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PLANNED AREA DEVELOPMENT
HARRISON ROAD INERT MATERIALS LANDFILL

Submittal 1 Case C9-20-03 (ref RZ19-004)

Project:
4200 S Harrison Road
Tucson, Arizona 85730
NE1/4, Sec 34, T14S, R15E, G&SRM

Owner/Applicant:
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Job D17016

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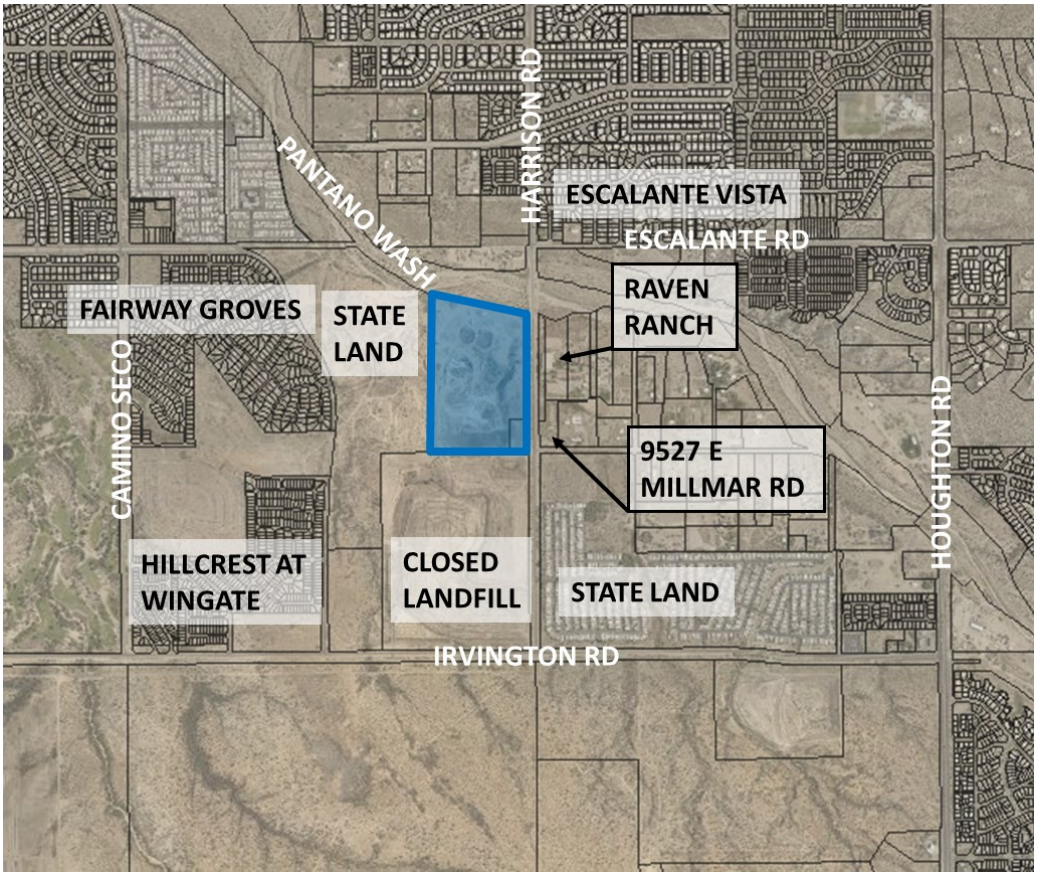
1.0 Introduction and Policy

A. Property Location and Description

The site consists of two parcels (APN 136-30-0020 and 0030), totaling approximately 55.5 acres, located on the west side of Harrison Road, directly south of the Pantano Wash approximately one-half mile north of Irvington Road.

The map below shows the location of the site.



B. Historic Use of the Property and Intent of the PAD

The property is a decades-old sand and gravel pit that was in operation prior to the City's annexation of the area in 1987. The mining operations date back to the 1960s. Consequently, the property consists of a void roughly 3 million cubic yards in volume. The deepest point in the pit, in the south half of the property, is approximately 120 feet deep. The northern-most part of the property is where the old buildings and truck scale were located when the pit was fully operational. Most buildings were removed. Some burned down. Today, the only remnants are the concrete slabs.

The historic sand and gravel operations, an "extraction" use, was permitted as a non-conforming use by Pima County in its SR zoning prior to annexation into the City of Tucson. The City of Tucson annexed the property in 1987, with the current SR zoning,

and translated the extraction use as legal, non-conforming, to allow the use to continue. The operations eventually stopped and the legal non-conforming status was lost.

The intent of this proposed PAD is to establish both interim and future zoning standards for the property to allow the owner to operate an inert materials landfill with materials recycling (crushing and sales) activities, industrial uses categorized in the Unified Development Code (UDC) as a "sanitation system" and "salvaging and recycling", until the void at the property is filled to a stable condition. Then development on the stabilized land can occur with a use(s) conforming to the South Pantano Area Plan.

Only inert materials will be accepted in the landfill. Inert materials are those that are not flammable, will not decompose and will not leach substances in concentrations that exceed applicable aquifer water quality standards prescribed in Arizona Revised Statutes (ARS) 49-201, paragraph 20, when subjected to a water leach test that is designed to approximate natural infiltrating waters. Inert materials include concrete, asphaltic pavement, brick, rock, gravel, sand, soil and metal, if used as reinforcement in concrete, but does not include special waste, hazardous waste, glass or other metal.

The proposed uses for this PAD will be phased. In the first phase, there will be an interim industrial use in which landfill and salvaging/recycling activities will be conducted to rebuild the soils on the property to stable conditions using inert materials. In the second phase, upon completion of the landfill, future development on the site will conform to the SPAP Subarea 6 uses of "park industrial use integrated with residential, commercial and recreation development".

C. <u>Conformance with South Pantano Area Plan and Plan Tucson Goals and Policies</u>

The subject parcel is within Subarea 6 of the South Pantano Area Plan (SPAP), which was written and adopted in 1984, prior to the annexation of the subject property in 1987.

A recent Plan Amendment to the SPAP to allow for this PAD proposal was approved and adopted by the City of Tucson Mayor and Council under Resolution 23037 on June 4, 2019. While the original SPAP identified subarea 6 as containing sand and gravel operations and landfills and discussed the need for soils in those areas to be rebuilt to stable conditions, no provisions were made that would allow the industrial designation required to permit the activities associated with rebuilding the soils. To address that deficiency, the plan amendment amended the description of the Subarea 6 "Proposed Use" by adding an exception for the subject property. The description, as amended, and which is located on Page 33 of the SPAP, follows:

> <u>Proposed Use:</u>
> Park Industrial use integrated with residential, commercial and recreational development is suitable for areas where it is feasible to rebuild the soil to stable conditions. Development should be designed to provide active recreational facilities and open spaces along the Pantano

Wash and in areas not planned for improvement. When all or part of the State Trust land is sold or leased, proposed development should be in compliance with *South Pantano Area Plan* policies.

Exception: Parcels 136-30-0020 & 136-30-0030. In order to support future development of these Parcels with Park Industrial uses per Plan policy guidance, substantial amounts of soil replacement and engineered stabilization must take place. To accomplish the goal of soil stabilization, the SPAP, Subarea 6, will allow an interim Industrial use(s). While heavy Industrial uses (I-2) are not appropriate for future end uses or zoning, a flexible zoning tool, such as a Planned Area Development (PAD), should be pursued to accommodate a phased approach to interim Industrial use and future Park Industrial use on the amendment site.

D. <u>Rationale for Use of PAD zoning</u>

If not for the historic mining operations on the property, it would have been possible to rezone the property from its current SR zoning to another suitable City of Tucson zoning. However, an interim industrial use is required during the period in which the soils will be rebuilt. The PAD rezoning process is the only process currently permitted by the City of Tucson that will accommodate both the interim and future uses. It will allow for the flexibility to establish standards for the interim industrial use and prohibit the industrial uses from continuing indefinitely.

The PAD process provides the opportunity to specify the duration of the interim use since permanent industrial uses are not in conformance with SPAP subarea 6 uses and are not compatible with the surrounding residential zoning. Additionally, a specific milestone(s) in the landfilling process can be established to clearly understand when the interim use will terminate.

E. <u>Benefits of using a PAD zoning</u>

In the case of this project, the use of a PAD rezoning process is not just beneficial, but necessary, to address the need for an interim use which cannot be achieved by any other rezoning mechanism currently allowed by the City of Tucson. However, the use of a PAD is beneficial to the applicant because it allows the flexibility to set-forth standards for the interim industrial use that cannot be achieved/permitted under the UDC standards such as use setbacks that consider the existing proximity of sand and gravel pit to the property lines.

The use of a PAD process to facilitate permitting the landfill is also beneficial to the community in the following ways:

- The PAD will include the specific limitations associated with the interim industrial use as determined appropriate through the public process including input from all stakeholders.

- It will set forth the guidelines necessary to understand when the interim use terminates.
- Opening the landfill will fill a need in the Tucson Metro area created by the closures and pending closures of other existing facilities.
- Rebuilding of the soils on the property will improve the appearance of the site over time and the future development of the property with uses conforming to the SPAP will complement the neighborhood which is continually expanding with residential development.

F. <u>Suitability of PAD to environmental factors</u>

The proposed PAD is suitable adjacent to the closed Harrison Road sanitary landfill to the south due to the similarity of the properties. The difference is that the proposed inert materials landfill will not produce the methane gas and groundwater contaminants that the sanitary landfill did.

Staff at the City of Tucson Environmental Services Department provided records indicating that the closed landfill is no longer producing detectable amounts of methane gas at any of their 37 methane monitoring wells. They also provided records indicating that groundwater contaminants levels for VOCs and inorganic compounds have dissipated. Treatment facilities that were in-use to extract, and treat the groundwater before pumping it back into the earth were decommissioned in December of 2016. Therefore, there are no complications anticipated relating to filling the subject property adjacent the closed sanitary landfill.

G. <u>Compatibility of the PAD to adjoining uses</u>

The underlying goal of the proposed PAD, in the long-term, is to make the property suitable for future development that is compatible with the adjoining residential zoning within the guidelines of integrated uses specified in the SPAP for subarea 6. The land to the north, east and south are all zoned SR and the land to the west is zoned R-2. In its current state, the property is neither compatible with the surrounding residentially-zoned land nor conforming to the proposed uses in the SPAP. The only option to remedy that incompatibility is to fill the extraction pit to allow future compatible development to occur. The phased approach of this PAD will allow the owner to complete the work necessary for that transition in the first phase of the PAD, the interim phase.

Although the proposed interim industrial use, required to rebuild the soils onsite, will not be a sustainable compatible use for the surrounding residentially-zoned properties as they become residentially developed, it is compatible with many of the current surrounding uses, being vacant land, commercial recreation and animal production. Since the interim industrial use is similar in nature to the historic use of the property, new impacts to neighboring properties will be minimal and will generally be a continuance of the former industrial use associated with the extraction pit. The phased approach of this PAD is meant to permit the necessary landfill work, during the time

period specified for the interim phase, while minimizing adverse impacts to surrounding properties by establishing enforceable standards and guidelines specific to the industrial use.

H. <u>Physical and economic suitability and feasibility of the PAD with existing infrastructure</u>

The suitability and feasibility of the proposed PAD was somewhat demonstrated by the former use of the site which was a similar use. Physically and economically, the difference will essentially equate to a reversal of the earth removal process that occurred. Similar equipment and vehicles will utilize the existing infrastructure at presumably a similar rate. There are no records of the trip (traffic) generation associated with the former extraction use. However, an analysis of the projected landfill traffic, by Mathieu Engineering Corp., attached in Appendix A, determined that there will be no change to the Level of Service of Harrison Road as a result of the landfill operations.

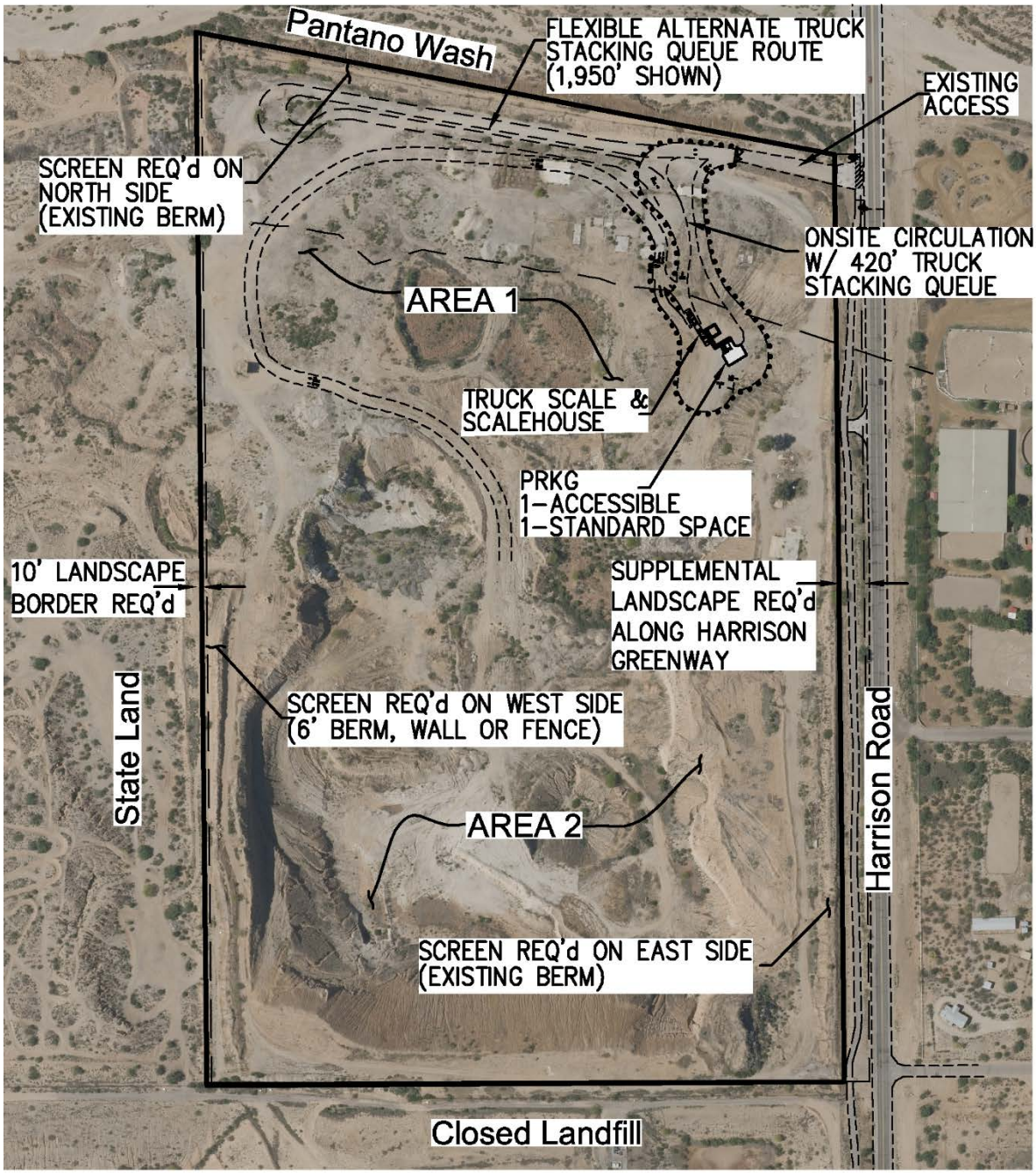
2.0 PAD Proposal

A. Illustrative Site Plan

The interim phase of the implementation of this PAD focuses mainly on landfill activities in which the existing sand and gravel pit will be filled with inert materials to rebuild and stabilize the soils on the property. Other permitted interim phase activities, as outlined in the Permitted Land Uses section of this PAD, will occur outside the pit area. A conceptual mapping of the use areas is presented on Exhibit 1. Interim phase landscape border and screening requirements specified in the Landscape and Screening Section of this PAD are also illustrated. Interim setbacks, as detailed in the Development Standards Section of this PAD are shown on Exhibit 2.

Post-landfill land uses, as explained in the Permitted Land Uses section of this PAD, shall be proposed following completion of the landfill and shall be required to submit Development Packages to the City of Tucson for review and approval.

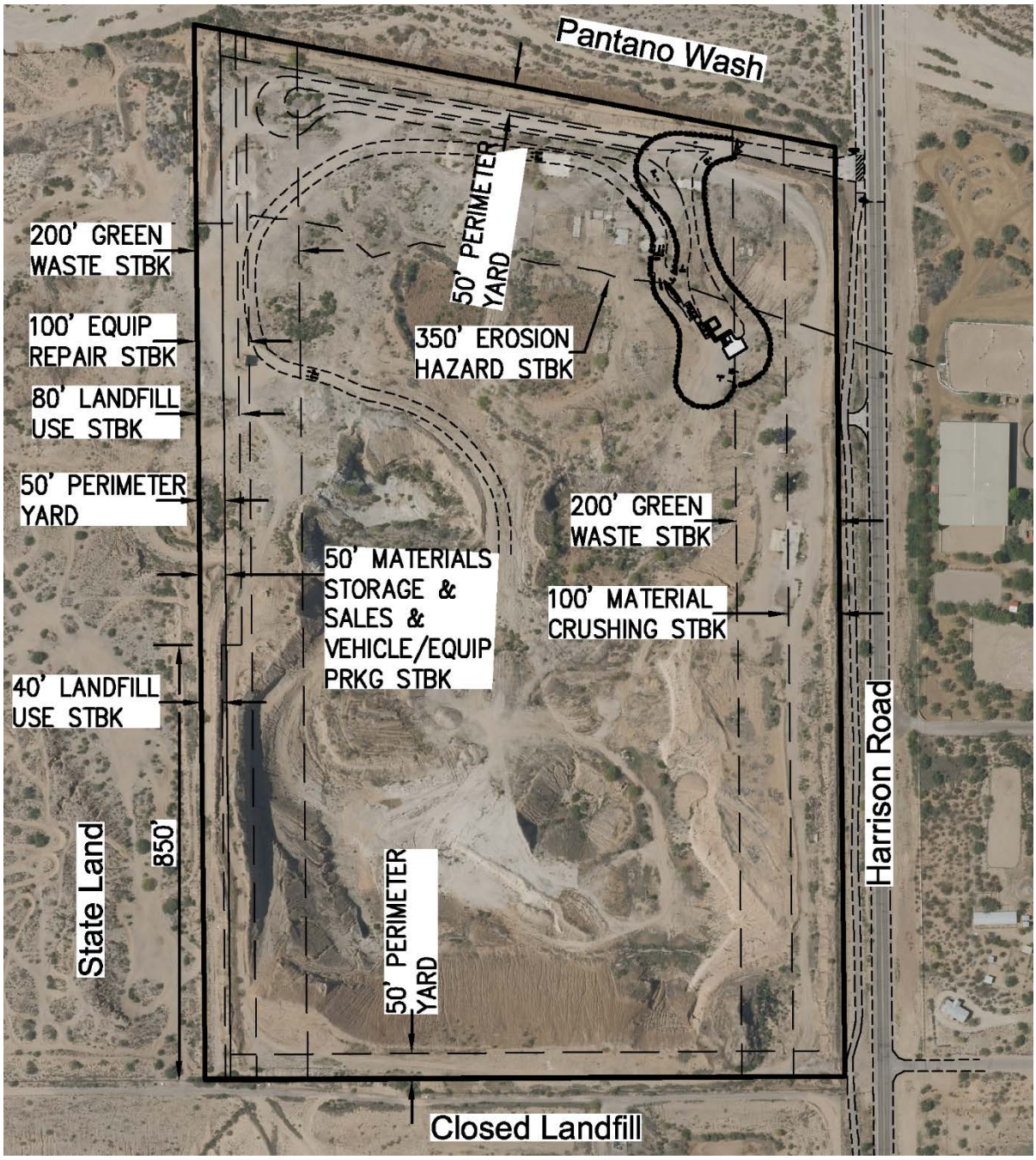
EXHIBIT 1
ILLUSTRATIVE LAND USE CONCEPT PLAN FOR INTERIM TIMEFRAME



Legend

———	Property Boundary
.....	Barricades or other movable barriers bounding truck stacking queue area
AREA 1	Green Waste, Recycling, Sorting, Storage/Sales, Crushing, Vehicle & Equipment Parking, Minor Repairs, & Landfill Activities
AREA 2	Landfill & Crushing Activities

EXHIBIT 2
SETBACKS MAP FOR PERMITTED INTERIM USES



Legend

Property Boundary

Setbacks (STBK)

B. General Land Uses

The PAD has a single zoning district that allows interim industrial uses, throughout the duration of the landfill activities in a specified interim timeframe, and Park Industrial (P-I) during and after the interim timeframe.

The interim uses associated with the landfill activities include business operations, sanitation system (inert), materials crushing, salvaging and recycling, materials sales and excavating, outdoor materials storage, outdoor green waste storage and processing, sorting, and equipment parking. All interim uses are permitted outdoors. Refer to definitions for Business Operations, Sanitation System, Inert Materials, Crushing, Salvaging and Recycling, Green Waste, and Green Waste Processing and Storage in Section 2.P.

Following the completion of the landfill and termination of the specified interim timeframe, the permitted uses shall be only those uses either expressly permitted or permitted by a special exception process in the P-I zone as outlined in the current UDC. Special exception uses shall be subject to the applicable special exception process currently required by the UDC.

Completion of the landfill and/or termination of the specified interim timeframe shall not be a prerequisite condition of permitting any P-I permitted uses or P-I Special Exception uses in the PAD district.

C. Permitted Land Uses

Permitted Uses:

- All uses permitted in the P-I Zone, per the UDC, subject to the applicable use-specific standards.

Special Exception Uses:

- All uses permitted by special exception in the P-I Zone, per the UDC, according to the applicable type of special exception procedure noted therein and subject to the applicable use-specific standards.

Completion of the landfill and/or termination of the specified interim timeframe shall not be a prerequisite condition of permitting any P-I permitted uses or P-I Special Exception uses in the PAD district.

Permitted Interim Uses:

- Sanitation System (Landfill)
    - For landfill accepting only inert materials.
- Excavating, earth moving, earth compacting and other earthwork activities
- Salvaging and Recycling
    - Includes outdoor material crushing, storage and sales

    - Materials salvaging and recycling is limited to asphalt, concrete, rock, gravel, stone, soil, sand, brick, block, tile and other clean inert materials generally associated with construction and demolition waste.
- Materials Storage and Sales
- Green Waste Storage and Processing
- Materials Sorting
- Vehicle and Equipment Parking

All permitted interim uses shall be permitted outdoors.

D. <u>Interim Timeframe</u>

The interim phase of this PAD shall terminate 12 years after the PAD adoption date or upon completion of the landfill, whichever occurs first. Any of the following occurrences shall signify the completion of the landfill:

1. The grade of the entire property has reached a minimum elevation equal to 2-feet above the adjacent grade of the paved Harrison Road multi-use path, which varies along the length of the property frontage, with a minimum elevation anywhere on the site being 2,730 above Mean Sea Level on the North American Vertical Datum of 1988 (NAVD 88).
2. A period of one (1) year has passed since the grade of the entire property has reached a minimum elevation corresponding to the grade of the adjacent paved Harrison Road multi-use path. A letter from the City of Tucson to the property owner, stating that this condition has been met, according to the City, shall mark the start of the 1-year period unless contested by the property owner on the basis of inaccuracy(s).

Interim Timeframe Extensions:

Since the incoming volume of materials is difficult to predict and dependent on many factors, two (2) consecutive 2-year interim timeframe extensions shall be allowed if the landfill is not complete at the end of the initial interim timeframe. The two timeframe extensions shall be considered minor PAD amendments, reviewed and approved administratively per UDC 3.5.5.J, and shall be applied for prior to the end of the initial timeframe or current timeframe extension, whichever is applicable. If the landfill is not complete after 16 years, a Major PAD Amendment will be required to continue operations.

E. <u>Development Standards</u>

1. Standards for Permitted Uses and Special Exception Uses:

Development of the property with Permitted Uses or Special Exception Uses, whether such development occurs during the interim phase or after the termination of the interim timeframe, shall conform to the UDC Development Standards applicable to the type of development proposed. Review and approval by the City of Tucson Planning and

Development Services Department of a Development Package is required prior to permitting.

2. Standards for Permitted Interim Uses:

The following Development Standards shall apply to the Permitted Interim Uses during the interim phase of this PAD. Review and approval by the City of Tucson Planning and Development Services Department of a Development Package demonstrating compliance with these standards is required prior to permitting for proposed Interim Uses.

Dimensional Standards:

Minimum Site Area	None
Maximum Lot Coverage	None
Maximum Building Height	30 feet
Perimeter Yard (Building Setbacks)	North: 50 feet from property line East: Greater of 21 feet or Height of Exterior Building Wall, measured from back of future curb South: 50 feet from property line West: 50 feet from property line

Landfill Use Setbacks:

Landfill activities relating to the placement and compaction of inert landfill materials, cover fill, backfill, and other earthwork necessary to complete the landfill or to address slope or excavation safety shall be setback from the west property boundary a distance of **80 feet**.

> *Exception:* Along the southern 850 feet of the western boundary, where existing cut slopes are closer to the property line, the setback shall be **40 feet**.

Landfill use setbacks do not apply to the driving of equipment, such as loaders or trucks, for the purpose of moving them between locations onsite, in instances when there is no safe alternate route outside the setback.

Other Use Setbacks:

Materials Crushing	North: None East: 100 feet South: None West: 200 feet
Materials Storage and Sales	North: None East: None South: None West: 50 feet
Green Waste Storage	North: None East: 200 feet South: None West: 200 feet
Green Waste Processing, Sorting	North: None East: 200 feet South: None West: 200 feet
Vehicle & Equipment Parking	North: None East: None South: None West: 50 feet
Equipment maintenance and minor repairs	North: None East: None South: None West: 100 feet

Refer to the Setbacks Map for Permitted Interim Uses on Exhibit 2 in Section 2.A.

Parking, Bicycles and Loading:
A minimum of two (2) parking spaces are required and shall be located in close proximity to the scale house. Accessible parking shall be provided based on the number of parking spaces provided at the ratio required by IBC Section 1106. Parking spaces provided shall meet the dimensional requirements of the UDC and ICC/ANSI A117.1, as applicable.

No short-term or long-term bicycle parking spaces are required.

No designated loading zones are required.

Vehicular Use Area Criteria:
Access lanes for vehicles entering and exiting the truck scale area, landfill, and materials storage and sales areas are expected to be occasionally re-aligned throughout the

various stages of the life cycle of the landfill as needed. Access lanes may be un-improved but must be graded to provide a surface drivable by conventional passenger vehicles and must be kept free of debris. Access lanes directing traffic in and out of the truck scale area and landfill should be sufficiently delineated with barricades, cones or other clearly visible markers. Lanes providing one-way traffic shall be at least 20 feet wide. Two-way lanes shall be a minimum of 24 feet wide. Parking Area Access Lanes (PAALs) providing access to parking spaces shall meet the width requirements of the UDC.

Parking areas and PAALs are not required to be paved except that accessible parking spaces, access aisles and walkways serving as accessible paths shall consist of a smooth durable surface meeting the accessible path requirements of ICC/ANSI A117.1.

The stacking of vehicles entering the site must be accommodated fully onsite with a queue area of sufficient length to prevent any congestion on Harrison Road or on the Harrison Road Paved Multi-Use Path. The number of vehicles entering the site is expected to require a minimum stacking queue length of 350-feet based on the peak hour inbound traffic and the length of a WB-50 truck. Refer to the Traffic Engineering and Impact Analysis by Mathieu Engineering Corp. in Appendix A. The queue must be delineated with barricades or other movable barriers, so the provision of additional space is possible if the traffic entering the facility exceeds the estimated volume. The City of Tucson shall have the authority and shall be granted access, as necessary, to make scheduled or un-announced inspections, during regular business hours, to ensure the stacking queue length is adequate and imposing no congestion on Harrison Road.

Access:
Vehicular access shall be from Harrison Road only.

Where active site entrances cross the Harrison Road Paved Multi-Use Path, the developer shall place 12” x 12” R1-1 “STOP” signs with WS6 Stop Lines (6” wide white lines) on the path on both sides of the crossing to warn bicyclists of crossing traffic. The crossing shall be marked with 4” white diagonal striping across the entrance paving to delineate the path’s crossing and draw the attention of crossing drivers.

Pedestrian Circulation:
No pedestrian connectivity is required from Harrison Road.

Sidewalks shall be installed providing an accessible route from accessible parking to the scale house entrance. Sidewalks may be constructed with concrete, asphalt, asphalt milling, pavers or any other materials providing a smooth durable surface. Sidewalks shall be a minimum of 4’ wide.

Noise:
Hours of operation shall be:

Monday-Friday	6:30 am until 4:30 pm
Saturday	7:00 am until 3:00 pm
Sunday	Closed

All activities onsite shall be limited to the hours of operation.

Materials crushing operations shall occur twice per year for periods lasting not more than 21 business days. Crushing operations shall be limited to the hours of operation.

Noise levels shall be mitigated such that the decibel levels audible from anywhere offsite do not exceed the maximum levels of City Code 16-31. The landfill and associated activities in the early stages of the interim phase are expected to be fully mitigated by the depth of the pit and the additional noise abatement provided by the perimeter earthen berms. If the abatement is not adequate in the later stages of the interim phase, as the landfill elevation increases, noise barriers may be required. Noise barriers may consist of stockpiled material, berms, temporary walls or any other effective materials and may be placed temporarily to serve the needs of the activities onsite which will move from time-to-time. Additionally, adjustments to the morning hours of operation may be made if noise issues arise.

The City of Tucson shall have the authority and shall be granted access, as necessary, during regular business hours, to make scheduled or un-announced inspections, to ensure the noise levels comply with City Code 16-31.

Odor:
The inert materials to be accepted at the landfill do not typically create odors. The materials will be covered with earth on a daily basis.

The staff will inspect incoming loads to ensure only acceptable materials are being deposited. Any restricted materials that are found within loads will be rejected. Any found dumped illegally will be moved to dumpsters for removal from the site. If dumpsters begin to produce odors that migrate offsite, they shall be emptied prior to the next scheduled collection date.

Odors associated with green waste collection, storage, and processing are more complex to predict. Whether odors will be produced is a function of the specific type of materials, whether the materials have already been stockpiled somewhere else for some time, the moisture content, humidity, temperature, etc. The green wastes entering the Harrison Road Inert Materials Landfill will not be permitted to enter the landfill area. They will be stored separately to dry out and lose weight before being hauled from the site to be deposited at a municipal solid waste landfill or green waste facility. The materials may or may not be processed onsite for reduction of volume,

depending on the rate of incoming materials. Regardless, odors shall not be allowed to be offensive and the odor standards of the UDC and Pima County Code shall apply. UDC Section 4.9.5.C.6.d states “Emission of odorous gases and other odorous matter shall not be permitted in such quantities as to be offensive to owners or occupants of adjoining property or in such a manner as to create a nuisance or hazard beyond the property lines.” Pima County Code 17.16.030 states “No person shall emit gaseous or odorous materials from equipment, operations or premises under his control in such quantities or concentrations as to cause air pollution.

The owner’s initial method for odor control will be to have an organized stockpiling system in which the older materials are always the first to be hauled from the facility. If odor control proves to be insufficient with that method, the owner shall employ any one or any combination of the following methods, as appropriate, to reduce odor emissions:

- Reduce stockpile heights,
- Increase the frequency of material removal,
- Reduce or suspend activities that reduce the material volume,
- Employ chemical odor control/neutralizer methods,
- Restrict the volume of incoming materials,
- Restrict the entry of specific material types that tend to produce odor, and
- Relocate stockpile locations periodically to allow the underlying areas to receive sunlight and dry.

If those initial methods of odor control are not sufficient to control odors, the City of Tucson may require an Enhanced Odor Mitigation Plan using best practices in odor mitigation that meet current industry standards. The Enhanced Odor Mitigation Plan shall be on record approved by the City of Tucson. The Plan may be subject to changes per periodic review.

The City of Tucson and Pima County shall have the authority and shall be granted access, as necessary, to make scheduled or un-announced inspections, during regular business hours, to ensure odors are in compliance with the Air Quality Permit(s) issued.

Debris:
All debris shall be kept onsite. Any debris that falls outside the property shall be removed by the owner.

The City of Tucson shall have the authority and shall be granted access, as necessary, to make scheduled or un-announced inspections, during regular business hours, to ensure debris is being kept onsite.

Landfill Materials Restricted
Only inert materials, as defined in Section 2.P, will be accepted in the landfill. Inert materials include concrete, asphaltic pavement, brick, rock, gravel, sand, soil and metal, if used as reinforcement in concrete, but does not include special waste, hazardous waste, glass or other metal.

The staff will inspect incoming loads to ensure only acceptable materials are being deposited. Any restricted materials that are found within loads will be rejected. Any found dumped illegally will be moved to dumpsters for removal from the site.
The City of Tucson shall have the authority and shall be granted access, as necessary, to make scheduled or un-announced inspections, during regular business hours, to ensure no restricted materials are being accepted in the landfill.

Dust Control:
The property owner(s) shall hold an active Fugitive Dust Activity/Air Quality Permit issued by Pima County Department of Environmental Quality at all times during the landfill operations and shall comply with all conditions and requirements of the permit. Water from existing onsite groundwater wells or water service(s) provided by Tucson Water, chemical stabilizers, or other effective dust suppressants shall be used to control dust emissions from onsite vehicle traffic, materials loading and unloading, materials crushing, and earthwork operations. Water shall be applied by water truck, hose, sprinklers or other effective means satisfying the permit requirements.

Pima County shall have the authority and shall be granted access, as necessary, to make scheduled or un-announced inspections, during regular business hours, to ensure dust and particulate levels are in compliance with the permit(s) issued.

Fire:
A Knox Box shall be located near the gate to allow after-hours Fire Department keyed-access.

Fire potential associated with the interim phase of the PAD is expected to be limited to the scale house building, vehicles and equipment, and the green waste storage area. The inert materials entering the landfill will be only non-flammable materials.

Onsite Solid Waste Collection:
Solid waste and recyclable waste generated by staff and customers, separated from incoming loads, or dumped illegally on the property shall be collected in dumpsters and hauled from the site to a Municipal Solid Waste Landfill either by the City of Tucson Environmental Services, a private collection company, or by the property owner.

Dumpster enclosures and screening shall not be required except that dumpsters shall not be visible from outside the site perimeter berms.

The City of Tucson shall have the authority and shall be granted access, as necessary, to make scheduled or un-announced inspections, during regular business hours, to ensure no restricted materials are being accepted in the landfill.

F. Landscape and Screening

1. Standards for Permitted Uses and Special Exception Uses:

Development of the property with Permitted Uses or Special Exception Uses, whether such development occurs during the interim phase or after the termination of the interim timeframe shall conform to the UDC requirements for Landscaping and Screening in UDC Section 7.6. This PAD does not preclude applicants from applying for a Design Development Option (DDO) per Section 3.11.1 of the UDC.

2. Standards for Permitted Interim Uses:

With the exception of the perimeter landscape border requirements specified herein, there shall be no onsite landscape requirements for the Permitted Interim Uses during the interim timeframe.

Perimeter landscape borders and screening for Permitted Interim Uses during the interim timeframe shall be as specified in the following table.

	Screening	**Landscape Border**
North property line	Existing earth berm	None (Pantano Wash)
East property line	Existing earth berm	Supplement plantings in the Harrison Road Greenway Landscaping (per below)
South property line	None (Adjacent property is elevated up to 14’ above the elevation at the property line)	None
West property line	6’ earth berm, 6’ wall or 6’ fence. Walls and fences to meet UDC screening standards. Refer to UDC 7.6.5.B	10’. See requirements below. Earth berm screens may be located within the 10’ width provided the minimums for plant materials are provided.

New plants used for perimeter landscape borders shall be drought-tolerant species. All new plant materials used must be selected from the Arizona Department of Water Resources’ Low Water Use/Drought Tolerant Plant List.

The landscape border planting requirements along the west property line shall be as follows:

- Canopy trees, meeting the size requirements of TSM 5-01.5.0, shall be planted every 33 linear feet per UDC 7.6.4.C.1.
- Drip irrigation for the canopy trees shall be installed per an approved landscape plan.
- Passive water harvesting tree wells with a minimum containment depth of 6-inches shall be placed around each canopy tree. Where located on or adjacent a slope, the well shall be open on the up-gradient side to capture runoff from the slope area.
- Ground cover and vegetative cover requirements within the landscape border shall be only to hydroseed the landscape border. Hydroseeding shall conform to the Native Seed List standards of TSM 5-02.6.0 Exhibit I.

Supplemental plantings within the Harrison Road Greenway shall conform to the Greenway planting guidelines specified in the Pima Regional Trail System Mater Plan, as shown on Page 61 of that document which is included below with pertinent sections indicated by red arrows. The existing vegetation shall be supplemented to increase the canopy tree density to one per 33 linear feet of Greenway length. Where possible, supplemental trees shall be placed to alternate from one side of the paved multi-use path to the other with varying distances from the path edge. An approved landscape plan and right-of-way use permit shall be required.

Pima Regional Trail System Master Plan- Greenway Excerpt

Greenways

Greenways are a corridor that typically features a path and trail, preserved native vegetation and/or landscape plantings, and pedestrian amenities. Greenways typically follow washes or drainageways but can also be adjacent to roads. If the greenway is along a wash, the path and trail can be together on one side (equivalent to the Divided Urban Pathway) or one on each side of the wash. Greenways are similar to River Parks except that right-of-way width is less, features are less extensive, and at-grade crossings of streets are more common.

DESIGN CONSIDERATIONS

Corridor Width. The minimum corridor width for Greenways is 50 feet. However, additional space is recommended wherever possible to help enhance the quality and impact of the greenway system, reduce the urban heat island effect, and allow for the restoration of the wildlife habit that once existed along the edges of the community's major watercourses.

Encroachment. New development shall not encroach into Greenway corridors.

Dedication. New development adjacent to Greenway corridors shall dedicate the 50-foot minimum corridor and construct the amenities consistent with this plan.

Design Integration. Urban design that integrates residential and commercial projects along the Greenway corridor is welcome and shall be strongly encouraged. Development should not "turn its back" on a Greenway, thereby creating an unsightly and undesirable condition of loading docks, service areas, and dumpsters in view of the Greenways.

Combined Public Corridor. Where opportunities occur to add publicly-owned property adjacent to Greenways, such as paralleling road right-of-way or public park, these lands should be combined in to one large public corridor.

Connectivity. Enhance connectivity to community features, such as parks, schools, commercial centers, offices, and neighborhoods by supplementing the recommendations of this plan and provide additional linked routes and connections to the Greenway.

Edge Porosity. The concept of "porosity" shall be integrated into Greenway design, with many opportunities to enter and exit the corridor. This will enhance safety, convenience, and connectivity.

Bridges. Bridges should be as flat as possible so as not to block sight lines and enhance user safety.

Underpasses. Wherever possible, separate equestrian underpasses under bridges should be provided for safety reasons.

Landscape. Landscaping is an opportunity to highlight and enhance regional and local character, therefore, landscaping shall be native and/or near native. Water harvesting techniques should be integrated into design wherever possible. Refer to local jurisdictions for specific approved plant lists.

Respite Areas. Provide respite areas with seat walls, plazas, and other design features at logical locations along River Parks. Compliment amenities at entry nodes and trailhead.

References. See Path, Trail, and Singletrack Trail Design Considerations for additional information.

Corridor Width	50 feet minimum
Path/Trail	Path and trail combined in one corridor
Vertical Clearance	12-foot minimum
Side Clearance	Three feet high by three feet wide each side of trail. Paths to have a four-foot shoulder on one side and a two-foot shoulder on the other side. (See Path and Trail Standards.) 24 inches from nearest pipe rails
Thorny Plants	Minimum 10-foot clearance between trail edge and newly planted thorny plants. Align trail to avoid existing thorny plants wherever possible to minimize their removal.
Clearance to Trees	Minimum six feet (provide minimum ten-foot clearance between trees and sewer lines)
Surface Material	(see Path and Trail standards)
Design Speed	(see Path and Trail standards)
Running Grade	(see Path and Trail standards)
Horizontal Alignment	(see Path and Trail standards)
Crossings	Limit driveway crossings to a maximum of every quarter-mile.
Signs	Wayfinding, directional, and interpretive
Barriers	New barriers shall be wildlife friendly, providing a minimum 18-inch gap between the bottom horizontal rail and finish grade.

G. Maintenance and Phasing of Infrastructure

Standards for the construction, maintenance and phasing of infrastructure, including roads, sewers, onsite sewage disposal systems, solid waste disposal facilities, utilities and drainage structures, whether privately or publicly owned, shall conform to the UDC and other City, State, or Federal standards and ordinances.

H. PAD to Supplement or Supersede the UDC

All references made in this PAD to the UDC shall be understood to refer to the Unified Development Code, itself, as well as its supplements; the Administrative Manual, and/or the Technical Standards Manual, as appropriate and applicable to the reference made. Where UDC standards are cited or referenced in this PAD, they shall be understood to refer to the standards in effect at the time this PAD is approved and adopted by the Mayor and Council.

This PAD shall govern the standards for the development and use of the property upon its adoption by the City of Tucson Mayor and Council. Where specific standards are set forth in the PAD, they shall supersede those of the Unified Development Code (UDC).

I. Development Design Guidelines

A Development Package shall be approved by the City of Tucson Planning and Development Services Department for the Permitted Interim Uses associated with the landfill and for any other development during the interim phase. The Development Package for any uses permitted under the "Permitted Interim Uses" as specified in Section 2.C shall be subject to the Development Standards of this PAD.

A Development Package shall also be approved for all development subsequent to the completion of the landfill and/or termination of the interim timeframe and shall be subject to the Development Standards of this PAD and those of the UDC in effect at the time of the PAD adoption.

Submittal and review procedures for Development Packages shall follow the processes the City has in-place at the time of the development proposal.

J. Drainage and Stormwater Management

The current runoff of stormwater is fully contained onsite due to the open pit. Once the landfill is completed, and upon further development of the site, the runoff will be required to drain toward the Pantano Wash either directly, or via the Harrison Road right-of-way. Runoff shall not be allowed to impact neighboring properties to the west or south.

Drainage Reports and Stormwater Pollution Prevention Plans for future development shall be reviewed and approved by the City of Tucson prior to the issuance of permits. Stormwater Detention and Retention requirements, as well as any applicable

commercial rainwater harvesting requirements shall be enforced. A stormwater detention waiver(s) may be appropriate due to the direct adjacency of the site to the Pantano Wash, a regional watercourse. Applications for waivers shall be reviewed along with the development plans.

Any structures proposed, whether erected during the interim phase or after the termination of the interim timeframe, and whether or not associated with any Permitted Interim Uses, shall be outside a 350' erosion hazard setback from the Pantano Wash unless a reduced erosion hazard setback distance is demonstrated with an engineering analysis or mitigated to a reduced width with engineered erosion protection measures.

Upon completion of the landfill, Stormwater Pollution Prevention Controls (Best Management Practices or BMPs) shall be kept in-place and maintained, in conformance with the then-current Construction General Permit (CGP) for the Arizona Pollution Discharge Elimination System (AZPDES), until such time as the site is stabilized-either by development hardscapes or erosions control measures or by established vegetation from re-seeding.

K. <u>Traffic</u>

Traffic in and out of the landfill facility is expected to be similar to former uses on the property. The AM and PM peak hour trips are expected to be 6 and 7, respectively. With that rate of traffic, the use is not expected to impact the Level of Service on Harrison Road. Refer to the Traffic Engineering and Impact Analysis by Mathieu Engineering Corp. in Appendix A.

The stacking of vehicles entering the site is expected to require a minimum stacking queue length of 350-feet based on the peak hour inbound traffic and the length of a WB-50 truck. Refer to the Traffic Engineering and Impact Analysis by Mathieu Engineering Corp. in Appendix A. Provision of that length onsite will prevent any congestion on Harrison Road or conflicts with bicycles and pedestrians on the Harrison path. The scale house will be situated onsite to provide a sufficient queue length to prevent any congestion at the site entrance or on Harrison Road. The queue will be delineated with barricades or other movable barriers, so the provision of additional space will be possible if the traffic entering the facility exceeds the estimated volume.

Five Years after the PAD has been approved, a left turn warrant analysis shall be provided to determine if a left turn lane is needed prior to the interim use terminating.

A Traffic Study(s) will be required to analyze the impacts of future post-landfill development at the time development is proposed.

L. Impacts to Existing Infrastructure, Public Services and Development

The implementation of this PAD will have minimal impacts to the existing roadway and utility infrastructure and public services in its interim phase due to the nature of the interim activities and their limited need for new structures and additional services. Refer to the Trip Generation Analysis in Appendix A.

Long term impacts to the roadway and utility infrastructure and public services, relating to post-landfill development of the site, will be evaluated at the time of development and will be subject any augmentation or improvement requirements deemed necessary at that time.

There are no existing structures onsite to be impacted by either the interim or future development of the site. There are no anticipated impacts to the structures on neighboring properties.

M. Sewer and Utilities

The availability of public sewer, water and other utilities adjacent to the site is outlined in detail in the Site Analysis section herein. The services needed to facilitate the interim phase of this PAD are available without the need for any augmentation to the existing systems since the landfill needs are minimal.

Future sewer and utilities needed to serve the post-landfill development of the site must be evaluated at the time of development based on several factors such as the type of development, its location on the site, whether land division is proposed, if streets are proposed, and the utility demands associated with the development.

N. Land Division, Land Split and Subdivisions

The processes for divisions of land in any form shall conform to the UDC.

O. Implementation and Administration

This PAD shall be implemented in accordance with Section 3.5.5 of the UDC and the provisions and requirements herein. This PAD shall supersede the UDC. If specific standards, requirements or restrictions are not set forth in this PAD, the UDC shall govern. Interpretations shall be made formally by the Zoning Administrator, in accordance with UDC 3.5.5.I, by request for a Zoning Administrator's Determination subject to the applicable appeals process.

Applications for modifications to the standards of this PAD and variances shall be allowed and shall follow the same procedures set-forth in the UDC. This policy shall apply to all forms of modifications and variances including but not limited to Technical Standards Modifications, Administrative Modifications, Design Development Options, Parking Design Modification Requests, and their respective appeals processes.

PAD Amendments:
Amendments to this PAD may be made pursuant to the provisions and requirements of UDC 3.5.5.J. Applications may be initiated by the property owner, the owner's agent, or the Mayor and Council upon written application per UDC 3.5.5.J.2.

Major Amendments:
The PDSD Director shall determine if a proposed change is a Major Amendment. Major Amendments are processed in accordance with the Zoning Examiner Legislative Procedure. Amendments to be considered Major Amendments are listed in UDC 3.5.5.J.c.

Minor Amendments/Administrative Changes:
The PDSD Director may approve changes determined to be minor or administrative per UDC 3.5.5.J.2.e. Amendments that shall be considered minor include but are not limited to:

- Two consecutive two-year interim timeframe extensions. Refer to Section 2.D.
- The addition of new information to the PAD, maps or text that do not change the effect of any regulation, development standard or guideline.
- Adjustments to the development standards herein, provided such changes are not harmful to the interests of the larger community or neighbors, do not create any public health or safety issues, and are consistent with the guiding goals and objectives of this PAD.
- The addition of permitted uses that may not be specifically named in this PAD but which are determined to be sufficiently similar in type and nature to those that are named herein.
- The addition of uses or accessory uses that are necessary to satisfy, fulfill, or carry-out any requirements imposed by federal, state, or local laws.
- Adjustments to the PAD required in order to comply with changes in federal, state or local laws.

P. Definitions

ARS: Arizona Revised Statutes

Business Operations: Activities necessary to carry out the day-to-day work involved in the interim uses including scale house activities, sales, materials weighing, materials loading and off-loading, administration, site inspections and testing, materials inspections, equipment maintenance, fueling, and minor repairs.

Crushing: The reduction of inert materials such as concrete, asphalt and rock by mechanical means.

Green Waste: Organic materials such as tree or brush trimmings.

Green Waste Processing: The reduction of green waste by chipping using machinery or other methods.

Green Waste Storage: The outdoor storage and stockpiling of green waste, either in its natural state or chipped by machinery. The waste shall not to be covered by earth or buried by any landfill activities.

Inert Materials: As defined in ARS 49-701, Inert Materials are those that are not flammable, will not decompose and will not leach substances in concentrations that exceed applicable aquifer water quality standards prescribed in ARS 49-201, paragraph 20, when subjected to a water leach test that is designed to approximate natural infiltrating waters. Inert Materials include concrete, asphaltic pavement, brick, rock, gravel, sand, soil and metal, if used as reinforcement in concrete, but does not include special waste, hazardous waste, glass or other metal. Inert Materials are specifically exempt from the definition of Solid Waste by ARS 49-701.01.B.

Inert Materials Landfill: Land on which inert materials waste is placed for permanent disposal by means of burial and/or covering with compacted earth.

Salvaging and Recycling: A use classification. As defined in UDC 11.3.5.L- "The reclamation and recovery of used materials and the processing of discarded scrap materials for commercial purposes. Typical uses include auto salvage yards, junkyards, paper salvage operations, and household good donation centers." In the context of this PAD, "Salvaging and Recycling" is used to reference the UDC use category only as it pertains to the classification of the Permitted Interim Uses of this PAD as outlined in Section 2.C.

Sanitation System: A use classification. As defined in UDC 11.3.11.D- "The collection, disposal, or treatment of waste materials. Typical uses include sewage pumping stations, sanitary landfills, sewage treatment facilities, and hazardous materials treatment facilities." In the context of this PAD, "Sanitation System" is used to reference the UDC use category only as it pertains to the classification of the Permitted Interim Uses of this PAD as outlined in Section 2.C.

UDC: City of Tucson Unified Development Code and its supplements; the Administrative Manual and the Technical Standards Manual.

3.0 Site Analysis

A. Significant Constraints of Site and Surroundings

The presence of the Pantano Wash north of the property is a natural constraint on traffic in the area during flooding. However, it is only expected to impede traffic flow from the north in the larger storm events that produce flow crossing Harrison Road.

The built constraints onsite relate to slopes that have been cut at steep inclines. A geotechnical evaluation prepared by Terracon has recommended modifying the slopes to 1.5:1 maximum incline prior to commencing activities to ensure a safe working condition.

View: Southeast from onsite

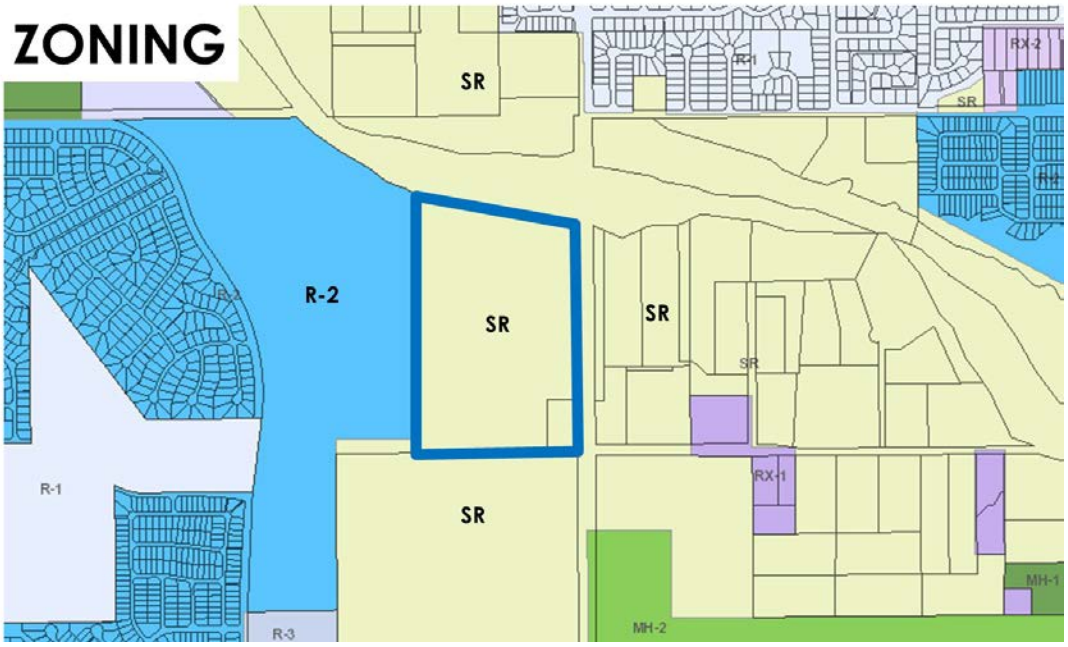
B. Major Transportation Elements

The Major Streets and Routes intended to serve the majority of the PAD traffic are Harrison Road, Irvington Road, Golf Links Road, Kolb Road and to a lesser extent, Houghton Road.

C. Existing Zoning and Uses

The existing zoning is SR, which was the zoning established at the time of annexation in 1987 to carry-over the Pima County SR zoning that was in-place at that time.

Immediately south of the site is the closed Harrison Road sanitary landfill owned by the City of Tucson. It is currently zoned SR and is used as a BMX bicycle race track, which is a Commercial Recreation use. Directly west of the site is Arizona State Trust property, currently vacant and zoned R-2. The Pantano Wash, zoned SR, borders the northern property line. To the east, across Harrison Road, the Raven Ranch operates with an Animal Production use in SR zoning, and south of the ranch is a single residential property, zoned SR, with a mobile home on the lot.



D. <u>Adjacent Parcels and Structures</u>

The Pantano Wash, north of the subject property, is within a public drainageway. A private residential lot north of the wash, at 3800 S. Harrison Rd., contains multiple accessory structures for horse facilities, which can be seen in the aerial photo below.

North-facing Oblique Aerial (2018 PAG)

Across Harrison Road from the property, to the east, the Raven Ranch also contains multiple structures used for horse facilities. Directly south of Raven Ranch, a single mobile home is located on the property at 9527 E Millmar Rd. Both properties are visible in the photo below.

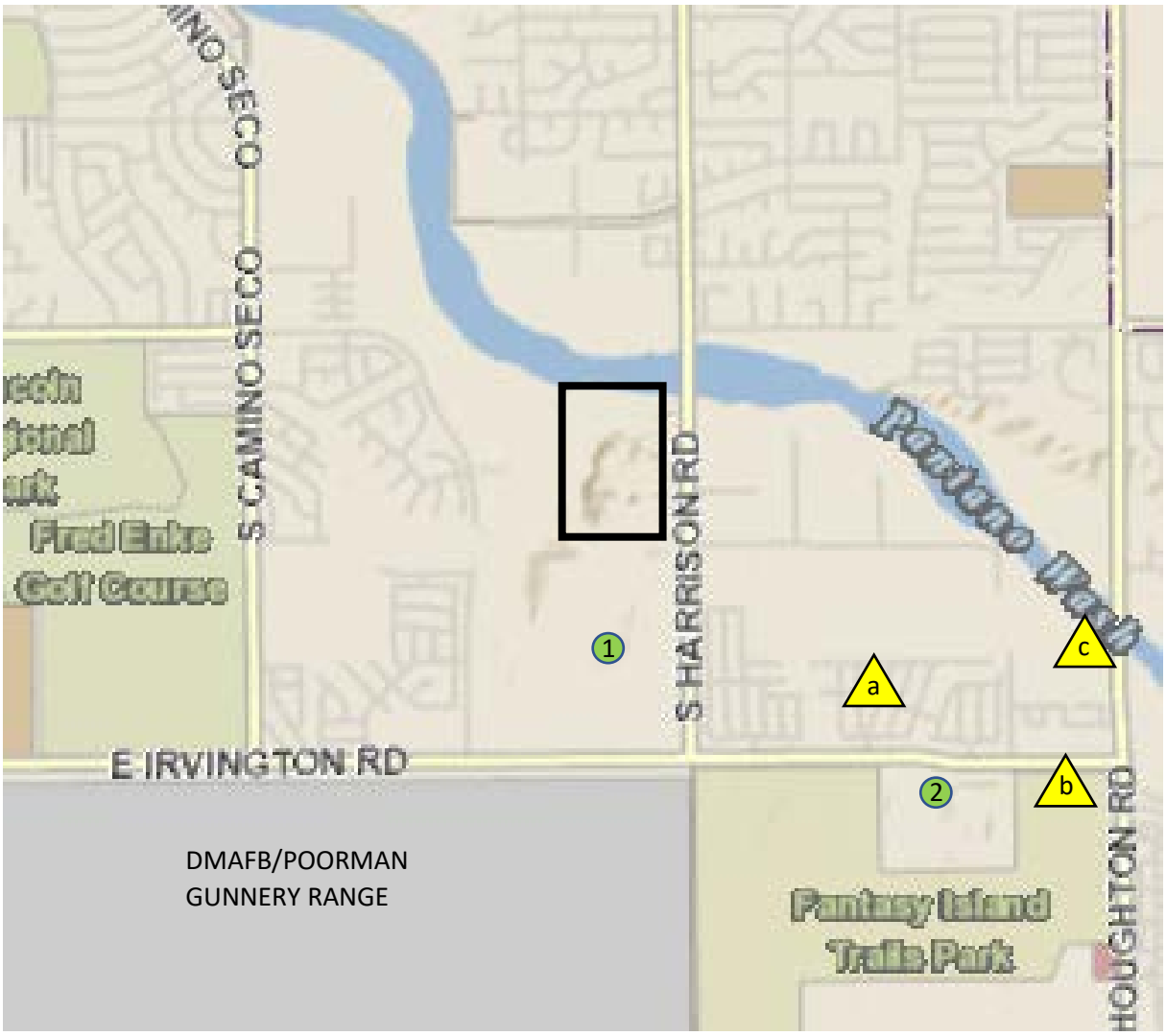
East-facing Oblique Aerial (2018 PAG)

The parcel to the south is the closed Harrison Road sanitary landfill. It does not contain any nearby structures. The State Trust Land to the west is currently undeveloped.

E. <u>Landfills and Hazardous Materials</u>

There are two landfills in close proximity to the subject property, both of which are closed sanitary landfills. They are shown on Exhibit 3 below.

EXHIBIT 3
LANDFILLS AND HAZARDOUS MATERIALS AZURITE/RCRA LOCATIONS



LEGEND

- Project Site
- (1) Harrison Rd Landfill, COT (Closed 1972-1996)
- (2) Irvington Landfill, COT (Closed 1978-1988)
- (a) Garigan Property 9880 E Milmar Rd Hazardous Waste (RCRA)
- (b) Talano Property 10251 E Irvington Rd Hazardous Waste (RCRA)
- (c) Pima County-Houghton Automotive Services, 4700 S Houghton Rd Hazardous Waste (RCRA)

F. Offsite Open Space and Recreation

Offsite recreation in the area of the subject property is mapped on Exhibit 4 below.

There is a network of bike routes in the area with connectivity to the popular Multi-use path that parallels the west side of Harrison Road directly adjacent the property frontage. The path is popular among riders that enjoy the Fantasy Island Trails Park just south of Irvington Road and is part of The Chuck Huckleberry Loop that connects to the Pantano River Park to the north of the Pantano Wash crossing at Harrison Road. The closed Harrison Road sanitary landfill is also now operated as a BMX bicycle racing track.

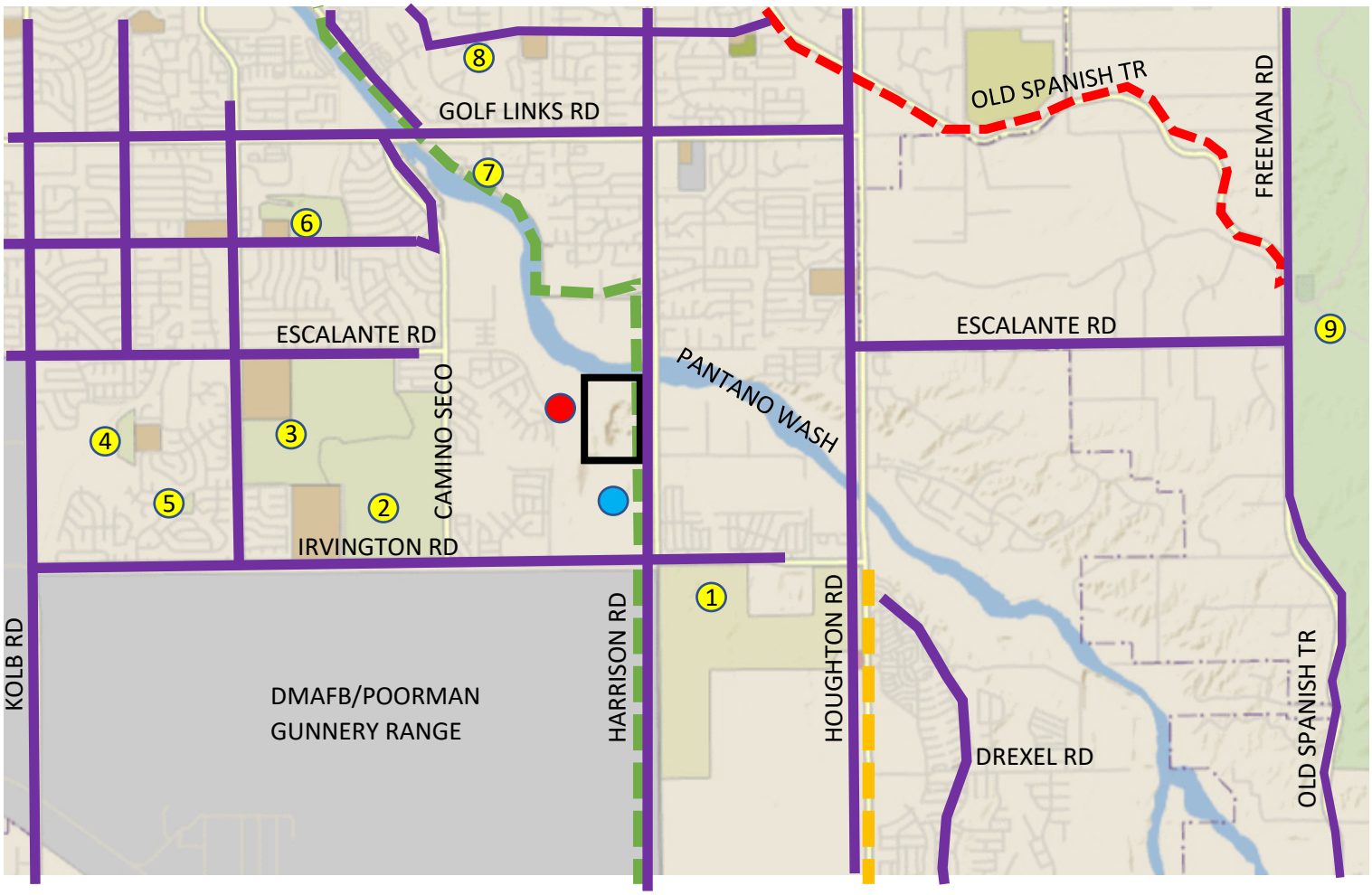
There are multiple parks in the greater vicinity, but none directly adjacent the property. Park locations area shown on Exhibit 4.

G. Public Educational, Community, Cultural Facilities

There are no schools or libraries directly adjacent to the project site. There is State Trust land abutting the site to the west and the closed landfill abutting the south property line is currently being used for BMX Bicycle Racing. Exhibits 4 and 5 are maps of schools, parks, recreation facilities, libraries and public land in the area.

The project site is within the Tucson Unified School District. Due to the industrial nature of the interim use, the project will present no immediate impact to attendance of schools, recreational or cultural facilities.

EXHIBIT 4
PUBLIC LAND, PARKS AND OTHER RECREATIONAL FACILITIES



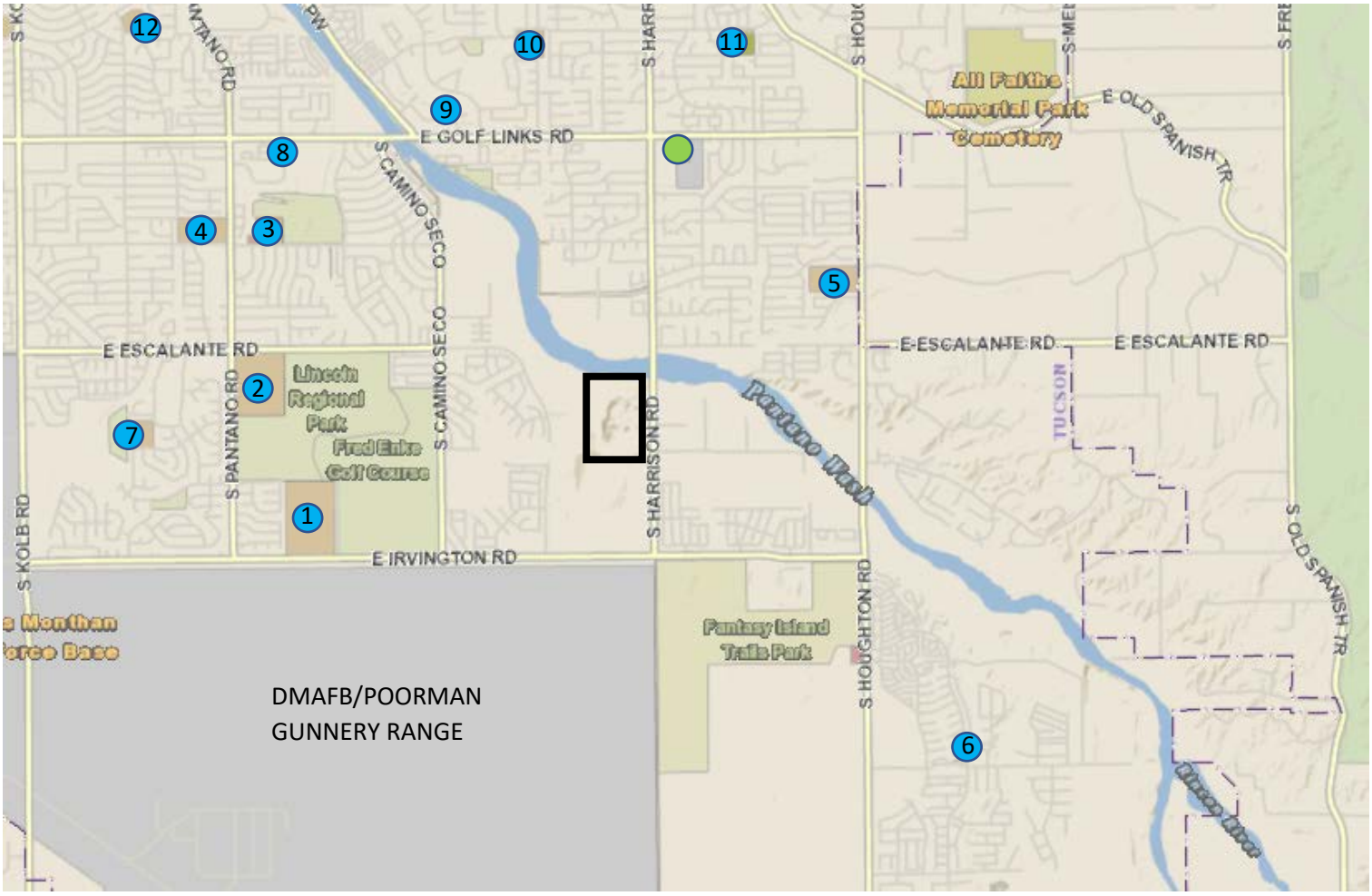
LEGEND

0 0.5 1 mile

N

- Project Site
- (1) Fantasy Island Trails Park
- (2) Fred Enke Golf Course
- (3) Lincoln Regional Park
- (4) Groves Park
- (5) Groves II Park
- (6) Chuck Ford Lakeside Park
- (7) Michael Perry Park
- (8) Rolling Hills Park
- (9) Saguaro National Park Rincon Mtns
- Vacant State Trust Land
- BMX Bicycle Track/Closed Landfill
- Pantano River Park/Harrison Rd Greenway
- Houghton Rd Greenway
- Trail-Old Spanish Trail (Ped., Bike, Horse)
- Bike Routes

EXHIBIT 5
SCHOOLS AND LIBRARY LOCATIONS



LEGEND

0 0.5 1 mile

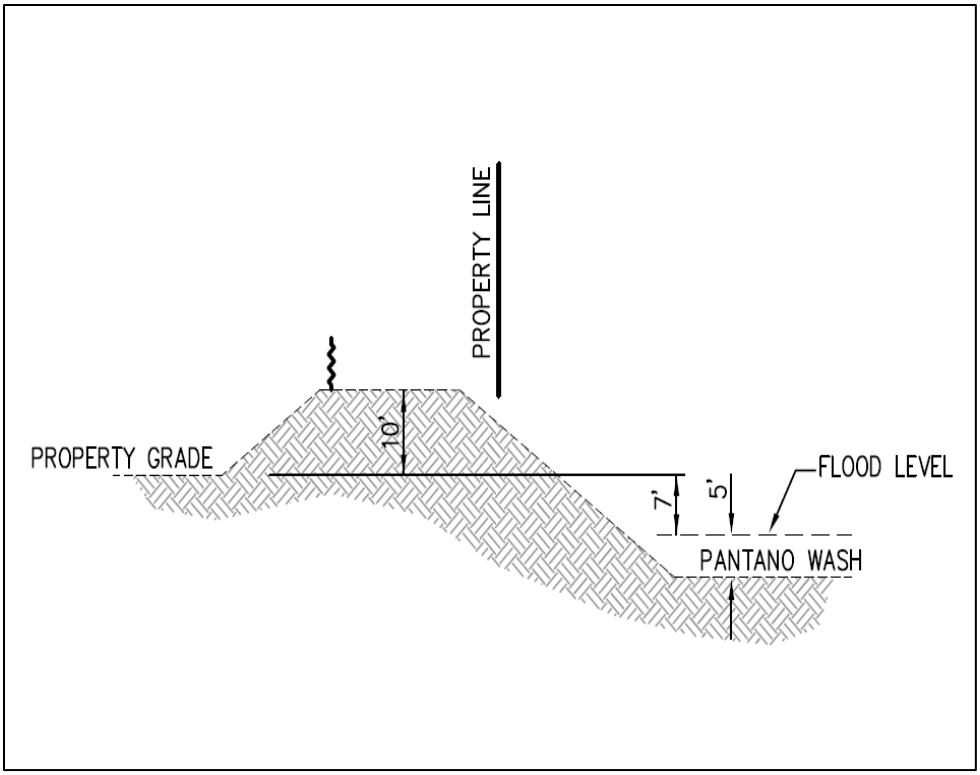
N

- Project Site
- 1 Pima Community College East Campus
- 2 Eastside Middle School & Santa Rita High School
- 3 Ford Elementary School
- 4 Carson Middle School
- 5 Secrist Middle School
- 6 Civano Community School
- 7 Lyons Elementary School
- 8 La Paloma Academy-Lakeside Campus
- 9 PPEP TEC Victor Soltero Learning Center
- 10 Marshal Elementary School
- 11 Dunham Elementary School
- 12 Dietz K-8 School
- Miller-Golf Links Library

H. Drainage

The property is located directly adjacent the Pantano Wash, a regional watercourse. Although the current FEMA Zone AE mapping of the 100-year floodplain in the Pantano Wash, shown below, appears to cross the northern property line along its entire length, a simple comparison of the flood elevations to the topography demonstrates the flood limits are actually contained in the wash and do not impact the property. The 100-year flood elevation of 2723, for example, near the middle of the property is approximately 7-feet below the property grade and 17-feet below the top of the embankment as shown on the cross section below.

FEMA FIRM Panel 04019C2320L (Eff. June 16, 2011)



Cross section of northern embankment near Pantano Wash

Erosion hazard setbacks associated with the Pantano Wash are 350-feet per Section 26-7.1 of the City of Tucson Code.

The property drainage onsite is contained within the open sand and gravel pit and existing perimeter embankments.

I. Overlays and Major Streets and Routes

The subject property is within the Davis-Monthan Air Force Base Vicinity but outside the Approach-Departure Corridors and Noise Control Districts.

Harrison Road is shown as a 120-foot Arterial Street on the City of Tucson's map of Major Streets and Routes.

J. Existing Structures, Roads and Development

At the time the sand and gravel operations were being conducted, multiple small buildings and trailers were present on the site. All have since been removed or have burned down. The only remnants of the buildings are concrete slabs. There are no developed roadways or other development on the site.

There is an existing groundwater well and some overhead utilities lines on the site that are summarized in Section 3.K of this PAD.

K. Sewer and Utilities, Easements

Public water and sewer, electric power and gas maps and associated easements are provided as Exhibits 6-10.

Electric Power:
Tucson Electric Power has overhead facilities in the area and provide service to the site currently as shown on the map. The large parcel has several blanket electric easements as well as a 16' electric easement as mapped on Exhibit 6.

Natural Gas:
Southwest Gas has a large diameter steel gas main on the east side of Harrison Road that changed from a 12" diameter to a 16" diameter main at the location indicated on Exhibit 7.

Sewer:
There is an existing 18-inch public sewer in Harrison Road as shown on Exhibit 8. Historically, the sewer facilities onsite were individual onsite disposal systems because public sewer lines in Harrison Road did not exist until 1981. Future sewer services will likely be required to connect to the 18-inch public sewer at a manhole location since Pima County Regional Wastewater standards preclude direct main connections to mains 15 inches or larger in diameter.

Water:
The Tucson Water map on Exhibit 9 shows a 12" water main in Harrison Road with an existing water service that was in-use by one of the buildings that previously existed onsite. The existing service will be adequate for connection of new domestic water for the site office. A backflow device will be required.

A fire hydrant exists in Harrison Road approximately near the mid-point of the property's frontage. There is another hydrant near the southeast corner of the site as well.

There is also an existing groundwater well onsite. The owner intends to use the well to supply water for dust control and soil compaction. Its location is roughly at the end of the overhead utility lines that dead-end in the northeast quadrant of the site.

Easements on the property are shown on Exhibit 10.

EXHIBIT 6
EXISTING UTILITIES-TUCSON ELECTIC POWER

APN 136-30-0020

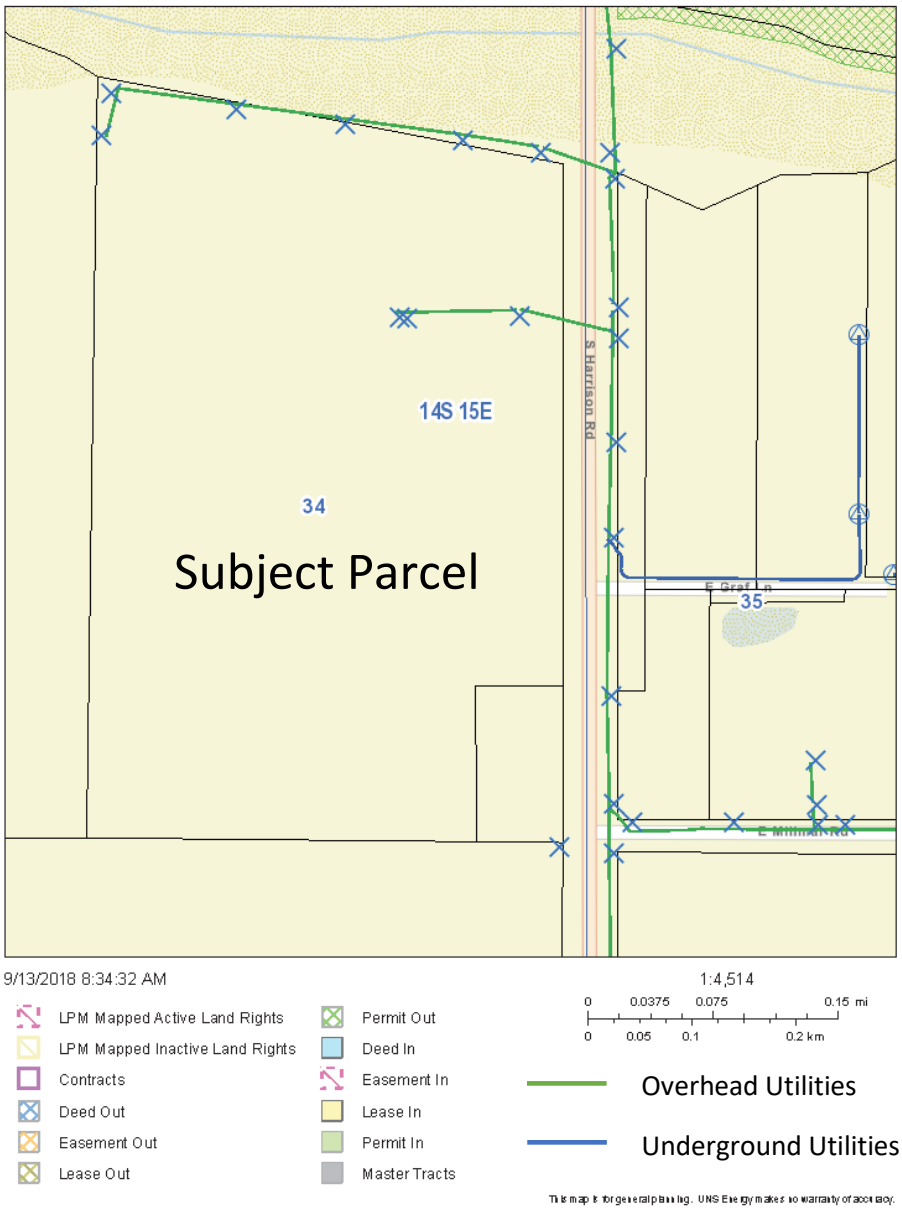


EXHIBIT 7
EXISTING UTILITIES-SOUTHWEST GAS

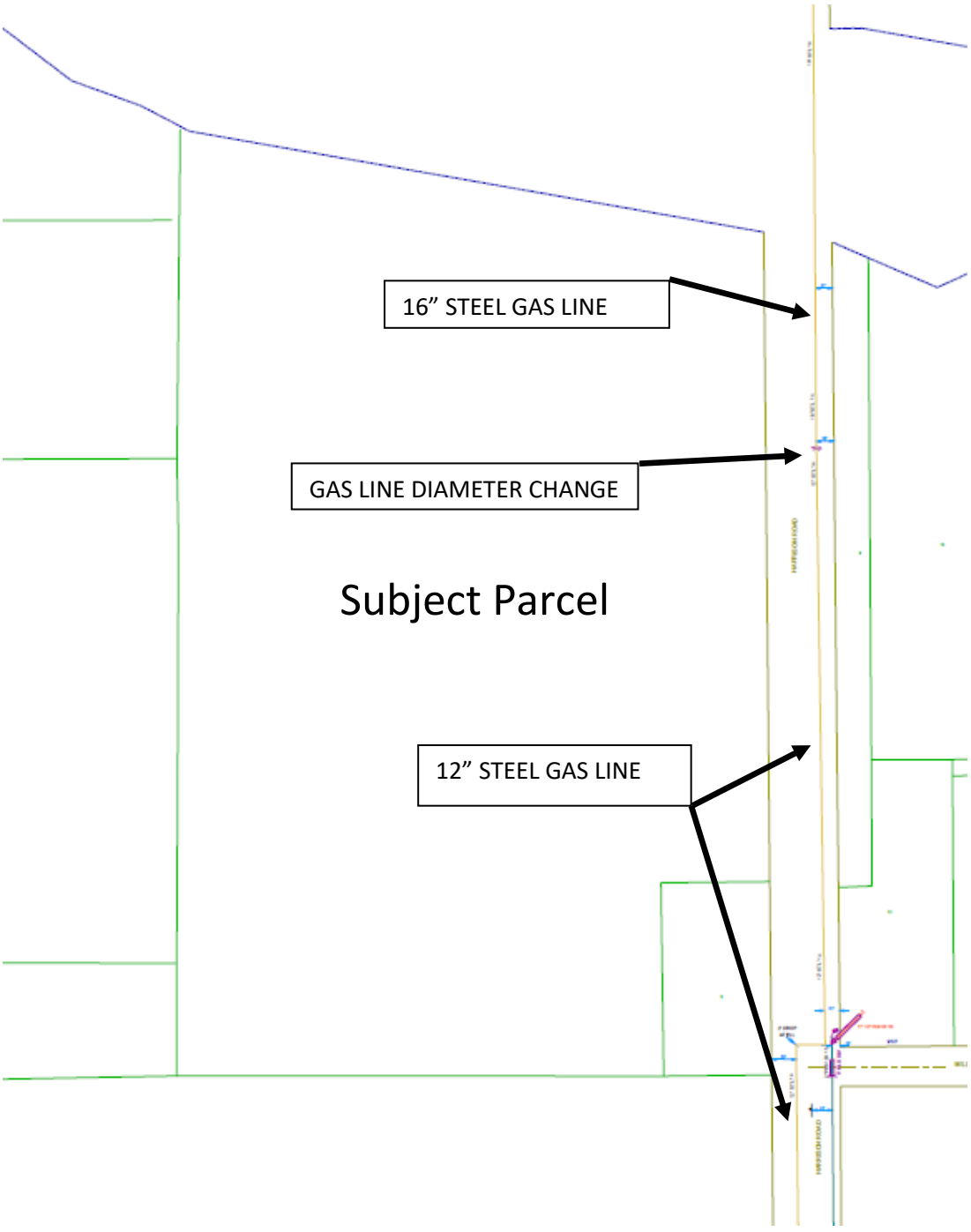


EXHIBIT 8
EXISTING UTILITIES-PUBLIC SEWER PCRWRD

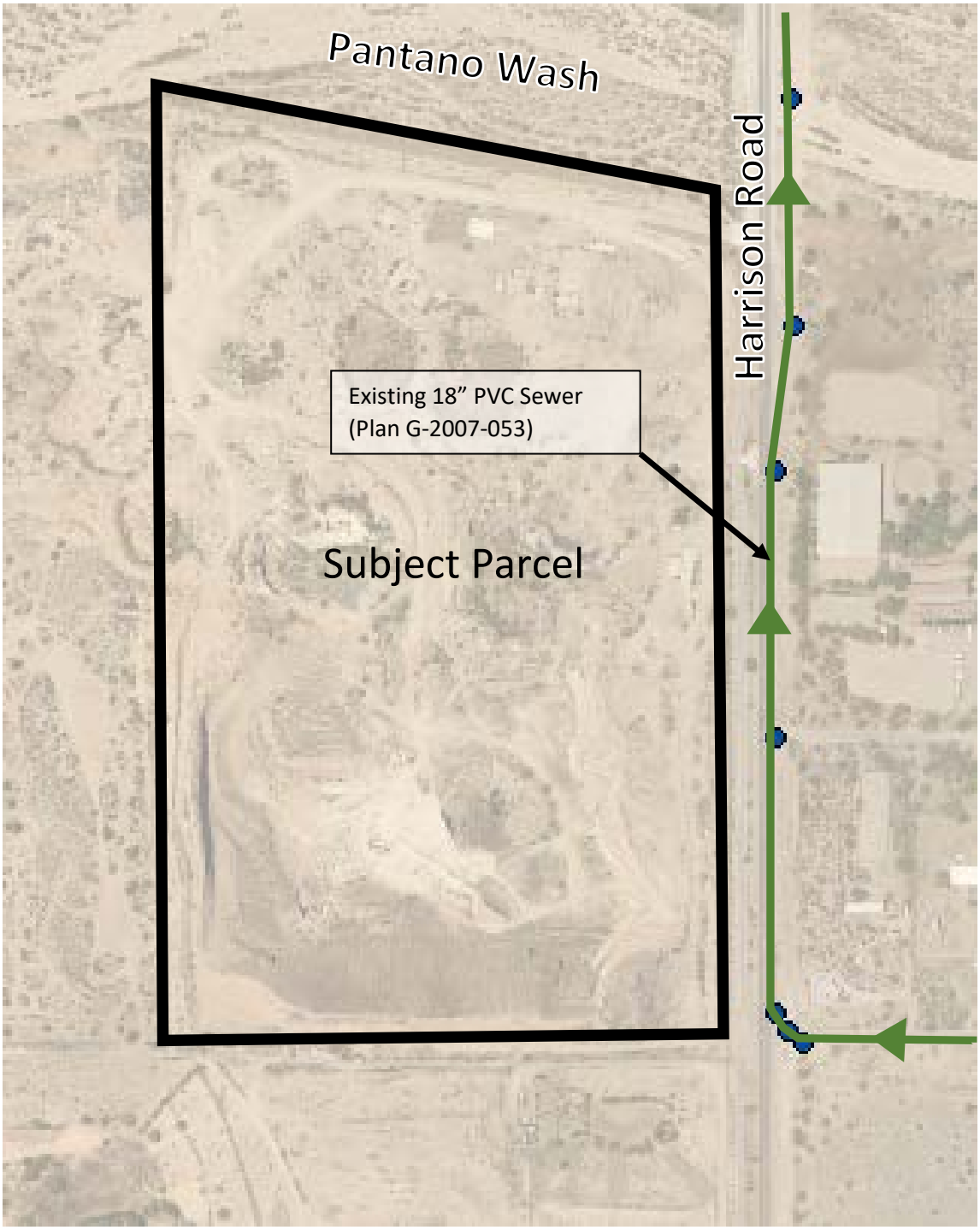


EXHIBIT 9
EXISTING UTILITIES-TUCSON WATER

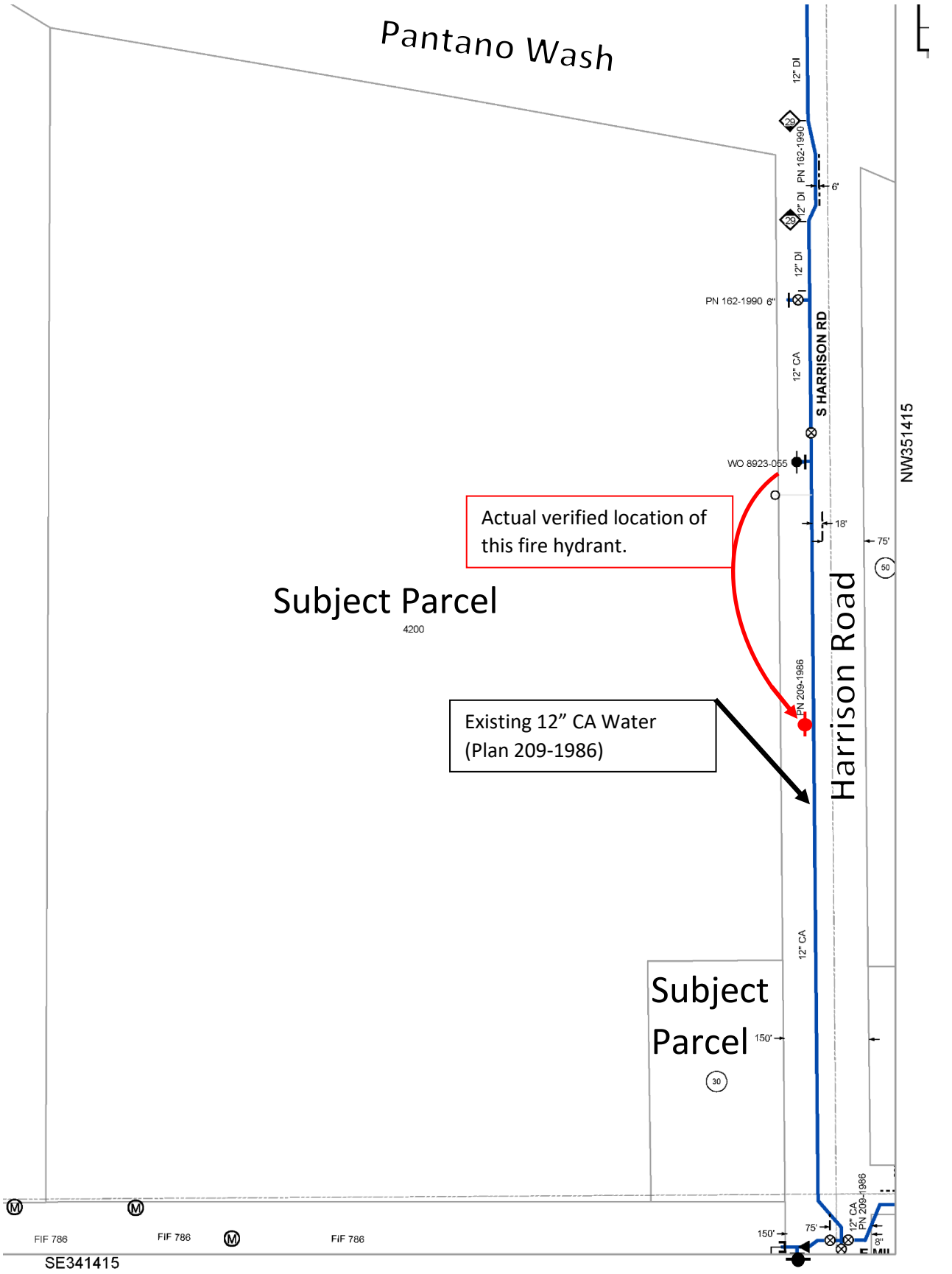
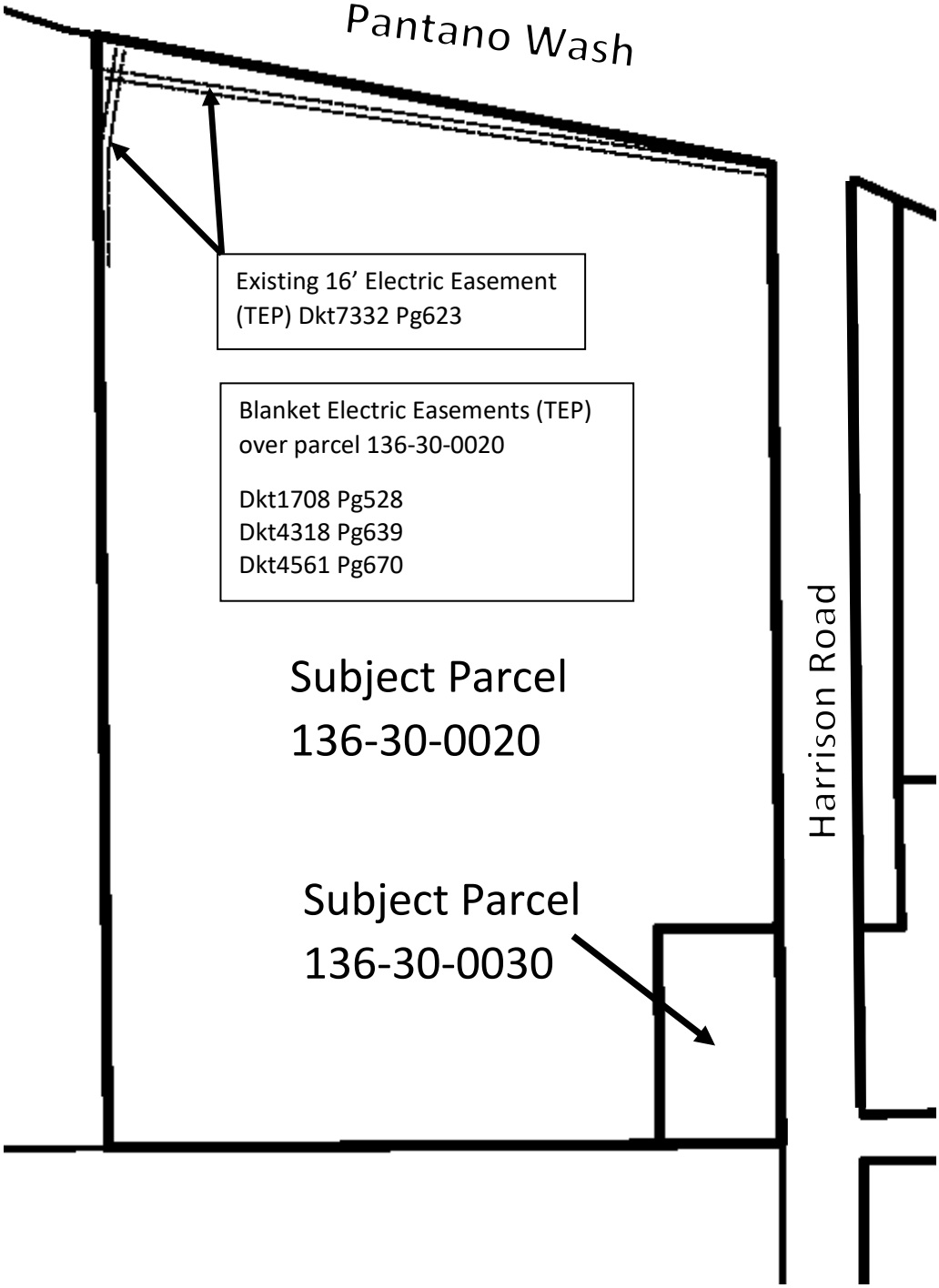


EXHIBIT 10
EXISTING EASEMENTS



L. Infrastructure and Public Services

The existing infrastructure in the area is typical of suburban/rural areas. Harrison Road is an asphalt-paved section with no curbs or sidewalk. It has 12-foot single northbound and southbound travel lanes with no median. The crossing at the Pantano Wash is concrete with widened shoulders.

The existing site entry is paved from the roadway to the entry gate, which is inset approximately 200 feet from the front property line. The paved width is approximately 27 feet.

The Harrison Road Multi-use path, which is part of the Harrison Road Greenway, and part of The Chuck Huckelberry Loop, is fully improved with asphalt paving and striping, and parallels the roadway on its west side. It connects to the Pantano River Park to the north and to the Fantasy Island Trails Park to the south.

Utility infrastructure for all utilities in the area is existing as discussed in the Section 3.K of this PAD.

Public services are available in the area with police, fire, and solid waste services provided by the City of Tucson with the nearest police and fire stations at the Tucson Police Rincon Substation at Golf Links Road and Harrison Road and the Tucson Fire Department Station 17 on Houghton Road south of Irvington Road.

M. Hydrology and Water Resources

No groundwater was observed by Terracon during their site investigation summarized in the Preliminary Geotechnical Engineering Report in Appendix B. The depth to groundwater and water elevation data available from the Arizona Department of Water Resources was summarized in their report for wells in the vicinity of the property in the table copied below.

Well Reg. I.D.	Depth to Groundwater (ft)	Water Elevation (ft MSL)	Date Last Checked	Comment
Local ID: D-14-15 35BCA	250.9	2484.1	January 2016	Approximately 1000-feet east of the site
Local ID: D-14-15 34DDD1	332.1	2487.9	January, 2019	Approximately 1/2-mile south of the site
Local ID: D-14-15 35BDB	240.8	2500.2	February, 2010	Approximately 1/3-mile south of the site

Based on the water elevation data, it should be expected that groundwater would be encountered at a depth of approximately 125-135 feet below the deepest part of the open pit.

N. Topography and Slopes

Topography in the existing sand and gravel pit reaches a depth of approximately 120 feet at its deepest point as shown in Exhibit 11. The topography shown was generated from the Pima Associations of Governments 2015 Digital Elevation Model and represents 2’ elevation contours.

Slopes onsite along the west and east are steeper than the recommended safe incline of 1.5:1 discussed in the Preliminary Geotechnical Engineering Report and will need to be graded for safety before landfill operations begin.

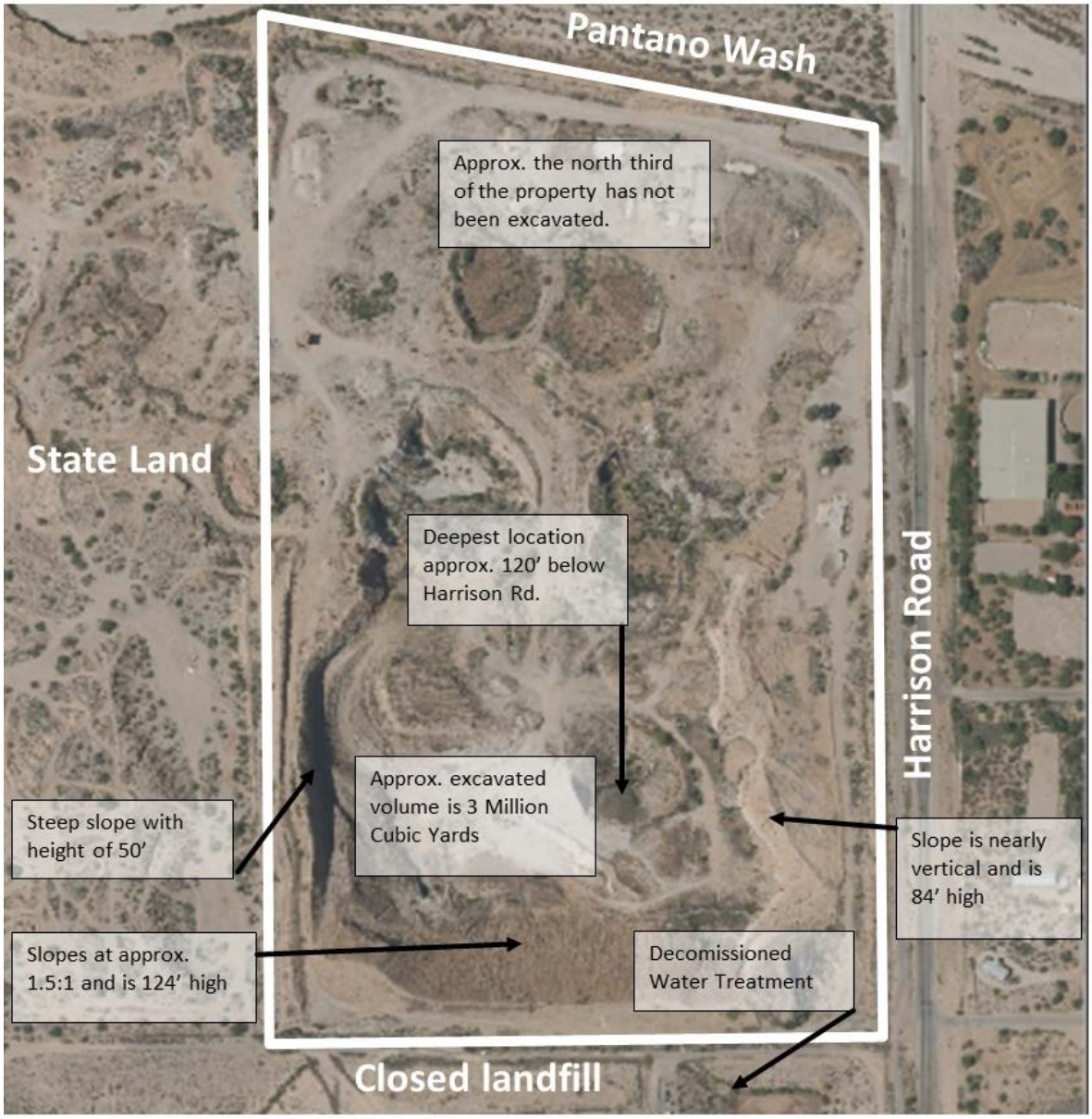


EXHIBIT 11
TOPOGRAPHY MAP

2’ Topography from PAG 2015 DEM

N

0 250’ 500’

O. Vegetation and Wildlife

Vegetation on the subject property is generally sparse with some areas with moderate to dense growth of weeds, shrubs and trees. It is not expected that any vegetation within the interior will be preserved due to the nature of the landfill activities. A native plant inventory and mitigation plan should be prepared.

Typical desert wildlife is expected to be present onsite but there are no Protected Riparian Areas present due to the lack of floodplain areas.

P. Geology and Soils

As summarized in Terracon's Preliminary Geotechnical Engineering Report, the geologic conditions mapped by the (Arizona) US Geological Survey at the location of the property include:

> **Qr**: Holocene river alluvium (Holcene), described as unconsolidated to weakly consolidated sand and gravel in river channels and sand, silt and clay on floodplains. Also included young terrace deposits fringing floodplains. (0-10 ka).
>
> **Q:** Quartenary surficial deposits, undivided (Quartenary), described as unconsolidated to strongly consolidated alluvial and eolian deposits. This unit includes: coarse, poorly sorted alluvial fan and terrace deposits on middle and upper piedmonts and along large drainages; sand, silt, and clay on alluvial plains and playas; and wind-blown sand deposits. (0-2 Ma)

Terracon explored the site soils; evaluating 26 locations. Their general summary of the soils type, starting at the top of the pit and extending to the bottom is summarized in the table below. More specific information is contained in the report in Appendix B.

Description	Approximate Depth to Bottom of Stratum from the Top of the Open Pit (feet)	Material Encountered	Relative Density
Stratum 1	54 to 70	Silty Clayey Sand, Silty Sand with variable amounts of gravel and cobbles/lenses of lean clays	Medium Dense
Stratum 2	100 to 110	Silty Clayey Sand with variable amounts of gravel and cobbles	Dense to Very Dense
Stratum 3	120 to 130	Poorly Graded Sand and Well Graded Sand with Gravel and variable amounts of silt	Medium Dense to Dense

The stability of slopes was a key component of Terracon's soils evaluation. Slope failure models were analyzed, as discussed in the report, and a recommendation was made to

address existing steep cuts by cutting-back or otherwise modifying the slopes to have a maximum incline of 1.5H:1V to ensure safety of workers and the public.

Q. <u>Viewsheds and Visual Analysis</u>

Views of the site from Harrison Road from the east, the Pantano Wash from the north and approximately two-thirds of the State land from the west are currently well screened by substantial earth berms. The land to the south is more elevated, since it is the closed landfill, and has open views of the property. The use of that property is currently a BMX bicycle racing track, a commercial recreation use.

From certain elevated vantage points onsite, the Catalina Mountains are prominently visible to the north. To the east, the view of the Rincon Mountains is less prominent with certain buildings and facilities of Raven Ranch visible across Harrison Road. To the south, the elevated terraces of the closed landfill are highly visible. To the east, much of the view is screened by high earth berms. The berms on the northern third of the western boundary have not been built high enough to block the view from certain vantage points onsite, providing a view of the State Land, which has been disturbed by a history of earth moving activities and contains excavations, earth piles and mounds.

Photos follow that show the views of the site from Harrison Road and views from within the property. The photos were taken September 12, 2018.

Photo 1: View of the southern third of the property from across Harrison Road south of Millmar Road. Looking northwest.

Photo 2: Existing entrance at southeast corner of property. Not viable for public entry.

Photo 3: View of the middle third of the property from across Harrison Road. Looking northwest.

Photo 4: View of the northern third of the property from across Harrison Road. Looking northwest.

Photo 5: Existing Harrison Rd entrance to be improved and used by the public.

Photo 6: View of the existing site entrance near the northeast corner of the property from Harrison Road. Looking southwest.

Photo 7: View from the existing site entrance near the northeast corner of the property to the Harrison Road Multi-Use Trail. Looking south.

Photo 8: View from the top of the earth berm at the northeast corner. Looking west. The Pantano Wash is downslope on the right.

Photo 9: View from within the property (north part). Looking northwest. Pantano Wash on opposite side of berm.

Photo 10: View from within the property (north part). Looking northeast. Pantano Wash on opposite side of berm. Existing entrance gate on right. Rincon Mountains in background. Harrison Road not visible.

Photo 11: View from within the property (north part). Looking east. Rincon Mountains and Raven Ranch in background. Harrison Road not visible.

Photo 12: View from within the property (north part). Looking east-southeast. Rincon Mountains and Raven Ranch in background. Harrison Road not visible.

Photo 13: View from within the property (north part). Looking east at sand and gravel pit. Closed landfill in far background.

Photo 14: View from within the property (west part). Looking northeast across pit. Catalina Mountains in background to the left. Rincon Mountains in background to the right.

Photo 15: View from within the property (west part). Looking east across pit. Rincon Mountains in background. Harrison Road and Raven Ranch not visible.

Photo 16: View from within the property (west part). Looking east-southeast across pit. Rincon Mountains in background to the left. Mobile home residence at 9527 E Millmar Rd is visible in background.

Photo 17: View from within the property (west part). Looking south. Closed landfill in far background with earth berm along west side of property visible to the right.

Photo 18: View from within the property (west part). Looking west-northwest.

Photo 19: View from within the property (south part). Looking southeast. Rincon Mountains in background. Closed landfill terraces to the right.

Photo 20: View from within the property (south part). Looking south and southern fence line and closed landfill.

Photo 21: View from within the property (south part). Looking west-southwest toward southwest property corner. Closed landfill to the left. State Land on opposite side of berm to the right.

Photo 22: View from southwest property corner, west of the earth berm. Looking west toward earth piles on State Land.

Photo 23: View from southwest property corner, west of the earth berm. Looking northwest toward earth piles on State Land.

Photo 24: View from southwest property corner. Looking north. Earth berm to the right. Catalina Mountains in the background.

R. **<u>Paleontological and Cultural Resources</u>**

A request was made to the Arizona State Museum to provide a summary of past archaeological surveys. The summary returned indicated that 32 past surveys had been conducted within a 1-mile radius of the property between 1978 and 2014, however none were conducted on the property itself. Because the site has already been excavated to the extent that it has, and further activities are expected only to fill the site, no additional investigations are expected to be conducted. The ASM letter is included in Appendix C.

APPENDIX A
TRAFFIC ENGINEERING & IMPACT ANALYSIS
(BY MATHIEU ENGINEERING CORP.)

Dynamic Civil Designs LLC

HARRISON ROAD INERT MATERIALS LANDFILL – PAD – TRAFFIC SECTION

Traffic in and out of the landfill facility is expected to be similar to former uses on the property. The AM and PM peak hour trips are expected to be 6 and 7, respectively. The site traffic generation is not expected to impact the Level of Service on Harrison Road. Refer to the Trip Generation Analysis by Mathieu Engineering Corp.

The scale house and office will be located on the site so that the inbound truck and vehicle stacking/queuing lane for the scale will be a minimum of 350 feet in length (the equivalent of six WB-50 trucks). This length will be sufficient to accommodate the peak queue entirely onsite and will prevent any traffic-blocking on Harrison Road or on the Harrison Road Paved Multi-Use Path. The outbound truck and vehicle stacking/queuing lane will also be a minimum of 350 feet in length. The stacking/queuing lanes will be delineated with barricades or other movable barriers, so the provision of additional space will be possible if the traffic entering the facility exceeds the estimated volume.

Where the proposed active site entrances cross the Harrison Road Paved Multi-Use Path, the developer shall place 12" x 12" R1-1 "STOP" signs with WS6 Stop Lines (6" wide white lines) on the path on both sides of the crossing to warn bicyclists of crossing traffic. The crossing shall be marked with 4" white diagonal striping across the entrance paving to delineate the path's crossing and draw the attention of crossing drivers.

A Traffic Study(s) will be required to analyze the impacts of future development on the site at the time development is proposed.

EXPECTED TRIPS

Based on information provided by the developer, the proposed Harrison Road Inert Materials Landfill PAD is expected to generate 30 trips per day, in and out of the landfill.

The Institute of Transportation Engineers does not have a Landfill Land Use. After research, it was determined that the closest land use fit to a landfill would be a warehouse use, in particular a 20,000 SF warehouse. At full build-out the proposed Harrison Road Inert Materials Landfill PAD is expected to generate 71 daily trips, 6 AM Peak Hour Trips, and 7 Peak Hour Trips.

TABLE 1
HARRISON ROAD INERT MATERIALS LANDFILL - SITE TRAFFIC GENERATION

LAND USE	ITE CODE	S.F.	NUMBER OF VEHICLE TRIPS						
			AM PEAK HOUR			PM PEAK HOUR			DAILY
			IN	OUT	TOTAL	IN	OUT	TOTAL	(TWO-WAY)
Warehousing/Landfill	150	20,000	5	1	6	2	5	7	71
TOTAL TRIPS		20,000	5	1	6	2	5	7	71

ROADWAY SEGMENTS

Harrison Road

Harrison Road is a two-lane north-south arterial roadway with a 120-foot right-of-way in the vicinity of the proposed landfill. The posted speed limit is 40 MPH. From the PAG Web Site, Harrison Road has a 2018 average daily traffic (ADT) of 10,333 vehicles a day at the Pantano Wash. Harrison Road also has the Harrison Road Paved Multi-Use Path located along the west right-of way.

From the *Florida DOT Quality/Level of Service (LOS) Handbook Tables for a Class I Roadway*, Harrison Road would have a LOS of B or better. The proposed Harrison Road Inert Materials Landfill PAD is not expected to degrade the LOS of Harrison Road beyond the current LOS of B.

AUXILIARY LANES

Harrison Road

Based on a review by City of Tucson staff a NB left-turn lane on Harrison Road is NOT needed at the entrance into the Harrison Road Inert Materials Landfill.

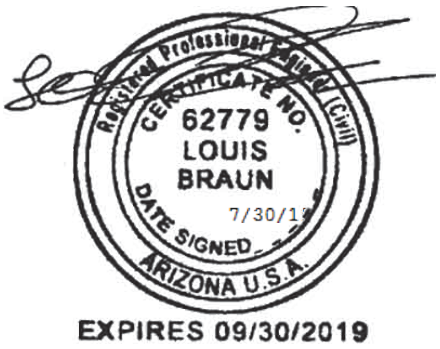
APPENDIX B
PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
(BY TERRACON)

Dynamic Civil Designs LLC

Preliminary Geotechnical Engineering Report

Planned Mine Reclamation Harrison Road Inert Materials Landfill
Northwest Corner of Millmar Road and Harrison Road
Tucson, Arizona

July 30, 2019
Terracon Project No. 63195039



EXPIRES 09/30/2019

Prepared for:
Harvey Trucking
Tucson, Arizona

Prepared by:
Terracon Consultants, Inc.
Tucson, Arizona

July 30, 2019

Harvey Trucking
5348 North Highway Drive
Tucson, AZ 85705

Attn: Mr. Larry Harvey
P: (520) 888.6255
E: tucsondirtguy@aol.com

Re: Preliminary Geotechnical Engineering Report
Planned Mine Reclamation Harrison Road Inert Materials Landfill
NWC of Millmar Road and Harrison Road
Tucson, Arizona
Terracon Project No. 63195039

Dear Mr. Harvey:

Terracon Consultants, Inc. (Terracon) has performed geotechnical engineering services for the proposed Mine Reclamation – Harrison Road Inert Materials Landfill project located at the northwest corner of Millmar Road and Harrison Road in Tucson, Arizona. These services were performed in general accordance with our Proposal Number P63195039, Revision no. 1, dated April 26, 2019. This preliminary geotechnical engineering report presents the results of the limited subsurface exploration and provides preliminary geotechnical engineering recommendations concerning earthwork for the proposed reclamation of the site.

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

Sincerely,
Terracon Consultants, Inc.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
62779
LOUIS
BRAUN
DATE SIGNED 7/30/19
ARIZONA U.S.A.
EXPIRES 09/30/2019

Louis D. Braun, P.E.
Project Engineer

Donald R. Clark, P.E.
Sr. Consultant/Sr. Principal

Ramon Padilla, P.E.
Geotechnical Services Manager

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NWC OF MILLMAR ROAD AND HARRISON ROAD
TUCSON, ARIZONA

Terracon Project No. 63195039
July 30, 2019

1.0 INTRODUCTION

This report presents the results of our preliminary geotechnical engineering services performed for the Planned Mine Reclamation – Harrison Road Inert Materials Landfill project located at the northwest corner of Millmar Road and Harrison Road in Tucson, Arizona.

The primary goals of the planned reclamation project include:

- Using the site as a landfill for the disposal of inert materials;
- Backfilling the site to the approximate grades surrounding the project area; and,
- To potentially develop the site in the future with commercial and/or industrial developments.

The purpose of the geotechnical engineering services provided by Terracon is to provide information and preliminary geotechnical engineering recommendations relative to the planned mine reclamation of the site including:

- An evaluation of existing geologic, subsurface and groundwater conditions at the site;
- An engineering evaluation of existing site and slope conditions;
- Recommendations for preparation of the site and existing slopes prior to and during reclamation;
- Recommendations for acceptable materials for use as landfill on the project;
- Recommendations for earthwork operations and land filling operations on the site; and,
- Other geotechnical engineering recommendations that should be considered in the reclamation of planning for future development of the site.

The scope of our engineering services completed thus far on the project have included:

- Review of pertinent data concerning the past mining operations conducted at the site;
- Review of readily available public domain geological and groundwater data concerning the site;

- Review of the available preliminary and/or conceptual information related to the proposed landfilling and future site development plans for the project;
- Conducting on-site engineering observations and field reconnaissance to determine existing site, subsurface and groundwater conditions;
- Sampling and on-site field testing of on-site soils from selected areas;
- Laboratory testing of samples obtained from the site to determine engineering properties of on-site soils;
- Engineering analyses of existing conditions including preliminary stability evaluations of existing slopes;
- Engineering analyses of proposed slope configurations for site preparation prior to reclamation;
- Engineering evaluation of proposed landfill materials;
- Development of recommendations for earthwork operations and land filling operations on the site; and,
- Preparation of this preliminary geotechnical engineering report.

Maps showing the site and on-site test locations are shown in the Site Location and Exploration Plan designated as Exhibits 1 and 2, respectively. Photographs of selected site conditions observed during the engineering reconnaissance of the site are included on Exhibits A-1 and A-2 in Appendix A. The results of the laboratory testing performed on soil samples obtained from the site during the engineering field reconnaissance are included on Exhibits B-1 through B-9 in Appendix B. Results of our slope stability evaluations of existing and proposed conditions are included on Exhibits C-1 through C-18 in Appendix C.

2.0 PROJECT INFORMATION

2.1 Site Description

ITEM	DESCRIPTION
Location	The project is located at the NWC of Millmar Road Harrison Road in Tucson, Arizona. We understand the site is approximately 55.8 acres and is designated as Pima County Assessor Parcel Nos. 136-30-0020 and 136-30-0030. Approximate GPS Coordinates: Latitude: 32.17205, Longitude:-110.79214.
Existing Conditions	The project site is currently an abandoned mine property that was mined as an open pit excavation. The majority of the previous mining activity took place on the southern two thirds of the site. Excavation depths on the site (with respect to Harrison Road) range from approximately 20 to 130 feet, with the greatest depths generally located on the southern portion of the site. The northern portion of the site which is generally at the natural grade of the surrounding area, includes remnants of previous developments including concrete slabs.

ITEM	DESCRIPTION
Current Ground Cover	The site appears to consist of primarily graded or excavated areas. Vegetation across the site is generally sparse, but some areas of the site have a moderate to dense growth of weeds, shrubs and trees. Existing slabs and various dumping of inert materials and soils are scattered throughout the site.
Existing Topography	From the topographic information provided to us by Dynamic Civil Designs and review of available PimaMaps, the lowest elevation on the site appears to be approximately 2,608 feet above mean sea level (amsl). The top of the slope along the eastern boundary along Harrison Road is at an approximate elevation of roughly 2,734 feet amsl. The elevations along the southern and western boundaries of the site are approximately 2,750 and 2,752 feet amsl, respectively.

2.2 Project Description

We understand the site was previously an open pit mine designated as the B&R Material mine site, and approximately 3 million cubic yards of materials were excavated and removed from the site. As previously mentioned, the excavation depths (with respect to Harrison Road) range from approximately 20 to 130 feet, with the greatest depths generally on the southern portion of the site. Based on the previous mine excavation activities at the site, the existing topography at the site includes significant height (of roughly 50 to 120 feet tall) slopes generally along the western, southern and eastern site perimeter with slope inclinations ranging from near vertical to approximately 1.5H:1V (horizontal: vertical).

We understand the site was purchased by Harvey Trucking, and based on information provided to us by James McMurtrie from Dynamic Civil Designs, LLC (DCD), we understand the goals for the project are to:

- Utilize the site as a landfill for the disposal of inert materials;
- Backfill the site to the approximate grades surrounding the project area; and,
- To potentially develop the site in the future with commercial and/or industrial developments.

The mine reclamation efforts are anticipated to include backfilling the site with inert materials (concrete debris, asphalt, soil, gravel, rock, etc.) under engineering observation and testing in order for these backfill materials to have adequate compaction and provide support for future development of the site. We understand the backfilling operations are anticipated to take approximately 7 to 10 years in order to completely fill the existing mine excavation. Once the existing mine excavation is backfilled with engineered (compacted) fill, we understand future development at the site may include commercial and/or industrial developments.

We understand the process to re-zone the site for future commercial/industrial use is currently underway. We have been provided by DCD an AutoCad file (*Zexist prelim*) with topographic lines provided by Pima County as well as a pdf for the City of Tucson named *Plan Amendment Proposal*

for Harrison Road Inert Material Landfill discussing existing site conditions and plans for development.

Based on discussions with Larry Harvey of Harvey Trucking (Harvey), we understand the proposed reclamation of the site will be divided into 3 main areas (i.e. Areas A, B and C). There are two planned sub areas in Area A. The following figure shows the approximate location of each of the planned reclamation areas, and the following paragraphs describe the proposed reclamation plans for each area.

Area A - This area is generally located along the northern roughly ¼ of the site. Except for Sub-Areas A1 and A2, most of Area A is currently at approximate planned finished grade. We understand Area A currently excludes any existing fill or landfill and is comprised of native ground and site soils. The area contains some remnants of previous developments at the ground surface which include old building slabs, debris, soil stockpiles and light vegetation. As currently planned, Area A will generally be used as staging area to place stockpiles of incoming or site generated materials during the planned landfill operations.

Area A1 is a subarea of Area A and consists of an existing evaporation pond previously used during the previous mining operations of the site. On-site engineering observations indicate the presence of fine-grained clay soils at the base of the pond areas, a result of previous aggregate washing and screening activities at the site. We understand the present plan is to utilize these clay soils as an economic resource, excavate these materials and export them off-site. As recommended in the following sections of this report, Area A1 will then be graded, benched and backfilled with engineered fill to the level of the surrounding grades of Area A.

Area A2 is a subarea of Area A, and the ground surface across this subarea is generally below the surrounding ground surface elevations. The current plan is to backfill Area A2 with engineered fill to the level of the surrounding grades of Area A.

At the completion of reclamation and placement of engineered fill, Area A is planned to be developed as prime real estate.

Area B – This area is generally located on the eastern and north-central portion of the site. Area B currently includes an existing landfill with unknown thicknesses and some stockpiled debris. The current plan for Area B is for the existing landfill materials and stockpiled debris to generally remain in place and to use this area, once reclaimed for some purpose other than future commercial and industrial building development. Some earthwork is anticipated across the existing ground surface and up to finished grades, but the existing landfill and debris are planned to remain underlying this area. Therefore, long-term ground settlements may be variable, and (at- and below-grade) structural elements (e.g., buildings, pavements, utilities, etc.) will be excluded from this area. At the completion of landfill operations, potential uses of Area B may include a gravel surfaced or graded parking lot (or other similar open space area), where the impact of ground surface settlements will not have a significant effect. Periodic maintenance to restore the development of uneven ground surface elevations from on-going settlement of this area should be anticipated with time.

Area C – This area is located on the southern roughly ¾ of the site, and generally consists of the majority of the excavated areas from the previous open pit mining operations conducted at the site. As previously mentioned, the excavated areas have depths below the adjacent street elevations ranging from approximately 20 to 120 feet. Existing ground surface elevations within Area C vary significantly, ranging from 2,752 feet amsl along the western boundary to 2,608 feet amsl at the lowest point within the existing pit.

Area C currently excludes any existing fill or landfill materials. However, on-site engineering observations and site reconnaissance indicate the presence of a large number of soil and debris stockpiles and variable amounts of vegetation. The northern portion of Area C includes previous concrete washout areas. A circular depressed area was present in the southern portion of Area C, and the bottom of this circular depressed area appears to be the lowest ground surface elevation across the site at an estimated 120 feet below the elevation of Harrison Road.

The previous mining operations have resulted in the presence of significant slope cuts along the entire perimeter of the site. The majority of these significant slope cuts are present within Area C. Current cut slope inclinations range from 1.5H:1V (horizontal to vertical) to near vertical at some locations within the project area. The western and eastern portions of Area C contain near vertical existing slopes/cuts with heights ranging from approximately 50 to 84 feet.

Current plans are to flatten (decrease) current existing near vertical slopes to create safe working conditions for the future reclamation efforts. Excavated materials will be used to backfill and level the lower portions of Area C prior to additional reclamation efforts. The currently planned mine reclamation earthwork operations of this area will include staging the backfilling operations of the site by alternating backfilling operations between the east and west halves of the site until reaching finished grade. These staging operations in planned mine restoration backfill areas are planned to include the placement of engineered fill in one area until reaching an elevation difference between adjacent staged backfill areas of no greater than 20 feet, and then moving the backfill operations to an adjacent area and match ground surface elevations between the two staged areas. Staged areas not being backfilled with engineered fill are planned to be used for placement of stockpiles of

inert materials for processing and subsequent placement as engineered fill. Once the mine reclamation and engineered fill placement is completed in Area C, we understand future development plans may include commercial and/or industrial developments and/or parking/storage lot development.

3.0 SUBSURFACE CONDITIONS

3.1 Site Geology

The project area is located in the Basin and Range physiographic province ([1]Cooley, 1967) of the North American Cordillera ([2]Stern, et al, 1979) of the southwestern United States. The southern portion of the Basin and Range province is situated along the southwestern flank of the Colorado Plateau and is bounded by the Sierra Nevada Mountains to the west. Formed during middle and late Tertiary time (100 to 15 m.y. ago), the Basin and Range province is dominated by fault-controlled topography. The topography consists of mountain ranges and relatively flat alluviated valleys. These mountain ranges and valleys have evolved from generally complex movements and associated erosional and depositional processes.

Typically, the ranges in this area are of small areal extent but protrude significantly above adjacent wide alluviated plains and valleys. The basin rims are formed by the mountain ranges which consist of sedimentary, igneous and metamorphic materials which have been subjected to recurrent faulting and tilting, and in some places volcanic and intrusive events. As a result of erosion, the valleys have experienced partial infilling with sedimentary material which has been deposited as alluvial fans. Occasionally, the valleys may become interlocking as a result of coalescing alluvial fans which are referred to as bajadas.

Specific geologic conditions mapped by the (Arizona) U.S. Geological Survey at the location of the project include:

- **Qr: Holocene river alluvium (Holocene),** described as unconsolidated to weakly consolidated sand and gravel in river channels and sand, silt, and clay on floodplains. Also includes young terrace deposits fringing floodplains. (0-10 ka)

- **Q: Quaternary surficial deposits, undivided (Quaternary),** described as unconsolidated to strongly consolidated alluvial and eolian deposits. This unit includes: coarse, poorly sorted alluvial fan and terrace deposits on middle and upper piedmonts and along large drainages; sand, silt and clay on alluvial plains and playas; and wind-blown sand deposits. (0-2 Ma)

[1]Cooley, M.E., 1967, **Arizona Highway Geologic Map**, Arizona Geological Society.

[2]Stern, C.W., et al, 1979, **Geological Evolution of North America**, John Wiley & Sons, Santa Barbara, California.

3.2 Subsurface Soil Conditions

Terracon's scope work for the preparation of this report included engineering observations and site reconnaissance, performing dynamic cone penetrometer (DCP) testing on exposed subsurface soils, surface bulk soil sampling, and laboratory testing. Since the development plans for the project are at a preliminary planning stage, geotechnical exploration including geotechnical soil borings and test pits was not performed at the site.

During Terracon's engineering observations and site reconnaissance, exposed surface and near surface soils were evaluated at a total of 26 selected locations by performing DCP testing and obtaining bulk disturbed soil samples for further laboratory testing and evaluation. The approximate locations of the DCP and soil sampling are shown on the Exploration Plan, Exhibit 2. Based on our visual engineering observations, and the results of the field and laboratory testing, the subsurface conditions at the site starting at the top of the open pit and extending to the bottom can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum from the Top of the Open Pit (feet)	Material Encountered	Relative Density
Stratum 1	54 to 70	Silty Clayey Sand, Silty Sand with variable amounts of gravel and cobbles/lenses of lean clays	Medium Dense
Stratum 2	100 to 110	Silty Clayey Sand with variable amounts of gravel and cobbles	Dense to Very Dense
Stratum 3	120 to 130	Poorly Graded Sand and Well Graded Sand with Gravel and variable amounts of silt	Medium Dense to Dense

3.3 Dynamic Cone Penetrometer Results

A total of 26 dynamic cone penetrometer (DCP) tests were performed at the site. The DCP testing allows for the correlation of results to the conventional Standard Penetration Test (SPT), used to evaluate the resistance N-values of soils. The SPT correlations were used to characterize the relative density of granular soils and the consistency of fine-grained soils. The locations of the testing are included on the Exploration Plan, Exhibit 2. The results of these DCP testing and correlated penetration (N-value) results are outlined below:

Dynamic Cone Penetrometer Results			
Test No.	**Blow Count**	**Correlated N-Value**	**Comments/Location**
1	9/12"	2	East Evaporation Pond (Area A1)
2	6/12"	1	West Evaporation Pond (Area A1)

Dynamic Cone Penetrometer Results			
Test No.	**Blow Count**	**Correlated N-Value**	**Comments/Location**
3	17/6”	5	Slope Near Well (Area A2)
4	50/1½”	35+	Area to be Raised (Area A2)
5	48/6”	14	Top of East Slope
6	36/2”	30	Top of South Slope
7	50/4”	25	Top of West Slope
8	50/4½”	22	Top of Slope (Area C)
9	50/2”	35+	Along Slope Approximately -10 feet (Area C)
10	44/2”	35+	Along Slope Approximately -20 feet (Area C)
11	50/5”	19	Along Slope Approximately -30 feet (Area C)
12	42/2”	35	Along Slope Approximately -40 feet (Area C)
13	45/6”	13	Along Slope Approximately -50 feet (Area C)
14	48/2”	35+	Along Slope Approximately -60 feet (Area C)
15	50/2”	35+	Along Slope Approximately -65 feet (Area C)
16	50/4”	25	Next to Pond; possible fill (Area C)
17	36/2”	30	Other side of roadway (Area C)
18	42/3”	29	SE Corner at bottom of excavation (Area C)
19	32/3”	23	Near bottom of excavation (Area C)
20	50/5½”	17	SW Corner at bottom of excavation; ponding (Area C)
21	27/6”	8	Along western excavation approx. -80 (Area C)
22	50/4”	25	Along western excavation approx. -60 (Area C)
23	50/4”	25	Along western excavation approx. -55 (Area C)
24	50/1”	35+	Middle of excavation (Area C)
25	50/2”	35+	Middle of excavation (Area C)
26	41/12”	6	Near edge of fill embankment (Area B)

In addition to the correlation between the DCP and the Standard Penetration Testing, the data can be and was utilized for the evaluation of the approximate in-situ shear strength and other engineering properties of the on-site soils for use in our engineering analyses of existing conditions.

3.4 Laboratory Test Results

Laboratory tests were performed on selected soil samples and the test results are presented in Appendix B. The laboratory testing consisted of the following types of tests:

- Atterberg Limit Determinations, ASTM D4318
- Grain Size Distribution, ASTM D422 and ASTM C 136

- Direct Shear Test of Soils under Consolidated Drained Conditions, ASTM D3080

The following is a summary of laboratory test results obtained for the soils obtained from the site:

Laboratory Test	Summary of Test Results
Atterberg Limits	The Atterberg limits test results indicate the granular (sand) soils exhibit low to non-plastic characteristics. The Atterberg limits test results indicated the on-site clay exhibit low to high plasticity characteristics.
Grain Size/Gradation	The gradation test results of the granular (sand) soils indicate these soils contain percent fines (percent passing the sieve No. 200) ranging from approximately 4 to 38 percent, percent sand ranged from approximately 45 to 76 percent, and percent gravel ranged from about 0 to 35 percent. The gradation test results of the fine-grained (clay) soils indicate these soils contain percent fines (percent passing the sieve No. 200) ranging from approximately 75 to 99 percent, and percent sand ranged from approximately 1 to 25 percent.
Direct Shear	Two direct shear tests were performed on remolded samples obtained from on-site soils within the existing pit. The direct shear test results indicated internal friction angles at approximately 32 degrees and apparent cohesion values ranging from approximately 634 to 1,005 pounds per square foot (psf). Residual values of internal friction indicated by the direct shear test results ranged from approximately 33 to 34 degrees and cohesion values ranging from approximately 0 to 287 psf.

3.5 Groundwater Conditions

Groundwater was not observed within the existing excavations in the open pit at the time of our engineering site observations and reconnaissance. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

Based on information obtained from the Arizona Department of Water Resources – Groundwater Data website (https://gisweb2.azwater.gov/gwsi) the depth to groundwater in the vicinity of the project site is presented in the following table:

Well Reg. I.D.	Depth to Groundwater (ft)	Water Elevation (ft MSL)	Date Last Checked	Comment
Local ID: D-14-15 35BCA	250.9	2484.1	January 2016	Approximately 1000-feet east of the site
Local ID: D-14-15 34DDD1	332.1	2487.9	January, 2019	Approximately 1/2-mile south of the site
Local ID: D-14-15 35BDB	240.8	2500.2	February, 2010	Approximately 1/3-mile south of the site

Note: An existing wash is located adjacent to the northern portion of the site. We understand occasional seepage has been noted in on-site excavations and is apparently the result of periodic surface water flows in the wash.

3.6 Site Seismicity

The project site is located within the Basin and Range Province that extends from eastern California to central Utah, and from southern Idaho into the state of Sonora in Mexico (http://geomaps.wr.usgs.gov/). The region is characterized by north-south trending mountain ranges and down-dropped valleys as the result of tectonic extension that began in early Miocene time. Normal faults, typically inclined at an angle of about 60 degrees, mark the boundary of the horst and graben structural features.

A search of historical seismicity at the U.S. Geological Survey (USGS) National Earthquake Information Center (https://www.usgs.gov/natural-hazards/earthquake-hazards/connect) identified 83 earthquakes (Richter Magnitude (**M)** ≥ 2.5) within a radius of 200 km of the project site between 1977 and July 8, 2019. A smaller radius of 150 km identified 2 earthquakes during that same time period. The number of significant earthquakes (**M** ≥ 4.5) within a radius of 200 km between the years of 1961 to 2014 was 4.

A large number of Quaternary faults have been mapped by the USGS in southern California, southern Nevada, and Arizona. However, the closest mapped fault with activity in the past 15,000 years is more than 100 km from the site. Given the distance from the nearest mapped fault to the site, there is minimal risk of ground surface rupture due to faulting.

Probabilistic seismic hazard analyses by the Structural Engineers Association (SEC) result in a stiff soil peak ground acceleration (PGA) value of 0.111g for the Maximum Considered Earthquake (MCE). Ground motions from the MCE have a 2 percent probability of exceedance in 50 years, or a return period of 2,475 years. The PGA of 0.111g was used for purposes of seismic stability analyses of the existing and proposed embankment sections for the project.

The depth to groundwater is approximately 250 feet or greater below the ground surface. Therefore, earthquake-induced soil liquefaction affecting the site is unlikely.

4.0 GEOTECHNICAL ENGINEERING CONSIDERATIONS

Based on the engineering observations made during our site reconnaissance, the subsurface conditions that are evident at the site, the engineering properties of the on-site soils, and our understanding of the planned reclamation and future development of the site, we consider the following to be key geotechnical engineering considerations for the project:

- Treatment of existing slopes during preparation of the site prior to reclamation efforts;

- Treatment of existing fill materials in areas where future development will be planned;
- Preparation of the site where engineered fills will be placed and constructed;
- The use of proposed landfill materials and their placement; and,
- Implementation of recommendations for earthwork operations and land filling operations on the site.

Our engineering evaluation, and analyses for these key geotechnical engineering considerations are discussed in the following sections of this report.

4.1 Analyses of Existing and Proposed Slope Configurations

Key to the planned reclamation of the site will be the treatment of existing slopes within the mined areas of the site. Some existing slopes represent a potential safety issue for earthwork operations in their present condition and configuration. Additionally, the presence of over steepened slopes introduces a concern for differential movement where engineered fills will be constructed.

As part of our engineering analyses, we have evaluated the stability of the existing and proposed slopes along the eastern, southern and western slopes for reclamation and long-term landfill operation conditions. The slopes used for our analyses were considered as critical locations based on their existing configurations. For purposes of our stability evaluations, cross-sections of existing and proposed slopes were developed on the basis of measurements and engineering observations made at the site during our field reconnaissance, measurements and elevations obtained from Google Earth Pro, and the AutoCAD file provided by DCD. The adjacent figure shows the names and locations of the slope cross sections and configurations that were evaluated in our engineering analyses.

Geotechnical profiles for the stability analyses have been based upon the visual engineering observations performed during our field reconnaissance and results of field and laboratory test data. Since groundwater was not observed within the confines of the open pit

area, hydrostatic forces were not incorporated into the stability analyses for the existing or proposed slope configurations.

Strength parameters, used to model the subsurface stratigraphy for the stability analyses, were acquired through back calculation analyses of existing critical cut slopes, our experience with similar soils in the Tucson area, and the results of the field and laboratory testing. The Mohr-Coulomb strength parameters utilized for the stability analyses are summarized as follows:

Slope/W Designation	USCS Classification	Unit Weight (pcf)	Internal Angle of Friction (degrees)	Cohesion (psf)
SC-SM	Silty Clayey Sand (SC-SM)	110	32	1,100
SC-SM	Silty Clayey Sand (SC-SM)	120	36	1,100
SP	Poorly Graded Sands (SP)	125	34	0

4.1.1 Analytical Approach

Stability analyses for existing and proposed slopes were performed using the computer program Slope/W developed by Geo Slope. Slope/W utilizes algorithms for the Morgenstern-Price method of slices for postulated circular and irregular slip surfaces and for translation of active-passive block failure surfaces. Morgenstern-Price analyses were performed on each cross section. The Morgenstern-Price method uses force and moment equilibrium to determine a factor of safety against instability. These analyses are based on limit-equilibrium where the forces resisting failure are compared against the forces tending to cause failure. This ratio, termed the factor of safety (FS), is an indication of stability (or instability) of the postulated failure surface.

The stability of each cross section was analyzed for static and pseudo-static (seismic) conditions. The seismic analyses included a pseudo-static coefficient to represent potential horizontal earthquake loading on each slope. These stability evaluations involve a search routine to determine the lowest factor of safety on the critical failure surface for each model. The lowest factor of safety obtained from a search routine of potential failure surfaces within each cross section is considered as an indicator of the long-term safety of the slope against instability. Typically, a factor of safety of 1.50 under static conditions and 1.125 under seismic conditions can be considered acceptable where engineering properties of the existing soils within the slope are well known and the surrounding conditions of the slope are not critical. Due to the limited understanding of the engineering properties of the existing site soils, we recommend minimum factors of safety of 1.60 under static conditions and 1.25 under seismic conditions be considered for this project. Detailed results of the stability calculations for each cross section are shown On Exhibits B-1 through B-18 in Appendix B.

Each of the following slope stability cases were analyzed with their respective results shown in the “Summary of Stability Analyses” table.

- Case 1: Existing South Slope at 1.5H:1V (Horizontal:Vertical): Case 1 was studied to evaluate the approximate factor of safety of the existing southern slope at the slope inclination configuration of 1.5H:1V.
- Case 2: Existing East Slope with Variable Slopes ranging from 1H:2.5V in the upper portion of the slope to a vertical face on the lower portion of the slope: Case 2 was studied to evaluate the factor of safety of the existing eastern slope at an inclination configuration varying from 1H:2.5V to near vertical.
- Case 3: Proposed East Slope at 1H:1V: Case 3 evaluated the factor of safety of the eastern slope using a proposed slope inclination configuration of 1H:1V for reclamation/construction operations.
- Case 4: Proposed East Slope at 1.25H:1V: Based on the results of Case 3, Case 4 further evaluated the proposed eastern slope using an inclination configuration of 1.25H:1V.
- Case 5: Proposed East Slope at 1.5H:1V: Based on the results of Case 4, Case 5 further evaluated the proposed eastern slope using an inclination configuration of 1.5H:1V.
- Case 6: Existing West Slope comprised of Variable Slopes of 3H:1V to 1H:10V throughout the height of the slope: Case 6 evaluated the factor of safety of the existing western slope at inclination configurations varying from 3H:1V to 1H:10V.
- Case 7: Proposed West Slope at 1H:1V: Case 7 evaluated the factor of safety of the proposed western slope using an inclination configuration of 1H:1V for reclamation/construction operations.
- Case 8: Proposed West Slope at 1.25H:1V: Based on the results of Case 7, Case 8 further evaluated the proposed western slope using an inclination configuration of 1.25H:1V.
- Case 9: Proposed West Slope at 1.5H:1V: Based on the results of Case 8, Case 9 further evaluated the proposed western slope using an inclination configuration of 1.5H:1V.

4.1.2 Analyses of Slope Stability Results

Results of the stability analyses for each of the cases outlined above, and the corresponding minimum calculated factors of safety are summarized as follows:

Stability Case	Ground Motion Condition	Calculated Minimum Factor of Safety (FS)
Case 1: Existing South Slope – 1.5H:1V	Static	1.79
	Seismic	1.45
Case 2: Existing East Slope – 1H:2.5V to Vertical	Static	1.01
	Seismic	0.88

Stability Case	Ground Motion Condition	Calculated Minimum Factor of Safety (FS)
Case 3: Proposed East Slope – 1H:1V	Static	1.38
	Seismic	1.16
Case 4: Proposed East Slope – 1.25H:1V	Static	1.50
	Seismic	1.24
Case 5: Proposed East Slope – 1.5H:1V	Static	1.67
	Seismic	1.35
Case 6: Existing West Slope – 3H:1V to 1H:10V	Static	1.39
	Seismic	1.22
Case 7: Proposed West Slope – 1H:1V	Static	1.31
	Seismic	1.11
Case 8: Proposed West Slope – 1.25H:1V	Static	1.49
	Seismic	1.23
Case 9: Proposed West Slope – 1.5H:1V	Static	1.66
	Seismic	1.35

Results of the analyzes are based on dry conditions, and the presence of water in any slope would result in lower factors of safety against slope instability.

For Case 1, the analyses of the Existing South Slope at a slope inclination of 1.5H:1V indicated a factor of safety greater than 1.60, which suggests the existing slope can be considered stable under static conditions. The existing 1.5H:1V slope analyzed in a seismic condition resulted in a factor of safety greater than 1.25, which suggests that the existing slope can be considered stable and would likely not encounter significant permanent deformations in a seismic event. Given the location of the project and the low pseudo-static horizontal acceleration coefficient, deformations in a seismic event would likely be minimal.

In Case 2, the analyses of the Existing East Slope with a total height of 84 feet and variable slope inclinations ranging from 1H:2.5V in the upper portion of the slope to a vertical face in the lower portion of the slope indicated a static factor of safety of 1.01, and a seismic factor of safety of 0.88, which suggests the existing slope is not considered stable under static or seismic conditions. We recommend the existing east slope be sloped back as outlined within the planned slopes as discussed below.

For Cases 3 through 5, configurations of the Proposed East Slope were modeled with overall slope inclinations of 1H:1V, 1.25H:1V, and 1.5H:1V for a proposed slope height of 124 feet. The stability analyses for these cases indicated static factors of safety ranging from 1.38 to 1.67, and seismic factors of safety ranging from 1.16 to 1.35. Based on the results, only the 1.5H:1V slope configuration model indicated factors of safety greater than the minimum suggested requirements

of 1.60 and 1.25 for static and seismic conditions, respectively. These results indicate a 1.5H:1V excavation can be considered acceptable for construction of the Proposed East Slope.

For Case 6, the Existing West Slope was modeled with slope inclinations varying from 3H:1V to 1H:10V throughout a total height of 120 feet. The stability analyses for this case indicated a static factor of safety of 1.39 and a seismic factor of safety of 1.22, which suggests the existing slope may be stable under static and seismic conditions, although the conditions fell below the recommended minimum suggested requirement of 1.60 for static conditions. Based on these results, we recommend the existing west slope be sloped back as outlined within the planned slopes as discussed below.

For Cases 7 through 9, the Proposed West Slope was modeled with overall slope inclinations of 1H:1V, 1.25H:1V, and 1.5H:1V for a proposed slope height of 130 feet. The stability analyses for these cases indicated static factors of safety ranging from 1.31 to 1.66 and seismic factors of safety of ranging from 1.11 to 1.35. Based on the results, only the 1.5H:1V slope configuration model indicated factors of safety greater than the minimum suggested requirements of 1.60 and 1.25 for static and seismic conditions, respectively. These results indicate a 1.5H:1V excavation can be considered acceptable for construction of the Proposed West Slope.

4.1.3 Engineering Conclusions and Recommendations

The following are conclusions and recommendations that have been drawn from this study:

- The existing south slope is considered stable at the current 1.5H:1V configuration.
- The existing east and west slope should be excavated to a the proposed 1.5H:1V slope to create a stable condition for landfill operations.

4.2 Earthwork Recommendations

The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, and other geotechnical conditions exposed during the construction of the project.

4.2.1 Site Preparation

All existing structures and any structural remnants, remnants of previous development, disturbed site soils, end-dumped soils piles, existing uncontrolled fill and backfill, existing underground features, and any other surface and subsurface remnants of former and existing facilities should be removed at all planned areas of engineered fill placement on the site. Areas where engineered fills will be placed and constructed should be graded to create a relatively flat surface to receive

fill. The exception to this recommendation is for Area B where the existing uncontrolled fills and debris fills are planned to be left in place, provided the plans (of excluding structures and structural elements) for the future development of this area remains unchanged.

If during site preparation operations, unexpected fills or underground facilities are encountered, such features should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction. Once the site is cleared, we recommend performing geotechnical test pits to confirm the exposed ground is comprised of native site soils in an effort to avoid placing engineered (compacted) fill and backfill over unsuitable materials that could undermine the improvement efforts. The geotechnical engineer or their representative should observe the exposed subsurface soils in the test pits prior to the placement of engineered fill.

The engineered fill should extend a minimum of 15 feet laterally beyond the outside edge of proposed future development areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. Exposed areas which will receive engineered fill, once properly cleared and benched where necessary (as subsequently discussed below), should be moisture conditioned (or aerated) as necessary and proof-rolled under the direct supervision of the geotechnical engineer or their representative. Proof-rolled areas should meet compaction requirements to a minimum depth of 8 inches. Alternatively, proof-rolling may be eliminated if the site preparation included scarifying the areas which will receive fill to a minimum depth of 8 inches, moisture conditioning, and compacting the exposed soils. Exposed surfaces which will receive fill should be observed and approved by Terracon prior to placement of engineered fill.

If during the landfilling operations, placement of engineered fill is suspended for any period of time in certain areas, or if the surface of engineered fill soils becomes disturbed in any form, the site preparation recommendations outlined above for the upper 8 inches of exposed materials should be re-implemented prior to the subsequent placement of engineered fill soils.

4.2.2 Excavation Considerations

The earthwork operations related to flattening slopes at the site are anticipated to generally consist of a large amount of excavation primarily within Area C, and moderate amounts within Area A1. Based on the results of the slope stability analysis as discussed is Section 4.0 we recommend existing slopes for the site be graded and improved to slope inclinations of 1.5H:1V or flatter.

However, it is the individual contractor(s) responsibility for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottoms. Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred. The contractor is responsible for maintaining the slope conditions resulting in a safe

and stable slope stability. As an example, staging of materials should not placed on the upper portion of the slope, as this would result in additional loading increasing the instability of the slope. Also, as another example, construction water or any other water should not be allowed to infiltrate into the slopes, as this would also change the slope stability conditions and result in an increased instability. As required and upon request, Terracon can assist with periodic observations and/or evaluations during construction.

4.2.3 Benching

Where existing or proposed slopes are steeper than 5H:1V (horizontal:vertical), specifically along the boundary of Area C and within Areas A1 and A2, these areas should be benched to reduce the potential for slippage between existing slopes and engineered fills (by forming a sliding plane). Failure to perform adequate benching could result in instability and undesirable settlement of the newly-constructed fills/embankments. Benches should be wide enough to accommodate compaction and earth moving equipment, and to allow placement of horizontal lifts of fill. A maximum bench height of 4 feet and a minimum bench width of 6 feet is recommended. The recommended benching program can be implemented as the overall slopes are flattened to 1.5H:1V and as engineered fill soils are placed within the confines of the existing excavations. The south slope which already has a slope of 1.5H:1V will also need to be benched prior to receiving engineered fill.

4.2.4 Fill Materials and Placement

All materials used as engineered fill should include soils and inert materials that are free of organics and vegetation. Materials that can degrade or decompose over time resulting in a reduced volume can subsequently result in undesired settlements; therefore, these undesirable materials should be excluded from engineered fill areas planned for the support of structural elements. In general, engineered fill materials should conform within the maximum size limitations outlined in this section, and voids created due to several large particles in contact with each other (i.e., nesting) should not be allowed in the placement of fill materials at the site. It is understood that the mine reclamation efforts are anticipated to include backfilling the site with inert materials (concrete debris, asphalt, soil, gravel, rock, etc.) under engineering observation and testing in order for these backfill materials to have adequate compaction and provide support to future developments on the site in Areas B and C.

Engineered Fill

Based on the understanding that the (long term) future plans for Area A may include commercial and industrial developments, the on-site evaporation pond (Area A1) clay soils consisting of high plasticity fat clay should be completely removed and replaced with approved engineered fill soils. We understand the on-site soils from the excavation of the flattening of slopes along the edge of Area C are planned to be used as fill materials at the site. Results of the laboratory testing completed on samples obtained from the site during our field reconnaissance indicate that these materials will be suitable for use as engineered fill in Areas A1 and A2 when properly placed, moisture-conditioned and compacted.

For purposes of this report, engineered fill is defined as soils conforming to the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
6"	100
No. 4 Sieve	50-100
No. 200 Sieve	15 (min) to 45 (max)

- Liquid Limit ..... 35 (max)
- Plasticity Index ..... 15 (max)
- Maximum expansive potential (%)* 1.5

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

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 12 inches loose thickness unless otherwise approved by the geotechnical engineer.

Imported soils for use as fill material should conform to the specifications outlined for engineered fill. Proposed imported fill materials should be sampled, tested and approved by Terracon prior to being hauled to the site.

Rock Fill

For the purposes of this report, rock fill is defined as either soils or inert materials (such as concrete pieces) having maximum particle size greater than 6 inches. Based on our understanding, some oversized materials such as concrete slabs may be accepted at the landfill operations. Portions of these materials will be processed and removed from the site, and the remaining materials will be placed in the proposed landfill during site reclamation. Within Areas B and C, rock fill may be placed to within 10 feet of finished subgrade elevation. However, consideration should be given to the impact of rock fill on future excavations and improvements in these areas.

The inert materials to be brought to the proposed landfill are assumed to contain cobbles with maximum dimensions larger than 6 inches and boulders with maximum dimensions larger than 12 inches. In addition, the inert materials will contain cobble and boulder sized pieces of concrete and asphalt debris. These concrete and asphalt materials within the landfill materials are considered suitable for re-use within the fill placed at the site. If planned for re-use, these materials should be processed to either 18-inch minus (for rock fill) or 6-inch minus size (for engineered fill)

and should be blended with on-site or imported soils to create a stable soil matrix. If inert materials are to be used in the fill placed at the site, consideration should be given to reducing the size of such materials with a percussion hammer or other methods in order to maintain a maximum particle size of 18 inches for the fills placed at the site. Any oversized materials that are not processed based on these recommendations should be placed in Area B, following the remaining recommendations for compaction and observation as outlined below.

Rock fill should be placed only under the direction of Terracon. At no time should cobble and boulder sized materials be nested together. There should be sufficient finer grained material to prevent the creation of voids during fill placement. Rock fill material should be stockpiled and visually apparent that materials are not nested, then the rock fill should be moisture conditioned prior to placement, and then placed in loose lifts not more than 24-inches in thickness. For a loose lift thickness of 24 inches, a minimum 20-ton vibratory compactor is recommended for compaction of these materials. Rock fill should be compacted with a minimum of 10 overlapping passes of a vibratory compactor operating at a vibration of 30 to 50 hertz. Periodically, rock fill test strips should be performed to evaluate if the loose lift thickness and amount of passes of the vibratory compactor should be adjusted based on observations by Terracon. Maximum speed of the compactor while compacting the rock fill should be 300 feet per minute. The rock fill will require full time observation by Terracon during compaction.

Rock fills should be wetted prior to compaction to decrease compressibility and to increase the deformability of the rock pieces during construction. Water should be applied on the fill material at a minimum rate of 100 gallons per cubic yard of rock fill material. If, in the opinion of Terracon, additional wetting of the rock material is required to aid in the compaction process, the contractor should provide additional water for construction as directed.

4.2.5 Compaction Requirements

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

Material Type and Location	Per Standard Proctor Test (ASTM D 698)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction (referenced from optimum moisture content)	
		Minimum	Maximum
On-site soils and approved imported soils placed within a depth of 5 ft. below finished grades	95	-3%	+3%
On-site soils and approved imported soils placed at depths greater than 5 feet below finished grades	100	-3%	+3%
Rock Fill	As outlined in Section 4.2.4		

4.2.6 Recommended Testing Frequency

Engineered Fill

Based on the information provided, we understand engineered fills will be placed and constructed on a periodic basis during the reclamation process, and because of this, we anticipate the materials testing services will also be performed on a non-continuous and periodic basis for this project. We recommend Terracon be present at the site to observe the moisture conditioning of the engineered fill materials, their placement as a loose lift, and their compaction, to then perform field density testing on the placed engineered fill. We anticipate the Terracon engineering technician will perform 1 field density testing for roughly every 5,000 to 10,000 square feet of area per fill lift as part of the project Quality Control/Quality Assurance (QC/QA) program. Each lift of engineered fill should be 1-foot thick (or less).

Terracon and Harvey will need to coordinate closely on overlapping the engineered fill placement operations with the materials testing and observations. Terracon plans on occasionally using a survey crew and/or GPS unit to delimit the areas being observed and evaluated by Terracon. The Terracon materials observation and testing final report for the site will include the observations and testing performed for the site. Therefore, it is important Terracon be present to observe and evaluate the engineered fill placed at the site. If engineered fill lift is placed and later covered with an additional engineered fill lift (or lifts) without a Terracon representative present to observe the placement and perform field density testing, then additional work will be required to excavate test pits to expose the underlying lifts for subsequent field density testing. Further, if the underlying lifts do not meet the compaction requirements, then the overlying lifts will likely need to be removed to rework engineered fill areas not meeting the requirements.

Terracon's field testing will be supported by additional and periodic laboratory testing as required to evaluate compliance of the materials with the geotechnical engineering recommendations. Construction activities observed by Terracon on-site personnel will be documented in appropriate daily observations and inspection reports. The field and laboratory testing developed during this task will be evaluated by the project engineer for compliance with the geotechnical engineering recommendations.

Rock Fill

Due to the nature of the large rock particles in rock fill, typical field density testing is not applicable. The placement of rock fill will require full time observation by Terracon. As previously mentioned, Terracon should observe rock fill stockpiles prior to placement to observe if adequate fines are present to prevent nesting between rock particles. Terracon should then observe the moisture conditioning of the rockfill stockpile prior to the rockfill being placed. The Terracon engineering technician will then observe the rock fill lift thickness and the number of vibratory compactor passes performed on the area.

Terracon and Harvey will need to coordinate closely on overlapping the rock fill placement operations with the materials testing and observations. Terracon plans on occasionally using a survey crew and/or GPS unit to delimit the areas being observed and evaluated by Terracon. The Terracon materials testing observation and testing final report for the site will include the observations and testing performed for the site. Therefore, it is important Terracon be present to observe and evaluate the rock fill placed at the site, as no subsequent testing is practical/possible if a rock fill lift is placed without engineering observation.

QA/QC Report Documentation

Periodic progress materials testing and observation reports will be provided by Terracon throughout the reclamation/filling operations of the site. If continuous reclamation/filling operations are being performed at the site, we anticipate performing 1 progress report per month. If the reclamation/filling operations are intermittent, we plan on spacing the progress reports to a quarterly basis. Upon completion of the reclamation/filling of the site, a final materials testing and observation report will be prepared by Terracon for the site. The final report will include the progress reports and providing documentation of the QA/QC program performed by Terracon during the reclamation process. The final materials testing and observations report will provide Harvey with documentation of the fills placed during the reclamation process for use in the future planned commercial or industrial developments that may be contemplated by Harvey or other developers.

4.3 Additional Recommended Geotechnical Evaluations

As part of the reclamation of the site, the following additional geotechnical evaluations are recommended for the site:

- Once the site is cleared as recommended in this report and prior to the placement of engineered fill or rock fill, geotechnical test pits should be performed throughout the site to observe and confirm that the subsurface ground is comprised of native soils (and not unsuitable fill or other materials). These geotechnical test pits are recommended in an effort to prevent the placement of engineered fill or rock fill over materials that may provide unsuitable support and undermine the overlying engineered fill or rock fill.

- Once the reclamation process is completed, development/site specific geotechnical explorations will be required to provide final geotechnical engineering design recommendations for future planned developments that may be constructed on the site. The final geotechnical engineering design recommendations will be dependent on the proposed development project details (type of building, number of building stories, etc.). These development/site specific geotechnical explorations and final geotechnical engineering design recommendations are anticipated for Areas A and C.

- The existing fill in Area B are planned to remain. Therefore, long-term ground settlements may be variable, and (at- and below-grade) structural elements (e.g., buildings, pavements, utilities, etc.) will be excluded from this area. A geotechnical exploration to delimit the

existing fill area in Area B should be performed. Depending on the limits of the existing fill in Area B, Area B should be extended laterally beyond the existing fill areas to prevent the placement of structural elements near the existing fills that could be affected by the adjacent fill materials.

5.0 GENERAL COMMENTS

Terracon should be retained to review the grading plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the laboratory testing and visual observations performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

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

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Exhibit 1: Site Location
Planned Mine Reclamation – Harrison Road Inert Materials Landfill ■ Tucson, AZ
July 30, 2019 ■ Terracon Project No. 63195039

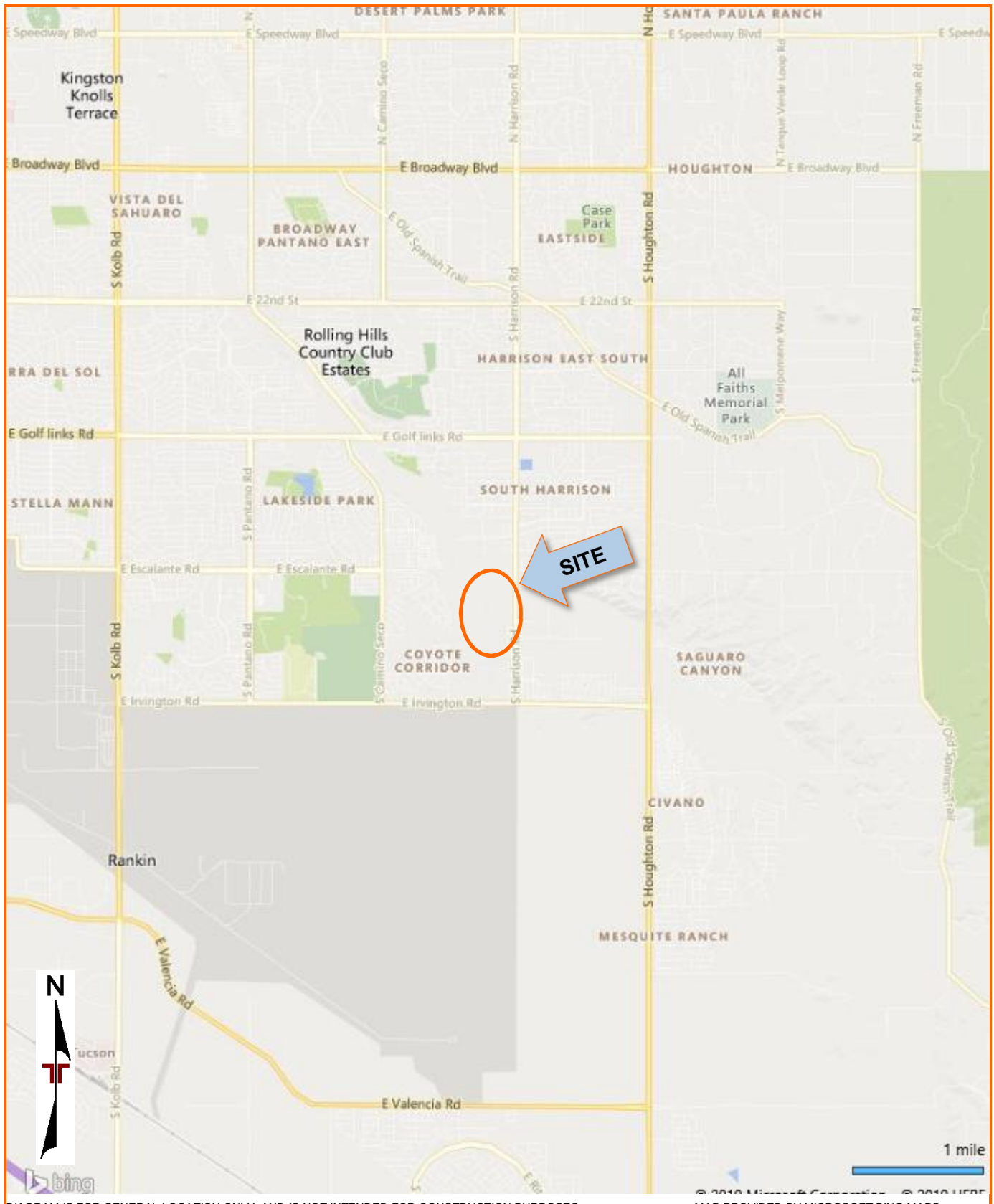


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exhibit 2: Exploration Plan
Planned Mine Reclamation – Harrison Road Inert Materials Landfill ■ Tucson, AZ
July 30, 2019 ■ Terracon Project No. 63195039

APPENDIX A – PHOTOGRAPHY LOG

Photo #1 View of concrete slabs remaining from mine operations in Area A.

Photo #2 View of west evaporation pond in Area A1.

Photo #3 Side view of fill area and debris within Area B.

Photo #4 Stress Cracks along fill edge in Area B.

Photo #5 View of existing road within Area A2.

Photo #6 View of eastern slope in Area C.

Photo #7 View of southern slope in Area C.

Photo #8 View of a low severity depression in Medium Duty Section.

Photo #9 View of low point within mine excavation within Area C.

Photo #10 View of slope along eastern edge in Area C.

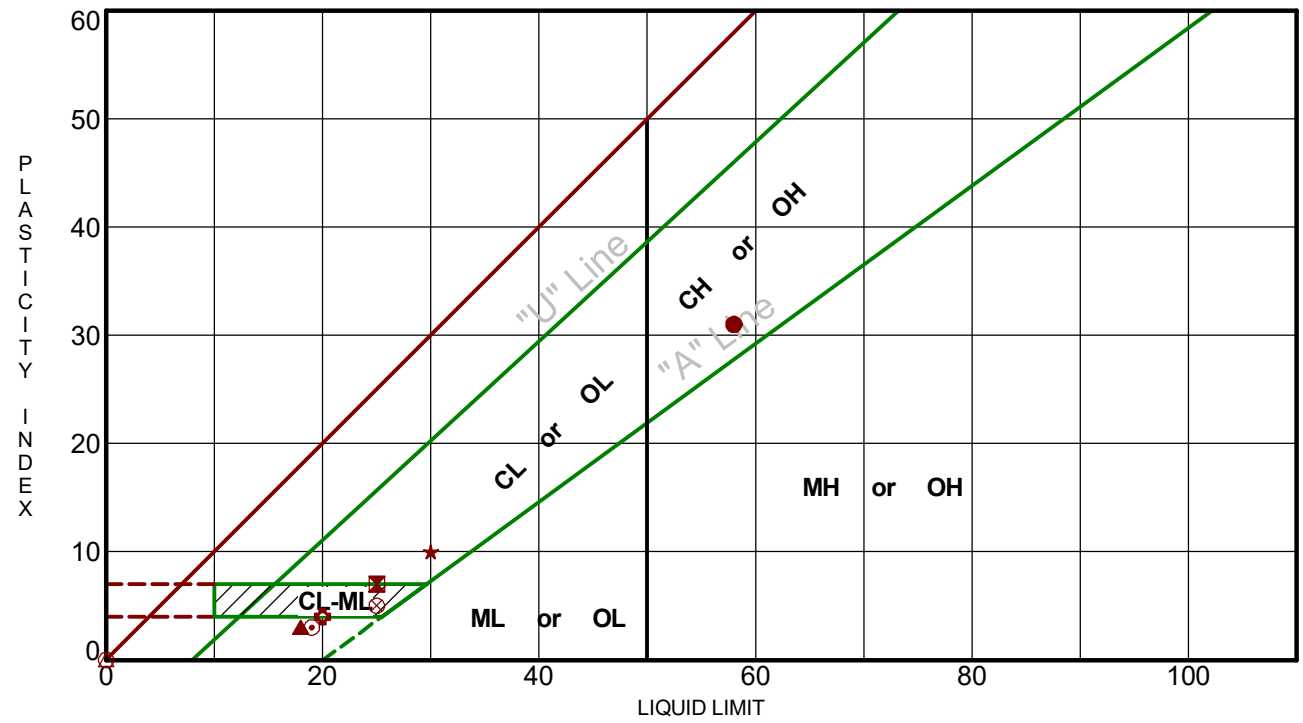
Photo #11 Various debris dumped within the mine site in Area C.

Photo #12 View of mine site from the south (Area C).

APPENDIX B - EXPLORATION RESULTS

ATTERBERG LIMITS RESULTS

ASTM D4318



Sample ID		Depth	LL	PL	PI	Fines	USCS	Description
●	1	0 - 2	58	27	31	99	CH	FAT CLAY
⊠	3	0 - 2	25	18	7	35	SC-SM	SILTY, CLAYEY SAND
▲	5	0 - 2	18	15	3	38	SM	SILTY SAND
★	7	0 - 2	30	20	10	74	CL	LEAN CLAY with SAND
⊙	10	0 - 2	19	16	3	20	SM	SILTY SAND with GRAVEL
✿	15	0 - 2	20	16	4	17	SC-SM	SILTY, CLAYEY SAND with GRAVEL
○	19	0 - 2	NP	NP	NP	9	SW-SM	WELL-GRADED SAND with SILT and GRAVEL
△	20	0 - 2	NP	NP	NP	4	SP	POORLY GRADED SAND with GRAVEL
⊗	21	0 - 2	25	20	5	33	SC-SM	SILTY, CLAYEY SAND

PROJECT: Harrison Mine Reclamation

SITE: NWC of Millmar Road and Harrison Road
Tucson, Arizona

Terracon
355 S Euclid Ave, Ste 107
Tucson, AZ

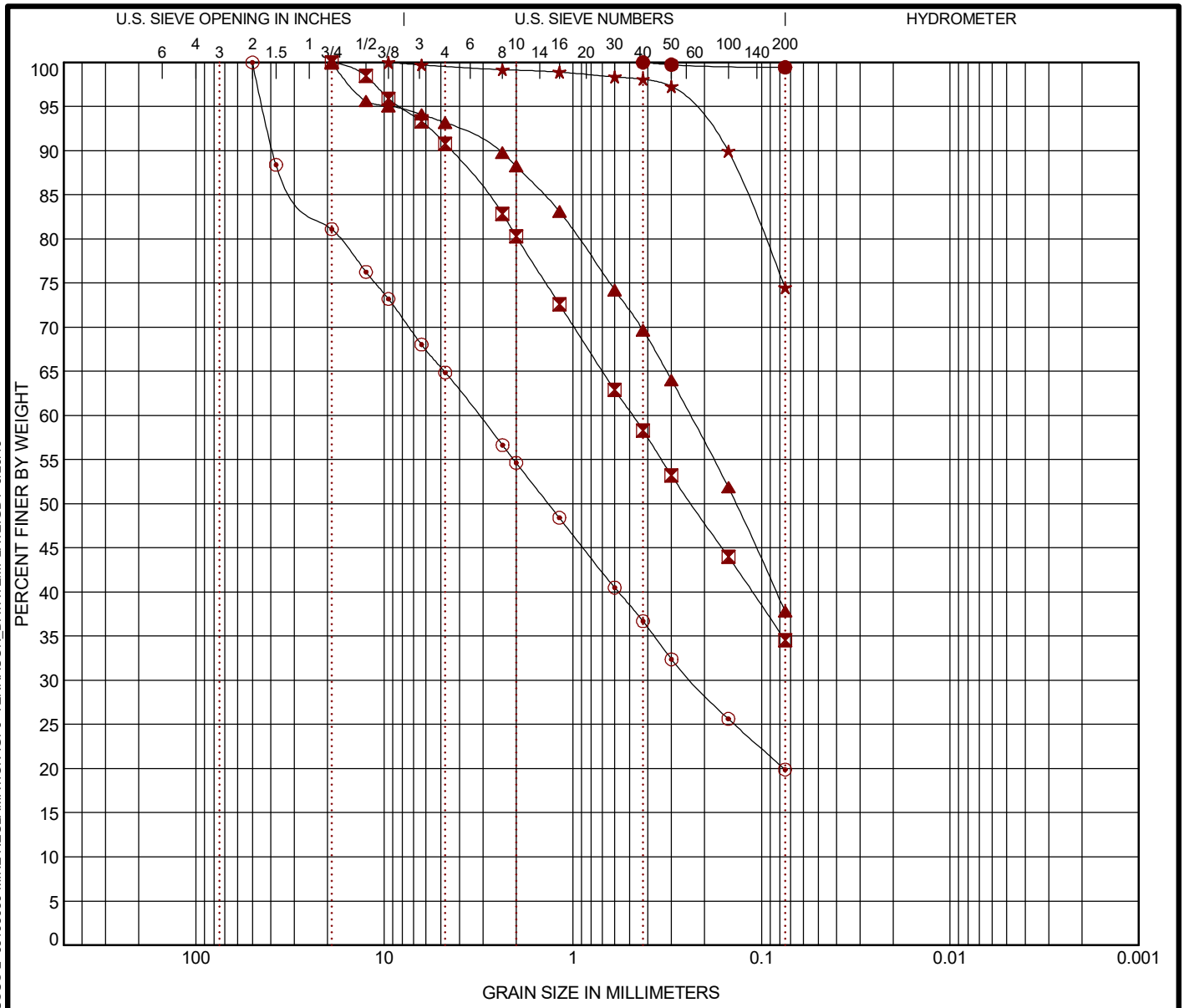
PROJECT NUMBER: 63195039

CLIENT: Harvey Trucking
Tucson, Arizona

EXHIBIT: B-1

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	1	0 - 2	FAT CLAY (CH)		58	27	31		
⊠	3	0 - 2	SILTY, CLAYEY SAND (SC-SM)		25	18	7		
▲	5	0 - 2	SILTY SAND (SM)		18	15	3		
★	7	0 - 2	LEAN CLAY with SAND (CL)		30	20	10		
⊙	10	0 - 2	SILTY SAND with GRAVEL (SM)		19	16	3		

Sample ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	1	0 - 2	0.425				0.0	0.0	0.6		99.4	
⊠	3	0 - 2	19	0.482			0.0	9.2	56.2		34.6	
▲	5	0 - 2	19	0.239			0.0	6.8	55.4		37.8	
★	7	0 - 2	9.5				0.0	0.4	25.1		74.5	
⊙	10	0 - 2	50	3.14	0.235		0.0	35.1	45.0		19.9	

PROJECT: Harrison Mine Reclamation

SITE: NWC of Millmar Road and Harrison Road
Tucson, Arizona

Terracon
355 S Euclid Ave, Ste 107
Tucson, AZ

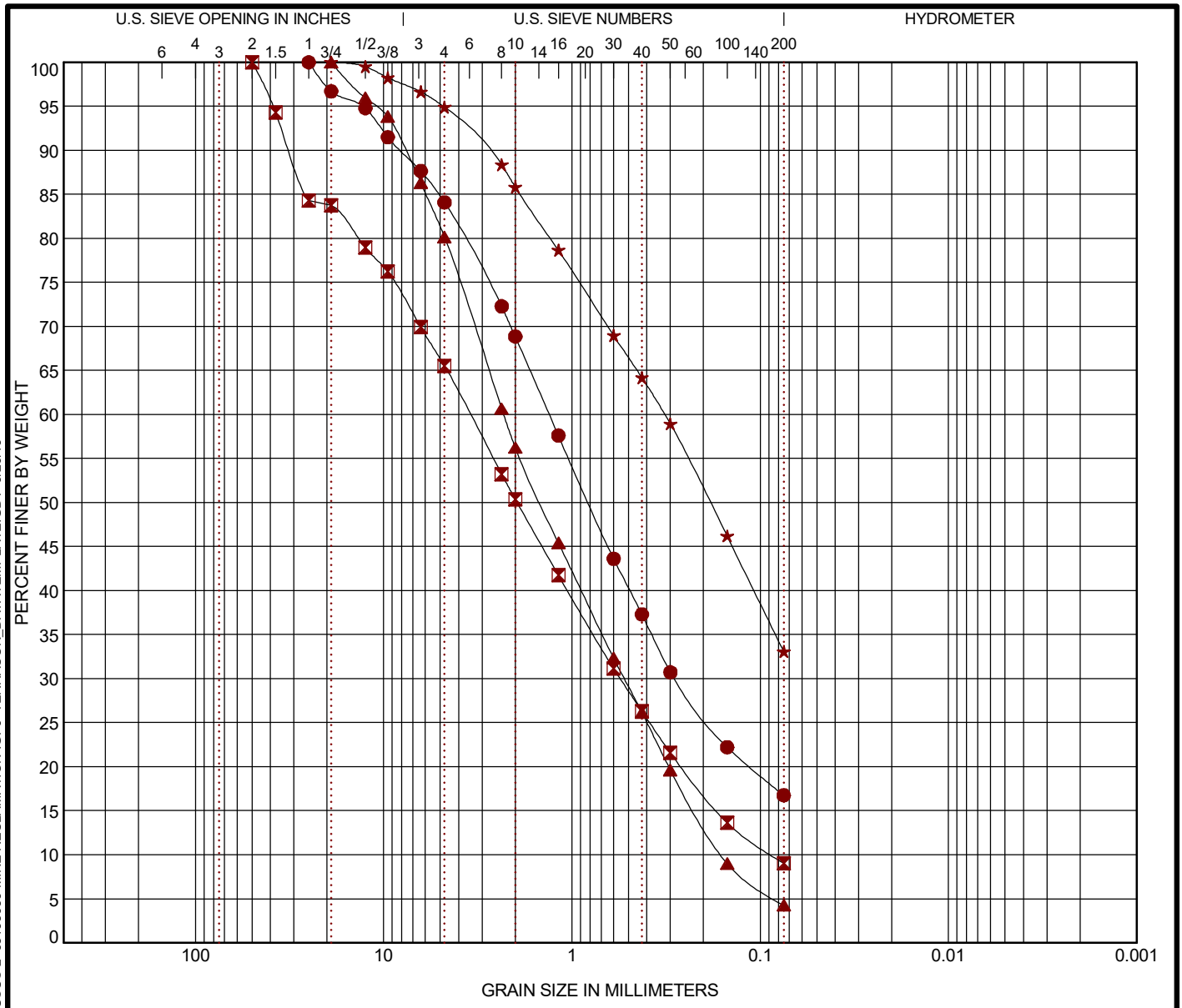
PROJECT NUMBER: 63195039

CLIENT: Harvey Trucking
Tucson, Arizona

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Sample ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
15	0 - 2	SILTY, CLAYEY SAND with GRAVEL (SC-SM)		20	16	4		
19	0 - 2	WELL-GRADED SAND with SILT and GRAVEL (SW-SM)		NP	NP	NP	1.02	40.01
20	0 - 2	POORLY GRADED SAND with GRAVEL (SP)		NP	NP	NP	0.75	14.38
21	0 - 2	SILTY, CLAYEY SAND (SC-SM)		25	20	5		

Sample ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
15	0 - 2	25	1.32	0.283		0.0	15.9	67.3		16.8	
19	0 - 2	50	3.472	0.553	0.087	0.0	34.5	56.5		9.0	
20	0 - 2	19	2.302	0.527	0.16	0.0	19.9	75.9		4.3	
21	0 - 2	19	0.322			0.0	5.1	61.8		33.1	

PROJECT: Harrison Mine Reclamation

SITE: NWC of Millmar Road and Harrison Road
Tucson, Arizona

Terracon
355 S Euclid Ave, Ste 107
Tucson, AZ

PROJECT NUMBER: 63195039

CLIENT: Harvey Trucking
Tucson, Arizona

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 63195039 MINE RECLAMATION .GPJ TERRACON_DATATEMPLATE.GDT 6/20/19

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS ASTM D3080

Terracon

PROJECT:	Harrison Mine Reclamation	**JOB NO:**	63195039
LOCATION:	Tucson, AZ	**WORK ORDER NO:**	63195039
MATERIAL:	Silty Clayey Sand	**LAB NO:**	B15 @ 0'-2'
SAMPLE SOURCE:	B15 @ 0'-2'	**DATE SAMPLED:**	06/18/19

Sample Preparation: Remolded sample specimens to given density of 110.0pcf @ 8.0% Moisture. Specimens consolidated at normal load for 30 mins. Prior to shear. Specimens not inundated.

Initial Parameters of specimen:

	Point 1	Point 2	Point 3
Normal Stress (psf):	**2000**	**4000**	**8000**
Dry mass (g):	132.88	132.90	132.96
Height (in):	1.0000	1.0000	1.0000
Diameter (in):	2.42	2.42	2.42
Moisture, %:	8.1	8.0	8.0
Dry Density (pcf):	110.1	110.1	110.1
Saturation, %:	42	42	42
Void Ratio:	0.50	0.50	0.50

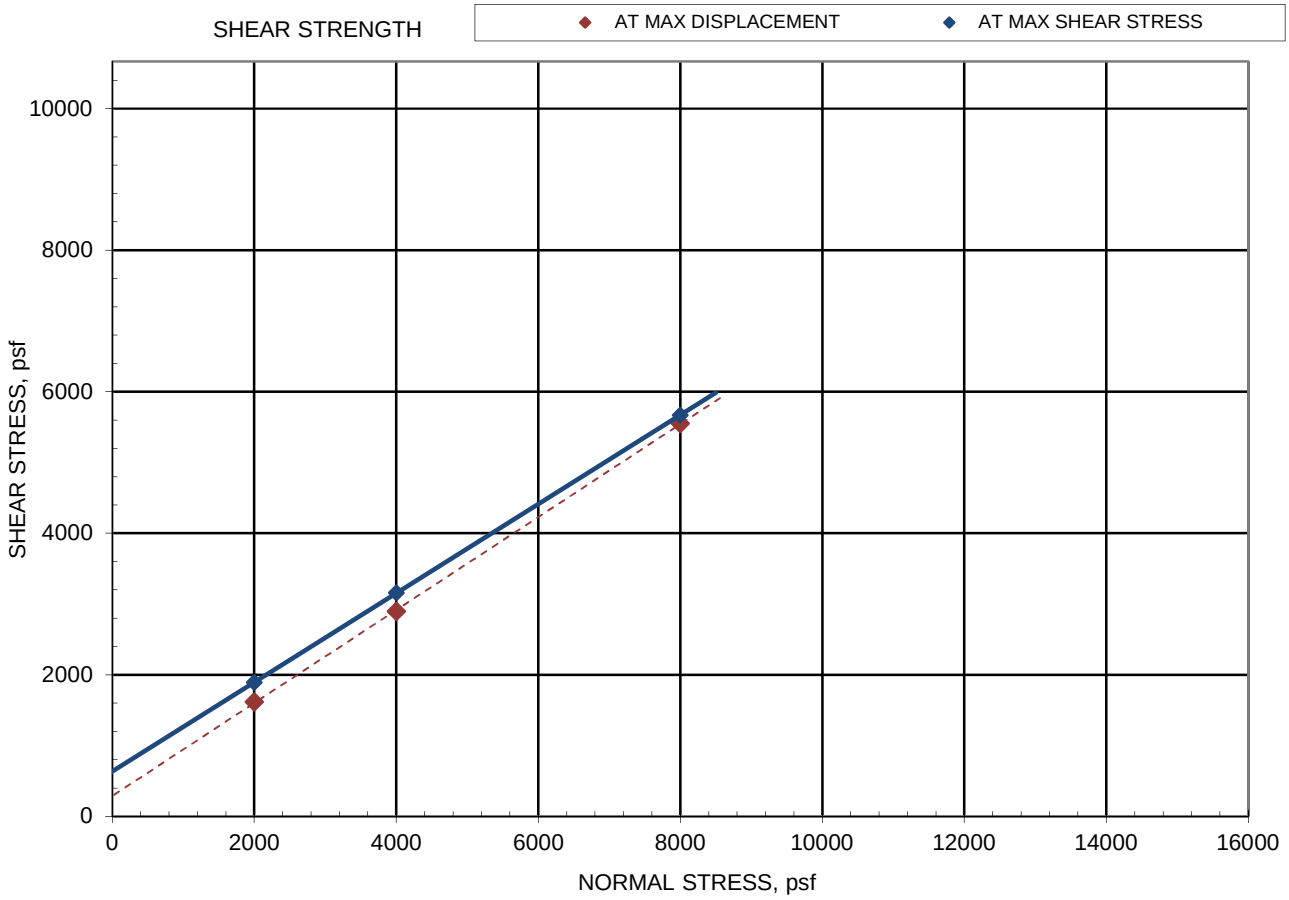
Pre- Shear Parameters of specimen:

	Point 1	Point 2	Point 3
Normal Stress (psf):	**2000**	**4000**	**8000**
Dry mass (g):	132.88	132.90	132.96
Height (in):	0.9888	0.9819	0.9743
Diameter (in):	2.42	2.42	2.42
Moisture, %:	8.1	8.0	8.0
Dry Density (pcf):	111.3	112.1	113.0
Saturation, %:	44	45	46
Void Ratio:	0.49	0.48	0.46

Normal Stress (psf):	2000	4000	8000
Maximum Shear Stress, (psf):	1890	3157	5669
Displacement at Maximum Shear, (in):	0.102	0.151	0.227
Shear Stress at Max Displacement, (psf)	1615	2894	5549
Maximum Displacement, (in):	0.450	0.450	0.451
Rate of Deformation, in/min	0.0070	0.0070	0.0070

SHEAR DEVICE: Geomatic model 8914, Dead Weight load force

	FRICTION ANGLE	COHESION
AT MAX SHEAR STRESS	**32**	**634**
Specs:		
AT MAX DISPLACEMENT	33	287
Specs:		



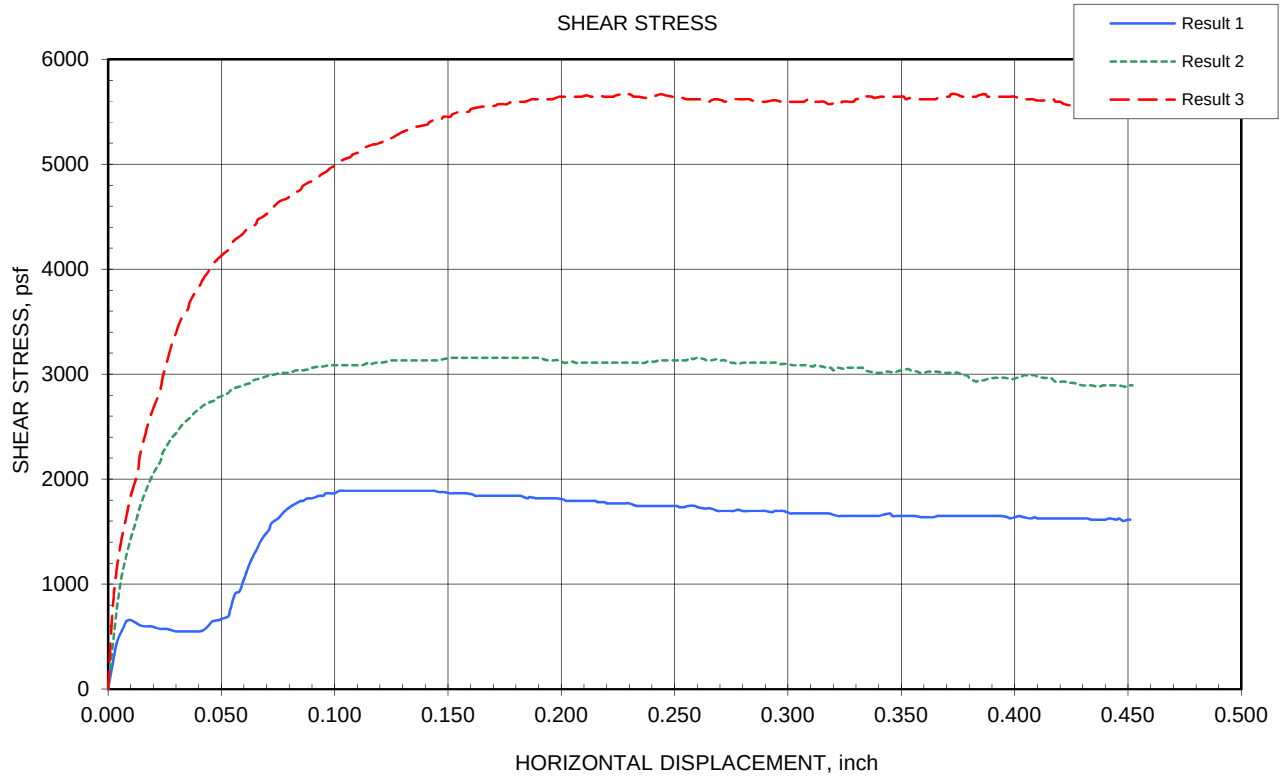
Note: The friction angle presented is applicable only to the load ranges and sample conditions tested

EXHIBIT: B-4

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS ASTM D3080

Terracon

PROJECT:	Harrison Mine Reclamation	**JOB NO:**	63195039
LOCATION:	Tucson, AZ	**WORK ORDER NO:**	63195039
MATERIAL:	Silty Clayey Sand	**LAB NO:**	B15 @ 0'-2'
SAMPLE SOURCE:	B15 @ 0'-2'	**DATE SAMPLED:**	6/18/2019



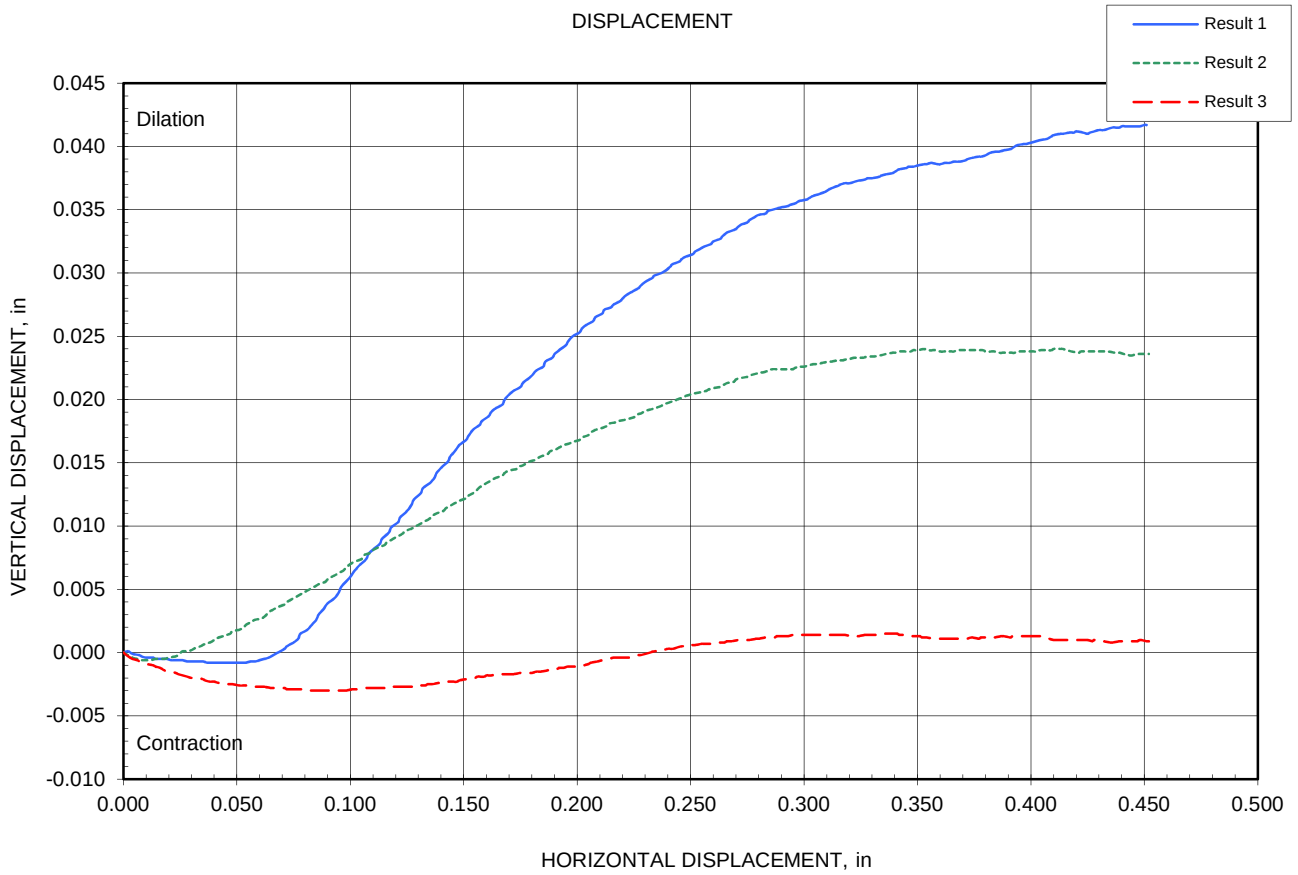


EXHIBIT: B-5

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS ASTM D3080

Terracon

PROJECT:	Harrison Mine Reclamation	**JOB NO:**	63195039
LOCATION:	Tucson, AZ	**WORK ORDER NO:**	63195039
MATERIAL:	Silty Clayey Sand	**LAB NO:**	B21 @ 0'-2'
SAMPLE SOURCE:	B21 @ 0'-2'	**DATE SAMPLED:**	06/18/19

Sample Preparation: Remolded sample specimens to given density of 110.0pcf @ 8.0% Moisture. Specimens consolidated at normal load for 30 mins. Prior to shear. Specimens not inundated.

Initial Parameters of specimen:

	Point 1	Point 2	Point 3
Normal Stress (psf):	**2000**	**4000**	**8000**
Dry mass (g):	132.66	132.97	132.88
Height (in):	1.0000	1.0000	1.0000
Diameter (in):	2.42	2.42	2.42
Moisture, %:	8.0	8.0	8.1
Dry Density (pcf):	109.9	110.1	110.1
Saturation, %:	42	42	42
Void Ratio:	0.51	0.50	0.50

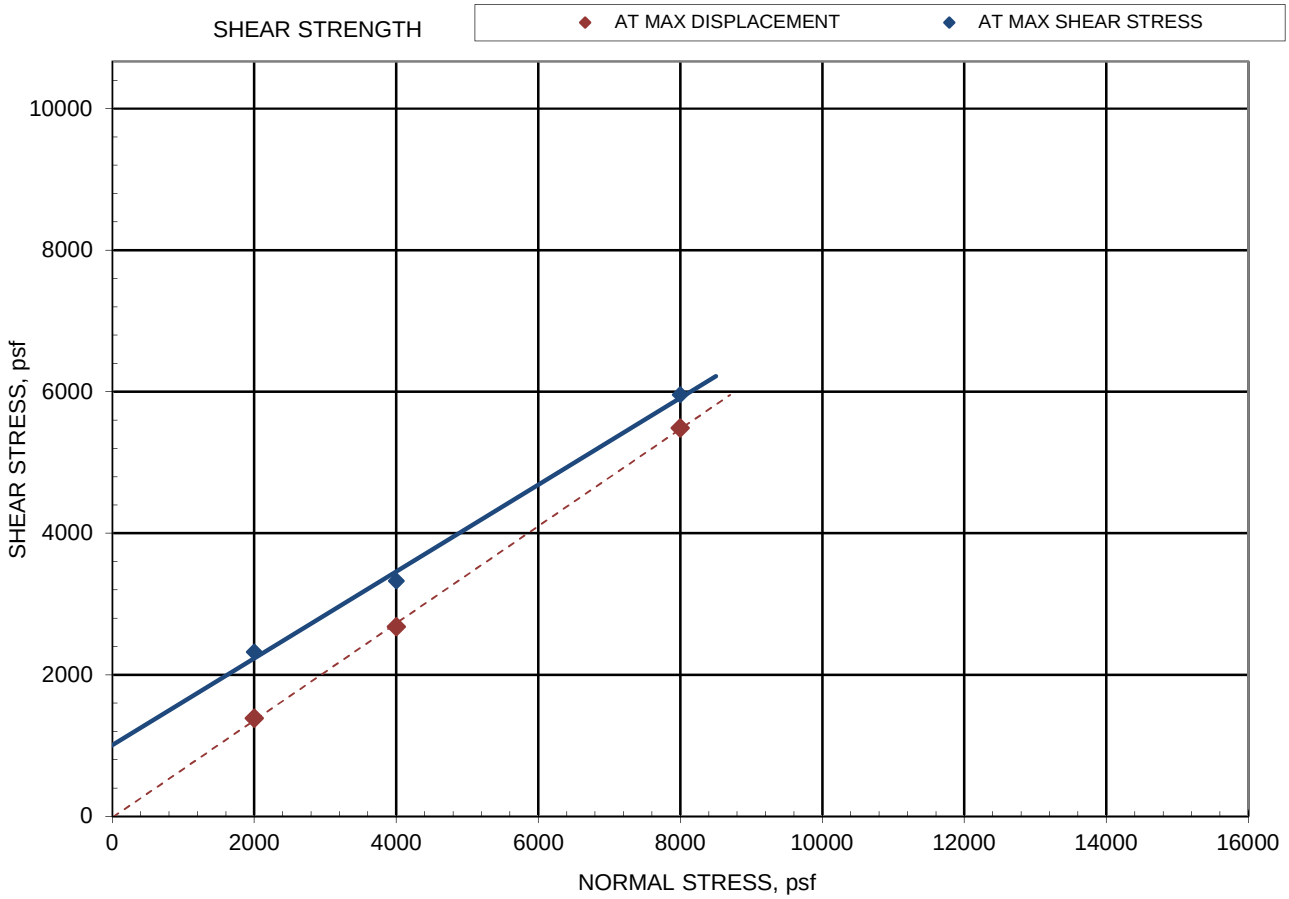
Pre- Shear Parameters of specimen:

	Point 1	Point 2	Point 3
Normal Stress (psf):	**2000**	**4000**	**8000**
Dry mass (g):	132.66	132.97	132.88
Height (in):	0.992	0.984	0.9758
Diameter (in):	2.42	2.42	2.42
Moisture, %:	8.2	8.0	8.1
Dry Density (pcf):	110.8	111.9	112.8
Saturation, %:	44	44	46
Void Ratio:	0.49	0.48	0.47

Normal Stress (psf):	2000	4000	8000
Maximum Shear Stress, (psf):	2320	3325	5956
Displacement at Maximum Shear, (in):	0.032	0.099	0.178
Shear Stress at Max Displacement, (psf)	1387	2679	5489
Maximum Displacement, (in):	0.451	0.450	0.450
Rate of Deformation, in/min	0.0070	0.0070	0.0070

SHEAR DEVICE: Geomatic model 8914, Dead Weight load force

	FRICTION ANGLE	COHESION
AT MAX SHEAR STRESS	**32**	**1005**
Specs:		
AT MAX DISPLACEMENT	34	0
Specs:		



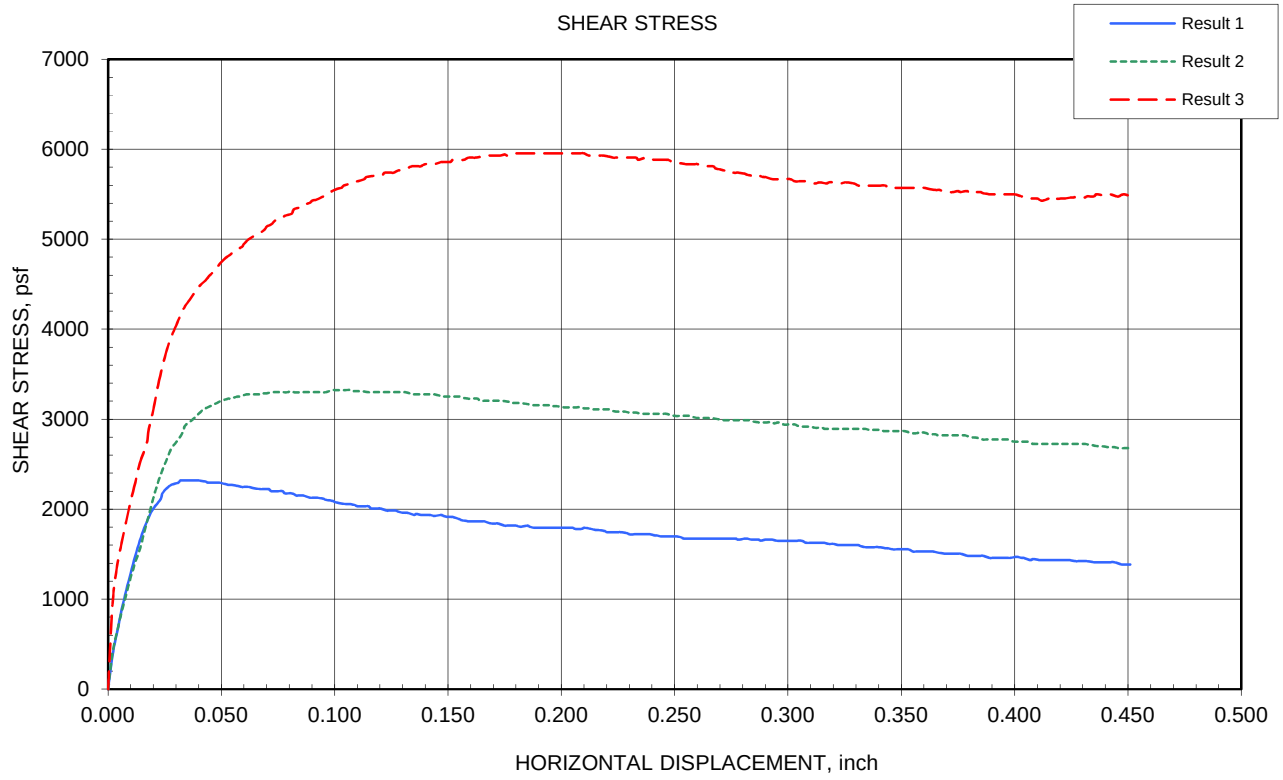
Note: The friction angle presented is applicable only to the load ranges and sample conditions tested

EXHIBIT: B-6

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS ASTM D3080

Terracon

PROJECT:	Harrison Mine Reclamation	**JOB NO:**	63195039
LOCATION:	Tucson, AZ	**WORK ORDER NO:**	63195039
MATERIAL:	Silty Clayey Sand	**LAB NO:**	B21 @ 0'-2'
SAMPLE SOURCE:	B21 @ 0'-2'	**DATE SAMPLED:**	6/18/2019



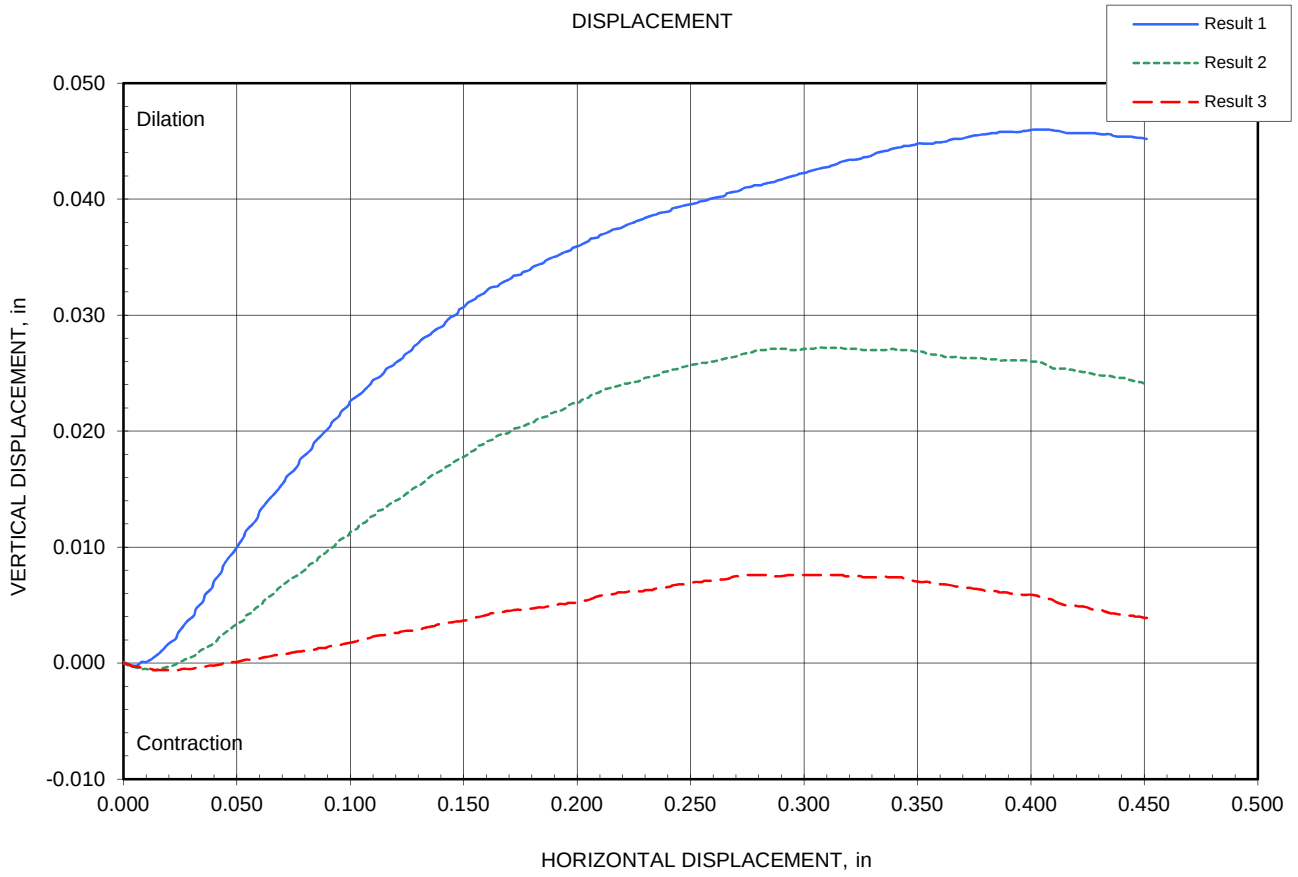


EXHIBIT: B-7

SUMMARY OF LABORATORY RESULTS

Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	Atterberg Limits			Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI_{50}	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
						LL	PL	PI										
1	0.0 - 2.0	CH			99	58	27	31										
3	0.0 - 2.0	SC-SM			35	25	18	7										
5	0.0 - 2.0	SM			38	18	15	3										
7	0.0 - 2.0	CL			74	30	20	10										
10	0.0 - 2.0	SM			20	19	16	3										
15	0.0 - 2.0	SC-SM			17	20	16	4										
19	0.0 - 2.0	SW-SM			9	NP	NP	NP										
20	0.0 - 2.0	SP			4	NP	NP	NP										
21	0.0 - 2.0	SC-SM			33	25	20	5										

REMARKS

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

PROJECT: Harrison Mine Reclamation

SITE: NWC of Millmar Road and Harrison Road
Tucson, Arizona

Terracon
355 S Euclid Ave, Ste 107
Tucson, AZ
PH. 520-770-1789 FAX. 520-792-2539

PROJECT NUMBER: 63195039

CLIENT: Harvey Trucking
Tucson, Arizona

EXHIBIT: B-8

UNIFIED SOIL CLASSIFICATION SYSTEM

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

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add “with cobbles or boulders, or both” to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ³ 15% sand, add “with sand” to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add “with organic fines” to group name.

[I] If soil contains ³ 15% gravel, add “with gravel” to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add “with sand” or “with gravel,” whichever is predominant.

[L] If soil contains ³ 30% plus No. 200 predominantly sand, add “sandy” to group name.

[M] If soil contains ³ 30% plus No. 200, predominantly gravel, add “gravelly” to group name.

[N] PI ³ 4 and plots on or above “A” line.

[O] PI < 4 or plots below “A” line.

[P] PI plots on or above “A” line.

[Q] PI plots below “A” line.

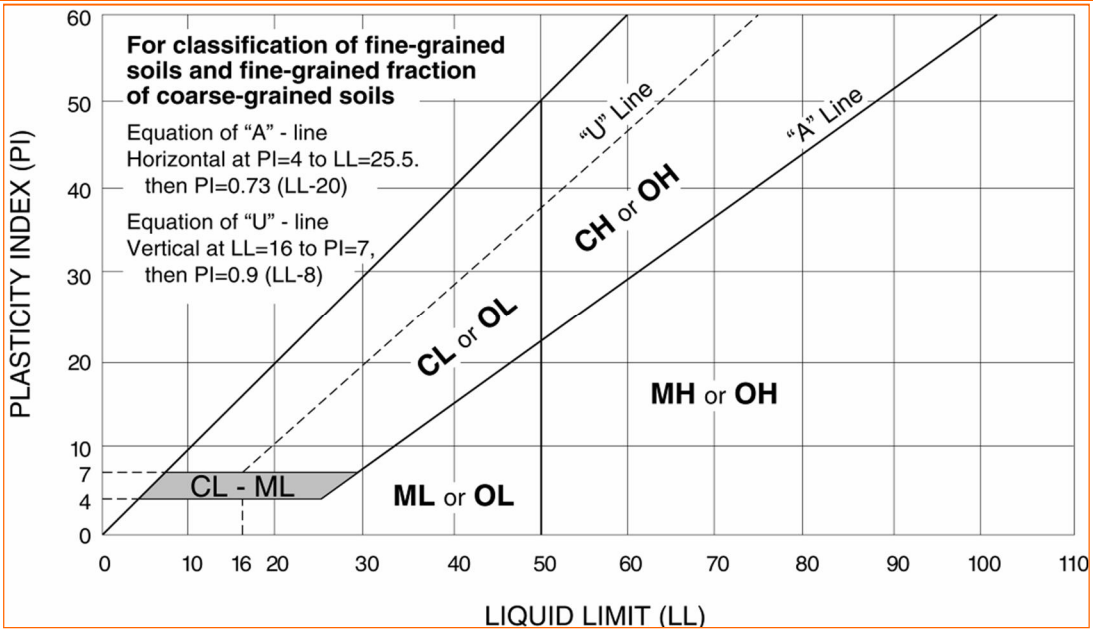


EXHIBIT: B-9

APPENDIX C – SLOPE STABILITY EVALUATION

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 1: Existing South Slope
Slope Stability Analysis
Slope Inclination: Approx 1.5H:1V
Slope Height: 120 ft

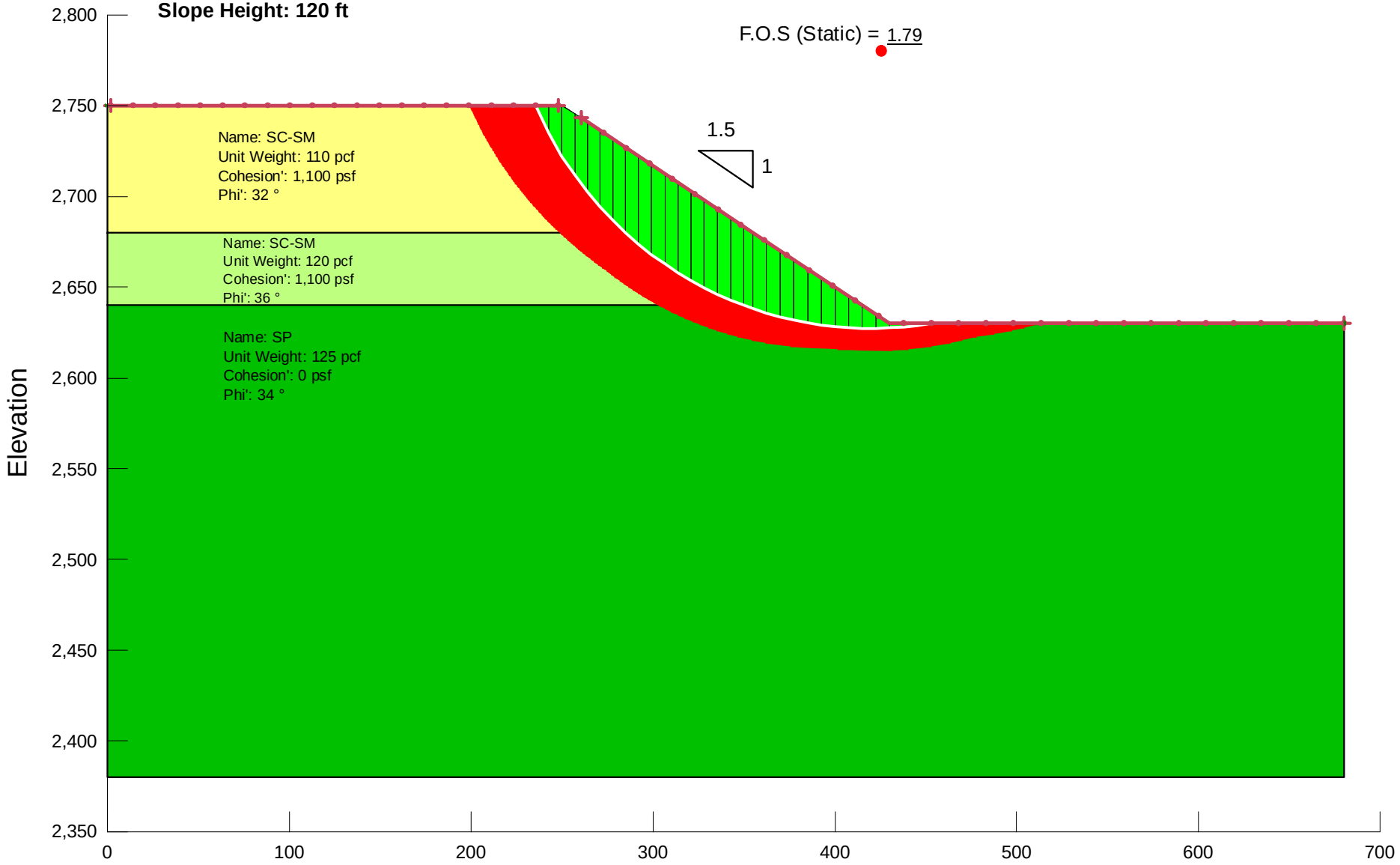


Exhibit: C-1

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 1: Existing South Slope
Slope Stability Analysis
Slope Inclination: Approx 1.5H:1V
Slope Height: 120 ft

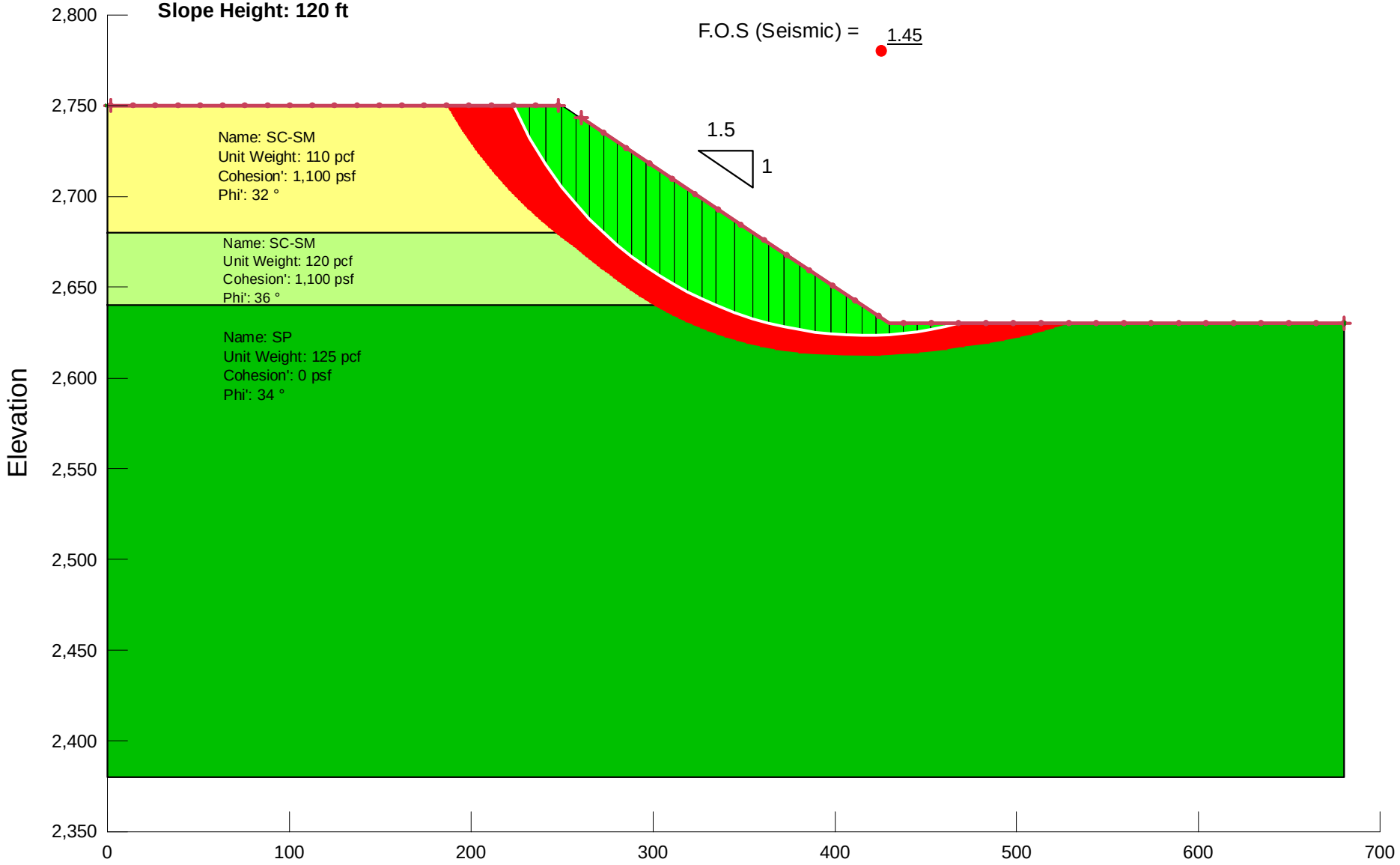


Exhibit: C-2

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 2: Existing East Slope
Slope Stabilty Analysis
Slope Inclination : Varying From Approx 1H:2.5V to Vertical
Slope Height :84 ft

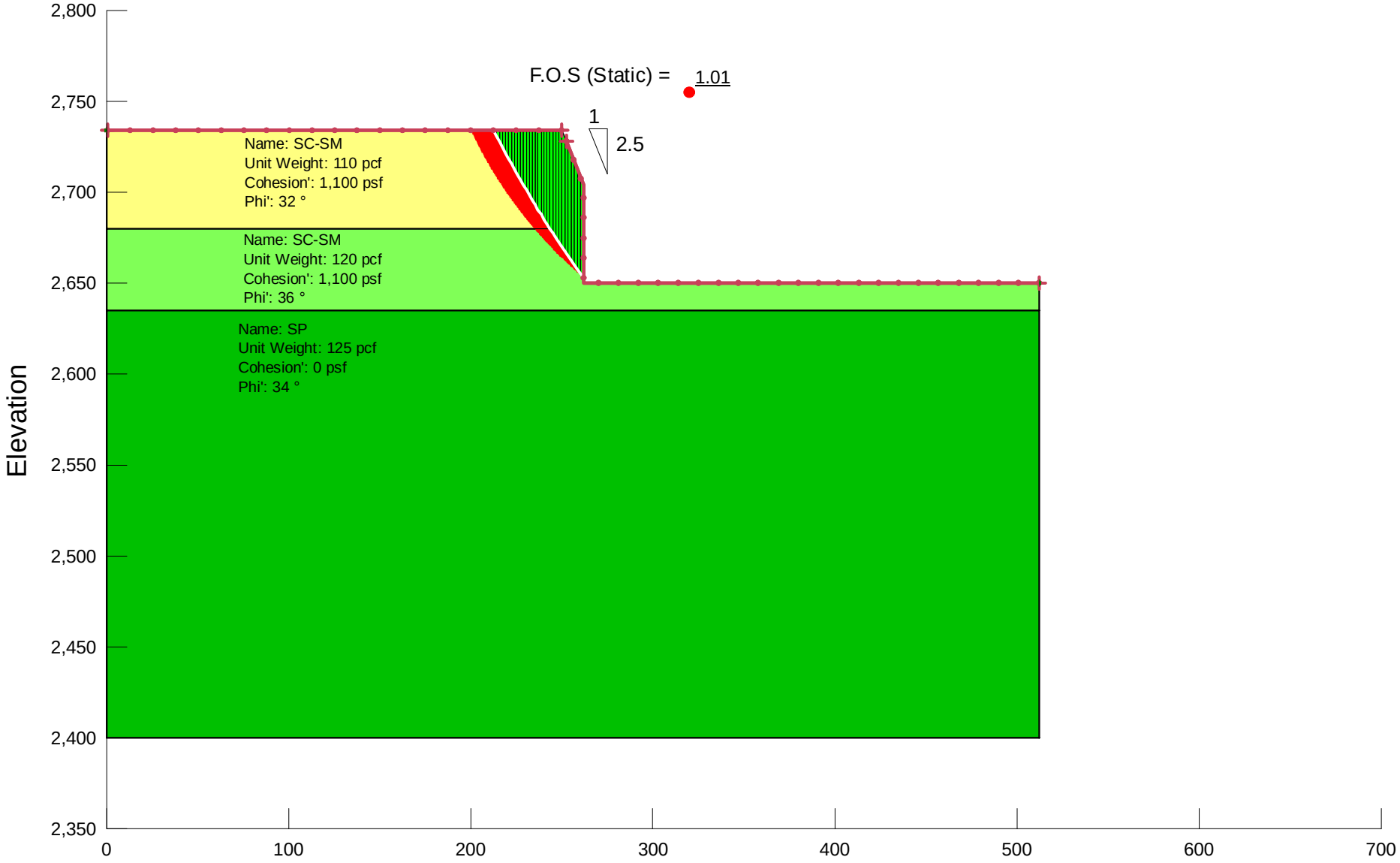


Exhibit: C-3

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 2: Existing East Slope
Slope Stabilty Analysis
Slope Inclination : Varying From Approx 1H:2.5V to Vertical
Slope Height :84 ft

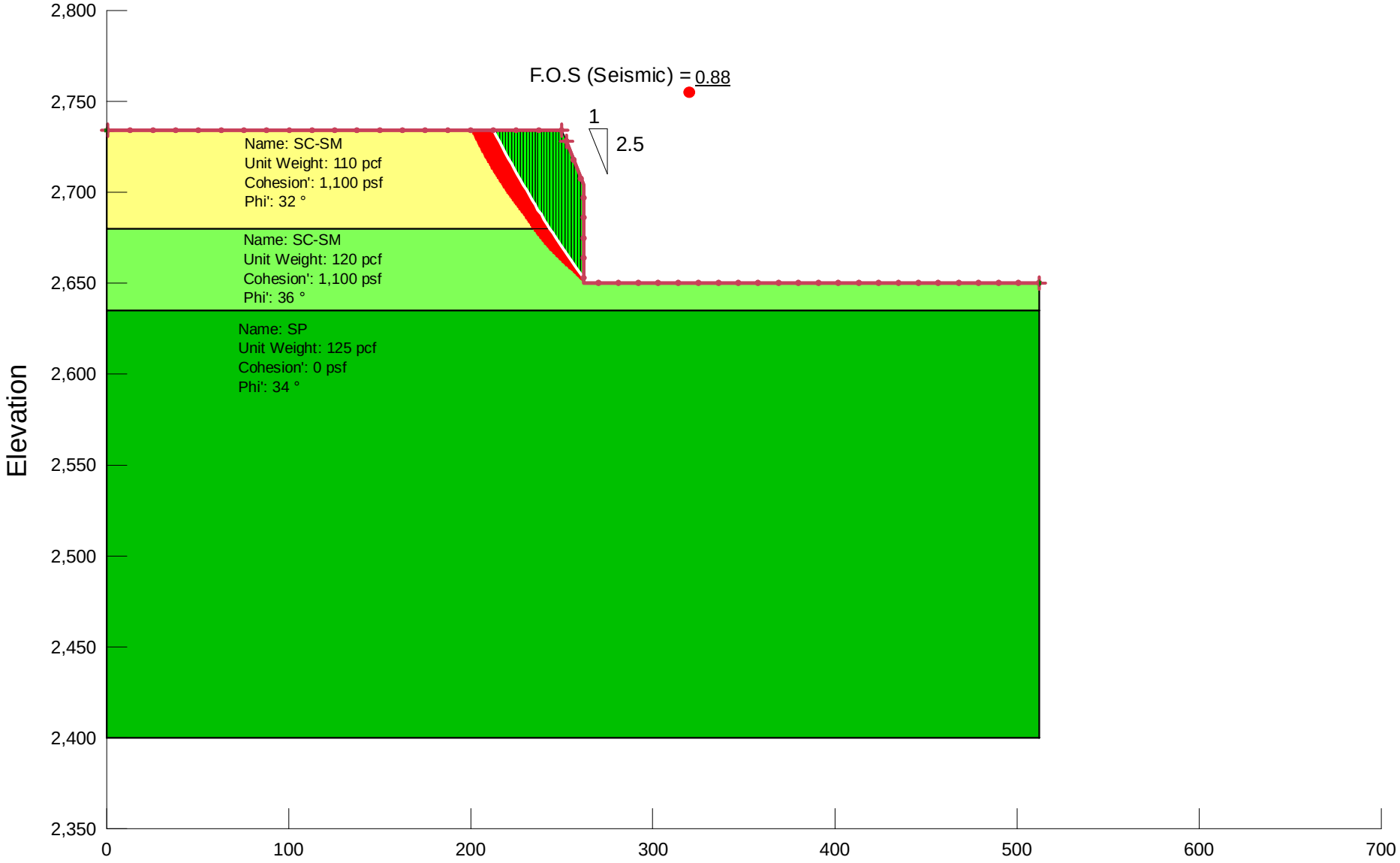


Exhibit: C-4

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 3: Planned East Slope
Slope Stability Analysis
Slope Inclination: 1H:1V
Slope Height : 124 ft

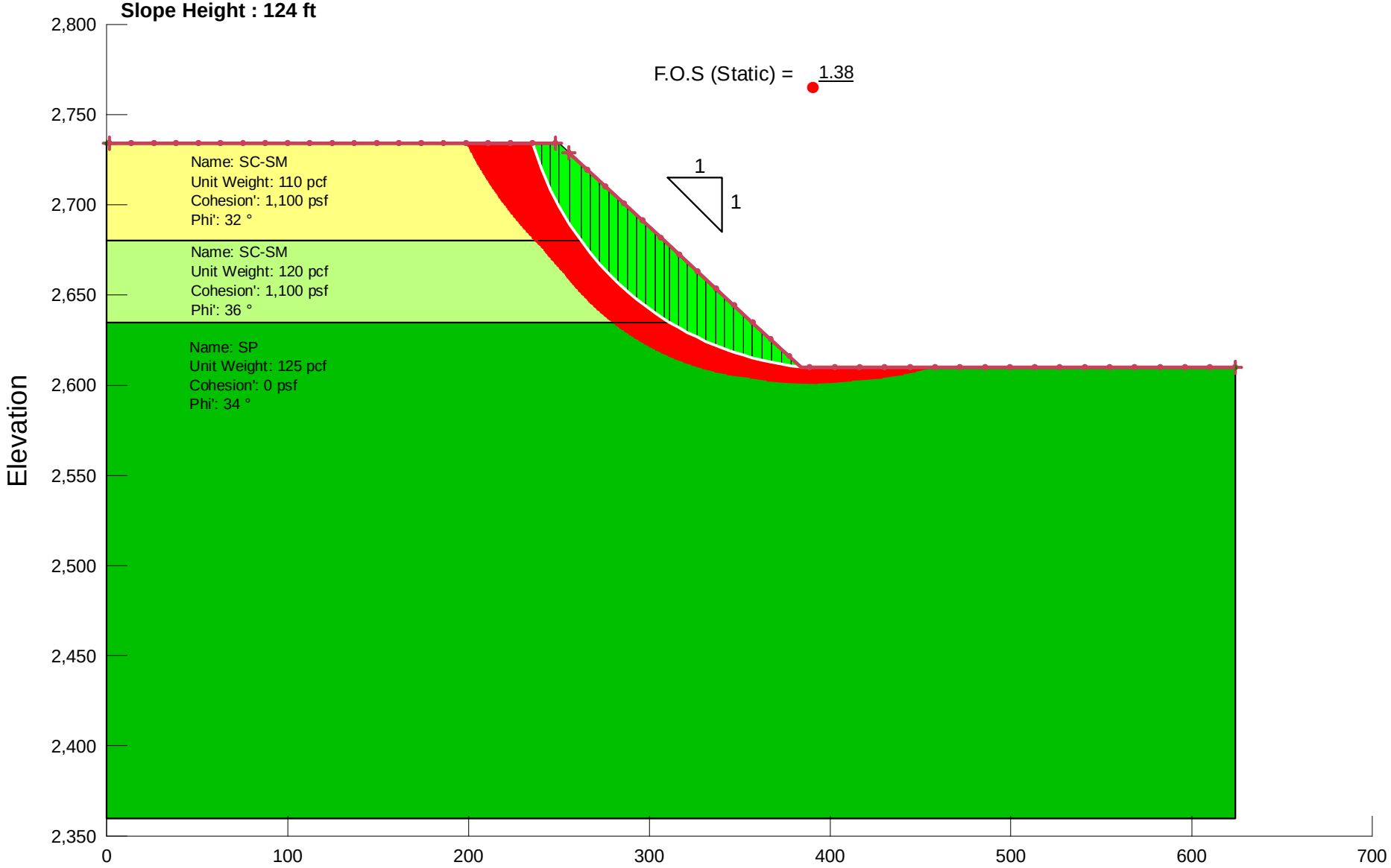


Exhibit: C-5

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 3: Planned East Slope
Slope Stability Analysis
Slope Inclination: 1H:1V
Slope Height : 124 ft

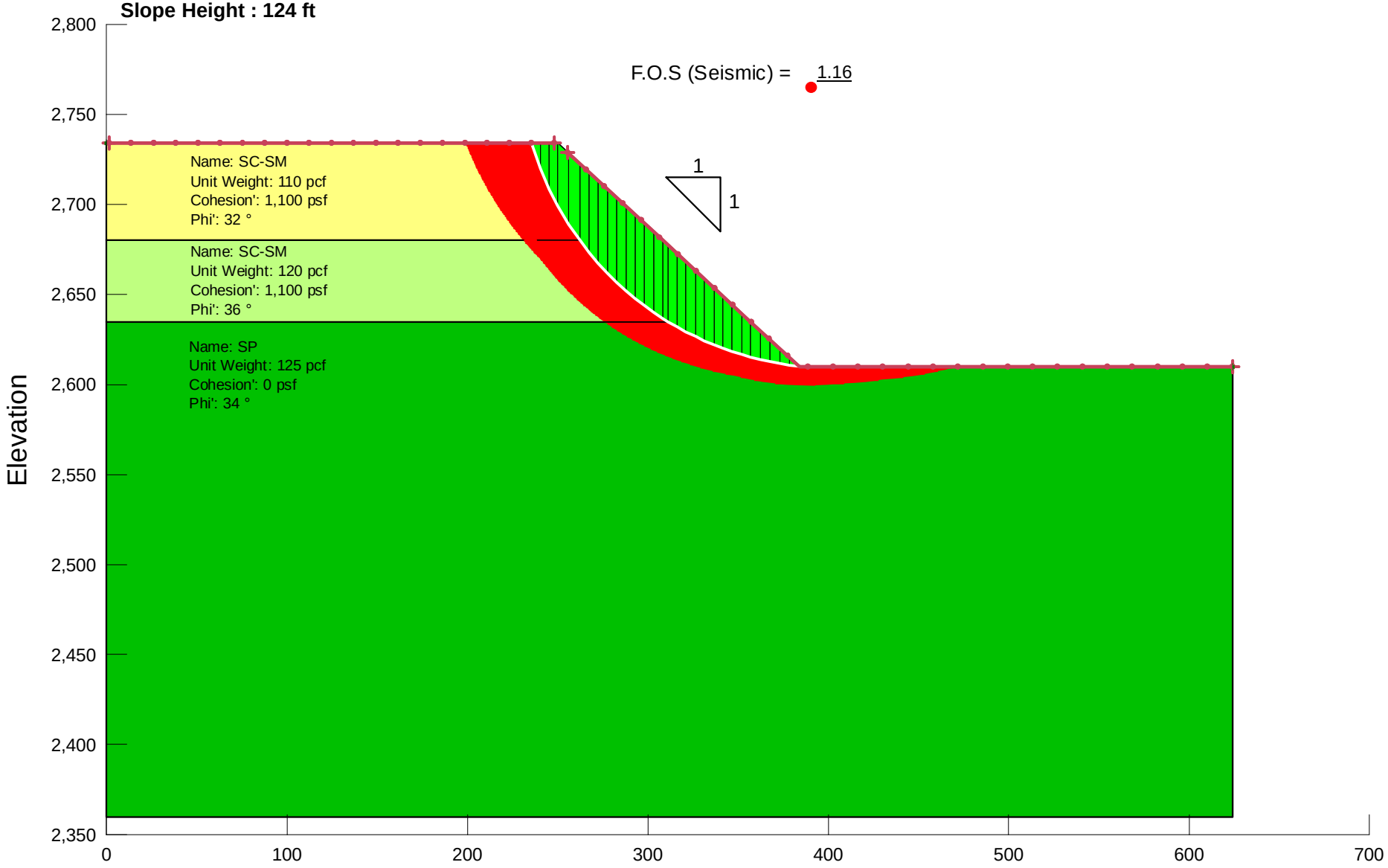


Exhibit: C-6

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 4: Planned East Slope
Slope Stability Analysis
Slope Inclination: 1.25H:1V
Slope Height : 124 ft

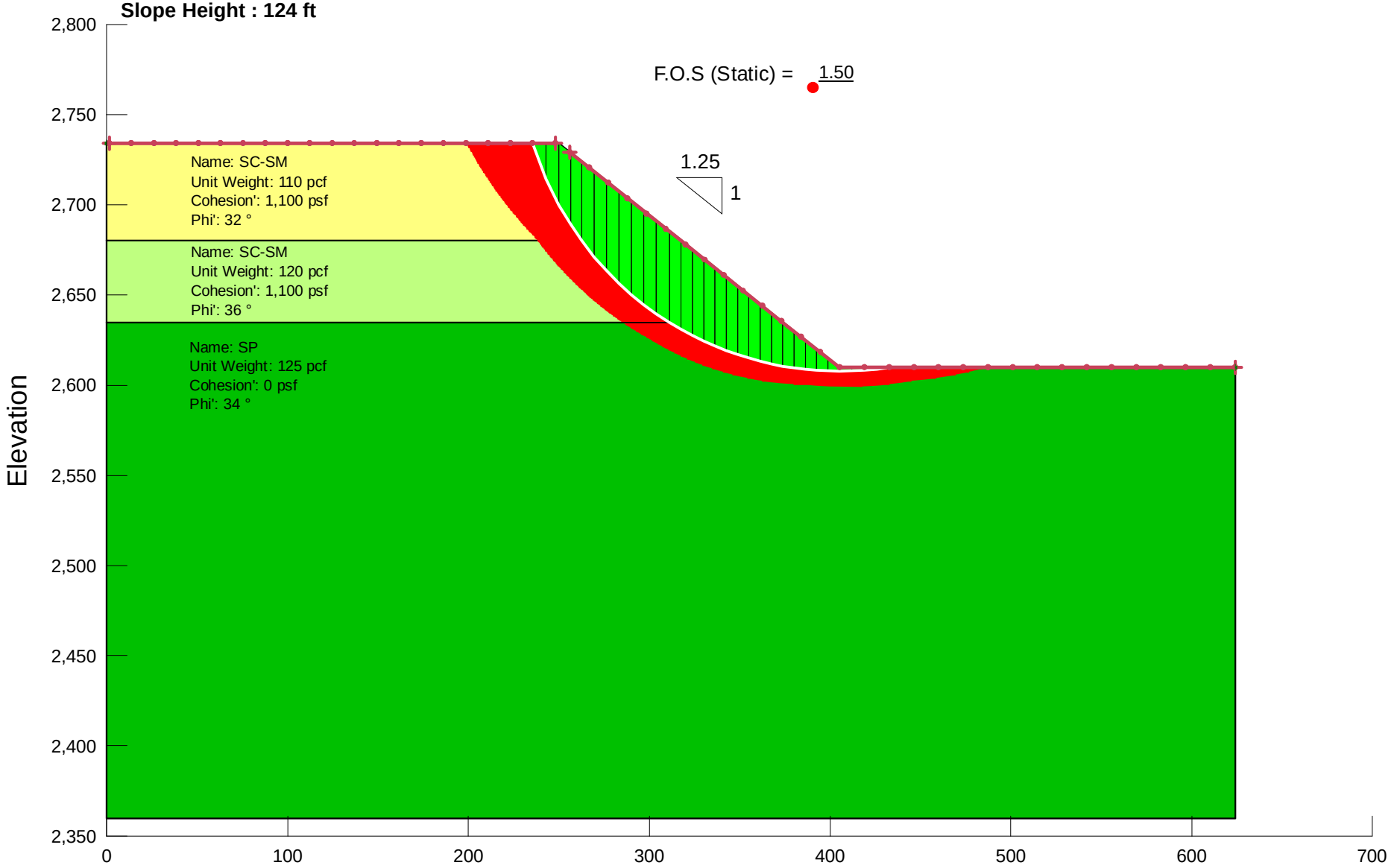


Exhibit: C-7

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 4: Planned East Slope
Slope Stability Analysis
Slope Inclination: 1.25H:1V
Slope Height : 124 ft

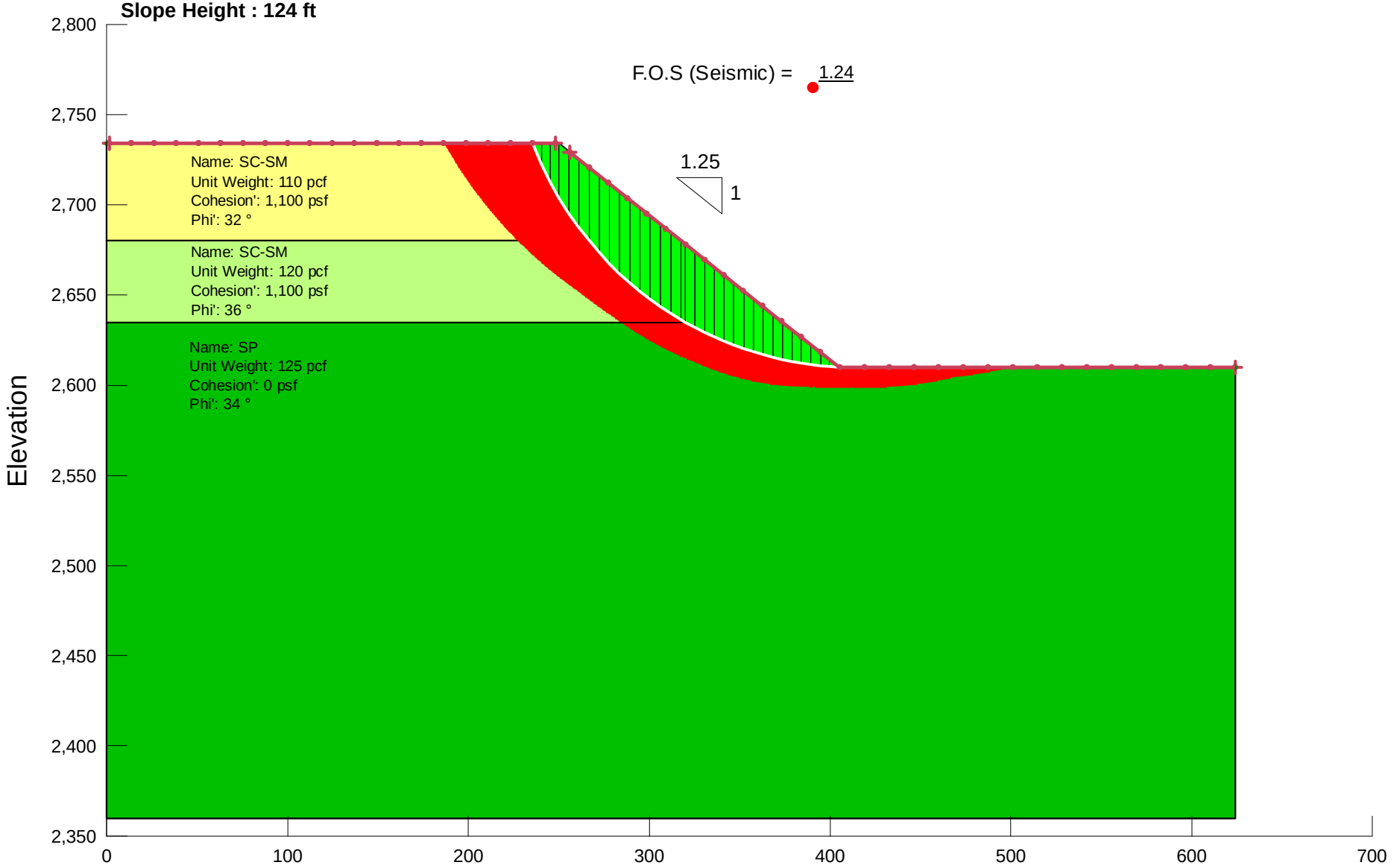


Exhibit: C-8

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 5: Planned East Slope
Slope Stability Analysis
Slope Inclination: 1.5H:1V
Slope Height : 124 ft

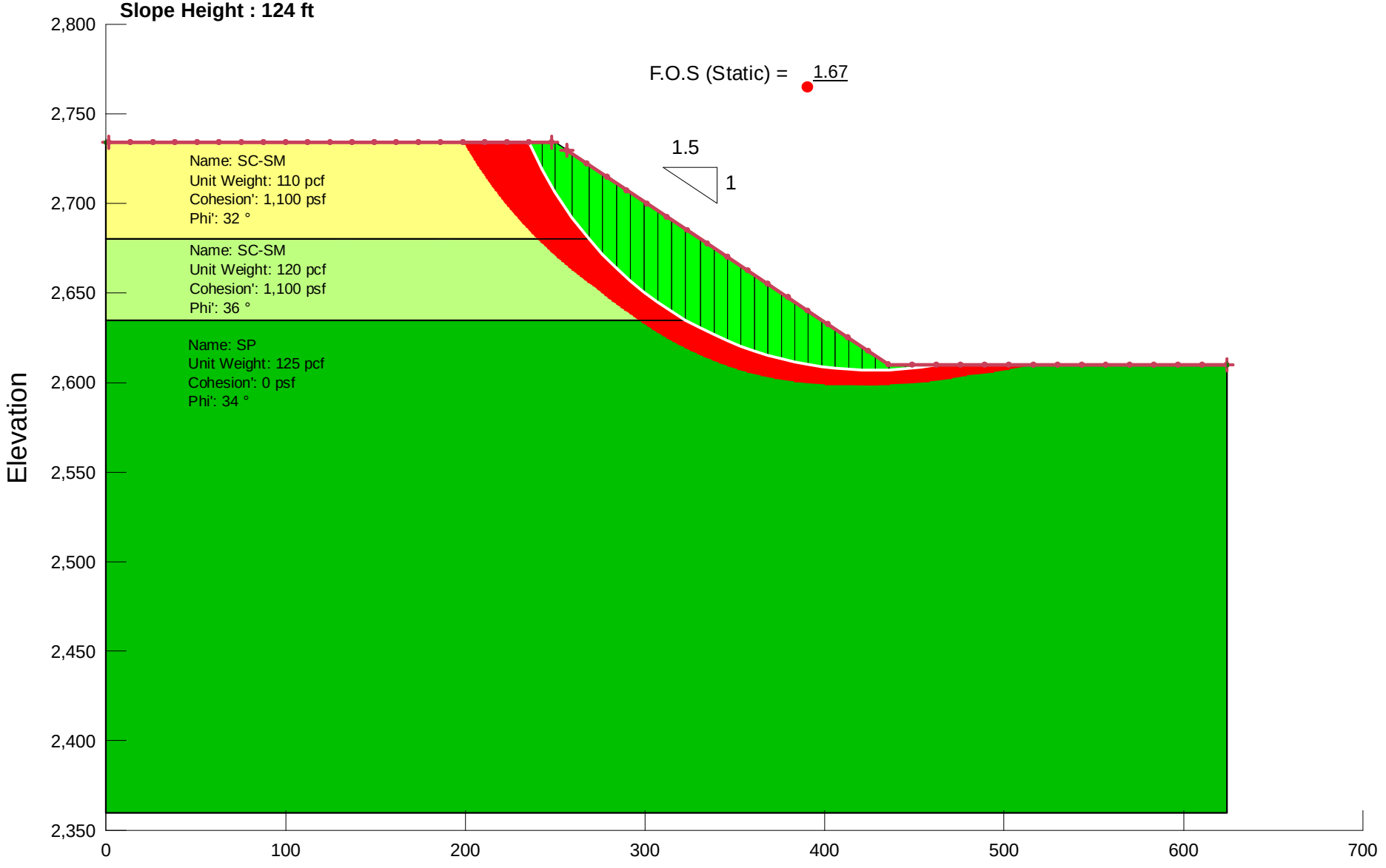


Exhibit: C-9

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 5: Planned East Slope
Slope Stability Analysis
Slope Inclination: 1.5H:1V
Slope Height : 124 ft

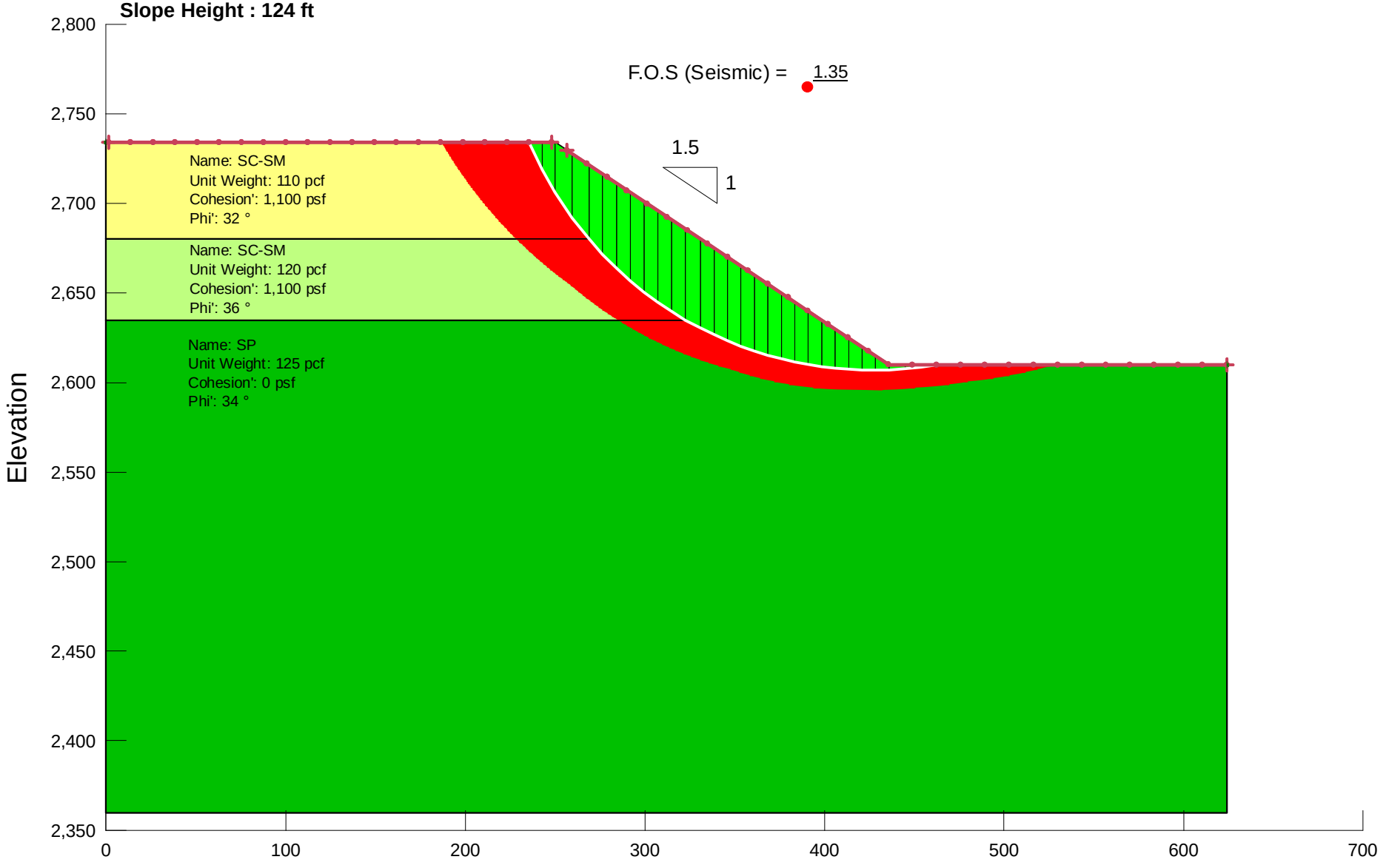


Exhibit: C-10

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 6: Existing West Slope
Slope Stability Analysis
Slope Inclination: Varying from 3H:1V to 1H:10V
Slope Height : 120 ft

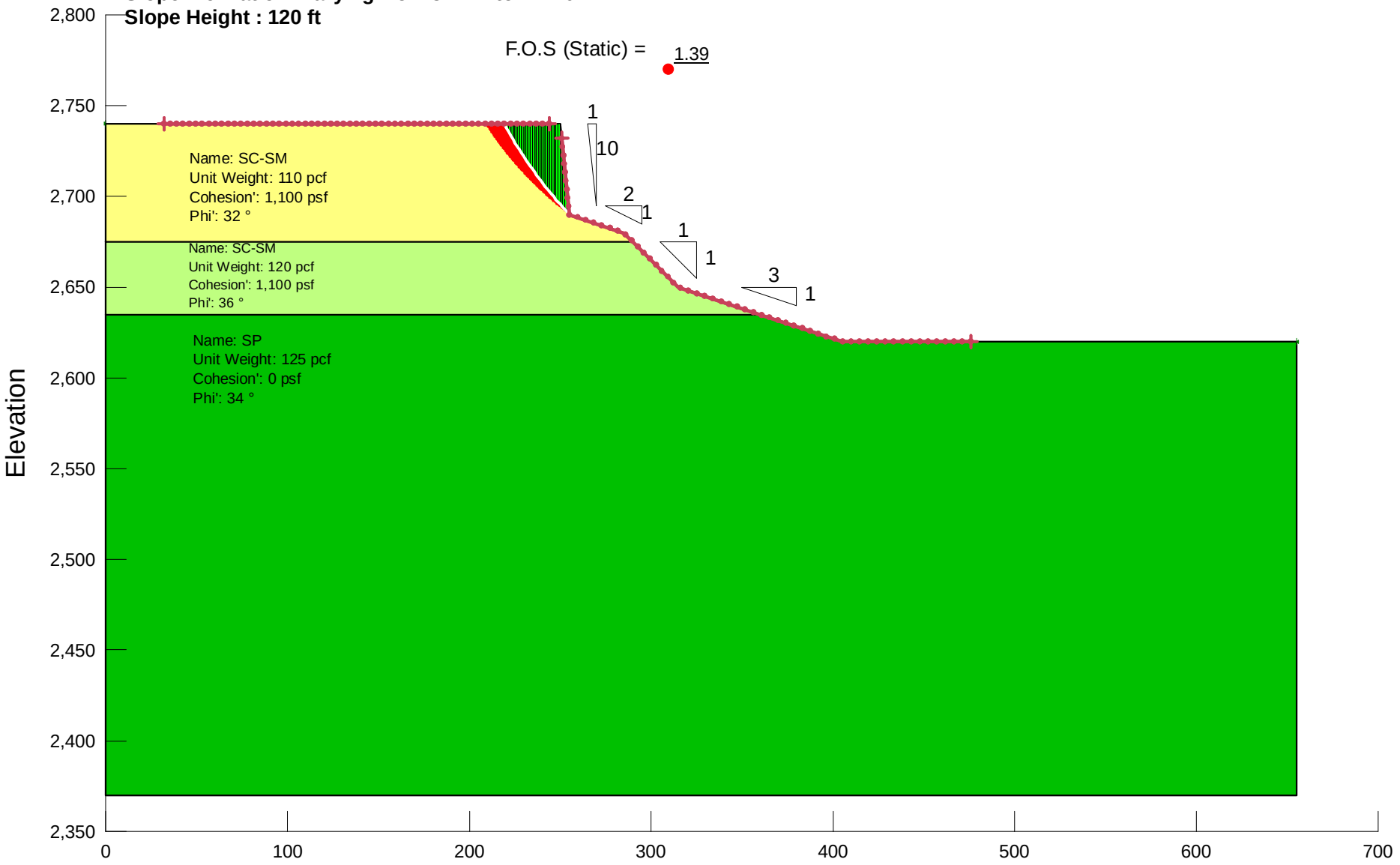


Exhibit: C-11

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 6: Existing West Slope
Slope Stability Analysis
Slope Inclination: Varying from 3H:1V to 1H:10V
Slope Height : 120 ft

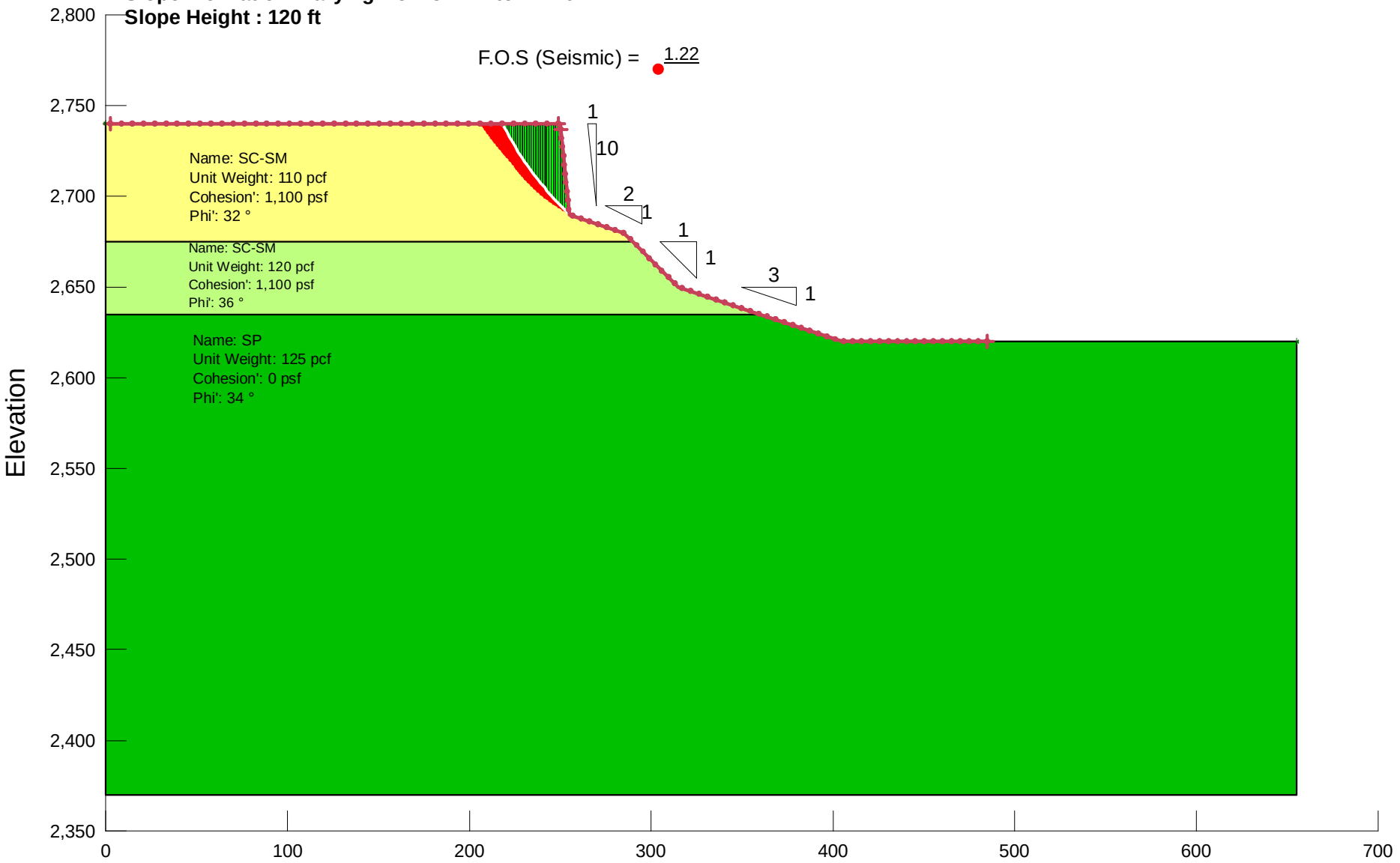


Exhibit: C-12

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 7: Planned West Slope
Slope Stability Analysis
Slope Inclination: 1H:1V
Slope Height: 130 ft

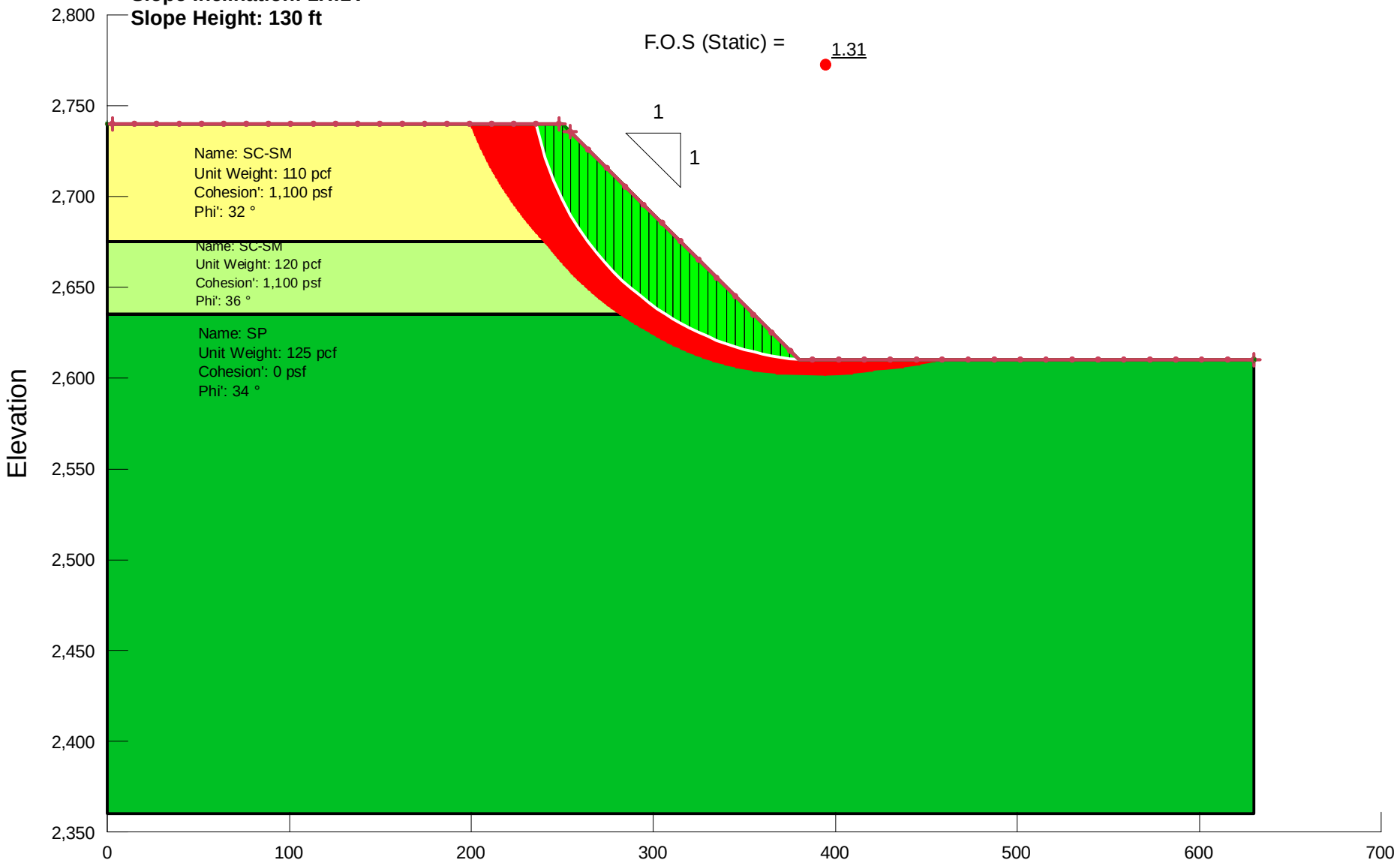


Exhibit: C-13

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 7: Planned West Slope
Slope Stability Analysis
Slope Inclination: 1H:1V
Slope Height: 130 ft

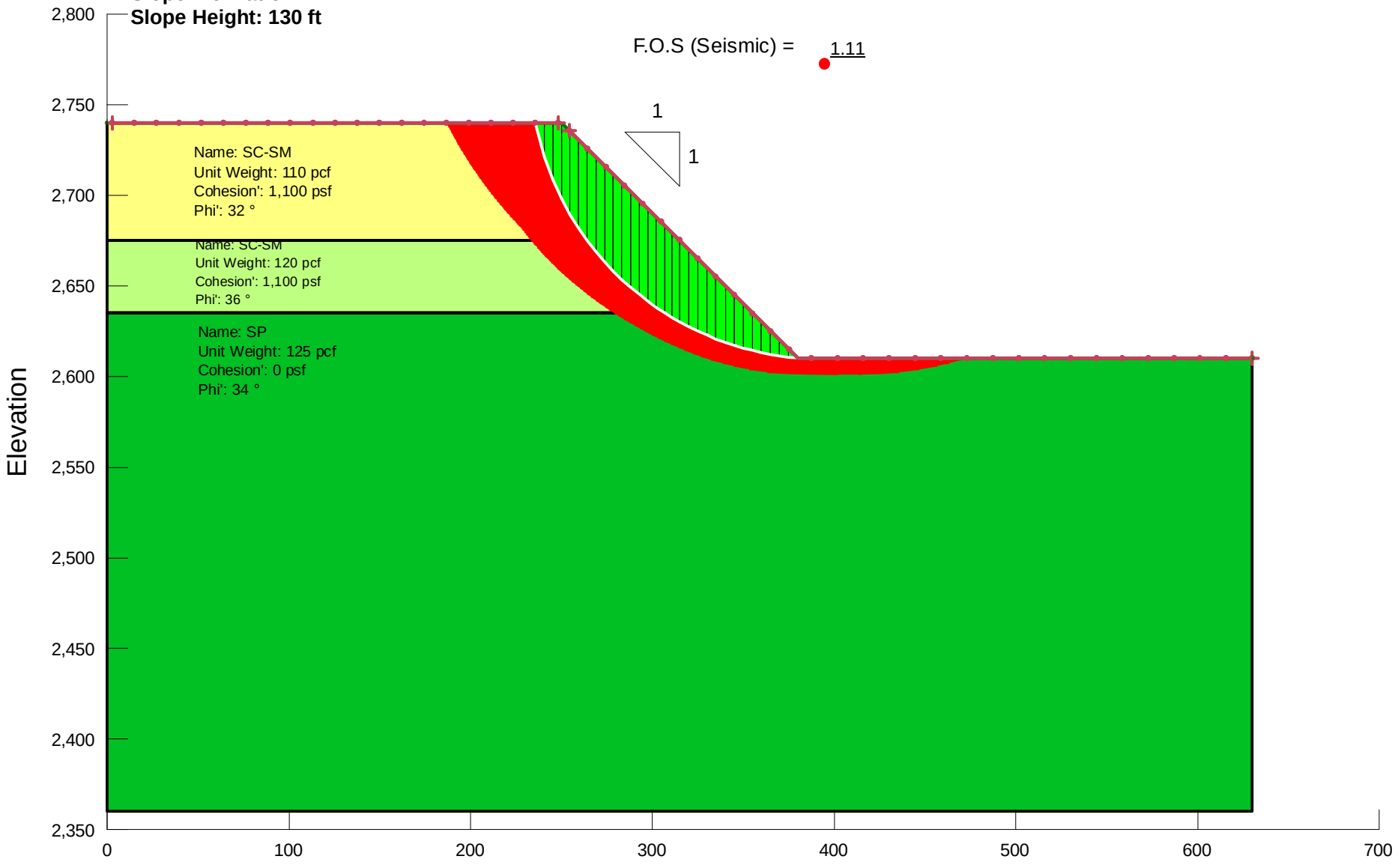


Exhibit: C-14

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 8: Planned West Slope
Slope Stability Analysis
Slope Inclination: 1.25H:1V
Slope Height: 130 ft

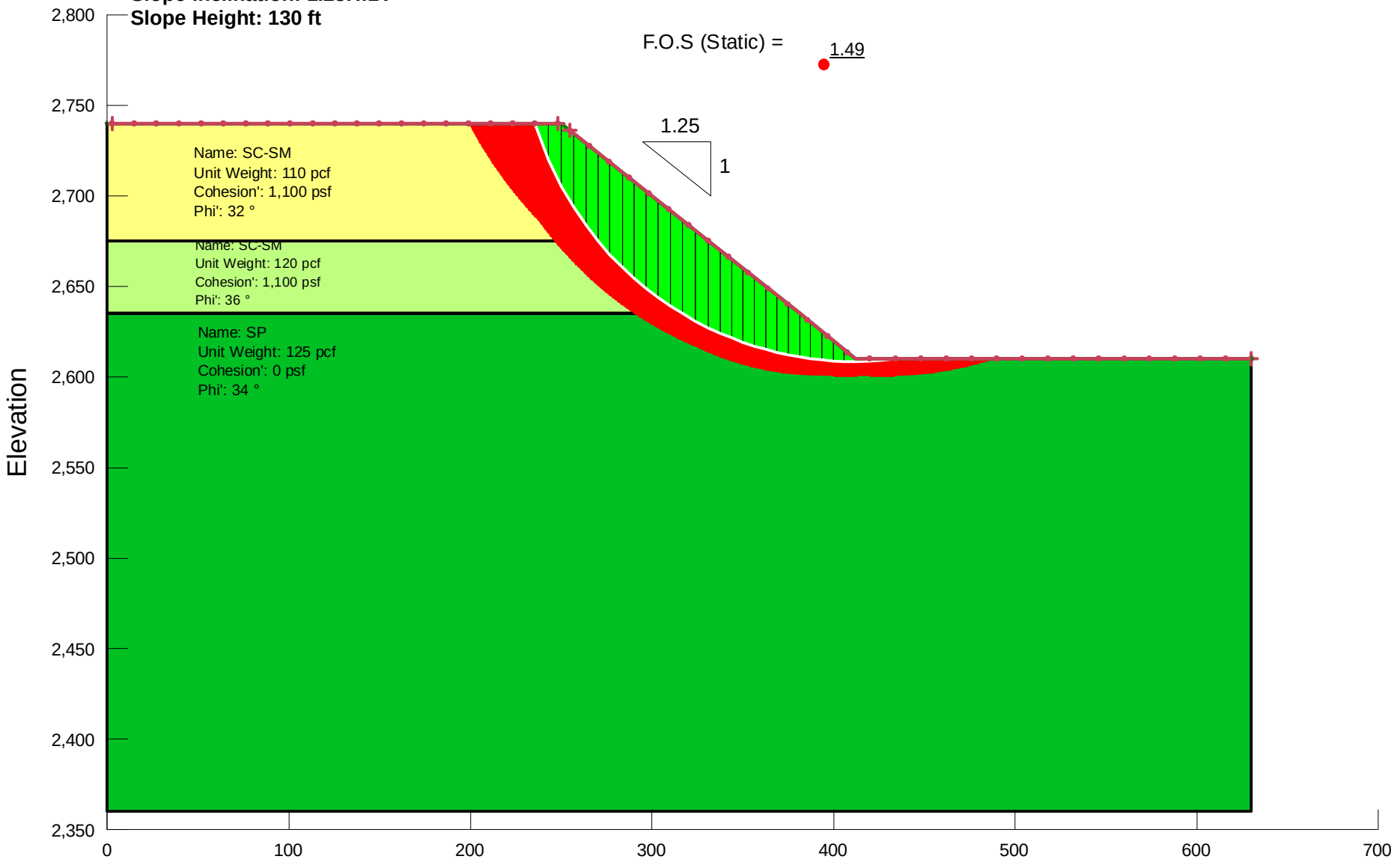


Exhibit: C-15

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 8: Planned West Slope
Slope Stability Analysis
Slope Inclination: 1.25H:1V
Slope Height: 130 ft

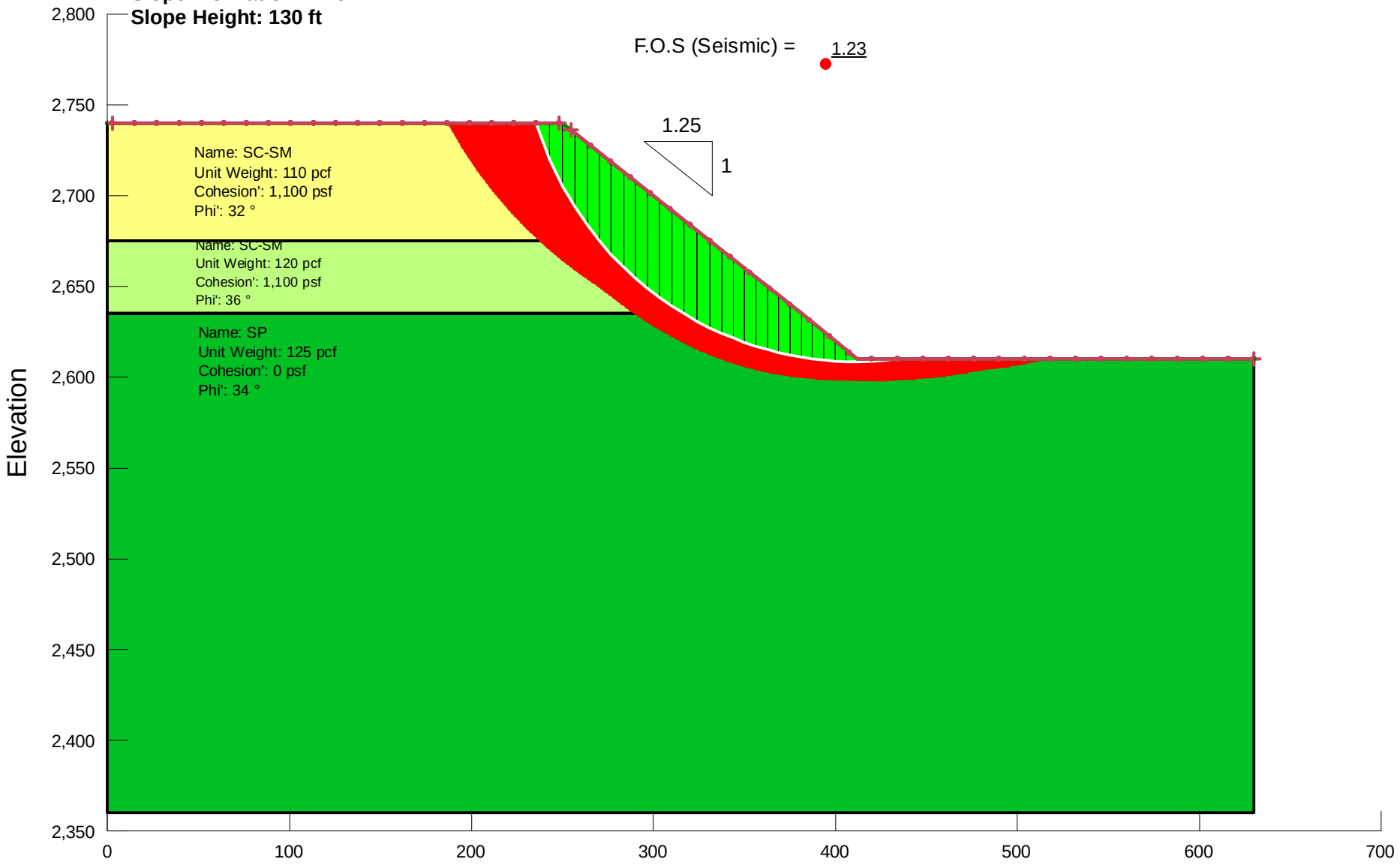


Exhibit: C-16

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 9: Planned West Slope
Slope Stability Analysis
Slope Inclination: 1.5H:1V
Slope Height: 130 ft

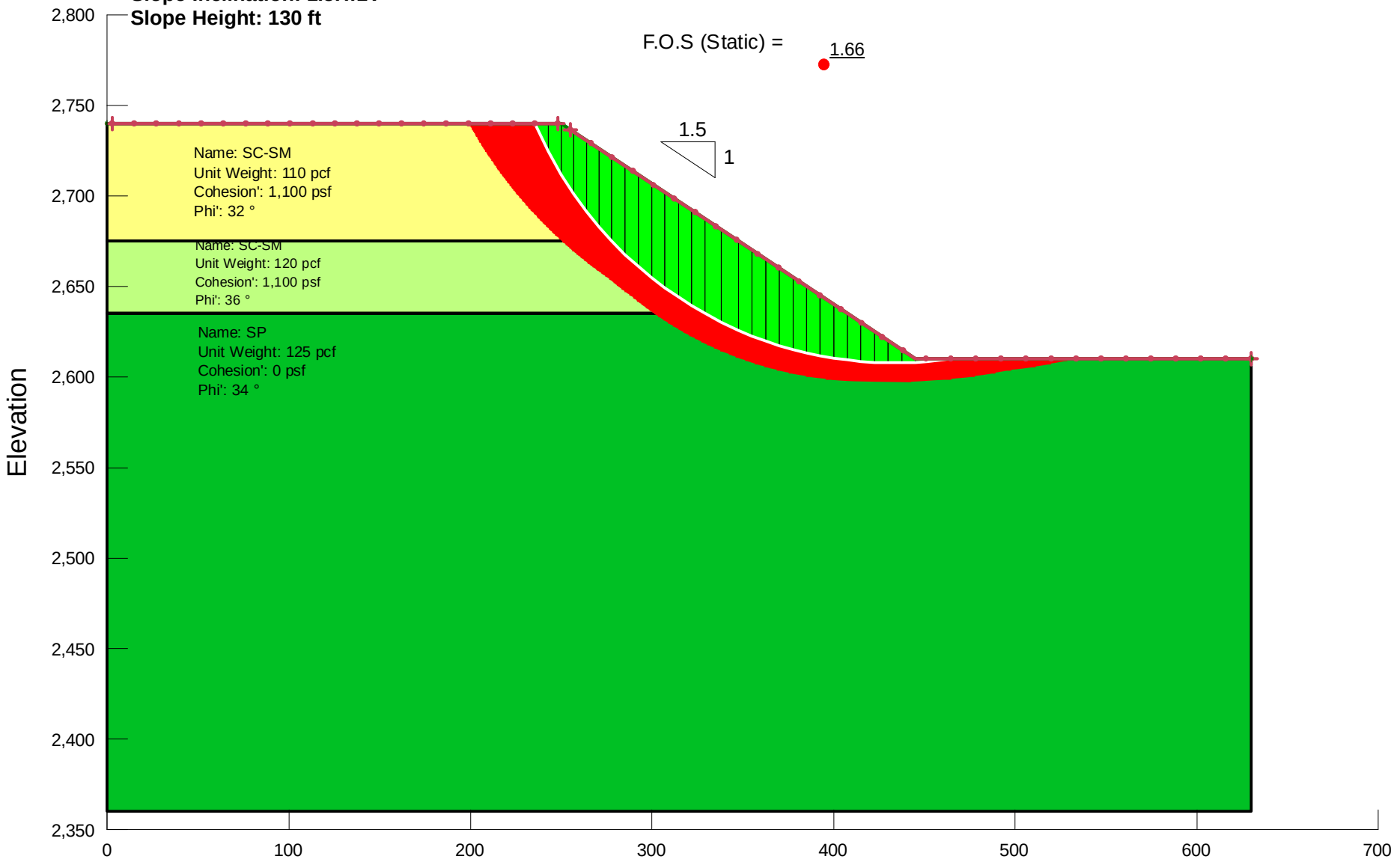


Exhibit: C-17

Harrison Mine Reclamation
Tuscon, Arizona
Terracon Project No. 63195039

Case 9: Planned West Slope
Slope Stability Analysis
Slope Inclination: 1.5H:1V
Slope Height: 130 ft

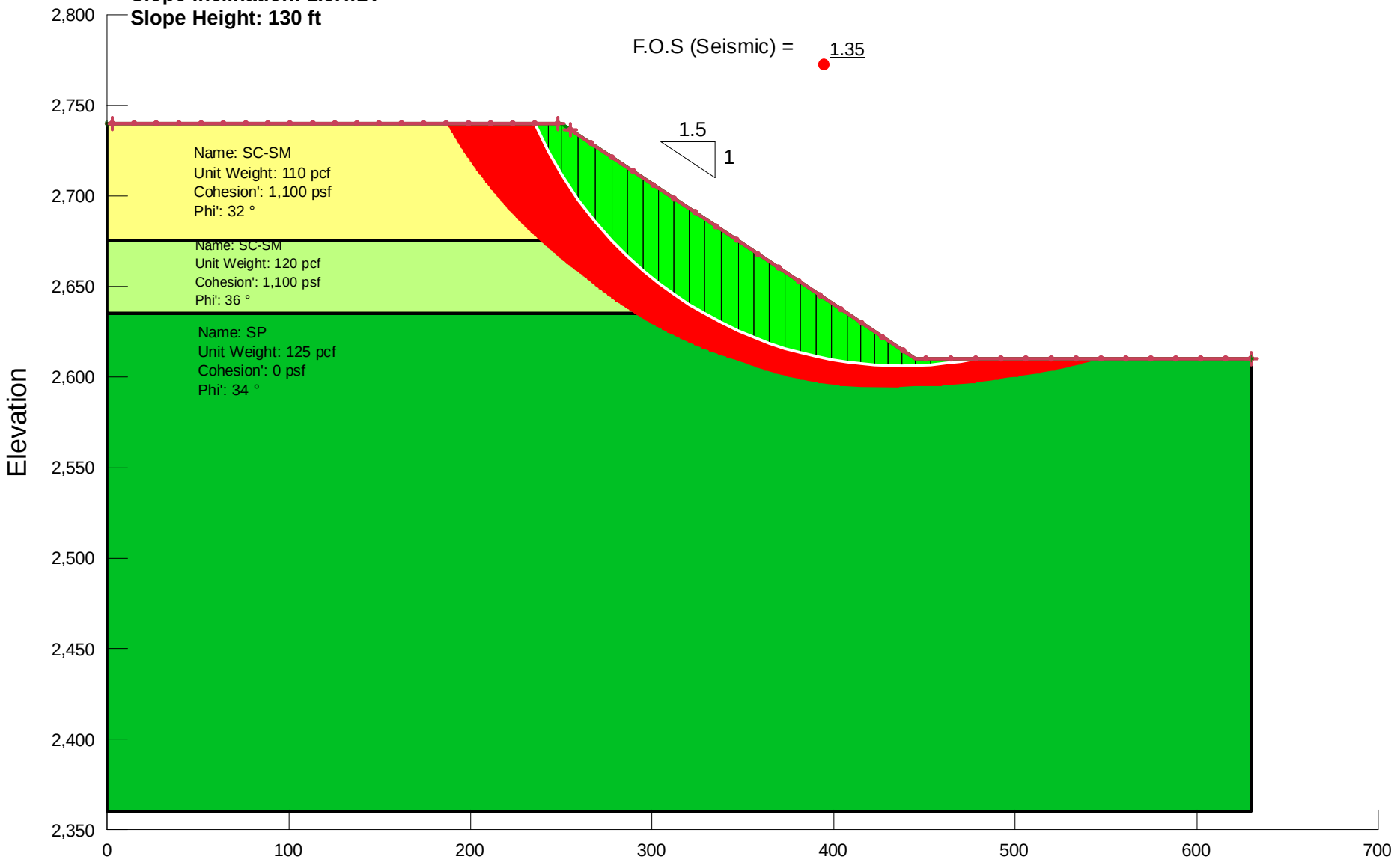


Exhibit: C-18

APPENDIX C
ARIZONA STATE MUSEUM ARCHAEOLOGICAL SUMMARY

Dynamic Civil Designs LLC

THE UNIVERSITY OF ARIZONA
ARIZONA STATE MUSEUM

Arizona State Museum
PO Box 210026
Tucson AZ 85721-0026
(520) 621-6281
www.statemuseum.arizona.edu

21 November 2018

James McMurtrie
Dynamic Civil Designs
10150 N. Tall Cotton Dr.
Marana, AZ 85653

RE: Archaeological Summary Letter in support proposed landfill on Harrison Road

Dear James:

Arizona State Museum (ASM) has reviewed archaeological project and site records in support of Dynamic Civil Designs' "Harrison Road Inert Materials Landfill" project (Figure 1). Correspondence indicates this project will involve converting a former sand and gravel pit into an inert materials landfill located on privately-owned land south of Pantano Wash at 4200 S. Harrison Road in Tucson, Arizona. The project area encompasses all of parcels 136-30-0020 and 136-30-0030 within T14S R15E S34. Below are the results of ASM's research.

Search Results:

According to a search of the archaeological site files and records retained at ASM, 32 archaeological survey projects were conducted within a one-mile radius of the project area between 1978 and 2014. Previous survey work was conducted in support of residential and commercial development; military base improvements; wash stabilization; road and intersection improvements; river park construction; cell tower installation; and the installation and maintenance of transmission, electric, and pipe lines. No portion of the project area has been previously surveyed. Nine archaeological sites have been identified within a one-mile radius of the project area, none of which are within the current project area.

Recommendations and Responsibilities:

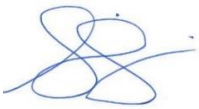
1. The project area has not been surveyed; therefore, ASM recommends, but it is not required by ASM, that a qualified archaeological contractor be consulted before any ground-disturbance begins. A list of archaeological contractors is available on the ASM website at: http://www.statemuseum.arizona.edu/services/cultural-resources-services.

2. Pursuant to Arizona Revised Statute §41-865, if any human remains or funerary objects are discovered during project work, all work will stop within the area of the remains and Dr. Claire Barker, ASM repatriation coordinator, will be contacted at 520-626-0320.

3. City, county, or municipal governments may have requirements; therefore, ASM recommends that the relevant jurisdiction(s) be consulted.

If you have any questions about the results of this records search, please contact me at twilling@email.arizona.edu or 520-621-2096.

Sincerely,



Shannon Twilling, M.A.
Research Specialist
Arizona Antiquities Act Permits Office

Company: Dynamic Civil Designs LLC

Project: Harrison Road Inert Materials Landfill

Parcels:
136-30-0020
136-30-0030

T14S R15E S34

Proposed Project Area

Generated 11/21/2018

Figure 1. Location of proposed project area.