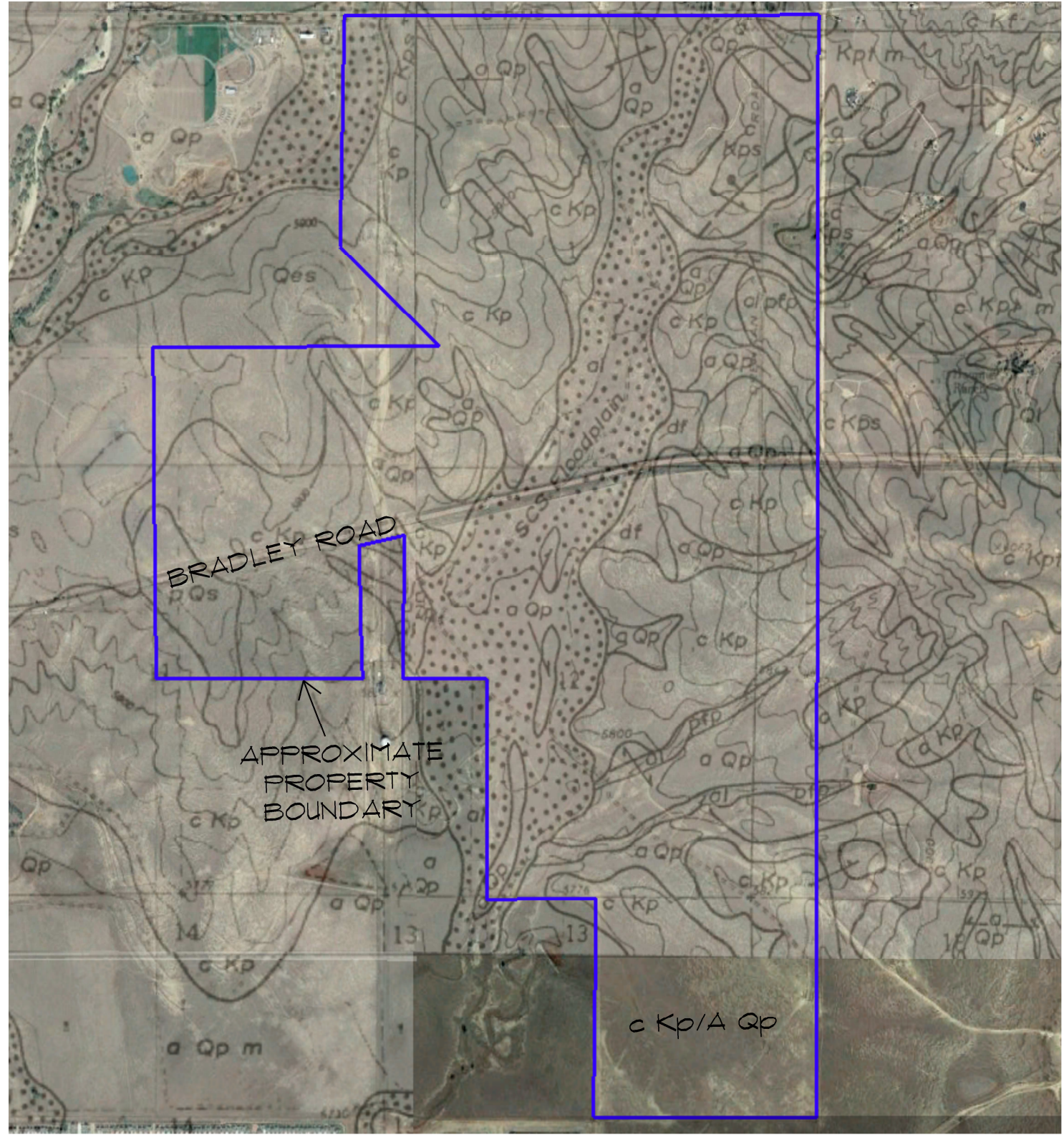
Materials Testing  
Forensics  
Civil / Planning

**Engineers / Architects**  
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COLORADO SPRINGS, CO 80918  
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ROLLING MEADOWS  
BRADLEY ROAD  
EL PASO COUNTY, COLORADO  
LANDUIS COMPANY

ENGINEER:	TFM
DRAWN BY:	KCR
CHECKED BY:	TFM
ISSUED:	8-5-2022

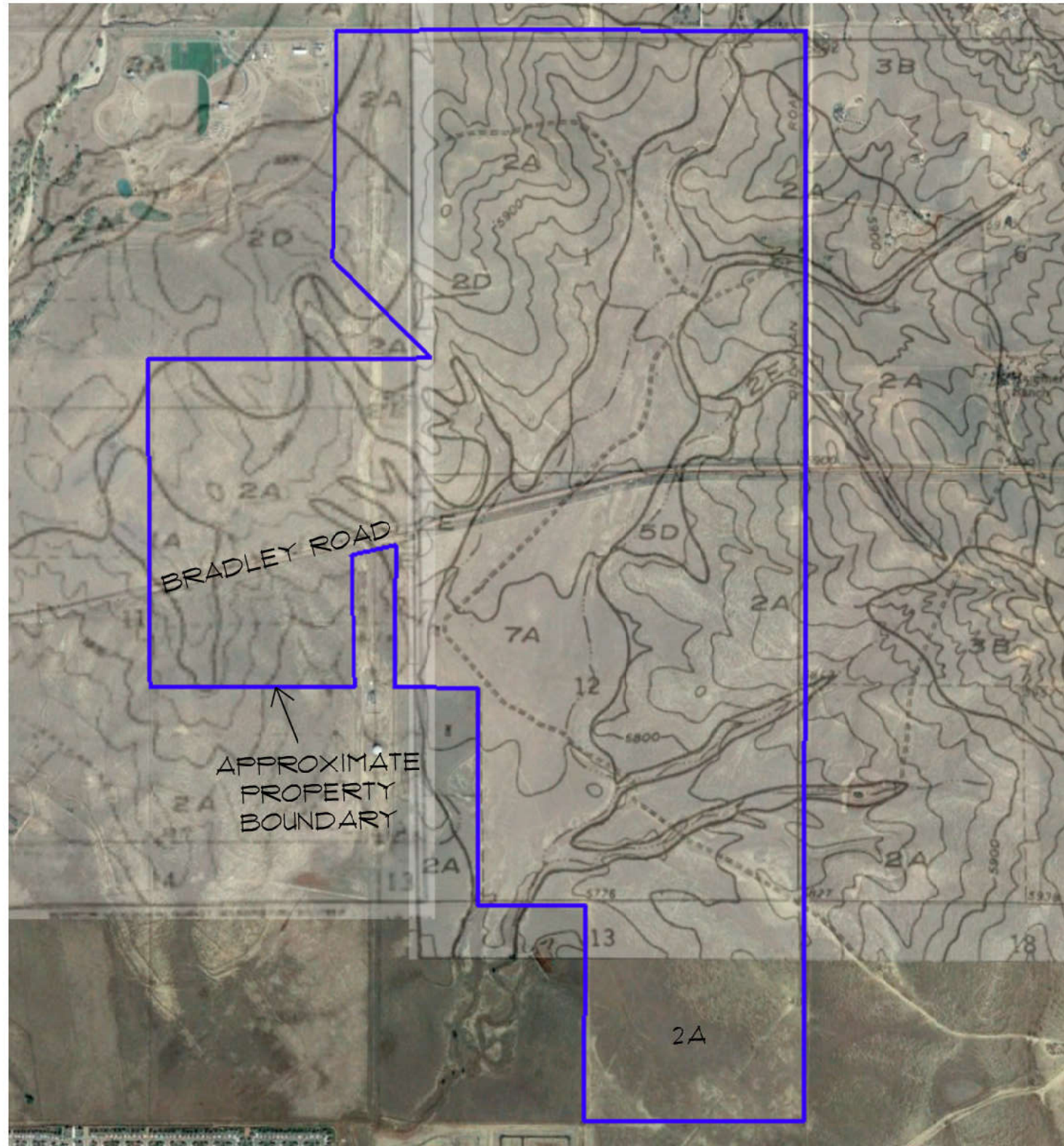
ENGINEERING MAP OF  
POTENTIAL GEOLOGIC  
HAZARDS AND SURFICIAL  
DEPOSITS



ENGINEERING CONDITIONS

- p Qs - Slocum Alluvium
- a Qp - Piney Creek Alluvium
- al - Alluvium
- Qes - Eolian Sand
- df - Debris Fan
- c Kp/c Kps - Colluvium, Pierre Shale (locally subdivided)
- pfp - Physiographic Floodplain
- SCS Floodplain - Soil Conservation Service Floodplain





#### ENGINEERING CONDITIONS

1A - Stable alluvium, colluvium and bedrock on flat to gentle slopes (0-5%)

2A - Stable alluvium, colluvium and bedrock on gentle to moderate slopes (5-12%)

2D - Eolian deposits generally on flat to gentle slopes of upland areas

2E - Low terraces and valleys of minor tributary streams

3B - Expansive and potentially expansive soil and bedrock on flat to moderate slopes (0-12%)

5D - Debris Fan

7A - Physiographic floodplain where erosion and deposition presently occur and is generally subject to recurrent flooding. Includes 100-year floodplain along major streams where floodplain studies have been conducted



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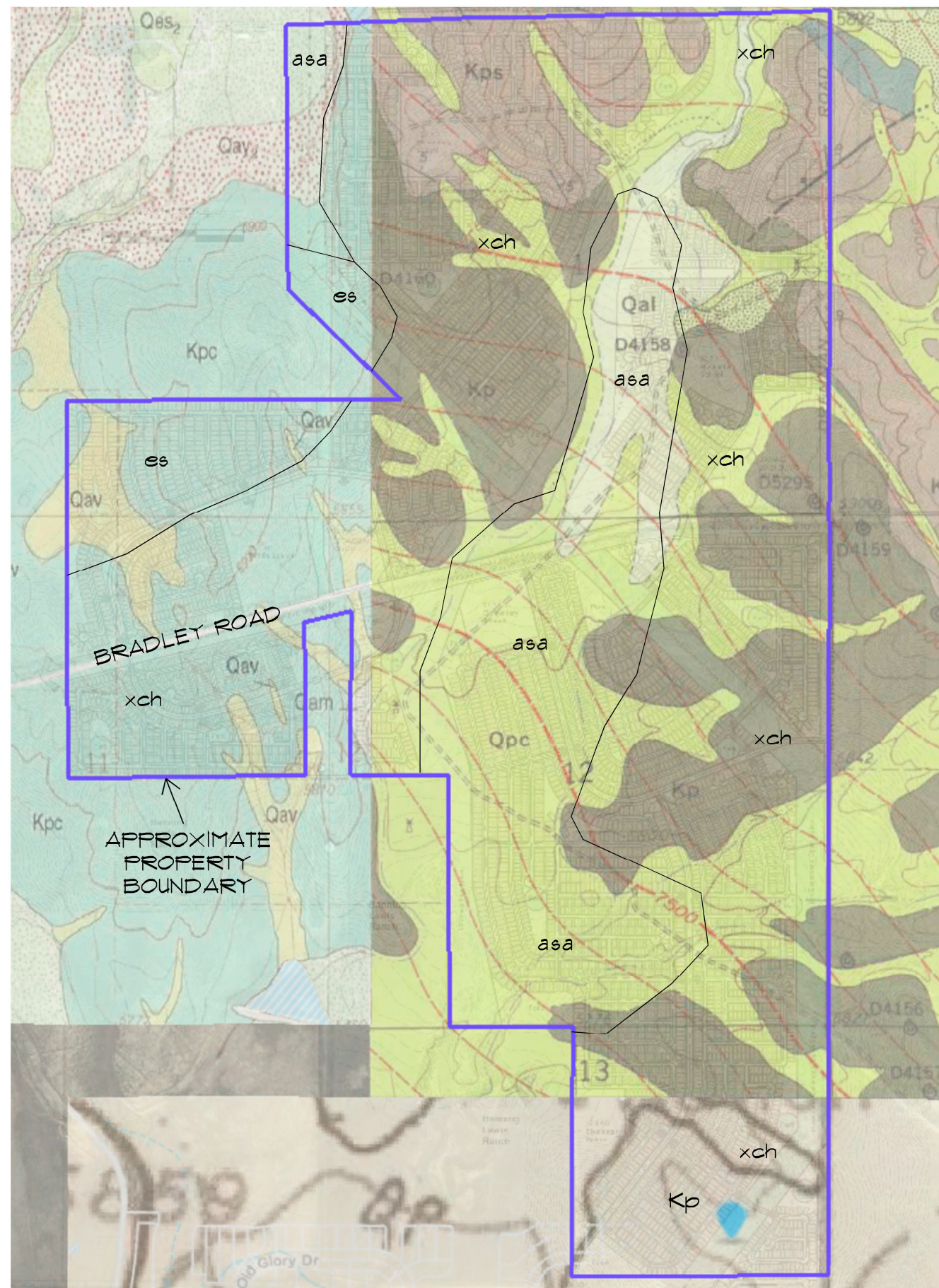
ENGINEER:	TFM
DRAWN BY:	KCR
CHECKED BY:	TFM
ISSUED:	8-5-2022

ENVIRONMENTAL AND  
ENGINEERING GEOLOGIC  
MAP FOR LAND USE

SHEET No.

FIG-80





### GEOLOGIC CONDITIONS

es - Eolian Sand

asa - Alluvial sand, silt, clay, and gravel

xch - clayey, calcareous disintegration residuum

Qam - Middle Alluvium (Late Pleistocene)

Qav - Valley-side Alluvium, Undivided (Holocene and Late Pleistocene)

Kpc - Cone-in-cone of Lavington (1933)

Kpts - Lower Part of Upper Transition Member

Qay2 - Young Alluvium Two (Late and Middle? Holocene)

Qs - Slocum Alluvium (Sangamon Interglaciation or Illinoian Glaciation)

Kps - Pierre Shale, Sandstone at or Just Above Base of Upper Transition Member

Kp - Pierre Shale, Main Part of Formation

Qpc - Piney Creek Alluvium

Qal - Alluvium

Kpt - Pierre Shale, Main Part of Upper Transition Member

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GENERAL  
GEOLOGIC MAP

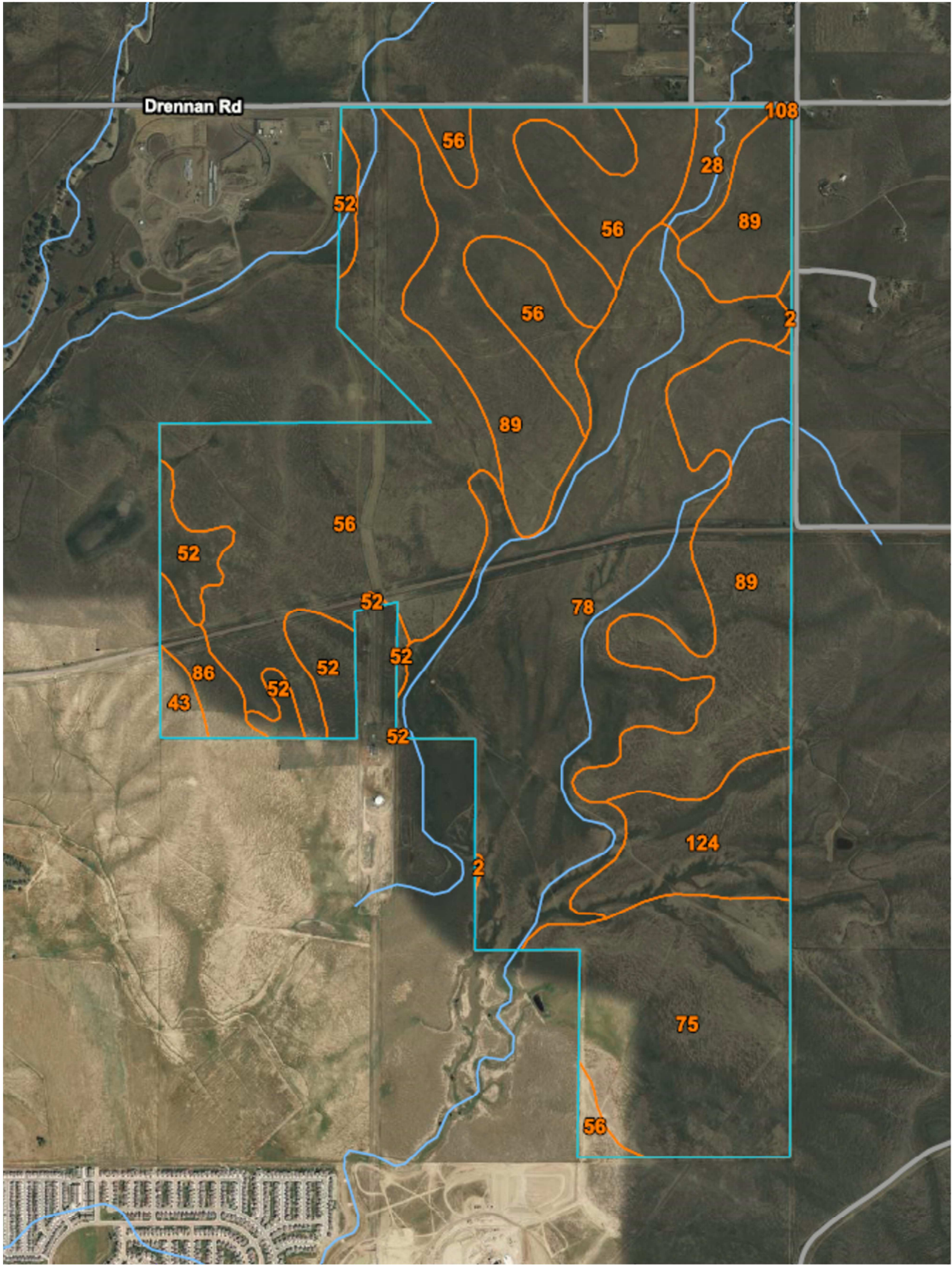
SHEET No.

**FIG-81**



NOT TO SCALE





USDA SOIL SURVEY MAP UNITS

- 56 - Nelson-Tassel fine sandy loam, 3 to 18 percent slopes
- 108 - Wiley silt loam, 3 to 9 percent slopes
- 2 - Ascalon sandy loam, 1 to 3 percent slopes
- 28 - Ellicott loamy coarse sand, 0 to 5 percent slopes
- 43 - Kim loam, 1 to 8 percent slopes
- 52 - Manzanist clay loam, 0 to 3 percent slopes
- 75 - Razor-Midway Complex
- 78 - Sampson loam, 0 to 3 percent slopes
- 86 - Stoneham sandy loam, 3 to 8 percent slopes
- 89 - Tassel fine sandy loam, 3 to 18 percent slopes
- 124 - Olneist sandy loam, 0 to 3 percent slopes



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Materials Testing  
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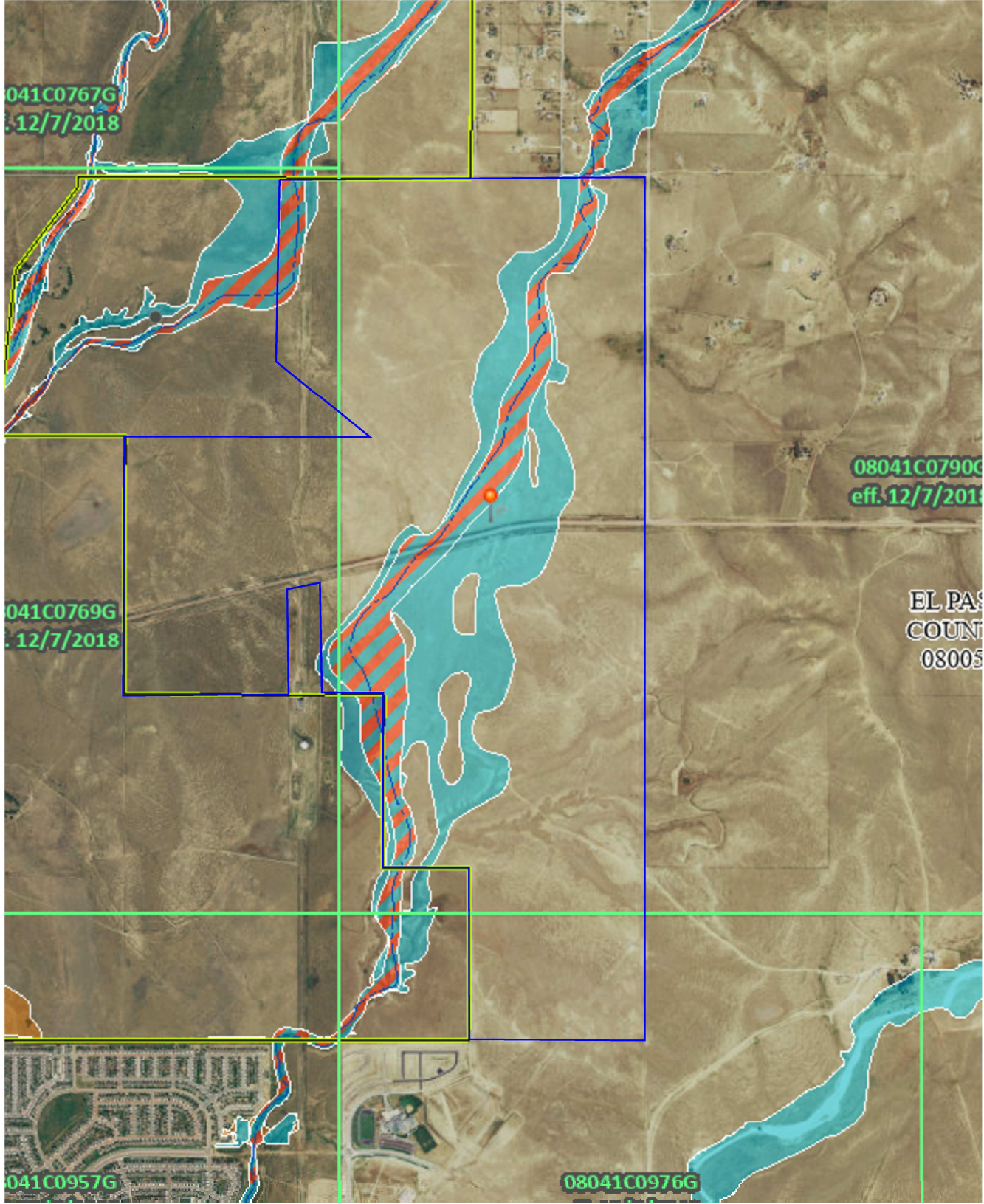
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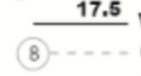







USDA SOIL SURVEY  
MAP





FLOOD HAZARD INFORMATION

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance 17.5 Water Surface Elevation
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary



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ENGINEER:	TFM
DRAWN BY:	KCR
CHECKED BY:	TFM
ISSUED:	8-5-2022

FEMA MAP

## APPENDIX A

### Additional Reference Documents

1. *Overall Sketch Plan*, received via electronic email from Matrix, plan not dated.
2. *Conceptual Layout 01, Rolling Hills – Bull Hill*, prepared by Matrix Design Group, dated November 9, 2021.
3. *Conceptual Layout 03, Rolling Hills – Bull Hill*, prepared by Matrix Design Group, dated January 27, 2022.
4. *Overall Conceptual Layout, Rolling Hills – Bull Hill*, prepared by Matrix Design Group, dated October 25, 2021.
5. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 08041C0790G, 08041C0769G*, Federal Emergency Management Agency (FEMA), effective December 7, 2018.
6. *Corral Bluffs Quadrangle, Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
7. *Corral Bluffs Quadrangle, Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
8. *Elsmere Quadrangle, Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
9. *Elsmere Quadrangle, Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
10. *Geologic Map of the Elsmere 7.5 Minute Quadrangle, El Paso County, Colorado*, Madole, R.F., and Thorson, J.P., CGS, Open-File Report OF02-02, 2003.
11. *Generalized Surficial Geologic Map of the Pueblo 1 degree x 2 degree Quadrangle, Colorado*, Moore, D.E., Straub, A.W., Berry, M.E., Baker, M.L., and Brandt, T.R., USGS, Miscellaneous Field Studies Map MF-2388, 2002.
12. *Geologic Map of the Corral Bluffs Quadrangle, El Paso County, Colorado*, Soister, P.E., USGS, Geologic Quadrangle Map GQ-783, 1968.
13. *Geologic Map of the Pueblo 1 degree x 2 degrees quadrangle, south central Colorado*, Scott, G.R., Taylor, R.B., Epis, R.C., and Wobus, R.A., Miscellaneous Investigations Series Map I-1022, 1978.
14. *Geologic map of the Pueblo 1 degree x 2 degrees quadrangle, south-central Colorado*, Scott, G.R., Taylor, R.B., Epis, R.C., and Wobus, R.A., Miscellaneous Field Studies Map MF-775, 1976.
15. *El Paso County Aggregate Resource Evaluation Map, Master Plan for Mineral Extraction, Map 1*
16. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County, State and Mineral Lands, Open-File Report OF-03-07*
17. *Colorado Springs and Vicinity Natural Hazard Explorer ArcGIS WebViewer*  
<https://www.arcgis.com/apps/MapSeries/index.html?appid=dce03f88b282442d8ec751fd439e357e>
18. *USDA Web Soil Survey*  
<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

19. *Pikes Peak Regional Building Department*: <https://www.pprbd.org/>.
20. El Paso County Assessor Real Property Search  
<https://property.spatalest.com/co/elpaso/#/property/>
21. *USGS National Geologic Map Database*  
<https://ngmdb.usgs.gov/mapview/?center=-97,39.6&zoom=4>
22. *Historical Aerials*: <https://www.historicaerials.com/viewer>, Images dated 1947, 1955, 1960, 1969, 1983, 1999, 2005, 2009, 2011, 2013, 2015, 2017, and 2019.
23. *USGS TopoView Historical Topographic Map Viewer*  
<https://ngmdb.usgs.gov/topoview/viewer/#15/38.7488/-104.6183>  
*Fountain Quadrangle, Colorado*, dated 1948, 1950, 1951, 1961, 2010, 2013, 2016, 2019, and 2022.
24. *USGS TopoView Historical Topographic Map Viewer*  
<https://ngmdb.usgs.gov/topoview/viewer/#15/38.7488/-104.6183>  
*Corral Bluffs Quadrangle, Colorado*, dated 1961, 2010, 2013, 2016, 2019, and 2022.
25. *USGS TopoView Historical Topographic Map Viewer*  
<https://ngmdb.usgs.gov/topoview/viewer/#15/38.7488/-104.6183>  
*Fountain NE Quadrangle, Colorado*, dated 1950, 1961, 2010, 2013, 2016, 2019, and 2022.
26. *USGS TopoView Historical Topographic Map Viewer*  
<https://ngmdb.usgs.gov/topoview/viewer/#15/38.7488/-104.6183>  
*Elsmere Quadrangle, Colorado*, dated 1950, 1961, 2010, 2011, 2013, 2016, 2019, and 2022.
27. *Google Earth Pro*, Imagery dated 1999, 2003, 2004, 2005, 2006, 2011, 2015, 2017, 2019, 2020 and 2021.

## APPENDIX B

### Guideline Site Grading Specifications

**Description:** Unless specified otherwise by local or state regulatory agencies, these guideline specifications are for the excavation, placement and compaction of material from locations indicated on the plans, or staked by the Engineer, as necessary to achieve the required elevations. These specifications shall also apply to compaction of materials that may be placed outside of the project.

**General:** The Geotechnical Engineer shall approve fill materials, method of placement, moisture contents and percent compactions, and shall give written approval of the compacted fill.

**Clearing Site:** The Contractor shall remove trees, brush, rubbish, vegetation, topsoil and existing structures before excavation or fill placement is commenced. The Contractor shall dispose of the cleared material to provide the Owner with a clean job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures. Clearing shall also include removal of existing fills that do not meet the requirements of this specification and existing structures.

**Preparation of Slopes or Drainage Areas to Receive Fill:** Natural slopes or slopes of drainage gullies where grades are 20 percent (5:1, horizontal to vertical) or steeper shall be benched prior to fill placement. Benches shall be at least 10 feet wide. Benches may require additional width to accommodate excavation or compaction equipment. At least one bench shall be provided for each 5 feet or less of vertical elevation difference. The bench surface shall be essentially horizontal perpendicular to the slope or at a slight incline into the slope.

**Scarifying:** Topsoil and vegetation shall be removed from the ground surface in areas to receive fill. The surface shall be plowed or scarified a minimum of 12 inches until the surface is free from ruts, hummocks or other uneven features which would prevent uniform compaction by the equipment to be used.

**Compacting Area to Receive Fill:** After the area to receive fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods, moisture conditioned to a proper moisture content and compacted to the maximum density as specified for the overlying fill. Areas to receive fill shall be worked, stabilized, or removed and replaced, if necessary, in accordance with the Geotechnical Engineer's recommendations in preparation for fill.

**Fill Materials:** Fill material shall be free from organic material or other deleterious substances, and shall not contain rocks or lumps having a diameter greater than six inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer or imported to the site and shall be approved by the Geotechnical Engineer prior to placement. It is recommended that the fill materials have nil to low expansion potential, i.e., consist of silty to slightly clayey sand.

- The moisture-conditioned materials should be placed in maximum 6" compacted lifts. These materials should be compacted to a minimum of 92 percent of the maximum



- Modified Proctor dry density or 95 percent of the maximum Standard Proctor dry density. Material not meeting the above requirements shall be reprocessed.

Materials used for moisture-conditioned structural fill should be approved by RMG prior to use. Moisture-conditioned structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

**Moisture Content:** Fill materials shall be moisture conditioned to within limits of optimum moisture content specified. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas or imported to the site.

The contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Geotechnical Engineer, it is not possible to obtain uniform moisture content by adding water to the fill material during placement. The Contractor may be required to rake or disk the fill soils to provide uniform moisture content through the soils.

The application of water to embankment materials shall be made with watering equipment, approved by the Geotechnical Engineer, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are eroded.

Should too much water be added to the fill, such that the material is too wet to permit the desired compaction to be obtained, compacting and work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework the wet material in an approved manner to hasten its drying.

**Compaction of Fill Areas:** Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Fill materials shall be placed such that the thickness of loose material does not exceed 10 inches and the compacted lift thickness does not exceed 6 inches.

Compaction, as specified above, shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Geotechnical Engineer. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Geotechnical Engineer. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area.

**Moisture Content and Density Criteria:**

- A. Fill placed in roadways and utility trenches should be moisture conditioned and compacted in accordance with El Paso County Specifications.
- B. Fill placed outside of roadways and utility trenches should be compacted to at least 92% of the maximum Modified Proctor density (ASTM D-1557) or at least 95% of the maximum Standard Proctor density (ASTM D-698) at a moisture content within 2% of optimum.



**Compaction of Slopes:** Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and such that there is no appreciable amount of loose soil on the slopes. Compaction of slopes may be done progressively in increments of three to five feet in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

**Density Testing:** Field density testing shall be performed by the Geotechnical Engineer at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

**Observation and Testing of Fill:** Observation by the Geotechnical Engineer shall be sufficient during the placement of fill and compaction operations so that he can declare the fill was placed in general conformance with Specifications. All observations necessary to test the placement of fill and observe compaction operations will be at the expense of the Owner.

**Seasonal Limits:** No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Geotechnical Engineer indicates the moisture content and density of previously placed materials are as specified.

**Reporting of Field Density Tests:** Density tests made by the Geotechnical Engineer shall be submitted progressively to the Owner. Dry density, moisture content, percent compaction, and approximate location shall be reported for each test taken.

## **FEMA FIRM Floodplain Maps**





NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations** shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services  
NOAA, NNGS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at <http://www.ngs.noaa.gov/>.

**Base Map** information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

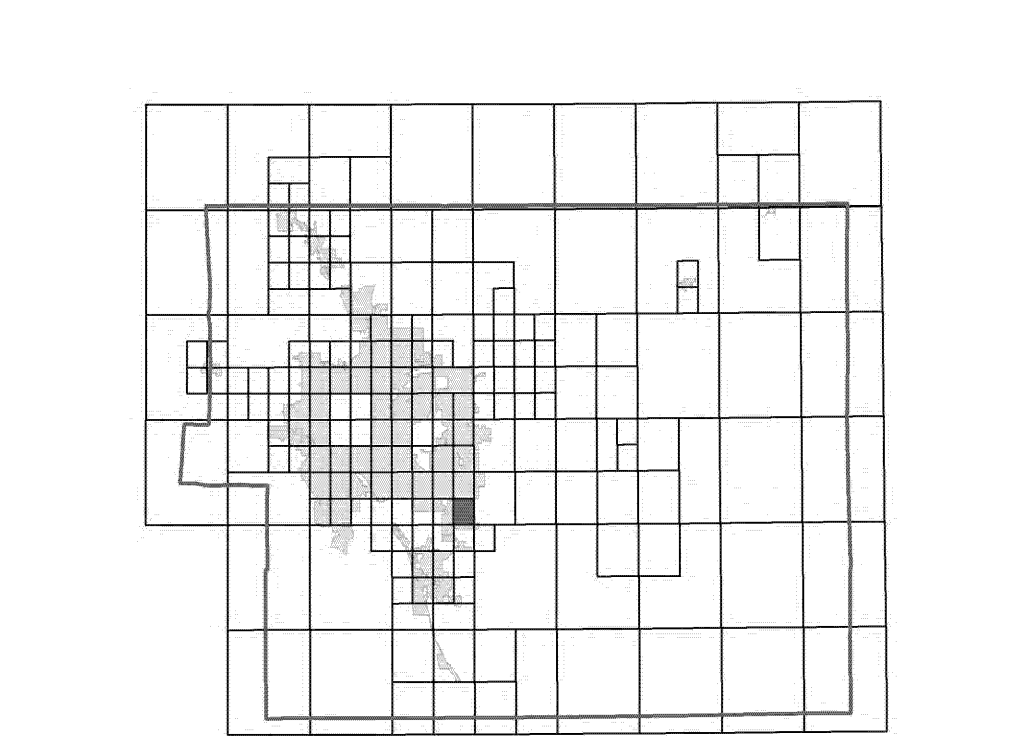
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FIMX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfip>.

El Paso County Vertical Datum Offset Table	
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

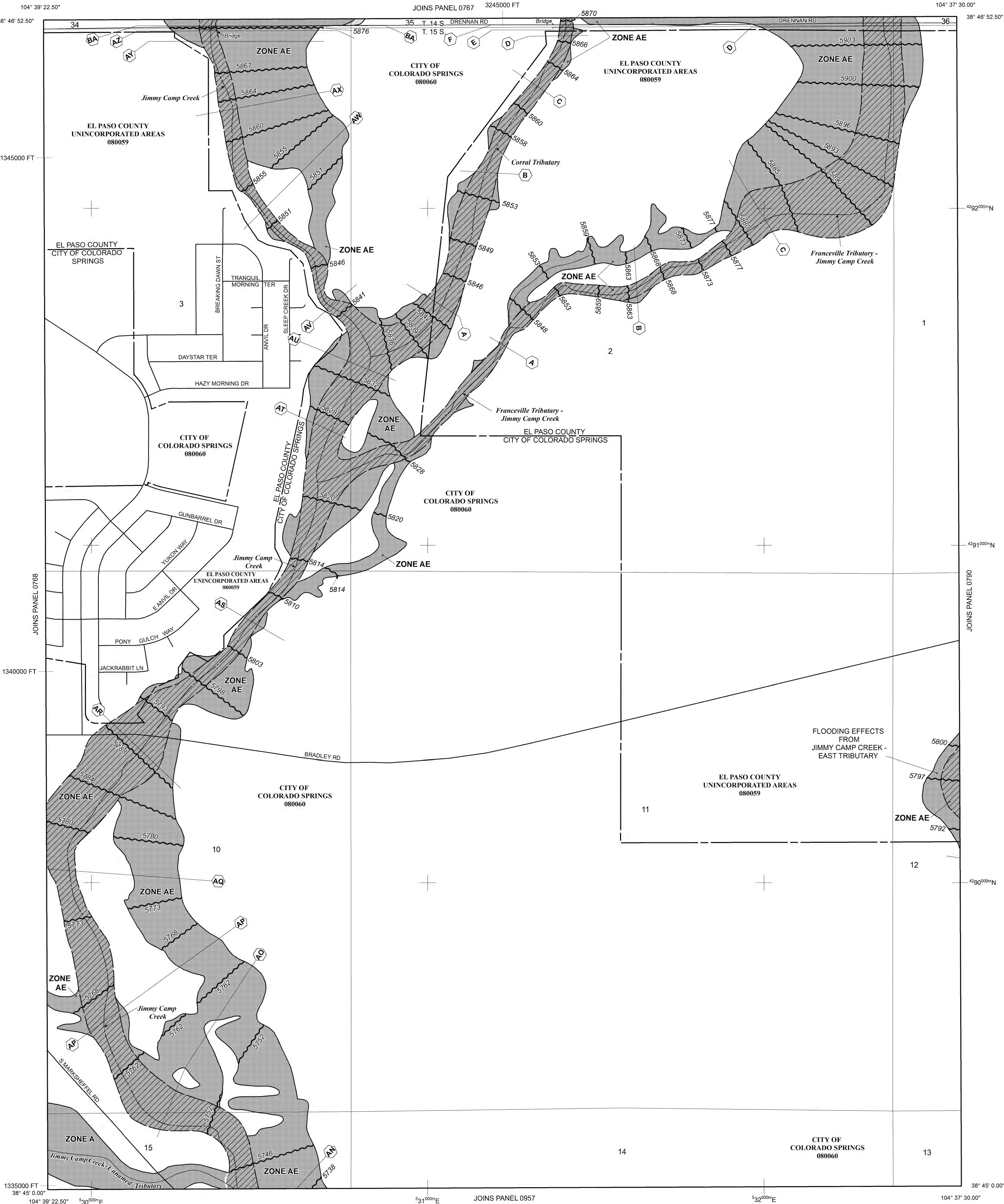
Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWB) and the Federal Emergency Management Agency (FEMA).



Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



## **CDPHE General Permit**





# STATE OF COLORADO

## COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

### Water Quality Control Division

CDPS GENERAL PERMIT STORMWATER DISCHARGES ASSOCIATED WITH  
CONSTRUCTION ACTIVITY AUTHORIZATION TO DISCHARGE UNDER THE COLORADO DISCHARGE PERMIT SYSTEM (CDPS)  
**COR400000**

In compliance with the provisions of the Colorado Water Quality Control Act, (25-8-101 et seq., CRS, 1973 as amended) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.; the "Act"), this permit authorizes the discharge of stormwater associated with construction activities (and specific allowable non-stormwater discharges in accordance with Part I.A.1. of the permit) certified under this permit, from those locations specified throughout the State of Colorado to specified waters of the State.

Such discharges shall be in accordance with the conditions of this permit. This permit specifically authorizes the facility listed on the certification to discharge in accordance with permit requirements and conditions set forth in Parts I and II hereof. All discharges authorized herein shall be consistent with the terms and conditions of this permit.

This permit becomes effective on April 1, 2019, and shall expire at midnight March 31, 2024.

Issued and signed this 28th day of January, 2021.

*Meg Parish*

Meg Parish, Permits Section Manager Water Quality Control Division

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

#### Permit History

Minor Modification Issued January 28, 2021 Effective February 1, 2021

Modification Issued December 31, 2020 Effective February 1, 2021

Originally signed and issued October 31, 2018; effective April 1, 2019

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## Part I

Note: At the first mention of terminology that has a specific connotation for the purposes of this permit, the terminology is electronically linked to the definitions section of the permit in Part I.E.

### A. COVERAGE UNDER THIS PERMIT

#### 1. Authorized Discharges

This general permit authorizes permittee(s) to discharge the following to state waters: stormwater associated with construction activity and specified non-stormwater associated with construction activity. The following types of stormwater and non-stormwater discharges are authorized under this permit:

##### a. Allowable Stormwater Discharges

- i. Stormwater discharges associated with construction activity.
- ii. Stormwater discharges associated with producing earthen materials, such as soils, sand, and gravel dedicated to providing material to a single contiguous site, or within ¼ mile of a construction site (e.g. borrow or fill areas).
- iii. Stormwater discharges associated with [dedicated asphalt](#), [concrete batch plants](#) and [masonry mixing stations](#) (Coverage under this permit is not required if alternative coverage has been obtained.)

##### b. Allowable Non-Stormwater Discharges

The following non-stormwater discharges are allowable under this permit if the discharges are identified in the stormwater management plan in accordance with [Part I.C](#) and if they have appropriate [control measures](#) in accordance with [Part I.B.1](#).

- i. Discharges from uncontaminated springs that do not originate from an area of land disturbance.
- ii. Discharges to the ground of concrete washout water associated with the washing of concrete tools and concrete mixer chutes. Discharges of concrete washout water must not leave the site as surface runoff or reach [receiving waters](#) as defined by this permit. Concrete on-site waste disposal is not authorized by this permit except in accordance with [Part I.B.1.a.ii\(b\)](#).
- iii. Discharges of landscape irrigation return flow.
- iv. Discharges from [diversions](#) of state waters within the permitted site.

##### c. Emergency Fire Fighting

Discharges resulting from emergency firefighting activities during the active emergency response are authorized by this permit.

#### 2. Limitations on Coverage

Discharges not authorized by this permit include, but are not limited to, the discharges and activities listed below. Permittees may seek individual or alternate general permit coverage for the discharges, as appropriate and available.

##### a. Discharges of Non-Stormwater

Discharges of non-stormwater, except the authorized non-stormwater discharges listed in Part

I.A.1.b., are not eligible for coverage under this permit.

- b. Discharges Currently Covered by another Individual or General Permit
- c. Discharges Currently Covered by a Water Quality Control Division (division) Low Risk Guidance Document

### 3. Permit Certification and Submittal Procedures

#### a. Duty to Apply

The following activities shall apply for coverage under this permit:

- i. Construction activity that will disturb one acre or more; or
- ii. Construction activity that is part of a [common plan of development or sale](#); or
- iii. Stormwater discharges that are designated by the division as needing a stormwater permit because the discharge:
  - (a) Contributes to a violation of a water quality standard; or
  - (b) Is a significant contributor of [pollutants](#) to state waters.

#### b. Application Requirements

To obtain authorization to discharge under this permit, applicants applying for coverage following the effective date of the renewal permit shall meet the following requirements:

- i. Owners and operators submitting an application for permit coverage will be co-permittees subject to the same benefits, duties, and obligations under this permit.
- ii. Signature requirements: Both the [owner](#) and [operator](#) (permittee) of the construction site, as defined in Part I.E., must agree to the terms and conditions of the permit and submit a completed application that includes the signature of both the owner and the operator. In cases where the duties of the owner and operator are managed by the owner, both application signatures may be completed by the owner. Both the owner and operator are responsible for ensuring compliance with all terms and conditions of the permit, including implementation of the stormwater management plan.
- iii. The applicant(s) must develop a stormwater management plan (SWMP) in accordance with the requirements of Part I.C. The applicant(s) must also certify that the SWMP is complete, or will be complete, prior to commencement of any construction activity.
- iv. In order to apply for certification under this general permit, the applicant(s) must submit a complete, accurate, and signed permit application form as provided by the division by electronic delivery at least 10 days prior to the commencement of construction activity, except those construction activities that are in response to a [public emergency related site](#); [public emergency related sites](#) shall apply for coverage no later than 14 days after the commencement of construction activities. The provisions of this part in no way remove a violation of the Colorado Water Quality Control Act if a [point source](#) discharge occurs prior to the issuance of a CDPS permit.
- v. The application in its entirety must be submitted via the division's online permitting system unless a waiver is granted by the division. If a waiver is granted, the application in its entirety, including signatures by both the owner and operator, must be submitted to:



Colorado Department of Public Health and Environment  
Water Quality Control Division  
Permits Section, WQCD-PS-B2  
4300 Cherry Creek Drive South  
Denver, CO 80246

- vi. The applicant(s) must receive written notification that the division granted permit coverage prior to conducting construction activities except for construction activities that are in response to a public emergency related site.

c. Division Review of Permit Application

Within 10 days of receipt of the application, and following review of the application, the division may:

- i. Issue a certification of coverage;
- ii. Request additional information necessary to evaluate the discharge;
- iii. Delay the authorization to discharge pending further review;
- iv. Notify the applicant that additional terms and conditions are necessary; or
- v. Deny the authorization to discharge under this general permit.

d. Alternative Permit Coverage

i. Division Required Alternative Permit Coverage:

The division may require an applicant or permittee to apply for an individual permit or an alternative general permit if it determines the discharge does not fall under the scope of this general permit, including if any additional terms and conditions are necessary in order to ensure that discharges authorized by this permit shall not cause, have the reasonable potential to cause, or measurably contribute to an exceedance of any applicable water quality standard, including narrative standards for water quality. In this case, the division will notify the applicant or permittee that an individual permit application is required.

ii. Permittee Request for Alternative Permit Coverage:

A permittee authorized to discharge stormwater under this permit may request to be excluded from coverage under this general permit by applying for an individual permit. In this case, the permittee must submit an individual application, with reasons supporting the request, to the division at least 180 days prior to any discharge. When an individual permit is issued, the permittee's authorization to discharge under this permit is terminated on the effective date of the individual permit.

e. Submittal Signature Requirements

Documents required for submittal to the division in accordance with this permit, including applications for permit coverage and other documents as requested by the division, must include signatures by **both** the owner and the operator, except for instances where the duties of the owner and operator are managed by the owner.

Signatures on all documents submitted to the division as required by this permit must meet the Standard Signatory Requirements in [Part II.K](#) of this permit in accordance with 40 C.F.R. 122.41(k).

i. Signature Certification

Any person(s) signing documents required for submittal to the division must make the following

certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

f. Compliance Document Signature Requirements

Documents which are required for compliance with the permit, but for which submittal to the division is not required unless specifically requested by the division, must be signed by the individual(s) designated as the [Qualified Stormwater Manager](#), as defined in Part I.E.

- i. Any person(s) signing inspection documents required for compliance with the permit per [Part I.D.5.c.xiii](#) must make the following statement and provide the date of the statement:

"I verify that, to the best of my knowledge and belief, that if any corrective action items were identified during the inspection, those corrective actions are complete, and the site is currently in compliance with the permit."

g. Field Wide Permit Coverage for Oil and Gas Construction

At the discretion of the division, a single permit certification may be issued to a single oil and gas permittee to cover construction activity related discharges from an oil and gas field at multiple locations that are not necessarily contiguous.

h. Permit Coverage without Application

**Qualifying Local Program:** When a small construction site is within the jurisdiction of a qualifying local program, the owner and operator of the construction activity are authorized to discharge stormwater associated with [small construction activity](#) under this general permit without the submittal of an application to the division. Sites covered by a qualifying local program are exempt from the following sections of this general permit: Part I.A.3.a.; Part I.A.3.b.; Part I.A.3.c.; Part I.A.3.d.; Part I.A.3.g.; Part I.A.3.i.; Part I.A.3.j.; Part I.A.3.k.

Sites covered by a qualifying local program are subject to the following requirements:

- i. **Local Agency Authority:** This permit does not pre-empt or supersede the authority of local agencies to prohibit, restrict, or control discharges of stormwater to storm drain systems or other water courses within their jurisdiction.
- ii. **Permit Coverage Termination:** When a site under a Qualifying Local Program is finally stabilized, coverage under this permit is automatically terminated.
- iii. **Compliance with Qualifying Local Program:** Qualifying Local Program requirements that are equivalent to the requirements of this permit are incorporated by reference. Permittees authorized to discharge under this permit, must comply with the equivalent requirements of the Qualifying Local Program that has jurisdiction over the site as a condition of this permit.
- iv. **Compliance with Remaining Permit Conditions.** Requirements of this permit that are in addition to or more stringent than the requirements of the Qualifying Local Program apply in addition to the requirements of the Qualifying Local Program.
- v. **Written Authorization of Coverage:** The division or local municipality may require any permittee within the jurisdiction of a Qualifying Local Program covered under this permit to

apply for, and obtain written authorization of coverage under this permit. The permittee must be notified in writing that an application for written authorization of coverage is required.

i. Permittee Initiated Permit Actions

Permittee initiated permit actions, including but not limited to modifications, contact changes, transfers, and terminations, shall be conducted following [Part II.L](#), division guidance and using appropriate division-provided forms.

j. Sale of Residence to Homeowner

**Residential construction sites only:** The permittee may remove residential lots from permit coverage once the lot meets the following criteria:

- i. The residential lot has been sold to the homeowner(s) for private residential use;
- ii. A certificate of occupancy, or equivalent, is maintained on-site and is available during division inspections;
- iii. The lot is less than one acre of disturbance;
- iv. All construction activity conducted on the lot by the permittee is complete;
- v. The permittee is not responsible for final stabilization of the lot; and
- vi. The SWMP was modified to indicate the lot is no longer part of the construction activity.

If the residential lot meets the criteria listed above then activities occurring on the lot are no longer considered to be construction activities with a duty to apply and maintain permit coverage. Therefore, the permittee is not required to meet the final stabilization requirements and may terminate permit coverage for the lot.

k. Permit Expiration and Continuation of Permit Coverage

Authorization to discharge under this general permit shall expire at midnight on March 31, 2024. While Regulation 61.4 requires a permittee to submit an application for continuing permit coverage 180 days before the permit expires, the division is requiring that permittees desiring continued coverage under this general permit must reapply at least 90 days in advance of this permit expiration. The division will determine if the permittee may continue to discharge stormwater under the terms of the general permit. An individual permit may be required for any facility not reauthorized to discharge under the reissued general permit.

If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued and remain in force and effect. For permittees that have applied for continued permit coverage, discharges authorized under this permit prior to the expiration date will automatically remain covered by this permit until the earliest of:

- i. An authorization to discharge under a reissued permit, or a replacement of this permit, following the timely and appropriate submittal of a complete application requesting authorization to discharge under the new permit and compliance with the requirements of the new permit; or
- ii. The issuance and effect of a termination issued by the division; or
- iii. The issuance or denial of an individual permit for the facility's discharges; or
- iv. A formal permit decision by the division not to reissue this general permit, at which time the division will identify a reasonable time period for covered dischargers to seek coverage under

an alternative general permit or an individual permit. Coverage under this permit will cease when coverage under another permit is granted/authorized; or

- v. The division has informed the permittee that discharges previously authorized under this permit are no longer covered under this permit.

## B. EFFLUENT LIMITATIONS

### 1. Requirements for Control Measures Used to Meet Effluent Limitations

The permittee must implement control measures to [minimize](#) the discharge of pollutants from all potential pollutant sources at the site. Control measures must be installed prior to commencement of construction activities. Control measures must be selected, designed, installed and maintained in accordance with [good engineering, hydrologic and pollution control practices](#). Control measures implemented at the site must be designed to prevent pollution or degradation of state waters.

#### a. Stormwater Pollution Prevention

The permittee must implement structural and/or nonstructural control measures that effectively minimize erosion, sediment transport, and the release of other pollutants related to construction activity.

##### i. Control Measures for Erosion and Sediment Control

Control measures for erosion and sediment control may include, but are not limited to, wattles/sediment control logs, silt fences, earthen dikes, drainage swales, sediment traps, subsurface drains, pipe slope drains, inlet protection, outlet protection, gabions, sediment basins, temporary vegetation, permanent vegetation, mulching, geotextiles, sod stabilization, slope roughening, maintaining existing vegetation, protection of trees, and preservation of mature vegetation.

Specific control measures must meet the requirements listed below.

- (a) Structural and nonstructural vehicle tracking controls shall be implemented to minimize vehicle tracking of sediment from disturbed areas and may include tracking pads, minimizing site access, wash racks, graveled parking areas, maintaining vehicle traffic to paved areas, street sweeping and sediment control measures.
- (b) Stormwater runoff from all disturbed areas and soil storage areas must utilize or flow to one or more control measures to minimize erosion or sediment in the discharge. The control measure(s) must be selected, designed, installed and adequately sized in accordance with good engineering, hydrologic and pollution control practices for the intended application. The control measure(s) must contain or filter flows in order to prevent the [bypass](#) of flows without treatment and must be appropriate for stormwater runoff from disturbed areas and for the expected flow rate, duration, and flow conditions (e.g. sheet or concentrated flow).
- (c) Selection of control measures should prioritize the use of structural and nonstructural control measures that minimize the potential for erosion (i.e. covering materials). Selection should also prioritize phasing construction activities to minimize the amount of soil disturbance at any point in time throughout the duration of construction.
- (d) Outlets that withdraw water from or near the surface shall be installed when discharging from basins and impoundments, unless [infeasible](#).
- (e) Maintain pre-existing vegetation or equivalent control measures for areas within 50 horizontal feet of receiving waters as defined by this permit, unless infeasible.

- (f) Soil compaction must be minimized for areas where infiltration control measures will occur or where [final stabilization](#) will be achieved through vegetative cover.
- (g) Unless infeasible, topsoil shall be preserved for those areas of a site that will utilize vegetative final stabilization.
- (h) Minimize the amount of soil exposed during construction activity, including the disturbance of [steep slopes](#).
- (i) Diversion control measures must minimize soil transport and erosion within the entire diversion, minimize erosion during discharge, and minimize run-on into the diversion. The permittee must minimize the discharge of pollutants throughout the installation, implementation and removal of the diversion. Diversions must meet one or more of the following conditions:
  - (1) Lined or piped structures that result in no erosion in all flow conditions.
  - (2) Diversion channels, berms, and coffer dams must be lined or composed of a material that minimizes potential for soil loss in the entire wetted perimeter during anticipated flow conditions (e.g. vegetated swale, non-erosive soil substrate). The entire length of the diversion channel must be designed with all of the following considerations: maximum flow velocity for the type of material(s) exposed to the anticipated flows to ensure that the calculated maximum shear stress of flows in the channel is not expected to result in physical damage to the channel or liner and result in discharge of pollutants. Additionally, the conditions relied on to minimize soil loss must be maintained for the projected life of the diversion (i.e. a vegetated swale must be limited to a period of time that ensures vegetative growth, minimizes erosion and maintains stable conditions).
  - (3) An alternative diversion criteria, approved by the division prior to implementation. The diversion method must be designed to minimize the discharge of pollutants and to prevent the potential for pollution or degradation to state waters as a result of the diverted flow through the diversion structure. In addition, the alternative diversion method must minimize the discharge of pollutants throughout the installation, implementation and removal of the diversion.

ii. Practices for Other Common Pollutants

- (a) Bulk storage, individual containers of 55 gallons or greater, for petroleum products and other liquid chemicals must have secondary containment, or equivalent protection, in order to contain [spills](#) and to prevent spilled material from entering state waters.
- (b) Control measures designed for concrete washout waste must be implemented. This includes washout waste discharged to the ground as authorized under this permit and washout waste from concrete trucks and masonry operations contained on site. The permittee must ensure the washing activities do not contribute pollutants to stormwater runoff, or receiving waters in accordance [Part I.A.1.b.ii](#). Discharges that may reach groundwater must flow through soil that has buffering capacity prior to reaching groundwater, as necessary to meet the effluent limits in this permit, including [Part I.B.3.a](#). The concrete washout location must not be located in an area where shallow groundwater may be present and would result in buffering capacity not being adequate, such as near natural drainages, springs, or wetlands. This permit authorizes discharges to the ground of concrete washout waste, but does not authorize on-site waste disposal per [Part I.B.3.d](#).
- (c) In the event that water remains onsite and contains pollutants either from the



firefighting activities or picked up from the site (i.e. in a gutter, sediment basin, etc.) after active emergency response is complete, the permittee must ensure the remaining water containing pollutants is properly removed and disposed of in order to minimize pollutants from discharging from the site, unless infeasible.

iii. Stabilization Requirements

The following requirements must be implemented for each site.

- (a) Temporary stabilization must be implemented for earth disturbing activities on any portion of the site where ground disturbing construction activity has permanently ceased, or temporarily ceased for more than 14 calendar days. Temporary stabilization methods may include, but are not limited to, tarps, soil tackifier, and hydroseed. The permittee may exceed the 14-day schedule when either the function of the specific area of the site requires it to remain disturbed or physical characteristics of the terrain and climate prevent stabilization. The SWMP must document the constraints necessitating the alternative schedule, provide the alternate stabilization schedule, and identify all locations where the alternative schedule is applicable on the site map. Minimum inspection frequency and scope, as directed in Part I.D., must be followed for temporarily stabilized areas.
- (b) Final stabilization must be implemented for all construction sites covered under this permit. Final stabilization is reached when (1), (2), and (3) below are complete:
  - (1) All construction activities are complete.
  - (2) Permanent stabilization methods are complete. Permanent stabilization methods include, but are not limited to, permanent pavement or concrete, hardscape, xeriscape, stabilized driving surfaces, vegetative cover, or equivalent permanent alternative stabilization methods. The division may approve alternative final stabilization criteria for specific operations. Vegetative cover must meet the following criteria:
    - a. Evenly distributed perennial vegetation, and
    - b. Coverage, at a minimum, equal to 70 percent of what would have been provided by native vegetation in a local, undisturbed area or adequate reference site, and
  - (3) The permittee must ensure all temporary control measures are removed from the construction site once final stabilization is achieved, except when the control measure specifications allow the control measure to be left in place (i.e. bio-degradable control measures).
- (c) Final stabilization must be designed and installed as a permanent feature. Final stabilization measures for obtaining a vegetative cover or alternative stabilization methods include, but are not limited to, the following as appropriate:
  - (1) Seed mix selection and application methods;
  - (2) Soil preparation and amendments;
  - (3) Soil stabilization methods to provide adequate protection to minimize erosion (e.g. crimped straw, hydro mulch or rolled erosion control products);
  - (4) Appropriate sediment control measures as needed until final stabilization is achieved;

(5) Permanent pavement, hardscape, xeriscape, stabilized driving surfaces;

(d) Other alternative stabilization practices as applicable.

b. Maintenance

The permittee must ensure that all control measures remain in effective operating condition and are protected from activities that would reduce their effectiveness. Control measures must be maintained in accordance with good engineering, hydrologic and pollution control practices. Observations leading to the required maintenance of control measures can be made during a site inspection, or during general observations of site conditions. The necessary repairs or modifications to a [control measure requiring routine maintenance](#), as defined in Part I.E., must be conducted to maintain an effective operating condition. This section is not subject to the requirements in [Part I.B.1.c](#) below.

c. Corrective Actions

The permittee must assess the adequacy of control measures at the site, and the need for changes to those control measures, to ensure continued effective performance.

When an [inadequate control measure](#), as defined in Part I.E., is identified (i.e., new or replacement control measures become necessary), the following corrective action requirements apply. The permittee is in noncompliance with the permit until the inadequate control measure is replaced or corrected and returned to effective operating condition in compliance with [Part I.B.1](#) and the general requirements in [Part I.B.3](#). If the inadequate control measure results in noncompliance that meets the conditions of Part II.L., the permittee must also meet the requirements of that section.

- i. The permittee must take all necessary steps to minimize or prevent the discharge of pollutants from the permitted area and manage any stormwater run-on onto the site until a control measure is implemented and made operational and/or an inadequate control measure is replaced or corrected and returned to effective operating condition. If it is infeasible to install or repair the control measure immediately after discovering the deficiency, the following must be documented in the SWMP in [Part I.D.5.c](#) and kept on record in accordance with the recordkeeping requirements in Part II.

(a) Describe why it is infeasible to initiate the installation or repair immediately; and

(b) Provide a schedule for installing or repairing the control measure and returning it to an effective operating condition as soon as possible.

- ii. If applicable, the permittee must remove and properly dispose of any unauthorized release or discharge within and from the permitted area (e.g., discharge of non-stormwater, untreated stormwater containing pollutants, spill, or leak not authorized by this permit.) The permittee must also clean up any contaminated surfaces, if feasible, to minimize discharges of the material in subsequent storm events, including water remaining from the response that contains pollutants after active emergency firefighting response is complete.

2. Discharges to an Impaired Waterbody

a. [Total Maximum Daily Load](#) (TMDL)

If the discharge from the site of permit coverage flows to or could reasonably be expected to flow to any water body for which a TMDL has been approved, and stormwater discharges associated with construction activity were assigned a pollutant-specific Wasteload Allocation (WLA) under the TMDL, the division may:

- i. Ensure the WLA is implemented properly through alternative local requirements, such as by a

municipal stormwater permit; or

- ii. Notify the permittee of the WLA and amend the permittee's certification to add specific effluent limits and other requirements, as appropriate. The permittee may be required to do the following:
  - (a) Under the permittee's SWMP, implement specific control measures based on requirements of the WLA, and evaluate whether the requirements are met through implementation of existing stormwater control measures or if additional control measures are necessary. Document the calculations or other evidence demonstrating that the requirements are expected to be met; and
  - (b) If the evaluation shows that additional or modified control measures are necessary, describe the type and schedule for the control measure additions or modifications.
- iii. Discharge monitoring may also be required. The permittee may maintain coverage under the general permit provided they comply with the applicable requirements outlined above. The division reserves the right to require individual or alternate general permit coverage.

### 3. General Requirements

- a. Discharges authorized by this permit shall not cause, have the reasonable potential to cause, or measurably contribute to an exceedance of any applicable water quality standard, including narrative standards for water quality.
- b. The division may require sampling and testing, on a case-by-case basis, in the event that there is reason to suspect that the SWMP is not adequately minimizing pollutants in stormwater or in order to measure the effectiveness of the control measures in removing pollutants in the effluent. Such monitoring may include Whole Effluent Toxicity testing.
- c. The permittee must comply with the lawful requirements of federal agencies, municipalities, counties, drainage districts and other local agencies including applicable requirements in [Municipal Stormwater Management Programs](#) developed to comply with CDPS permits. The permittee must comply with local stormwater management requirements, policies and guidelines including those for erosion and sediment control.
- d. All construction site wastes must be properly managed to prevent potential pollution of state waters. This permit does not authorize on-site waste disposal.
- e. This permit does not relieve the permittee of the reporting requirements in 40 CFR 110, 40 CFR 117 or 40 CFR 302. Any discharge of hazardous material must be handled in accordance with the division's Noncompliance Notification Requirements (see [Part II.L](#) of the permit).

## C. STORMWATER MANAGEMENT PLAN (SWMP) REQUIREMENTS

### 1. SWMP General Requirements

- a. A SWMP shall be developed for each construction site listed under [Part I.A.3.a](#), including but not limited to, construction activity that will disturb one acre or more and/or are part of a common plan of development or sale covered by this permit. The SWMP must be prepared in accordance with good engineering, hydrologic and pollution control practices.
  - i. For public emergency related sites, a SWMP shall be created no later than 14 days after the commencement of construction activities.
- b. The permittee must implement the provisions of the SWMP as written and updated, from commencement of construction activity until final stabilization is complete. The division may review the SWMP.

- c. A copy of the SWMP must be retained onsite or be onsite when construction activities are occurring at the site unless the permittee specifies another location and obtains approval from the division.

## 2. SWMP Content

- a. The SWMP, at a minimum, must include the following elements.
  - i. Qualified Stormwater Manager. The SWMP must list individual(s) by title and name who are designated as responsible for implementing the SWMP in its entirety and meet the definition of a Qualified Stormwater Manager. This role may be filled by more than one individual.
  - ii. Spill Prevention and Response Plan. The SWMP must have a spill prevention and response plan. The plan may incorporate by reference any part of a Spill Prevention Control and Countermeasure (SPCC) plan under section 311 of the Clean Water Act (CWA) or a Spill Prevention Plan required by a separate CDPS permit. The relevant sections of any referenced plans must be available as part of the SWMP consistent with [Part I.C.4](#).
  - iii. Other CDPS Permits. The SWMP must list the applicable CDPS permits associated with the permitted site and the activities occurring on the permitted site (e.g. a CDPS Dewatering Permit).
  - iv. Materials Handling. The SWMP must describe handling procedures of all control measures implemented at the site to minimize impacts from handling [significant materials](#) that could contribute pollutants to runoff. These handling procedures can include control measures for pollutants and activities such as, exposed storage of building materials, paints and solvents, landscape materials, fertilizers or chemicals, sanitary waste material, trash and equipment maintenance or fueling procedures.
  - v. Potential Sources of Pollution. The SWMP must list all potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges associated with construction activity from the site. This may include, but is not limited to, the following pollutant sources:
    - (a) Disturbed and stored soils;
    - (b) Vehicle tracking of sediments;
    - (c) Management of contaminated soils, if known to be present, or if contaminated soils are found during construction;
    - (d) Loading and unloading operations;
    - (e) Outdoor storage activities (erodible building materials, fertilizers, chemicals, etc.);
    - (f) Vehicle and equipment maintenance and fueling;
    - (g) Significant dust or particulate generating processes (e.g., saw cutting material, including dust);
    - (h) Routine maintenance activities involving fertilizers, pesticides, herbicides, detergents, fuels, solvents, oils, etc.;
    - (i) On-site waste management practices (waste piles, liquid wastes, dumpsters);
    - (j) Concrete truck/equipment washing, including washing of the concrete truck chute and associated fixtures and equipment;
    - (k) Dedicated asphalt, concrete batch plants and masonry mixing stations;

(l) Non-industrial waste sources such as worker trash and portable toilets.

- vi. Implementation of Control Measures. The SWMP must include design specifications that contain information on the implementation of all the structural and nonstructural control measures in use on the site in accordance with good engineering, hydrologic and pollution control practices; including, as applicable, drawings, dimensions, installation information, materials, implementation processes, control measure-specific inspection expectations, and maintenance requirements.

The SWMP must include a documented use agreement between the permittee and the owner or operator of any control measures located outside of the permitted area, that are utilized by the permittee's construction site for compliance with this permit, but not under the direct control of the permittee. The permittee is responsible for ensuring that all control measures located outside of their permitted area, that are being utilized by the permittee's construction site, are properly maintained and in compliance with all terms and conditions of the permit. The SWMP must include all information required of and relevant to any such control measures located outside the permitted area, including location, installation specifications, design specifications and maintenance requirements.

- vii. Site Description. The SWMP must include a site description which includes, at a minimum, the following:
- (a) The nature of the construction activity at the site;
  - (b) The proposed schedule for the sequence for major construction activities and the planned implementation of control measures for each phase. (e.g. clearing, grading, utilities, vertical, etc.);
  - (c) Estimates of the total acreage of the site, and the acreage expected to be disturbed by clearing, excavation, grading, or any other construction activities;
  - (d) A summary of any existing data and sources used in the development of the construction site plans or SWMP that describe the soil types found in the permitted area and the erodibility of the identified soil types;
  - (e) A description of the percent cover of native vegetation on the site if the site is undisturbed, or the percent cover of native vegetation in a similar, local undisturbed area or adequate reference area if the site is disturbed. Include the source or methodology for determining the percentage. If a percent cover is not appropriate for the site location (i.e. arid), describe the technique and justification for the identified cover of native vegetation;
  - (f) A description of any allowable non-stormwater discharges at the site, including those being discharged under a separate CDPS permit or a division low risk discharge guidance policy, and applicable control measures installed;
  - (g) A description of the drainage patterns from the site, including a description of the immediate source receiving the discharge and the receiving water(s) of the discharge, if different than the immediate source. If the stormwater discharge is to a [municipal separate storm sewer system](#), include the name of the entity owning that system, the location(s) of the stormwater discharge, and the receiving water(s);
  - (h) A description of all stream crossings located within the construction site boundary; and
  - (i) A description of the alternate temporary stabilization schedule, if applicable ([Part I.B.1.a.iii\(a\)](#)).



- (j) A description of the alternative diversion criteria as approved by the division, if applicable ([Part I.B.1.a.i\(i\)\(3\)](#)).

viii. Site Map. The SWMP must include a site map which includes, at a minimum, the following:

- (a) Construction site boundaries;
- (b) Flow arrows that depict stormwater flow directions on-site and runoff direction;
- (c) All areas of ground disturbance including areas of borrow and fill;
- (d) Areas used for storage of soil;
- (e) Locations of all waste accumulation areas, including areas for liquid, concrete, masonry, and asphalt;
- (f) Locations of dedicated asphalt, concrete batch plants and masonry mixing stations;
- (g) Locations of all structural control measures;
- (h) Locations of all non-structural control measures (e.g. temporary stabilization);
- (i) Locations of springs, streams, wetlands, diversions and other state waters, including areas that require pre-existing vegetation be maintained within 50 feet of a receiving water, where determined feasible in accordance with [Part I.B.1.a.i\(e\)](#);
- (j) Locations of all stream crossings located within the construction site boundary; and
- (k) Locations where alternative temporary stabilization schedules apply.

ix. Temporary Stabilization, Final Stabilization and Long Term Stormwater Management.

- (a) The SWMP must document the constraints necessitating an alternative temporary stabilization schedule, as referenced in [Part I.B.1.a.iii\(a\)](#), provide the alternate stabilization schedule, and identify all locations where the alternative schedule is applicable on the site map.
- (b) The SWMP must describe and locate the methods used to achieve final stabilization of all disturbed areas at the site, as listed in [Part I.B.1.a.iii\(b\)](#).
- (c) The SWMP must describe the measures used to establish final stabilization through vegetative cover or alternative stabilization method, as referenced in [Part I.B.1.a.iii\(c\)](#), and describe and locate any temporary control measures in place during the process of final stabilization.
- (d) The SWMP must describe and locate any planned permanent control measures to control pollutants in stormwater discharges that will occur after construction operations are completed, including but not limited to, detention/retention ponds, rain gardens, stormwater vaults, etc.

x. Inspection Reports. The SWMP must include documented inspection reports in accordance with [Part I.D.5.c](#).

### 3. SWMP Review and Revisions

Permittees must keep a record of SWMP changes made that includes the date and identification of the changes. The SWMP must be amended when the following occurs:

- a. A change in design, construction, operation, or maintenance of the site requiring implementation

of new or revised control measures;

- b. The SWMP proves ineffective in controlling pollutants in stormwater runoff in compliance with the permit conditions;
- c. Control measures identified in the SWMP are no longer necessary and are removed; and
- d. Corrective actions are taken onsite that result in a change to the SWMP.
- e. The site or areas of the site qualifying for reduced frequency inspections under [Part I.D.4](#).

For SWMP revisions made prior to or following a change(s) onsite, including revisions to sections addressing site conditions and control measures, a notation must be included in the SWMP that identifies the date of the site change, the control measure removed, or modified, the location(s) of those control measures, and any changes to the control measure(s). The permittee must ensure the site changes are reflected in the SWMP. The permittee is noncompliant with the permit until the SWMP revisions have been made.

#### 4. SWMP Availability

A copy of the SWMP must be provided upon request to the division, EPA, and any local agency with authority for approving sediment and erosion plans, grading plans or stormwater management plans within the time frame specified in the request. If the SWMP is required to be submitted to any of these entities, the submission must include a signed certification in accordance with [Part I.A.3.e](#), certifying that the SWMP is complete and compliant with all terms and conditions of the permit.

All SWMPs required under this permit are considered reports that must be available to the public under Section 308(b) of the CWA and Section 61.5(4) of the CDPS regulations. The permittee must make plans available to members of the public upon request. However, the permittee may claim any portion of a SWMP as confidential in accordance with 40 CFR Part 2.

### D. SITE INSPECTIONS

Site inspections must be conducted in accordance with the following requirements. The required inspection schedules are a minimum frequency and do not affect the permittee's responsibility to implement control measures in effective operating condition as prescribed in the SWMP, [Part I.C.2.a.vi](#), as proper maintenance of control measures may require more frequent inspections. Site inspections shall start within 7 calendar days of the commencement of construction activities on site.

#### 1. Person Responsible for Conducting Inspections

The person(s) inspecting the site may be on the permittee's staff or a third party hired to conduct stormwater inspections under the direction of the permittee(s). The permittee is responsible for ensuring that the inspector meets the definition of a Qualified Stormwater Manager. The inspector may be different than the individual(s) listed in [Part I.C.2.a.i](#).

#### 2. Inspection Frequency

Permittees must conduct site inspections in accordance with on the following minimum frequencies, unless the site meets the requirements of [Part I.D.3](#). All inspections must be recorded per [Part I.D.5.c](#).

- a. At least one inspection every 7 calendar days; or
- b. At least one inspection every 14 calendar days, if post-storm event inspections are conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion. Post-storm inspections may be used to fulfill the 14-day routine inspection requirement.
- c. When site conditions make the schedule required in this section impractical, the permittee may

petition the division to grant an alternate inspection schedule. The alternative inspection schedule must not be implemented prior to written approval by the division and incorporation into the SWMP.

### 3. Inspection Frequency for Discharges to Outstanding Waters

Permittees must conduct site inspections at least once every 7 calendar days for sites that discharge to a water body designated as an Outstanding Water by the Water Quality Control Commission.

### 4. Reduced Inspection Frequency

The permittee may perform site inspections at the following reduced frequencies when one of the following conditions exists:

#### a. Post-Storm Inspections at Temporarily Idle Sites

For permittees choosing an inspection frequency pursuant to [Part I.D.2.b](#) and if no construction activities will occur following a storm event, post-storm event inspections must be conducted prior to re-commencing construction activities, and no later than 72 hours following the storm event. If the post-storm event inspection qualifies under this section, the inspection delay must be documented in the inspection record per [Part I.D.5.c](#). Routine inspections must still be conducted at least every 14 calendar days.

#### b. Inspections at Completed Sites/Areas

When the site, or portions of a site, are awaiting establishment of a vegetative ground cover and final stabilization, the permittee must conduct a thorough inspection of the stormwater management system at least once every 30 days. Post-storm event inspections are not required under this schedule. This reduced inspection schedule is allowed if all of the following criteria are met:

- i. All construction activities resulting in ground disturbance are complete;
- ii. All activities required for final stabilization, in accordance with [Part I.B.1.a.iii\(b\) & \(c\)](#) and with the SWMP, have been completed, with the exception of the application of seed that has not occurred due to seasonal conditions or the necessity for additional seed application to augment previous efforts; and
- iii. The SWMP has been amended to locate those areas to be inspected in accordance with the reduced schedule allowed for in this paragraph.

#### c. Winter Conditions Inspections Exclusion

Inspections are not required for sites that meet all of the following conditions: construction activities are temporarily halted, snow cover exists over the entire site for an extended period, and melting conditions posing a risk of surface erosion do not exist. This inspection exception is applicable only during the period where melting conditions do not exist, and applies to the routine 7-day, 14-day and monthly inspections, as well as the post-storm-event inspections. When this inspection exclusion is implemented, the following information must be documented in accordance with the requirements in [Part I.C.3](#) and [Part I.D.5.c](#):

- i. Dates when snow cover existed;
- ii. Date when construction activities ceased; and
- iii. Date melting conditions began.

### 5. Inspection Scope

a. Areas to Be Inspected

When conducting a site inspection the following areas, if applicable, must be inspected for evidence of, or the potential for, pollutants leaving the construction site boundaries, entering the stormwater drainage system or discharging to state waters:

- i. Construction site perimeter;
- ii. All disturbed areas;
- iii. Locations of installed control measures;
- iv. Designated haul routes;
- v. Material and waste storage areas exposed to precipitation;
- vi. Locations where stormwater has the potential to discharge offsite; and
- vii. Locations where vehicles exit the site.

b. Inspection Requirements

- i. Visually verify whether all implemented control measures are in effective operational condition and are working as designed in their specifications to minimize pollutant discharges.
- ii. Determine if there are new potential sources of pollutants.
- iii. Assess the adequacy of control measures at the site to identify areas requiring new or modified control measures to minimize pollutant discharges.
- iv. Identify all areas of non-compliance with the permit requirements and, if necessary, implement corrective action(s) in accordance with [Part I.B.1.c.](#)

c. Inspection Reports

The permittee must keep a record of all inspections conducted for each permitted site. Inspection reports must identify any incidents of noncompliance with the terms and conditions of this permit. All inspection reports must be signed and dated in accordance with [Part I.A.3.f.](#) Inspection records must be retained in accordance with [Part II.O.](#) At a minimum, the inspection report must include:

- i. The inspection date;
- ii. Name(s) and title(s) of personnel conducting the inspection;
- iii. Weather conditions at the time of inspection;
- iv. Phase of construction at the time of inspection;
- v. Estimated acreage of disturbance at the time of inspection;
- vi. Location(s) and identification of control measures requiring routine maintenance;
- vii. Location(s) and identification of discharges of sediment or other pollutants from the site;
- viii. Location(s) and identification of inadequate control measures;
- ix. Location(s) and identification of additional control measures needed that were not in place at the time of inspection;

- x. Description of corrective action(s) for items vii, viii, ix, above, dates corrective action(s) were completed, including requisite changes to the SWMP, as necessary;
- xi. Description of the minimum inspection frequency (either in accordance with [Part I.D.2](#), [Part I.D.3](#) or [Part I.D.4.](#)) utilized when conducting each inspection.
- xii. Deviations from the minimum inspection schedule as required in [Part I.D.2](#). This would include documentation of division approval for an alternate inspection schedule outlined in [Part I.D.2.c](#);
- xiii. After adequate corrective action(s) have been taken, or where a report does not identify any incidents requiring corrective action, the report shall contain a statement as required in [Part I.A.3.f](#).

#### E. DEFINITIONS

For the purposes of this permit:

- (1) Bypass the intentional diversion of waste streams from any portion of a treatment facility in accordance with 40 CFR 122.41(m)(1)(i) and Regulation 61.2(12).
- (2) Common Plan of Development or Sale - A contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related. The division has determined that "contiguous" means construction activities located in close proximity to each other (within ¼ mile). Construction activities are considered to be "related" if they share the same development plan, builder or contractor, equipment, storage areas, etc. "Common plan of development or sale" includes construction activities that are associated with the construction of field wide oil and gas permits for facilities that are related.
- (3) Construction Activity - Ground surface disturbing and associated activities (land disturbance), which include, but are not limited to, clearing, grading, excavation, demolition, installation of new or improved haul roads and access roads, staging areas, stockpiling of fill materials, and borrow areas. Construction does not include routine maintenance to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. Activities to conduct repairs that are not part of routine maintenance or for replacement are construction activities and are not routine maintenance. Repaving activities where underlying and/or surrounding soil is exposed as part of the repaving operation are considered construction activities. Construction activity is from initial ground breaking to final stabilization regardless of ownership of the construction activities.
- (4) Control Measure - Any best management practice or other method used to prevent or reduce the discharge of pollutants to state waters. Control measures include, but are not limited to, best management practices. Control measures can include other methods such as the installation, operation, and maintenance of structural controls and treatment devices.
- (5) Control Measure Requiring Routine Maintenance - Any control measure that is still operating in accordance with its design and the requirements of this permit, but requires maintenance to prevent a breach of the control measure. See also inadequate control measure.
- (6) Dedicated Asphalt, Concrete Batch Plants and Masonry Mixing Stations - Are batch plants or mixing stations located on, or within ¼ mile of, a construction site and that provide materials only to that specific construction site.
- (7) Diversion - Discharges of state waters that are temporarily routed through channels or structures (e.g. in-stream, uncontaminated springs, non-pumped groundwater, temporary rerouting of surface waters).
- (8) Final Stabilization - The condition reached when construction activities at the site have been



- completed, permanent stabilization methods are complete, and temporary control measures are removed. Areas being stabilized with a vegetative cover must have evenly distributed perennial vegetation. The vegetation coverage must be, at a minimum, equal to 70 percent of what would have been provided by native vegetation in a local, undisturbed area or adequate reference site.
- (9) Good Engineering, Hydrologic and Pollution Control Practices: are methods, procedures, and practices that:
- a. Are based on basic scientific fact(s).
  - b. Reflect best industry practices and standards.
  - c. Are appropriate for the conditions and pollutant sources.
  - d. Provide appropriate solutions to meet the associated permit requirements, including practice based effluent limits.
- (10) Inadequate Control Measure - Any control measure that is not designed or implemented in accordance with the requirements of the permit and/or any control measure that is not implemented to operate in accordance with its design. See also Control Measure Requiring Routine Maintenance.
- (11) Infeasible - Not technologically possible, or not economically practicable and achievable in light of best industry practices.
- (12) Minimize - reduce or eliminate to the extent achievable using control measures that are technologically available and economically practicable and achievable in light of best industry practice.
- (13) Municipality - A city, town, county, district, association, or other public body created by, or under, State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or a designated and approved management agency under section 208 of CWA (1987).
- (14) Municipal Separate Storm Sewer System (MS4) - A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):
- a. Owned or operated by a State, city, town, county, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or a designated and approved management agency under section 208 of the CWA that discharges to state waters;
    - i. Designed or used for collecting or conveying stormwater;
    - ii. Are not a combined sewer; and
    - iii. Are not part of a Publicly Owned Treatment Works (POTW). See 5 CCR 1002-61.2(62).
- (15) Municipal Stormwater Management Program - A stormwater program operated by a municipality, typically to meet the requirements of the municipalities MS4 discharge certification.
- (16) Operator - The party that has operational control over day-to-day activities at a project site which are necessary to ensure compliance with the permit. This party is authorized to direct individuals at a site to carry out activities required by the permit (i.e. the general contractor).

- (17) Outstanding Waters - Waters designated as outstanding waters pursuant to Regulation 31, Section 31.8(2)(a). The highest level of water quality protection applies to certain waters that constitute an outstanding state or national resource.
- (18) Owner - The party that has overall control of the activities and that has funded the implementation of the construction plans and specifications. This is the party that may have ownership of, a long term lease of, or easements on the property on which the construction activity is occurring (e.g. the developer).
- (19) Permittee(s) - The owner and operator named in the discharge certification issued under this permit for the construction site specified in the certification.
- (20) Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. Point source does not include irrigation return flow. See 5 CCR 102-61.2(75).
- (21) Pollutant - Dredged spoil, dirt, slurry, solid waste, incinerator residue, sewage, sewage sludge, garbage, trash, chemical waste, biological nutrient, biological material, radioactive material, heat, wrecked or discarded equipment, rock, sand, or any industrial, municipal or agricultural waste. See 5 CCR 1002-61.2(76).
- (22) Presentation of credentials - a government issued form of identification, if in person; or (ii) providing name, position and purpose of inspection if request to enter is made via telephone, email or other form of electronic communication. A Permittee's non-response to a request to enter upon presentation of credentials constitutes a denial to such request, and may result in violation of the Permit.
- (23) Process Water - Any water which, during manufacturing or processing, comes into contact with or results from the production of any raw material, intermediate product, finished product, by product or waste product.
- (24) Public Emergency Related Site - a project initiated in response to an unanticipated emergency (e.g., mud slides, earthquake, extreme flooding conditions, disruption in essential public services), for which the related work requires immediate authorization to avoid imminent endangerment to human health or the environment, or to reestablish essential public services.
- (25) Qualified Stormwater Manager - An individual knowledgeable in the principles and practices of erosion and sediment control and pollution prevention, and with the skills to assess conditions at construction sites that could impact stormwater quality and to assess the effectiveness of stormwater controls implemented to meet the requirements of this permit.
- (26) Qualifying Local Program - A municipal program for stormwater discharges associated with small construction activity that was formally approved by the division as a qualifying local program.
- (27) Receiving Water - Any classified or unclassified surface water segment (including tributaries) in the State of Colorado into which stormwater associated with construction activities discharges. This definition includes all water courses, even if they are usually dry, such as borrow ditches, arroyos, and other unnamed waterways.
- (28) Severe Property Damage - substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. See 40 CFR 122.41(m)(1)(ii).
- (29) Significant Materials - Include, but not limited to, raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in

- food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the permittee is required to report under section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA); fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharges.
- (30) Small Construction Activity - The discharge of stormwater from construction activities that result in land disturbance of equal to, or greater than, one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale, if the larger common plan ultimately disturbs equal to, or greater than, one acre and less than five acres.
  - (31) Spill - An unintentional release of solid or liquid material which may pollute state waters.
  - (32) State Waters - means any and all surface and subsurface waters which are contained in or flow in or through this state, but does not include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed.
  - (33) Steep Slopes: where a local government, or industry technical manual (e.g. stormwater BMP manual) has defined what is to be considered a "steep slope", this permit's definition automatically adopts that definition. Where no such definition exists, steep slopes are automatically defined as those that are 3:1 or greater.
  - (34) Stormwater - Precipitation runoff, snow melt runoff, and surface runoff and drainage. See 5 CCR 1002-61.2(103).
  - (35) Total Maximum Daily Loads (TMDLs) -The sum of the individual wasteload allocations (WLA) for point sources and load allocations (LA) for nonpoint sources and natural background. For the purposes of this permit, a TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL includes WLAs, LAs, and must include a margin of safety (MOS), and account for seasonal variations. See section 303(d) of the CWA and 40 C.F.R. 130.2 and 130.7.
  - (36) Upset - an exceptional incident in which there is unintentional and temporary noncompliance with permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation in accordance with 40 CFR 122.41(n) and Regulation 61.2(114).

#### F. MONITORING

The division may require sampling and testing, on a case-by-case basis. If the division requires sampling and testing, the division will send a notification to the permittee. Reporting procedures for any monitoring data collected will be included in the notification.

If monitoring is required, the following applies:

1. The thirty (30) day average must be determined by the arithmetic mean of all samples collected during a thirty (30) consecutive-day period; and
2. A grab sample, for monitoring requirements, is a single "dip and take" sample.

#### G. OIL AND GAS CONSTRUCTION

Stormwater discharges associated with construction activities directly related to oil and gas exploration, production, processing, and treatment operations or transmission facilities are regulated under the Colorado Discharge Permit System Regulations (5 CCR 1002-61), and require coverage under this permit in accordance with that regulation. However, references in this permit to specific authority under the CWA do not apply to

stormwater discharges associated with these oil and gas related construction activities, to the extent that the references are limited by the federal Energy Policy Act of 2005.

## Part II: Standard Permit Conditions

### A. DUTY TO COMPLY

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Water Quality Control Act and is grounds for:

1. Enforcement action;
2. Permit termination, revocation and reissuance, or modification; or
3. Denial of a permit renewal application.

### B. DUTY TO REAPPLY

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain authorization as required by Part I.A.3.k. of the permit.

### C. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

### D. DUTY TO MITIGATE

A permittee must take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

### E. PROPER OPERATION AND MAINTENANCE

A permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of this permit. This requirement can be met by meeting the requirements for Part I.B., I.C., and I.D. above. See also 40 C.F.R. § 122.41(e).

### F. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause. The permittee request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. Any request for modification, revocation, reissuance, or termination under this permit must comply with all terms and conditions of Regulation 61.8(8).

### G. PROPERTY RIGHTS

In accordance with 40 CFR 122.41(g) and 5 CCR 1002-61, 61.8(9):

1. The issuance of a permit does not convey any property or water rights in either real or personal property, or stream flows or any exclusive privilege.
2. The issuance of a permit does not authorize any injury to person or property or any invasion of personal rights, nor does it authorize the infringement of federal, state, or local laws or regulations.
3. Except for any toxic effluent standard or prohibition imposed under Section 307 of the Federal act or any standard for sewage sludge use or disposal under Section 405(d) of the Federal act, compliance with a permit during its term constitutes compliance, for purposes of enforcement, with Sections 301,



302, 306, 318, 403, and 405(a) and (b) of the Federal act. However, a permit may be modified, revoked and reissued, or terminated during its term for cause as set forth in Section 61.8(8) of the Colorado Discharge Permit System Regulations.

#### H. DUTY TO PROVIDE INFORMATION

The permittee shall furnish to the division, within a reasonable time, any information which the division may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the division, upon request, copies of records required to be kept by this permit in accordance with 40 CFR 122.41(h) and/or Regulation 61.8(3)(q).

#### I. INSPECTION AND ENTRY

The permittee shall allow the division and the authorized representative, upon the [presentation of credentials](#) as required by law, to allow for inspections to be conducted in accordance with 40 CFR 122.41(i), Regulation 61.8(3), and Regulation 61.8(4):

1. To enter upon the permittee's premises where a regulated facility or activity is located or in which any records are required to be kept under the terms and conditions of this permit;
2. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit;
3. At reasonable times, inspect any monitoring equipment or monitoring method required in the permit; and
4. To enter upon the permittee's premises in a reasonable manner and at a reasonable time to inspect or investigate, any actual, suspected, or potential source of water pollution, or any violation of the Colorado Water Quality Control Act. The investigation may include: sampling of any discharges, stormwater or [process water](#), taking of photographs, interviewing site staff on alleged violations and other matters related to the permit, and assessing any and all facilities or areas within the site that may affect discharges, the permit, or an alleged violation.

The permittee shall provide access to the division or other authorized representatives upon presentation of proper credentials. A permittee's non-response to a request to enter upon presentation of credentials constitutes a denial of such request, and may result in a violation of the permit.

#### J. MONITORING AND RECORDS

1. Samples and measurements taken for the purpose of monitoring must be representative of the volume and nature of the monitored activity.
2. The permittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date the permit expires or the date the permittee's authorization is terminated. This period may be extended by request of the division at any time.
3. Records of monitoring information must include:
  - a. The date, exact place, and time of sampling or measurements;
  - b. The individual(s) who performed the sampling or measurements;
  - c. The date(s) analyses were performed

- d. The individual(s) who performed the analyses;
  - e. The analytical techniques or methods used; and
  - f. The results of such analyses.
4. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in the permit.

#### K. SIGNATORY REQUIREMENTS

##### 1. Authorization to Sign:

All documents required to be submitted to the division by the permit must be signed in accordance with the following criteria:

- a. For a corporation: by a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means:
  - i. A president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or
  - ii. The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
- c. For a [municipality](#), state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes
  - i. The chief executive officer of the agency, or
  - ii. A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency. (e.g. Regional Administrator of EPA)

##### 2. Electronic Signatures

For persons signing applications for coverage under this permit electronically, in addition to meeting other applicable requirements stated above, such signatures must meet the same signature, authentication, and identity-proofing standards set forth at 40 CFR § 3.2000(b) for electronic reports (including robust second-factor authentication). Compliance with this requirement can be achieved by submitting the application using the Colorado Environmental Online Service (CEOS) system.

##### 3. Change in Authorization to Sign

If an authorization is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization must be submitted to the division, prior to the re-authorization, or together with any reports, information, or applications to be signed by an authorized representative.

## L. REPORTING REQUIREMENTS

### 1. Planned Changes

The permittee shall give advance notice to the division, in writing, of any planned physical alterations or additions to the permitted facility in accordance with 40 CFR 122.41(l) and Regulation 61.8(5)(a). Notice is required only when:

- a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
- b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.41(a)(1).

### 2. Anticipated Non-Compliance

The permittee shall give advance notice to the division, in writing, of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements. The timing of notification requirements differs based on the type of non-compliance as described in subparagraphs 5, 6, 7, and 8 below.

### 3. Transfer of Ownership or Control

The permittee shall notify the division, in writing, ten (10) calendar days in advance of a proposed transfer of the permit. This permit is not transferable to any person except after notice is given to the division.

- a. Where a facility wants to change the name of the permittee, the original permittee (the first owner or operators) must submit a Notice of Termination.
- b. The new owner or operator must submit an application. See also signature requirements in Part II.K, above.
- c. A permit may be automatically transferred to a new permittee if:
  - i. The current permittee notifies the division in writing 30 calendar days in advance of the proposed transfer date; and
  - ii. The notice includes a written agreement between the existing and new permittee(s) containing a specific date for transfer of permit responsibility, coverage and liability between them; and
  - iii. The division does not notify the existing permittee and the proposed new permittee of its intent to modify, or revoke and reissue the permit.
  - iv. Fee requirements of the Colorado Discharge Permit System Regulations, Section 61.15, have been met.

### 4. Monitoring reports

Monitoring results must be reported at the intervals specified in this permit per the requirements of 40 CFR 122.41(l)(4).

### 5. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule in the permit, shall be submitted on the date listed

in the compliance schedule section. The fourteen (14) calendar day provision in Regulation 61.8(4)(n)(i) has been incorporated into the due date.

6. Twenty-four Hour Reporting

In addition to the reports required elsewhere in this permit, the permittee shall report the following circumstances orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances, and shall mail to the division a written report containing the information requested within five (5) working days after becoming aware of the following circumstances:

- a. Circumstances leading to any noncompliance which may endanger health or the environment regardless of the cause of the incident;
- b. Circumstances leading to any unanticipated bypass which exceeds any effluent limitations in the permit;
- c. Circumstances leading to any upset which causes an exceedance of any effluent limitation in the permit;
- d. Daily maximum violations for any of the pollutants limited by Part I of this permit. This includes any toxic pollutant or hazardous substance or any pollutant specifically identified as the method to control any toxic pollutant or hazardous substance.
- e. The division may waive the written report required under subparagraph 6 of this section if the oral report has been received within 24 hours.

7. Other Non-Compliance

A permittee must report all instances of noncompliance at the time monitoring reports are due. If no monitoring reports are required, these reports are due at least annually in accordance with Regulation 61.8(4)(p). The annual report must contain all instances of non-compliance required under either subparagraph 5 or subparagraph 6 of this subsection.

8. Other Information

Where a permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Permitting Authority, it has a duty to promptly submit such facts or information.

M. BYPASS

1. Bypass Not Exceeding Limitations

The permittees may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Part II.M.2 of this permit. See 40 CFR 122.41(m)(2).

2. Notice of Bypass

- a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, the permittee must submit prior notice, if possible at least ten days before the date of the bypass. See 40 CFR §122.41(m)(3)(i) and/or Regulation 61.9(5)(c).
- b. Unanticipated bypass. The permittee must submit notice of an unanticipated bypass in accordance with Part II.L.6. See 40 CFR §122.41(m)(3)(ii).

3. Prohibition of Bypass

Bypasses are prohibited and the division may take enforcement action against the permittee for bypass, unless:

- a. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
- b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
- c. Proper notices were submitted to the division.

#### N. UPSET

##### 1. Effect of an upset

An upset constitutes an affirmative defense to an action brought for noncompliance with permit effluent limitations if the requirements of Part II.N.2. of this permit are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review in accordance with Regulation 61.8(3)(j).

##### 2. Conditions Necessary for Demonstration of an Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed contemporaneous operating logs, or other relevant evidence that:

- a. An upset occurred and the permittee can identify the specific cause(s) of the upset;
- b. The permitted facility was at the time being properly operated and maintained; and
- c. The permittee submitted proper notice of the upset as required in Part II.L.6.(24- hour notice); and
- d. The permittee complied with any remedial measure necessary to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition to the demonstration required above, a permittee who wishes to establish the affirmative defense of upset for a violation of effluent limitations based upon water quality standards shall also demonstrate through monitoring, modeling or other methods that the relevant standards were achieved in the receiving water.

##### 3. Burden of Proof

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

#### O. RETENTION OF RECORDS

##### 1. Post-Expiration or Termination Retention

Copies of documentation required by this permit, including records of all data used to complete the application for permit coverage to be covered by this permit, must be retained for at least three years from the date that permit coverage expires or is terminated. This period may be extended by request of EPA at any time.

##### 2. On-site Retention

The permittee must retain an electronic version or hardcopy of the SWMP at the construction site from



the date of the initiation of construction activities to the date of expiration or inactivation of permit coverage; unless another location, specified by the permittee, is approved by the division.

P. REOPENER CLAUSE

1. Procedures for Modification or Revocation

Permit modification or revocation of this permit or coverage under this permit will be conducted according to Regulation 61.8(8).

2. Water Quality Protection

If there is evidence indicating that the stormwater discharges authorized by this permit cause, have the reasonable potential to cause or contribute to an excursion above any applicable water quality standard, the permittee may be required to obtain an individual permit, or the permit may be modified to include different limitations and/or requirements.

Q. SEVERABILITY

The provisions of this permit are severable. If any provisions or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances and the application of the remainder of this permit shall not be affected.

R. NOTIFICATION REQUIREMENTS

1. Notification to Parties

All notification requirements, excluding information submitted using the CEOS portal, shall be directed as follows:

a. Oral Notifications, during normal business hours shall be to:

Clean Water Compliance Section  
Water Quality Control Division  
Telephone: (303) 692-3500

b. Written notification shall be to:

Clean Water Compliance Section  
Water Quality Control Division  
Colorado Department of Public Health and Environment  
WQCD-WQP-B2  
4300 Cherry Creek Drive South  
Denver, CO 80246-1530

S. RESPONSIBILITIES

1. Reduction, Loss, or Failure of Treatment Facility

The permittee has the duty to halt or reduce any activity if necessary to maintain compliance with the effluent limitations of the permit. It shall not be a defense for a permittee in an enforcement action that it would be necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

T. OIL AND HAZARDOUS SUBSTANCE LIABILITY

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under Section 311 (Oil and Hazardous Substance Liability) of the CWA.

#### U. EMERGENCY POWERS

Nothing in this permit shall be construed to prevent or limit application of any emergency power of the division.

#### V. CONFIDENTIALITY

Any information relating to any secret process, method of manufacture or production, or sales or marketing data which has been declared confidential by the permittee, and which may be acquired, ascertained, or discovered, whether in any sampling investigation, emergency investigation, or otherwise, shall not be publicly disclosed by any member, officer, or employee of the Water Quality Control Commission or the division, but shall be kept confidential. Any person seeking to invoke the protection of this section shall bear the burden of proving its applicability. This section shall never be interpreted as preventing full disclosure of effluent data.

#### W. FEES

The permittee is required to submit payment of an annual fee as set forth in the 2016 amendments to the Water Quality Control Act. Section 25-8-502 (1.1) (b), and the Colorado Discharge Permit System Regulations 5 CCR 1002-61, Section 61.15 as amended. Failure to submit the required fee when due and payable is a violation of the permit and will result in enforcement action pursuant to Section 25-8-601 et. seq., C.R.S.1973 as amended.

#### X. DURATION OF PERMIT

The duration of a permit shall be for a fixed term and shall not exceed five (5) years. If the permittee desires to continue to discharge, a permit renewal application shall be submitted at least ninety (90) calendar days before this permit expires. Filing of a timely and complete application shall cause the expired permit to continue in force to the effective date of the new permit. The permit's duration may be extended only through administrative extensions and not through interim modifications. If the permittee anticipates there will be no discharge after the expiration date of this permit, the division should be promptly notified so that it can terminate the permit in accordance with Part I.A.3.i.

#### Y. SECTION 307 TOXICS

If a toxic effluent standard or prohibition, including any applicable schedule of compliance specified, is established by regulation pursuant to Section 307 of the Federal Act for a toxic pollutant which is present in the permittee's discharge and such standard or prohibition is more stringent than any limitation upon such pollutant in the discharge permit, the division shall institute proceedings to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition