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UWT Response to the July 2017 NOC of Tiered Draft EIR for the Mt. SAC West Parcel Solar Project

Introduction

United Walnut Taxpayers is providing comments on the West Parcel Solar Project Tiered Project Draft EIR to 2012 Facilities Master Plan Program EIR. Comments are divided into aesthetic effects, alternatives evaluation, costs evaluation, and review of 2014 and 2017 Converse study reports and 2017 DEIR Geology and Soils section. A Table of Contents is provided below.

Aesthetic Effects

1. There are three aspects to the aesthetics review, some of which have not been known until the release of this DEIR. They include motorist views of hillside losses, solar project building pad and asphalt surface, motorists views from street level south off Amar Road, and blocked views of residents and motorists.

    a. Motorist View of Building Pad and Asphalt Surface. The disclosure of an asphalt surface covering the building pad was not disclosed until this DEIR. The pictures shown below displays the hillside losses that will be experienced, and a perspective rendering based on known ground features showing the significant contrast between the natural hills versus the building pad and asphalt cover.

    b. Motorists Views from Street Level. Visual aspects from street level show the hillside losses that will occur from construction, traveling in a south to north direction on Grand Avenue. The grading construction element will require a grading permit through the City of Walnut, and must comply with General Plan restrictions of a Scenic Corridor and a Park Connection Corridor along Grand Avenue from Valley Boulevard to Temple Avenue.

    c. Blocked View from Motorists at Street Level. Motorists accustomed to seeing unobstructed views from Regal Canyon Drive will be blocked from views of the natural hillsides and the scenic wildlife reserve. Views would be almost completely obstructed by the building pad of the solar project.

Motorist View of Building Pad and Asphalt Surface

2. Visual effects of the west parcel project are seen from a number of perspectives in the City of Walnut up to a mile from the project, based on its elevated location with a large building pad and asphalt surface set within natural hillsides.

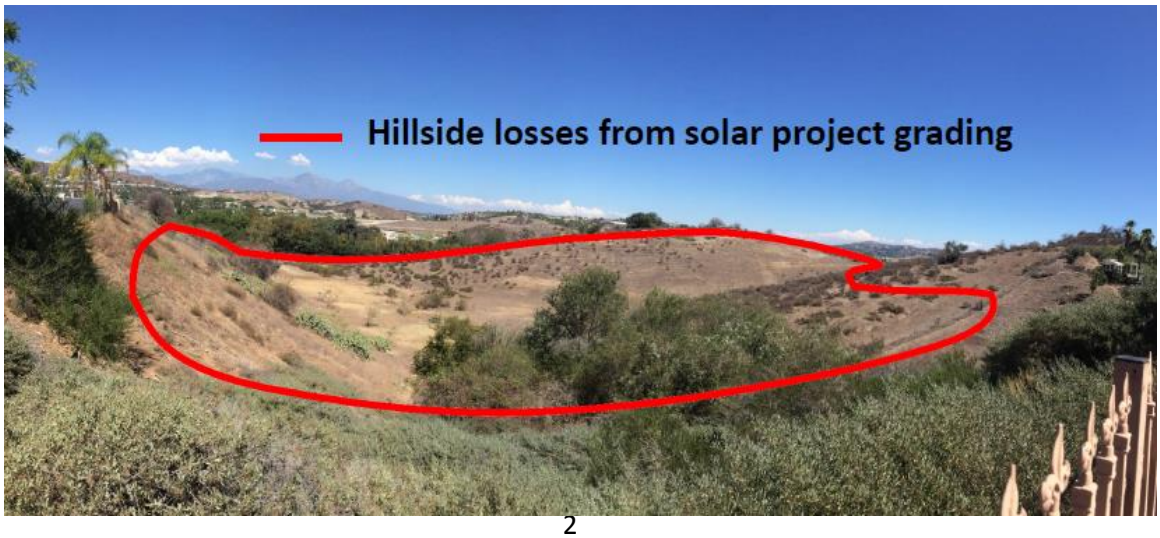
3. Viewsheds along Grand Avenue are Significantly Changed. Massive alterations to the natural viewshed of motorists on Grand Avenue entering from the north are shown below. Viewsheds show significant losses of natural hillsides some 70 feet above Grand Avenue and land areas that will be destroyed and replaced with a sterile building pad with long linear earthfill side slopes, asphalt cover and solar installations. The Grand Avenue viewshed is experienced by 1000's of motorists a day. Similar views are seen from Mountaineer Road.

Hillside Losses from Dirt Building Pad with Asphalt Cover Visible for Grand Avenue Entering

Blocked Views of Motorists by Solar Project Building Pad

4. Regal Canyon Drive in the Willows Community. Residents traveling up Regal Canyon Drive will see the industrial looking solar facility immediately next to the roadway blocking views of the natural canyons that once existed. Hundreds of cars a day travel this route, which will change the character of the passive community into a rigid landscape at its entrance.

Hillside Losses from Solar Project Building Pad at Regal Canyon Drive

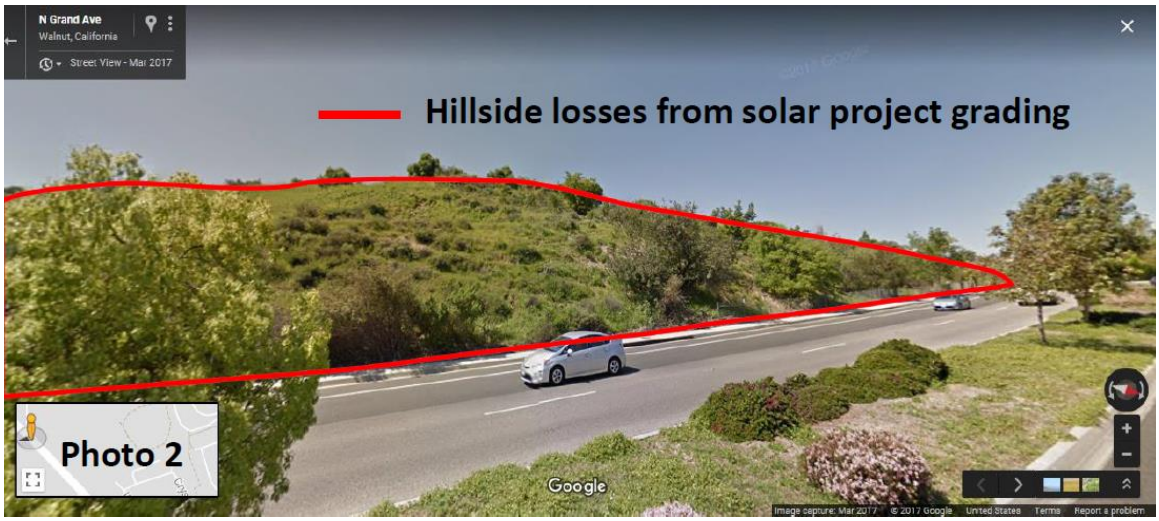


Motorists Blocked View from Solar Project at Regal Canyon Drive

Motorists Traveling Grand Avenue Observe Mass Hillside Losses Inconsistent with General Plan

5. Motorists traveling Grand Avenue would observe loss of hillsides, which is inconsistent with the General Plan Scenic Corridor designation of the roadway. The following views of Grand Avenue (photos 1 through 3, below) traveling from south to north from Snow Creek Drive to Amar Road displays the scenic values of Grand Avenue at street level and the significant destruction of native hillsides and vegetation caused by the west parcel project.

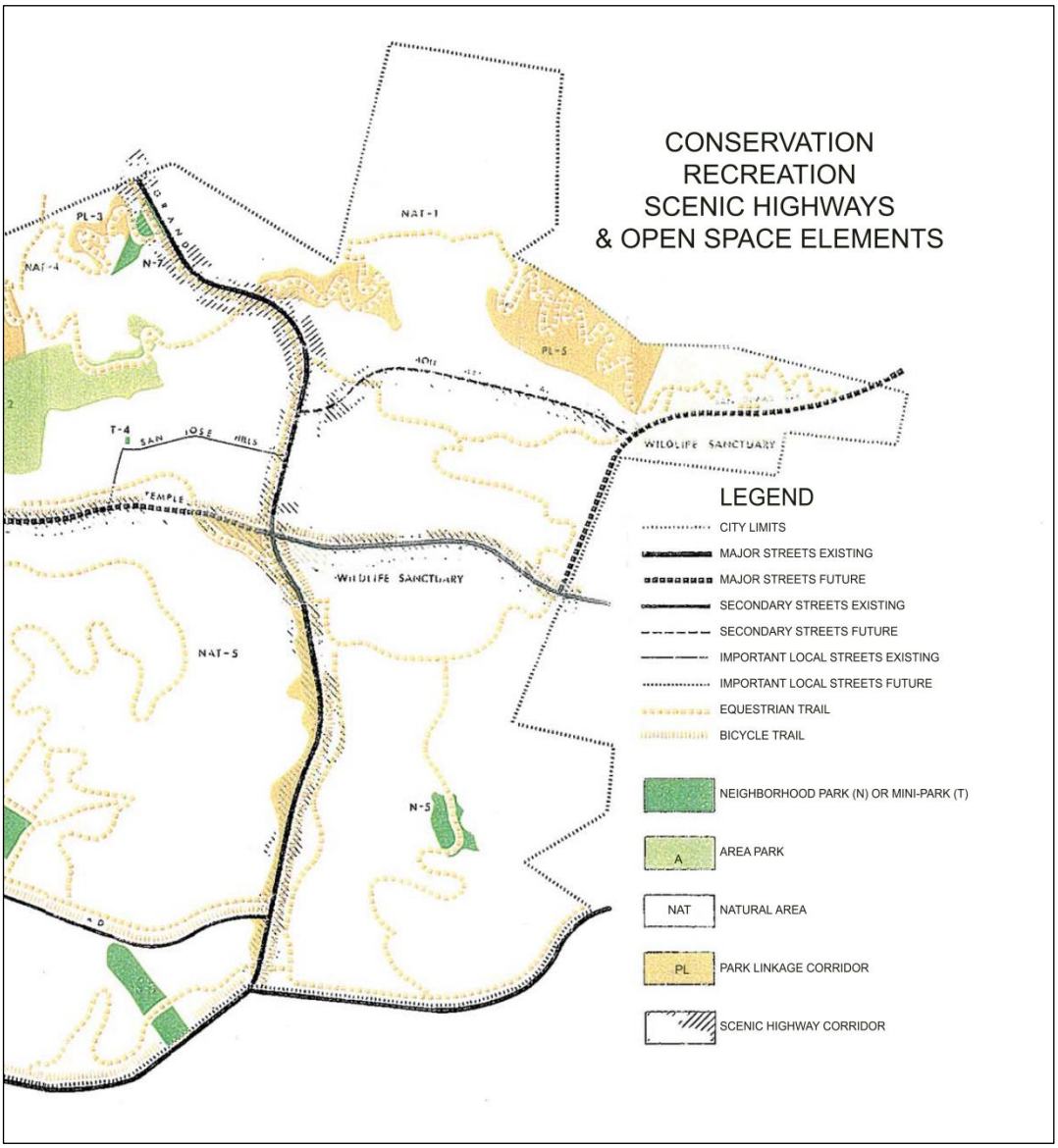
Hillside Losses from Solar Project Traveling form Snow Creek Drive to Amar Road



General Plan Conservation, Recreation, Scenic Highways & Open Space Element

6. The General Plan Conservation, Recreation, Scenic Highways & Open Space Element, page 49, Element VI states, "Of all the existing roads within the City of Walnut, Grand Avenue possesses the most scenic value" and that …… "It has naturally scenic qualities south of Temple Avenue." This is precisely where Mt. SAC intends to destroy its natural hillside beauty and replace it with up to 70 feet of earthfill covered with asphalt. Further, the General Plan states, "It can be viewed as a linear open space corridor maximizing both urban and natural processes." The destruction of the natural hillsides as planned under the proposed solar project would violate the intent to the General Plan designation of Grand Avenue as a scenic highway. The Scenic Highway designation along Grand Avenue is shown on the following figure.

7. According to the City of Walnut official's, Mt. SAC's grading plan submittal will be required to comply with this Scenic Highway designation, which would be in conflict with the proposed west parcel project.



Alternatives Evaluation

8. The Mt. SAC West Parcel DEIR has preliminarily evaluated six alternatives for solar power generation at different locations, and of different configurations and generation capacity. The alternatives evaluation, however, focused almost entirely on the west parcel, affording several paragraphs of description and analysis each to the other alternatives. A broader comparative assessment of the environmental impacts of alternatives, as required under CEQA Section 15126.6, is omitted.

<u>Scope of Alternatives Evaluated</u>

9. The scope of the DEIR relies mainly on economic evaluation of the alternatives as a decision-making tool, but omits the broader scope evaluations of environmental impacts of alternatives as part of the decision-making process. The alternatives include:

a. West parcel
b. Hillside area east of the stadium
c. Hillside area north and adjacent to Temple Avenue
d. Lot F
e. Lot A (Parking Structure J)

10. The United Walnut Taxpayers has evaluated a solar panel system on Lots B/B3 and discusses below the benefits of a parking structure initially proposed by Mt. SAC at Lot D in the 2015 SEIR.

Differing Levels of Resource Inventories and Impacts Evaluation

11. Imbalanced Resource Inventories and Impact Evaluation. Other than the west parcel, none of the alternatives are subjected to a similar level of resource inventory and impacts evaluation required by CEQA. Typically, a screening process removes certain alternatives found deficient in meeting project objectives, and is described in the screening process. This process may leave one or more alternatives for more detailed evaluation and comparison. Given this limited resource inventory and impact evaluation process of all but the west parcel, a reasonable comparison of alternatives is unworkable even in the limited scope evaluation described in Table 6.6.1

12. An evaluation of three alternative sites and methods for solar power generation was evaluated in a limited scope, unpublished report, "Solar Power Options for Mt. San Antonio College" in November 2013. The alternatives included (1) a 2.0 MW ground-mounted system at the west parcel, (2) a 0.33 MW system mounted atop a parking structure at Lots A/A2, and (3) a 1.5 MW carport [canopy] type system located in student Lot F. In some limited capacity and configuration, these alternatives have been evaluated in this DEIR. This reinforces that alternative configurations and locations for solar generation are available on campus.

Comparable Generation Capacity is Achievable at Several On-Campus Locations

13. The land area required for solar generation is estimated at 1.5 MW (2017 DEIR) over 3.4 acres at Parking Structure J or 2.3 MW per acre. An analysis of the Honolulu and Kahului Airports buildings and parking structures yields 3.1 MW per acre and for the Minneapolis-St. Paul Airport, an analysis of the parking structures yields 2.3 MW per acre. An average of the above three installations results in 2.7 MW per acre as a planning assumption, particularity for solar panels atop parking structures. Certain canopy-type solar systems may require larger net acreage per MW.

14. The alternatives included in the DEIR consistently do not match the generating capacity of the west parcel. However, examination of land areas available at various alternative sites show that equivalent generating capacity can be developed at Lot F, Lot B/B3, Lot D/D1 and Lot M. Moreover, the latest 2017 master plan indicates approximately 40 acres of parking lots are available on the Mt. SAC campus, providing many opportunities for alternatives to the west parcel.

Premature Discarding of Alternatives

15. In the alternatives evaluation, Mt SAC has prematurely discarded viable alternatives that either individually or in combination with other campus facilities may have formed viable alternatives. For example, proper consideration of solar panels atop parking canopies could result in a solar array not readily visible to nearby residents and motorists. These examples if properly sited could dramatically reduce visual impacts and be more favorable to the public, with decreased impact on the environment and natural landscape.

Combined Parking Structure and Solar Panel Systems

16. The alternative of a parking structure and with canopy mounted solar panels atop are viable at Lot F, Lots B/B3, Lots D/D1 and Lot M, which would not present unacceptable visual impacts to the public.

17. The time students must walk to certain parking structures configured with canopy-mounted solar systems is not objectionable. The walking time from Lot B near the Primary Instructional area compared to the furthest walking distance to Lot F or Lot M amounts to only 3 additional minutes. Based on Google maps walking rates for this flat terrain, the total walking times at 2.5 miles per hour walking rates are:

    a. Centroid of Lot F = 1889 feet (7.5 minute)
    b. Centroid of Lot M = 2100 feet (8.4 minutes)
    c. Centroid of Lot H = 1600 feet (6.3 minutes)
    d. Centroid of Lot B = 1200 feet (4.8 minutes)
    e. Centroid of Lot A = 800 feet (3.1 minutes)

Specific Comments on Alternatives

18. Motivation for West Parcel Project is for Campus Dirt Disposal. The report "Solar Power Options for Mt. San Antonio College", November 2013, states, "The use of the site for solar generation also provides an opportunity for the college to transfer soil from other construction projects on campus", likening the natural hillsides and canyons of the west parcel to a disposal zone. It is believed that the motivating factor and singular reason for the import of fill to the west parcel site is for disposal of dirt from the stadium hill and not the installation solar panels as much as 70 feet above street level. This was an unsound motivation, which has driven poor decision-making affecting surrounding residents, and the quality life and public safety in the City of Walnut.

    a. Hillside Alternatives in Agricultural Zone Unacceptably Impact the Natural Environment

        The hillside alternatives east of the stadium and north of Tempe Avenue result in significant impacts the natural environment. These two alternatives would be fixed ground mounted solar panels on native hillsides surrounding the college, which would result in similar impacts to hillsides as experienced on the west parcel. The UWT organization has not requested the evaluation of these alternatives. The destruction of the natural hillsides and agricultural zone is unacceptable.

        The alternatives evaluation for the hillside sites rely on prorated costs of earthwork. Because of the variable topography in hillside areas, the quantities of earthwork cannot be reliably estimated through prorated quantities. The costs of a linear or uniformly sized facility on flat ground may be prorated to a degree; however, earthwork quantities on variable topography cannot be prorated or relied upon for decision-making.

    b. Lot F is the Environmentally Preferred Alternative and Offers Combined Parking Structure/Solar Panel Benefits

        If located in areas less visible to the public, a parking structure with solar panel system atop would combine the uses of a solar panel system and parking structure, meeting the needs of both, saving land space, and possibly reducing public criticism.

Table 6.6.3 states further states that Parking Lot F is the Environmentally Superior alternative, before mitigation, which is a valid conclusion based on no impacts to habitats, and no aesthetic impacts to native hillsides. Remarkably, this conclusion is inconsequential since decision-making has been based solely on economic benefits, at the exclusion of environmental values.

At a 5.7-acre useable area estimated through Google maps, Lot F site is capable of supporting over 2 MW peak generation capacity with solar panel installations based on our estimate of 2.7 MW per acre, whereas the DEIR has limited Lot F to 1.5 MW peak capacity. From examination of land areas available, equivalent generating capacity to the west parcel can be developed.

c. Lot A (Parking Structure J) Confirms Planning Assumptions of 2.7 MW per Acre for Solar Installations

Based on area availability of 3.4 areas at Lot A, the 1.5 MW DEIR estimates of peak capacity at this location would be accomplished at 2.3 acres per MW. Considering this and results at other parking areas, UWT has used a planning assumption of 2.7 acres per MW.

d. Lot B/B3 (a United Walnut Taxpayer's proposal)

Significant Earthwork Costs Omitted from West Parcel Cost Estimate. The DEIR states that Lot B/B3 is not available because it is reserved for structured parking and is more costly than the west parcel. Should a parking structure be implemented near this area, consideration could be given to canopy mounted panels or solar panels atop a parking structure that could combine land use functions and be less visible from street level. The DEIR conclusion that a canopy mounted panel system is more costly than a west parcel system is false for the following reasons.

DEIR Earthwork Costs. Significant earthwork costs have been omitted from the total cost of the west parcel. For a reasonable cost estimate comparison of the west parcel to canopy mounted solar panels systems, proper grading costs must be included in the west parcel. Specifically, Table 6.6.1 included total grading costs of $1,813,800 and an export saving credit of $1,500,000 if avoiding earthwork exports off-site, for a net earthwork cost to the project of $313,800.

Documented Earthwork Quantifies. Earthwork quantifies of at least 477,500 CY are documented or characterized in the DEIR, including on-site grading (cut/fill) ($177,500 (CY), import from the stadium hill (139,000 CY), landslide removal based on Converse test pit cross sections including bulking (103,000 CY) and a stability key to help stabilize fill slopes including bulking (58,000 CY).

Earthwork Unit Prices. Given the above, it would be necessary to perform all earthworks on the project (477,500 CY) for a cost of $313,800 or at a unit price of $0.66 per cubic yard. This is unrealistic, since the representative unit costs of similar earthwork would be $13-$14 per CY, based on a survey of known contractor bids for similar work (see below).

Applying a realistic unit price of $14 per cubic yard to earthwork quantities of 477,500 CY yields a grading cost of $6,685,000 making the west parcel significantly more costly than solar panels mounted atop parking canopies or parking structures.

e. Lot D/D1 Described in 2015 SEIR May Function More Efficiently as a Combined Parking Structure./Solar Generation System

The 2015 SEIR discusses the benefits of a parking structure on Lot D to "provide parking for vehicles arriving from the south, west or east" and because of close proximity to the campus Primary Instructional zone. Solar panels atop the parking structure favorably combine land use functions of two facilities over a common land area. Solar panels are also less visible if elevated from street level. See the figure below depicting a parking structure with canopy solar panels at the top-level. The facility in the figure covers a 3.7-acre area and at 2.7 MW per acre would generate peak power of approximately 1.4 MW, but is expandable to the east or west to increase generation capacity.

The weight of the canopy structure and solar panels atop the parking structure are within CSB load requirements and require no additional strengthening in the parking structure (telecom. Sassi, 2017), such that costs per acre would be similar to canopy mounted panels at ground level.

Certain Alternatives Comparisons on Table 6.6.3 are False or Misleading

19. Loss of Non-Native Grasslands. Table 6.6.3 states the west parcel would result in the loss of no non-native gasses. This is false. The West Parcel Solar Project Biological Technical Report, May 2017, indicates the west parcel is substantially covered with non-native grasses, while other alternatives (excepting hillside alternatives) have no impacts to non-native grasses.

20. Adverse Impact. Table 6.6.3 makes the over-generalized and questionable statement that the west parcel alternative has no adverse impacts, while all other alternatives have adverse impacts. The west parcel exhibits significant impacts to non-native grasslands, coastal sage scrub, aesthetic impacts as demonstrated above, public safety issues demonstrated by active landslides, and co-mingling truck haul routes with public roadways. These are clearly adverse impacts.

21. Environmentally Superior Alternative. Table 6.3.3 states that the Parking Lot F is the environmentally superior alternative before mitigation, which is a valid conclusion based on no impacts to habitats, and no aesthetic impacts to native hillsides. However, this conclusion is inconsequential since all decision-making is based on economic benefits, at the exclusion of environmental values.

22. Conflicts with Campus Habitat Mitigation Plans (CBW/LUMA). This impact category correctly states that Lot F would not have impacts to the California Black Walnut Management Plan (CBW) and Land Use Management Areas (LUMA).

23. Earth Import Possible. This impact category implies that alternatives that dispose of dirt on the west parcel have beneficial impacts. Specifically, the west parcel project encourages disposal of dirt on its land areas from throughout the campus, which maximizes impacts to native habitats, and to public safety demonstrated by active landslides and co-mingling truck haul routes with public roadways.

Depiction of Lot D Parking Structure with Solar Panel Canopies at Roof Level

Cost Evaluation

24. Summary. The DEIR provides no back up information for the alternatives costs, makes cost adjustments generally beneficial to the west parcel costs but not to other alternatives, and when summing grading costs and export savings reduces grading costs to near zero. UWT has developed independent unit costs of grading which can be applied to major grading quantities and has developed costs of solar panels materials and installation, which together comprises the majority of project costs.

DEIR Assumptions and Cost Adjustments

25. Sensitivity of Cost Assumptions. Certain cost assumptions in Table 6.6.1 are highly sensitive to overall cost and in most cases will change the ranking of the alternatives. The most relevant assumptions and adjustments follow:

    a. Sunk Costs Should be Applicable to All Solar Generation Alternatives. Table 6.6.1 applied sunk costs to all but the west parcel. These costs should be applied to the west parcel as well, since they represent $1.5 million in legal fees of west parcel litigation.

    b. Costs to Export Stadium Hill Dirt Can be Avoided. The assumption that remaining dirt at the stadium hill must be hauled away at a cost to the project could well be erroneous. The remaining dirt, consisting mainly of good quality silty sand with some clay, may be used by contractors for off-site grading and hauled at no cost to the project. Sand and gravel suppliers and truckers may seek sources of earth borrow for customers and haul the dirt free of charge (telecom. WCSG, 2016, 2017).

In any case, a realistic effort should be made to have dirt removed at no cost and not assume it must be hauled at project cost. This assumption significantly changes relative costs of the west parcel versus solar panels mounted atop canopies or parking structures.

c. Cost of the Landslide Identified by Converse (2017) Must be Included in Total Costs. Removal and replacement of large quantities of landslide materials at the west parcel must be included in project costs. If not properly removed and replaced, these areas could experience landslides during construction or operation of the project.

d. SCE Incentives Should be Applied all Solar Alternatives. The cost incentives offered by SCE is a significant benefit to project costs and substantially affects the ranking of alternatives. The DEIR statement that SCE Incentives have been assured to the west parcel project appears to be false. SCE representatives have indicated the Net Energy Metering (NEM 1.0) program that the project is benefitting from expired on July 1, 2017, and has now become the NEM 2.0 Program. Unless applicants had their solar project installed and inspected by July 1, 2017, they will be required to reapply under the NEM 2.0 program. On this basis, any solar installation alternatives has been assumed to receive SCE solar incentive under the new NEM 2.0 program.

26. Prorated Costs of Hillside Grading are Unreliable. Prorated values are legitimate when estimates are made on uniform horizontal installations on relatively flat ground, but lose validity when applied to variable hillside topography where construction requires reasonably accurate cost estimates.

27. Costs of Grading are Unrealistic. Table 6.6.1, Solar Alternative Cost Estimates, states the cost of earthwork on the west parcel is $1,813,800, and that importing stadium hill dirt to the west parcel will result in an export savings of (-) $1,500,000 . The net earthwork costs are therefore $1,813,000 (-) $1,500,000 = $313,800, which given at least 477,500 CY of project grading discussed below results in an unrealistic unit cost around $0.66 per cubic yard.

28. Evaluation of Reliable Earthwork Unit Prices. Based on the unrealistic grading unit prices in the DEIR, an evaluation of grading unit costs based on contractor bid prices was performed to provide reasonably reliable unit costs and total grading costs of the project. The evaluation estimated (1) a mass grading import unit price of $13.76 per CY and (2) a salvage and replacement (cut/fill) earthwork unit price of $14.01 per CY (see below).

Mass Earthwork Import			
Quantity (CY)	Job No.	Contractor Bids Received	Contractor Bid Average Unit Price
70,000 CY	DWR/KSN Job. 1500-0140, July 2013	ASTA, Tiechert, Robert Burns, Granite, San Raphael, AM Stephens, Cal-Nevada, Ford	$10.26 per ton ($14.36 per CY @ 2013 price levels)
201,900 CY	DWR/MBK Job No. 2028-08-12-1	Asta, A.M. Stephens, Robert Burns, Dutra, Mass X, MCI, Tiechert, Woods	$8.91 per ton ($12.48 per CY @ 2012 price levels)
191,900 CY	WGI, 2007	Washington Group, Intl.	$13 per CY @ 2007 price levels ($14.45 per CY @ 2016 price levels)
		AVERAGE UNIT PRICE	**$13.76 per CY**

Salvage, Stockpile and Replace Dirt On-Site			
Quantity (CY)	Job No.	Contractor Bids Received	Contractor Bid Average Unit Price
337,485 CY	WGI, 2006/MWD Task Order, 2006	Washington Group, Intl.	$14.45 per CY ($17.20 @ 2016 price levels **(excavation, haul to stockpile + haul from stockpile, spread, compact)**
1,318, 753 CY	LACPWD, 2015, Job No. FCC00001147	W.A. Rasic Construction, C.A. Rasmussen, Griffith, Ames Construction, Pulice Construction, Shimmick, Myer and Sons	$6.09 per CY @ 2015 price levels **(excavation, haul to stockpile)**
337,485 CY	WGI, 2006	Washington Group, Intl.	$4.45 per CY @ 2006 price levels ($4.92 per CY @ 2015 price levels) **(haul from stockpile, spread, compact)**
		AVERAGE UNIT PRICE	**$14.01 per CY**

29. Total Project Grading Cost: Total project grading costs are composed of the following elements:

Grading Quantities

A description of the grading quantities for construction of the west parcel earthfill is provided in the following table. The quantities were (1) identified in the 2017 DEIR documents and (2) estimated within landslide areas to depths of at least 20 feet (Terrestrial Solutions, Inc. (TSI), June 2017) by D. Majors, P.E. (2017). Background data was reviewed in Converse Consultants study reports (2014, 2017). Streambed materials were recommended for removal and replacement to similar depths (TSI, 2017) and quantities estimated as a separate line item, below (D. Majors, 2017).

Summary of Earthwork Quantities		
Description	Quantity	Source
On-site hillside cut	177,500 CY	DEIR, 2017
Imported fill from stadium hill	139,000 CY	DEIR, 2017
On-site landslide removal, stockpile and replacement fill with 15% bulking, in addition to DEIR 55 feet cut on central hill (consulted DEIR Psomas/Converse mapping, 2017)	103,000 CY	TSI, UWT, 2017
On-site excavation, stockpile and replacement for stability key with 15% bulking (consulted DEIR Converse mapping, 2017)	58,000 CY	TSI, UWT, 2017
TOTAL EARTHWORK QUANTITIES WITH LANDSLIDE REMOVALS	**477,500 CY**	
On-site streambed excavation, stockpile and replacement fill with 15% bulking (consulted TSI, 2017)	109,000 CY	TSI, UWT, 2017
TOTAL EARTHWORK QUANTITIES WITH LANDSLIDE/STREAMBED REMOVALS	**586,500 CY**	

Grading Costs

30. Given realistic unit prices in the range of $14 per cubic yard, and earthwork quantities described above, the total grading cost was determined to be $6,685,000 (see below), making the west parcel significantly more costly than solar panels mounted atop parking canopies or parking structures.

Summary of Earthwork Costs			
Description	Quantity	Unit Price	Cost
On-site hillside cut and fill (SEIR, 2012)	177,500 CY	$14/CY	$2,485,000
Imported fill from stadium hill (DEIR, 2017)	139,000 CY	$14/CY	$1,946,000
On-site landslide removal, stockpile and replacement fill (est. from Converse, 2017)	103,000 CY	$14/CY	$1,442,000
On-site excavation, stockpile and replacement for stability key (TSI, 2017)	58,000 CY	$14/CY	$812,000
TOTAL WITH LANDSLIDE REMOVALS			**$6,685,000**
On-site streambed excavation, stockpile and replacement fill (TSI, 2017)	109,000 CY	$14/CY	1,526,000
TOTAL WITH LANDSLIDE & STREAMBED REMOVALS			**$8,211,000**

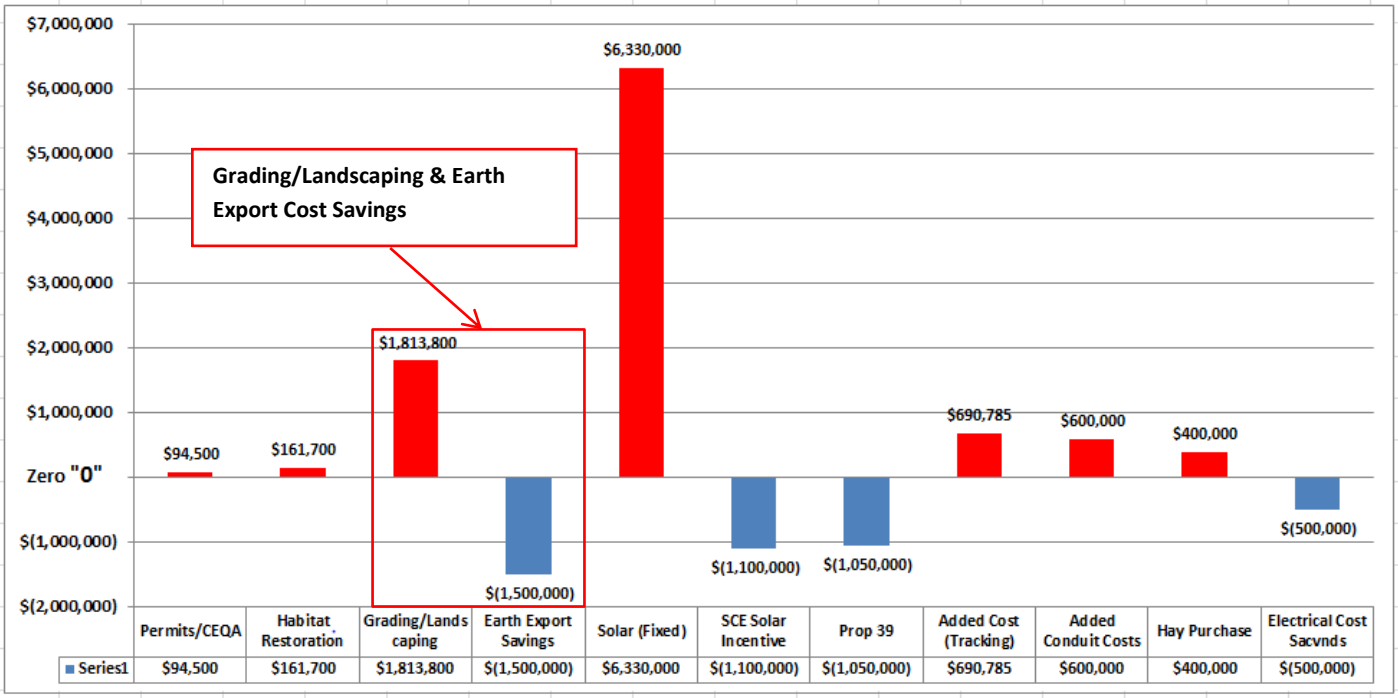
Examination of West Parcel Costs

31. The first chart shows the raw WPSP costs in the DEIR. It includes the various costs adjustments and credits applied by Mt. SAC after the construction costs are developed. The third vertical bar is the grading cost. The fourth bar is grading savings (a negative cost) if the stadium hill dirt is exported to the west parcel and not off-site.

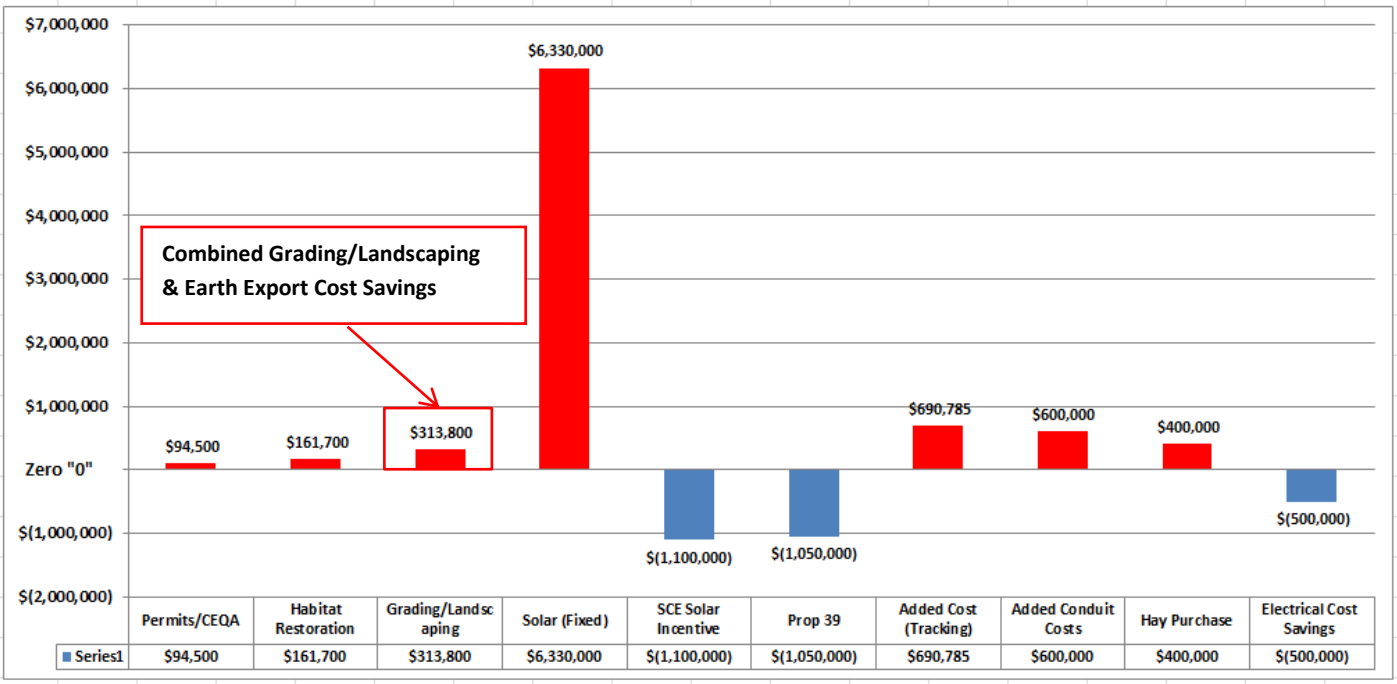
32. The second chart shows what happens when the grading cost and the export savings are combined into a net grading cost. The cost of grading virtually disappears because of combining a positive and a negative cost. As indicated above, it may not be necessary to export dirt off site, which eliminates the export cost savings and results in a further increase to west parcel costs.

33. These costs also do not account for possible additional remediation of landslides associated with High Landslide Potential lands identified on the LA County Engineer mapping for the City of Walnut General Plan and on the California Geological Survey CGS 88-21 Map No. 12 for this region, designating most lands at the west parcel at “close to their stability limits”.

Total Project Cost – West Parcel (DEIR)
Grading/Landscaping & Earth Export Savings



Total Project Cost – West Parcel (DEIR)
Combined Grading/Landscaping & Earth Export Savings



Comparative Cost Studies of Alternatives

General

35. DEIR Table 6.6.1 presents a what appears to be first costs of the west parcel at price levels varying from 2012 to 2016, referencing previous cost estimates with no supporting cost data, solar power installations of differing electrical output, which would make it necessary to compare alternatives on a cost per MW basis.

36. To simplify the comparisons, a representative 2.2 MW peak capacity project at the west parcel is compared to a 2.2 MW peak capacity system of canopy mounted solar panel systems generally near Lot B/B3 or Lots D/D1. In this way, the cost of these alternatives can be compared based on total cost. Either canopy mounted solar systems or solar panels atop parking structures have been shown to fit within these parking areas within or near the Primary Instructional Zone.

37. The alternative that generally ranked above others is the parking canopy mounted solar panels, which is understandable since it requires no grading, substantially eliminates environmental permits, and requires no import of export of dirt, whereas to the contrary, the west parcel requires all of these cost elements.

38. At equivalent electrical output, the principal cost elements to be evaluated are the grading costs and the cost of acquisition and installation of the solar panels, which amount to at least 80% of overall project costs.

Table 6.6.1 Alternatives Cost Comparison (Sensitivity of Cost to Mt. SAC Assumptions)

39. The total project costs depicted on Table 6.6.1 of the DEIR provides inadequate back-up information to evaluate the project costs. As such and as shown above, the development of costs for grading and for canopy-mounted solar arrays have been developed by UWT for comparison purposes.

40. In the chart below, there are 6 pairs of vertical cost bars, each with a red bar (west parcel) and blue bar (parking canopy panels). Per DEIR Table 6.6.1 assumptions, the parking canopies include sunk cost and Prop 39 incentives, but no SCE incentives. In the last column, the effects of adding in SCE Incentives to the parking canopies are shown. Per Table 6.6.1, the west parcel includes no sunk costs, no hay purchase, an export savings credit, Prop 39 incentives and SCE incentives, but virtually no earthwork costs when combining grading/landscaping with earth export savings. Sunk costs, hay purchase costs, grading costs and SCE incentives are progressively added into the cost chart to show the sensitivity of these cost items to total costs and ranking. See the Vertical Bar pairs A, B, C, D, E and F, which displays this process.

    a. Vertical Bars A. The red bar is the west parcel DEIR data. The blue bar is an equivalent power canopy type solar panel option developed by Sunvalley/RBI Solar, 2016 under supervision of H. Sassi, P.E.

    b. Vertical Bars B. Sunk cost and hay cattle feed replacement for loss of hillside grass are added to the red bar, which were left off the west parcel in Table 6.6.1.

    c. Vertical Bars C. West parcel earthwork, landslide removal and dirt import from the stadium, identified in or characterized in the DEIR, are added to the red bar costs. The third set of bars

shows the effects to grading costs by including published earthwork quantities in the DEIR and estimates of landslide removal, multiplied by historical earthwork unit prices locally and statewide. This amounts to at least 477,500 CY and over $6,685,000 in additional costs.

d. Vertical Bars D. Additional earthwork consisting of streambed materials removal and replacement, recommended by Terrestrial Solutions, Inc. (TSI) are added to the red bar.

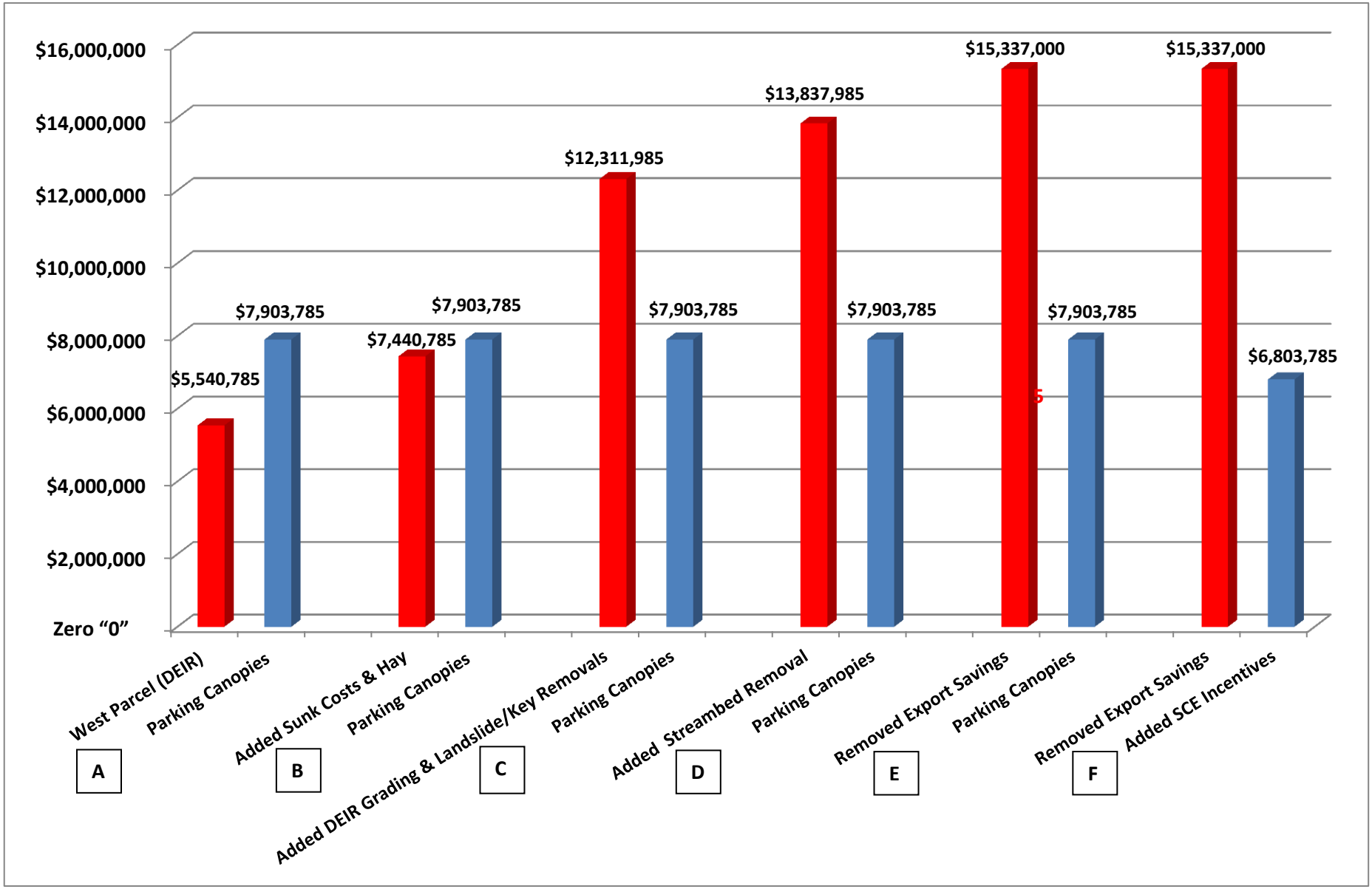
e. Vertical Bars E. Offsite export savings (a reduction in costs applied to the west parcel) are removed from the red bar since methods are available to disposed of stadium hill dirt free of charge though the needs of regional contractors .

f. Vertical Bars F. A credit is added to the blue bar for a SCE incentive program (a reduction in cost) since a new SCE Net Energy Metering (NEM 2.0) program was initiated on July 1, 2017.

41. Within the following table, the total west parcel cost in Vertical Bars C is $12,311,985. This cost includes the cost adjustments and credits applied by Mt. SAC, which if excluded, would yield the hard dollar construction costs of the project equal to $13,271,300. This cost is based on grading quantities from Psomas grading plans and landslide removals characterized in the DEIR. When multiplying these quantities by unit costs of local and statewide contractor bids for similar work and quantities, it produces the $13,271,300 value. This value compares favorably to the $13,723,645 Total Project Budget including Site Improvements and Earthwork identified in the Mt. SAC Board of Trustees Action for Professional and Design and Consulting – added Services (contract Amendments), page 37, October 12, 2016.

42. Economic studies to assess ROI & Payback (Table 6.6.2) have been based on the west parcel project Net Cost of $5,440, 785. Because these costs are considered unreliable as noted above, they should not be relied upon for development of ROI & Payback studies or for decision-making.

Total Project Costs
West Parcel (DEIR) vs. Parking Canopy Mounted Solar Panels



Terrestrial Solutions, Inc. (TSI) Geological and Geotechnical Review Reports

TERRESTRIAL SOLUTIONS INC. GEOTECHNICAL SERVICES

To: United Walnut Taxpayers

June 29, 2017
Project No.: 17-088

Attention: Mr. Dennis G. Majors, Board Member

Subject: Geotechnical Review of proposed Grading of the West Parcel Site for Mount San Antonio College, Walnut, California.

Primary References:
Converse Consultants, 2014, Geotechnical Study Report, Proposed Fill Placement at the West Parcel, Mount San Antonio College, Walnut, California, Project No. 13-31-339-01, dated December 19, 2014.

Psomas, Undated, South Campus Site Improvements – West, Mount San Antonio College. Sheets C0.0 through L3.10 (51 total sheets).

1.0 INTRODUCTION

Terrestrial Solutions Inc. (TSI) has conducted a geotechnical review of the available information and proposed grading at the West Parcel of Mount San Antonio College, Walnut, California. The primary document that was made available for review is a report from Converse Consultants (Converse) dated December 19, 2014. Also reviewed, was an undated grading plan, prepared by Psomas, submitted to the City of Walnut as the proposed grading plan of the site on January 24, 2017, with the ultimate intention of creating a large pad for construction of a solar panel array. It is our understanding that these documents were provided by the City of Walnut for purposes of obtaining a grading permit and represent the latest engineering and geotechnical information that have been received from the project developer, Mount San Antonio College.

The purpose of TSI's review is to assess the information presented in the primary references to determine if they provide sufficient geologic and geotechnical knowledge to provide remedial recommendations for development of the proposed project in a safe manner, and which suitably supports the proposed development while maintaining the integrity of the surrounding properties.

TSI's scope of work included review of the referenced documents, pertinent Aerial Photographs, site visits on March 30, April 12, and June 20, and preparation of this document. The site visit on March 30 included a field reconnaissance into the site through an unlocked and open gate and along a well-hiked trail to the top of the central knob.

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It is TSI's opinion that there are significant deficiencies in the subsurface investigations, discussions, and analysis presented in the Converse report. These deficiencies include: not identifying a significant landslide that is present at the site and formerly impacted Grand Avenue; insufficient geologic information to properly model the site, insufficient liquefaction analysis, and incomplete slope stability analysis which could result in undermining the stability of adjacent residential properties. In our opinion, the Converse report does not meet the minimum standards required by City, County, and State codes/guidelines and standards of practice for a geotechnical investigation of a hillside development in the southern California area. This review report further outlines the deficiencies and the consequences related to them for the proposed project and surrounding properties.

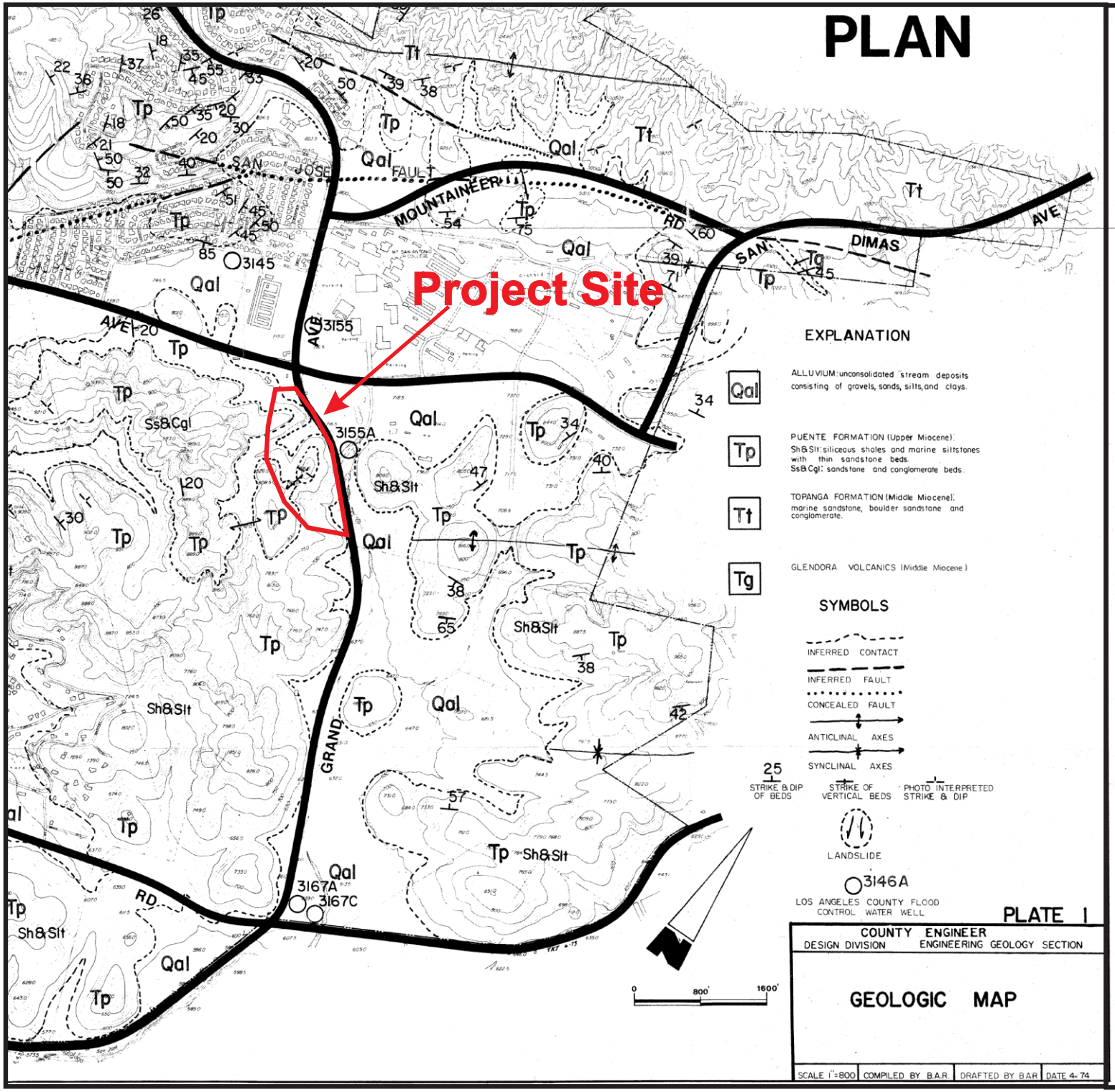
1.1 Site Description

The site is approximately 17.3 acres of undeveloped land, except at the northern end, which was previously graded to create a nearly level pad (Christmas Tree lot). The area proposed for development consists of a central hill area that is surrounded by valleys to the north and the south and a low connecting ridge between the two valleys. This irregularly shaped piece of land is surrounded to the immediate south and west by existing residential developments and to the northeast by Grand Avenue. The existing residential structures are along ridgelines that are directly above and overlook the proposed development.

Review of aerial photographs available from both Google Earth and HistoricAerials.com indicated that, other than the northern most portion, the site has remained relatively unused and undeveloped since at least 1946. A road has existed along the alignment of Grand Avenue since prior to 1946, and apparently was widened and realigned to its current four lane configuration in the late 1970's. The 1980 aerial reviewed indicates a disturbance or clearing of a portion of the east-central hill along Grand Avenue, including a landslide escarpment at the top of the hill. Apparently, the site has been used for cattle grazing in its recent history.

1.2 Proposed Project

The grading plan prepared by Psomas includes cut and fill grading to create a large pad area at an elevation ranging from 758 to 763 feet in elevation. To accomplish this, the pad area will require cutting down of the central hill, approximately 55 feet, and filling in the two valley areas up to approximately 60 feet. A large slope is proposed along Grand Avenue, which includes filling and cutting and is up to 80 feet in height. Two cut slopes are proposed along the northwestern perimeter of the site that are up to 40 feet in height. A fill slope up to 25 feet in height is also proposed along this edge. According to the grading plan approximately 139,000 cubic yards of import fill materials will be necessary to balance the cut/fill volumes proposed on the plan. The plan does not provide an estimate of remedial quantities to remove unsuitable earth materials and/or the corresponding shrinkage/bulking factors that are typically required by reviewing agencies.



Modified From Geologic Map City of Walnut General Plan, Plate I, 1974

Figure 1

Terrestrial Solutions Inc.

The Converse report preceded and therefore, did not review the Psomas grading plans provided to the City of Walnut as a part of a grading plan submittal in 2017. However, Converse did review a plan that was similar in design to the grading plan submittal and apparently developed in conjunction with the 2015 Addendum to the 2012 Facility Master Plan Final EIR. Agencies typically require that the Geotechnical Consultant review the latest plan that is prepared by the project Civil Engineer in case there have been significant changes that require additional analysis.

2.0 REVIEW OF THE GEOLOGIC AND GEOTECHNICAL INFORMATION

The Converse report (2014) was based on subsurface exploration consisted of drilling, logging, and sampling twenty-one (21) hollow-stem auger borings from May 5 to May 9, 2014 extending between depths of approximately 10 to 51.5 feet below the existing ground surface (bgs), and one (1) bucket auger boring (BH-13) on May 19, 2014 to a depth of 31 feet (bgs). Their investigation also included laboratory testing.

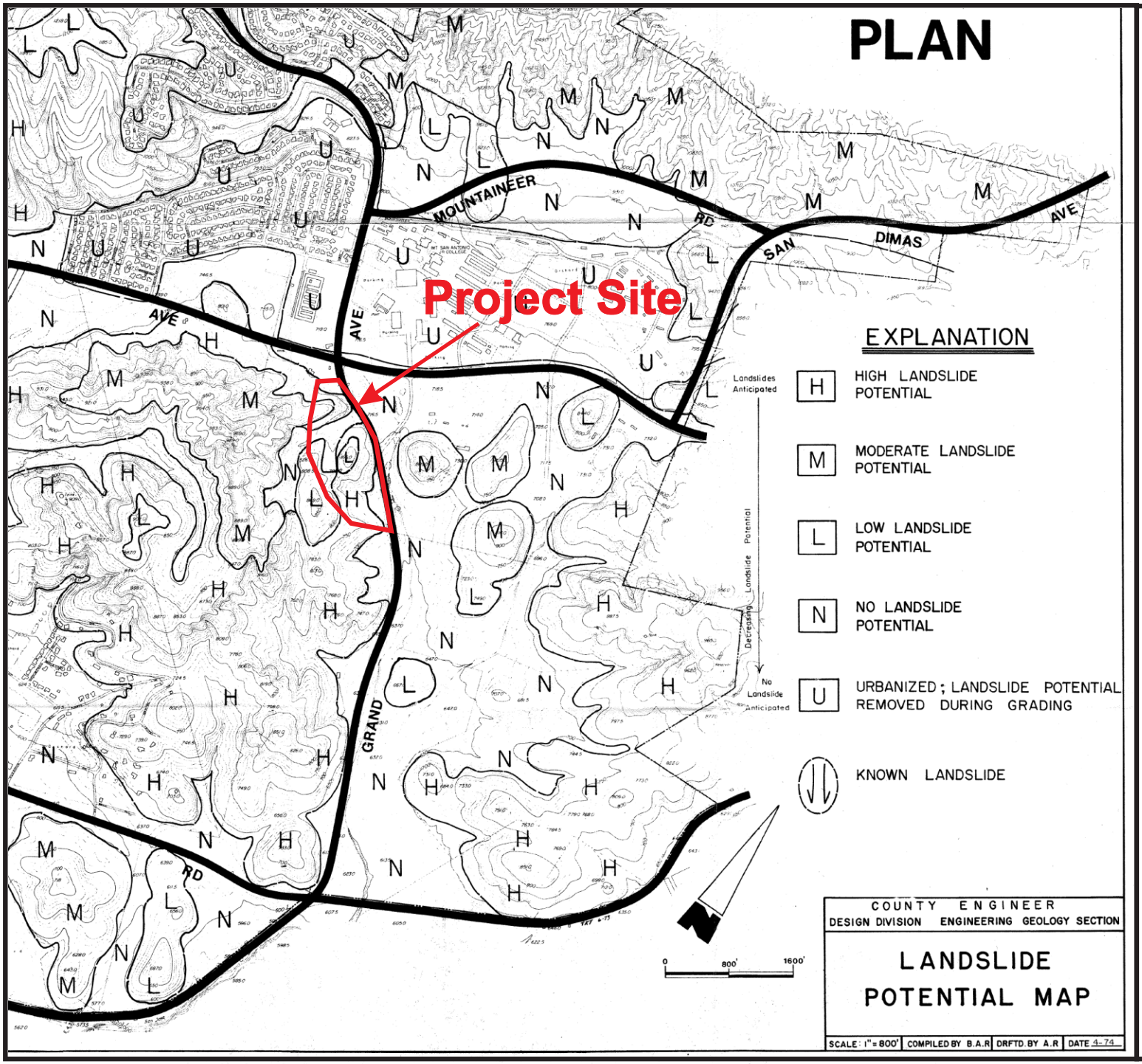
It is our understanding that supplemental trenching and possibly other field investigations were initiated by Converse (on behalf of Mt. SAC) in June 2017. Apparently, these field investigations were terminated by the US and Fish and Wildlife due to conflicts with the endangered California Gnatcatcher breeding season.

A normal review of a geotechnical report would include focused review and comments regarding specific sections of the report that are unclear, deficient in backup data, and/or of interest for other reasons. The Converse report was found to be significantly lacking in a geologic database and resulting geotechnical analysis from which to make appropriate review comments. Therefore, this review is separated into more general discussions of areas/issues of the report where there are significant concerns.

2.1 Geologic Conditions

In addition to the Converse (2014) report, several documents were reviewed by TSI to understand the geologic conditions which underlie the site. These documents include the regional Geologic map by Dibblee (1989), Geologic and Landslide Potential Maps (Plates I and II), generated by the Los Angeles County Engineer for the City of Walnut as part of their General Plan, dated April 1974 (included as Figures 1 and 2), CGS Open File Report 88-21 (Figure 3), and TSI's general knowledge of the subject geologic formations present at the site. The full references for these documents are provided at the end of this report as "Additional References".

The Dibblee map (1989) was presented by Converse in their report and indicates the site is underlain by bedrock of the Tertiary Sycamore Canyon Formation which is the uppermost member of the Puente Formation, and that bedding is generally striking northwest-southeast and dipping 15 to 30 degrees to the northeast. The surrounding areas are indicated as being underlain by the Tertiary Yorba member of the Monterey (Puente Formation) with similar bedding orientations. According to the Geologic Map (City of Walnut, 1974), the site is underlain by bedrock of the Puente Formation. This map (Figure 1) indicates that the central knob and adjacent hilltops are underlain by sandstone



Modified From Landslide Potential Map City of Walnut General Plan, Plate II, 1974

Figure 2a

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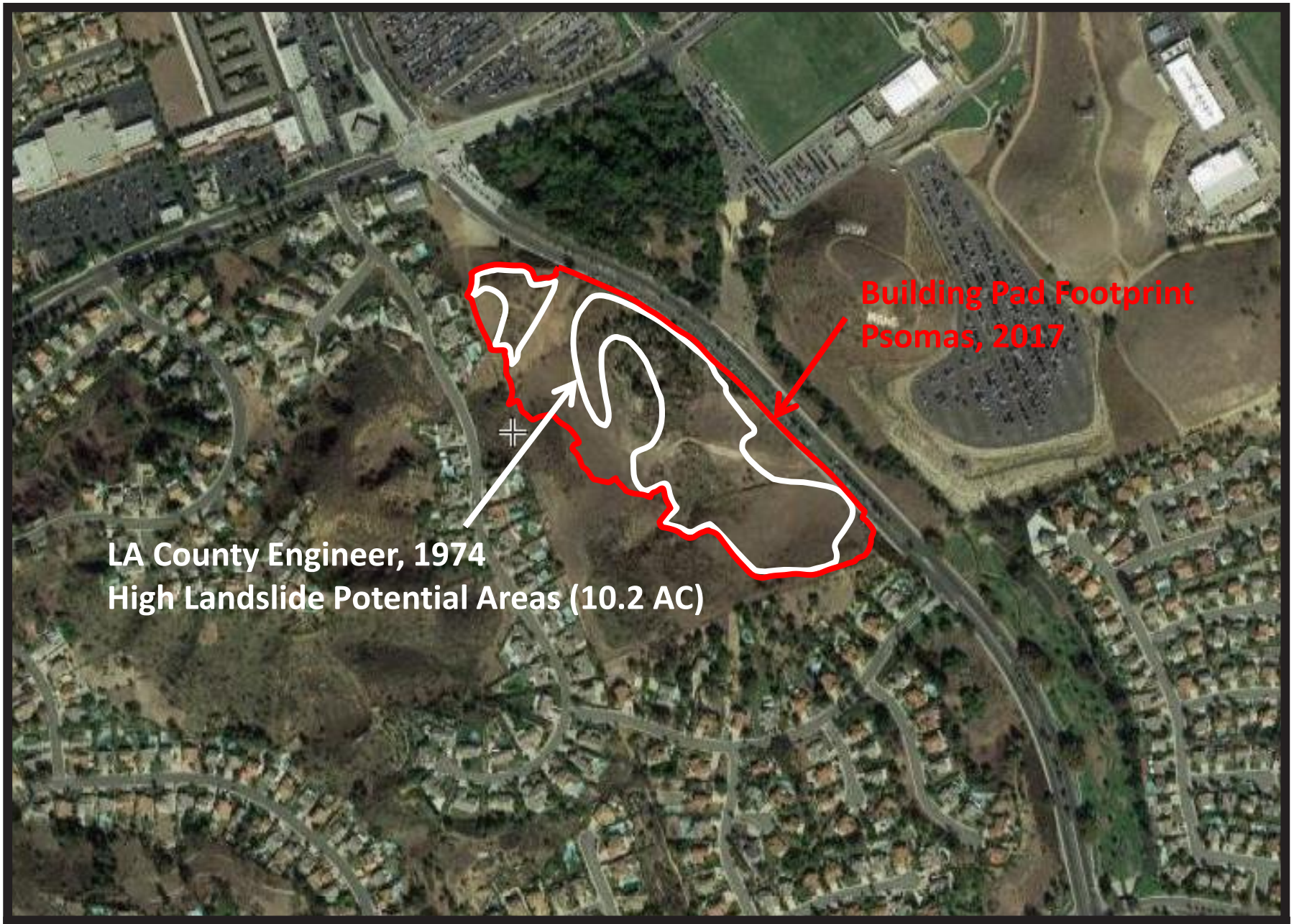


Landslide Potential Map
City of Walnut, General Plan,
Plate II, 1974

Terrestrial Solutions Inc.

Figure 2b

and conglomerate, however, the lower portions of the hills are shown as underlain by shales and siltstones. TSI's brief observations at the site indicate sandstone and conglomerates are present as well as shales and siltstone in the central knob area. Where the shale and siltstone was observed, bedding was dipping to the east-northeast approximately 20 to 30 degrees (similar to as indicated by Dibblee [1989]).

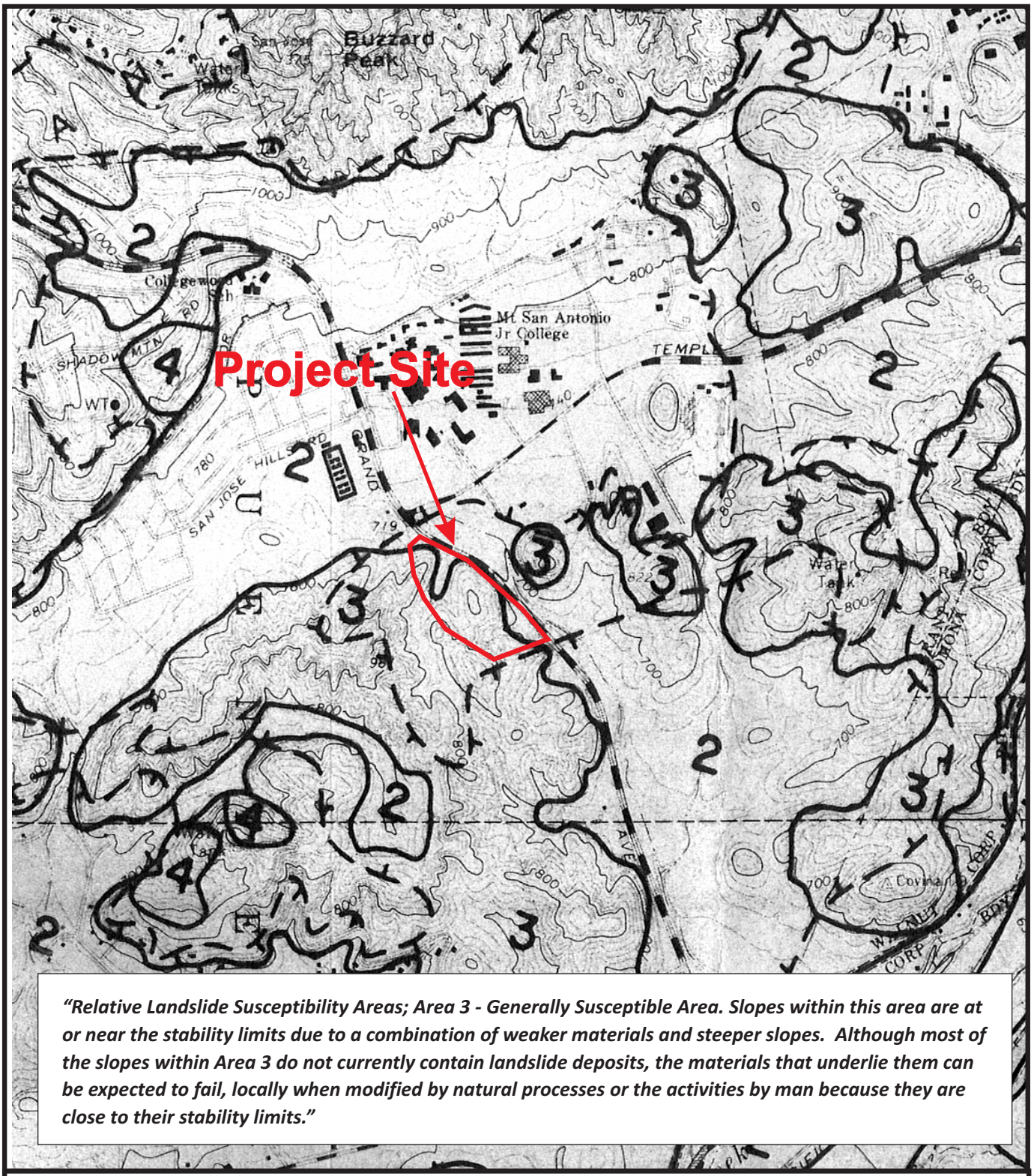
The text of the Converse report indicates, *"the majority of the proposed west Parcel site is underlain by hard, cemented sandstone pebble conglomerate bedrock".* There is no mention within the text of the report of the presence of siltstone and/or shales, which would be indicative of relatively lower strength materials rather than the "*hard, cemented sandstone pebble conglomerate"* cited in the Converse report. A detailed Geologic Map (other than Dibblee's Map) is not presented in the report. The boring logs indicate numerous observations of laminations and bedded siltstones. The cross-sections presented on Drawing No. 4 are referred to in the text (page 6) as Geologic cross-sections, but not labeled so on the drawing. The text indicates that these cross-sections indicate *"interpreted extents and limits of the different earth materials encountered"*. However, only a few notations are made of some of the earth materials encountered. Geologic contacts between the differing geologic materials are generally not indicated and no structural information (such as bedding orientations) are provided. Site-specific geologic structural information is only discussed in the text as it related to a single large-diameter bucket auger boring that was downhole logged. The observations in this boring indicated bedding that was generally striking north10 to 30 degrees east with 8 to 25 degree dips to the northwest. This bedding orientation is nearly opposite of the regional bedding orientations indicated on the Dibblee map and LA County Geologic Map (1974). In addition, Converse's observations from infrequent samples in the small diameter borings indicated bedding which had near horizontal to near vertical dips. These inconsistencies are not discussed in the text of the report or presented on the cross-sections.

The Converse report indicates that the San Jose Fault is located 3.9 kilometers (km) north of the site (Section 5.1). Based on the Dibblee map presented in their report the surface trace of this fault is less than 1.25 km to the north of the site.

2.2 Landslides/Mass Movements:

Converse correctly indicates that, according to official maps published by the State, the site is not located in an area that must be investigated for seismically induced landsliding. However, the Converse report does not reference the LA County Engineer Landslide Potential Map (Plate II, 1974) that indicates portions of the site have a high potential for landsliding (Figures 2a and 2b). In addition, Converse did not reference CGS Open File Report 88-21 that indicates the site is within Area 3 (Figures 3a and b). Area 3 is defined as;

"Relative Landslide Susceptibility Areas; Area 3 - Generally Susceptible Area. Slopes within this area are at or near the stability limits due to a combination of weaker materials and steeper slopes. Although most of the slopes within Area 3 do not currently contain landslide deposits, the materials



"Relative Landslide Susceptibility Areas; Area 3 - Generally Susceptible Area. Slopes within this area are at or near the stability limits due to a combination of weaker materials and steeper slopes. Although most of the slopes within Area 3 do not currently contain landslide deposits, the materials that underlie them can be expected to fail, locally when modified by natural processes or the activities by man because they are close to their stability limits."

Modified from CGS 88-21 Map No. 12.
Landslide Hazards in the Puente and San Jose Hills
1988

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Figure 3a

Landslide Susceptibility Areas
CGS 88-21, Map No. 12
1988

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Figure 3b

that underlie them can be expected to fail, locally when modified by natural processes or the activities by man because they are close to their stability limits."

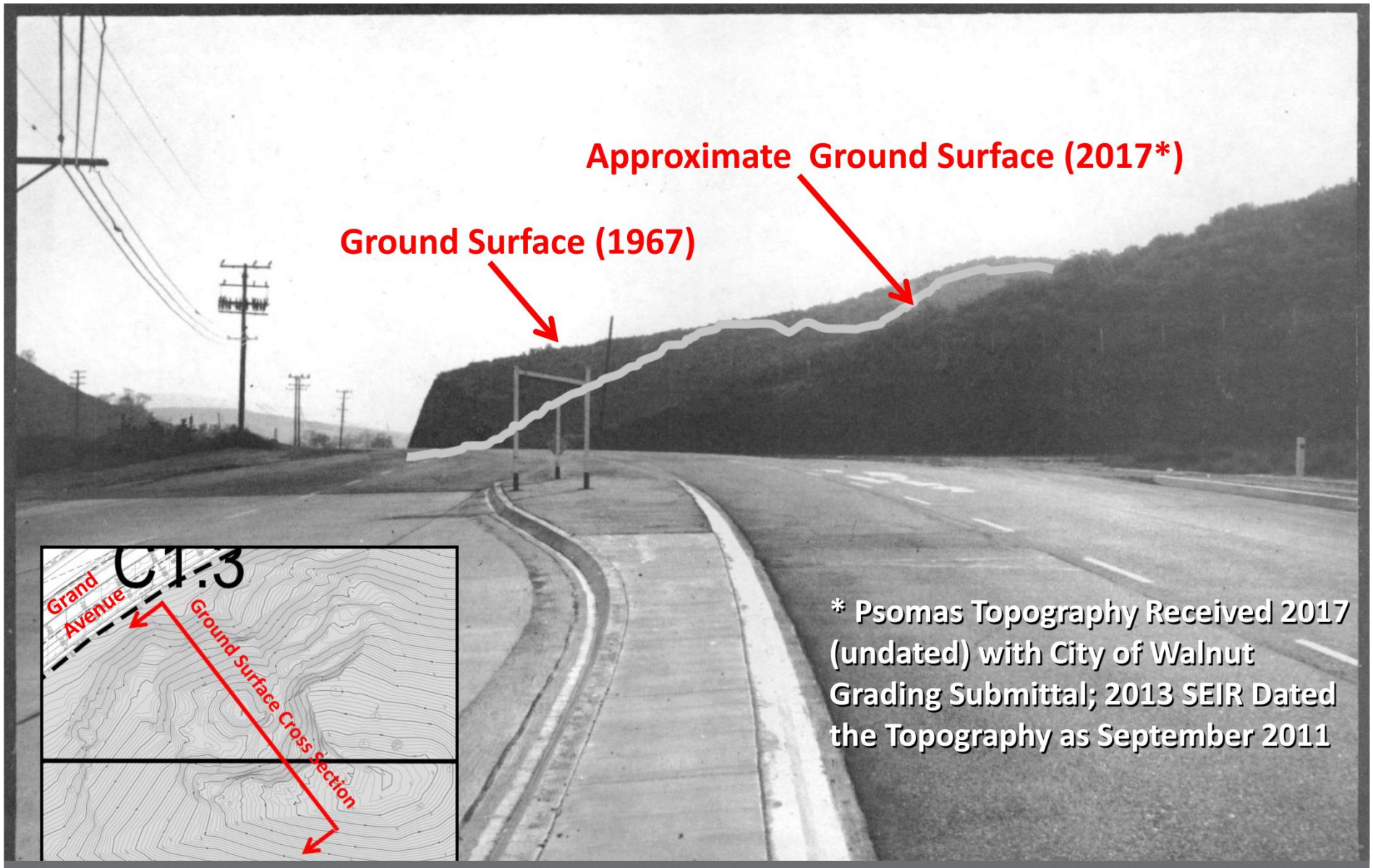
These figures clearly indicate that the proposed project is within areas that were previously determined by governing agencies to have a significant potential for slope instability and landsliding.

No discussion of mass movements/landsliding is provided in the Converse report other than relating to seismically induced landslides. State, County, and City codes/guidelines and standards of practice require a discussion of the potential for landsliding at any hillside site in California. No landslides are shown on any of their maps, cross-sections, or indicated in the text of the report. They also did not reference the LA County Engineering Map (Figures 2a and 2b) and/or the CGS Map (Figures 3a and 3b). Most of the borings excavated by Converse were outside of the areas identified on these maps as having the greatest potential for landslides or slope stability concerns. The known excavations observed on June 20, 2017 appeared to encounter disturbed and irregular bedrock debris in the area of the likely landslide, and thinly bedded, competent bedrock in the one trench located outside the limits of the landslide area.

TSI conducted a brief review of the potential for landsliding at the site. A review of aerial imagery from Google Earth clearly indicates a landslide(s) exists on the eastern side of the central hillside area descending to Grand Avenue (Photo's 1 and 2). This landslide area is present in aerial imagery dating from after 1980 until the present. The presence of this landslide complex was further confirmed based on the brief field reconnaissance on March 30, 2017. In addition, siltstone and shale bedrock with eastward dipping (toward Grand Avenue) bedding was also observed in this area.

A second site walk was conducted on April 12 with the former mayor of the City of Walnut (June Wentworth). She said that at least two landslides occurred at the subject site after Grand Avenue was expanded to its current four lane configuration in the late-1970's. According to the former Mayor, at least one of the landslides closed the road (Grand Ave.) and covered all the lanes. She indicated that the landslide material was removed from the road and a small wall was constructed to reduce further debris from covering the road at one of the areas. Ms. Wentworth remembers being told by the City's Engineer that *"This hillside area was unstable and should never be developed".* Figure 4 is a compilation of a photograph showing Grand Avenue in 1967 and the current ground surface based on 2011 Psomas topography. This figure clearly shows the pre-grading conditions and that the central hillside area has significantly changed its profile due to the grading and the landslide that occurred. Figure 5 is an aerial view of the area of the landslide in 1980 with the projection of the limits of the initial cut slope based on as built drawings (1979). This figure also shows the limits of the area that failed after the slope was constructed, including the landslide escarpment at the top of the central hill. Photo's 3 and 4 show the current scarp to the landslide in the central hill area.

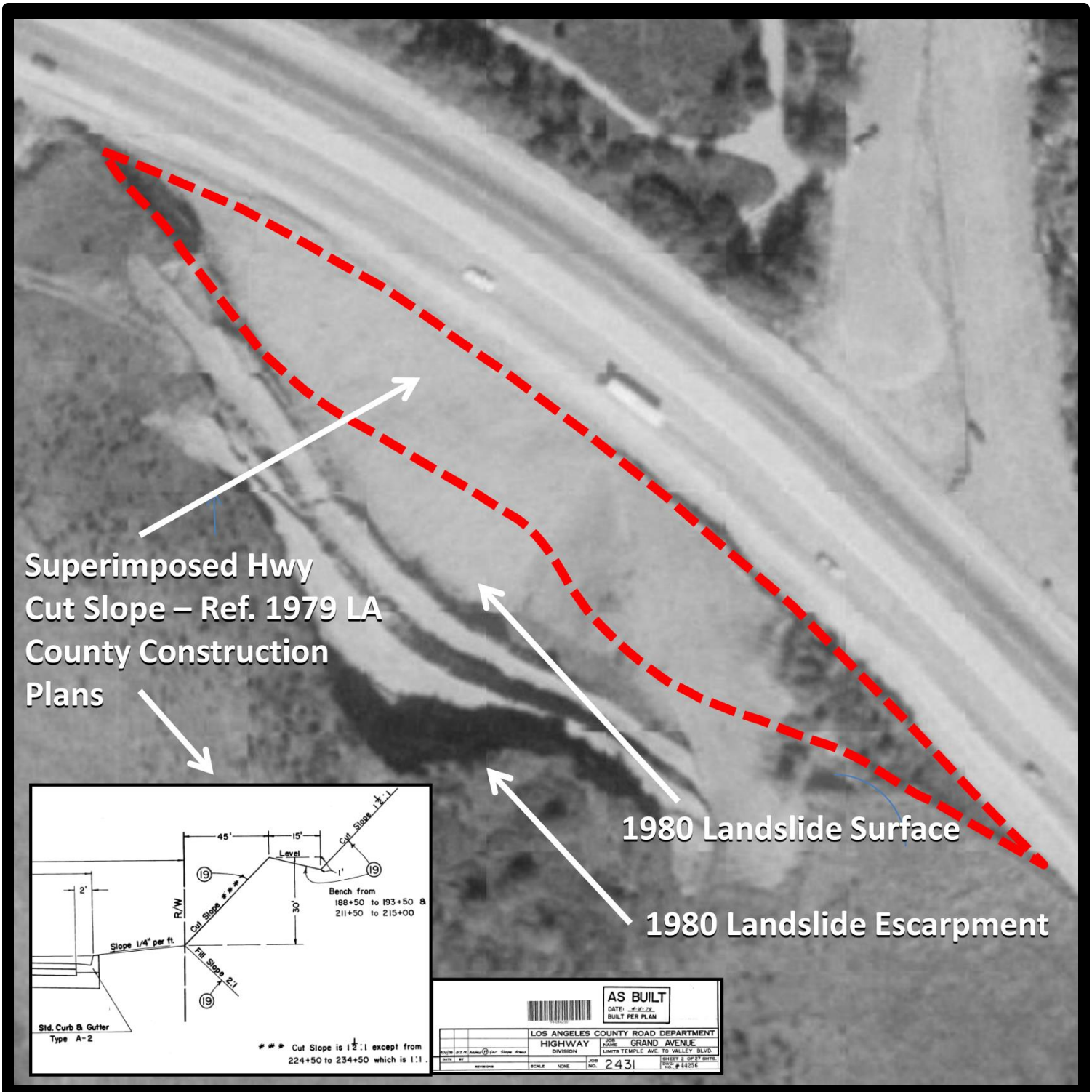
In addition to the landslide(s) discussed above, review of aerial imagery indicates several geomorphic features in other areas of the site which may indicate landsliding, or potential



Looking Southerly on Grand Avenue from Temple Avenue (1967)

Terrestrial Solutions Inc.

Figure 4



Aerial Showing Location of Landslide on Grand Ave. and Footprint of Original Cut Slope

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Figure 5

for landsliding. Essentially any of the east facing slopes (below the adjacent existing homes) that are underlain by thinly bedded (laminated) bedding have a potential for landsliding. An analysis of geomorphic features and the potential for landsliding was not provided by Converse.

2.3 Liquefaction

The Converse report identified portions of the site as having a potential for liquefaction according to the state of California (CGS, 1999). Several borings were excavated in these areas. Converse conducted analysis for liquefaction for only one of the borings (BH-15). This boring was located in the southern canyon area where the alluvial deposits were 12 feet in depth. Below the alluvial deposits was bedrock to the total depth. The Converse report concluded that the site was not susceptible to liquefaction and seismic settlement was anticipated to be negligible. Converse did not conduct specific liquefaction analysis for the northern canyon area where both borings BH-1 and BH-2 encountered alluvium to at least the total depth excavated of 21.5 feet. Neither of these borings was excavated to bedrock. Groundwater was indicated at a depth of approximately 19 feet in BH-1 and at a depth of 15.5 feet in BH-2. Neither of these borings were excavated along the axis of the canyon or at the low end of the canyon where the alluvium would be the deepest and groundwater would potentially to be the shallowest. Relatively low blow counts [Standard Penetrometer Testing (SPT)] were encountered in BH-1 at a depth of 10 feet. The observations within BH-1, loose alluvial deposits depicted by low blow counts, deeper alluvium, and shallow groundwater suggests susceptibility to liquefaction and a potential for instability of the proposed overlying earthfill.

2.4 Slope Stability

Converse did not provide specific stability analysis of the proposed or existing slopes in their report. They did comment (on page 7) that the proposed slope near BH-13 would have neutral to favorable bedding attitudes due to the bedding observed in this large diameter boring, contrary to published geologic mapping by Dibblee (1989) and the LA County Engineer (1974).

Geotechnical reports are generally required by reviewing agencies to specifically address the gross and surficial stability of proposed fill, cut, and existing/remaining natural slopes. For fill slopes, this typically includes analysis of the highest proposed slope. The surficial stability is generally based on the earth materials that are proposed for the slope. This analysis was not conducted by Converse.

Most agencies require that proposed cut slopes over approximately 10 feet in height have geologic characterization and specific analysis. This analysis requires sufficient surface and/or subsurface information to indicate the orientation of bedding, other potentially weak planes, and/or discontinuities. When there are out-of-slope geologic features, as are the conditions at this site, specific analysis of these features in relation to the proposed/existing slope is generally required by the reviewing agency. Specific slope stability analysis was not conducted for any slopes at the site in the Converse report.

Most of the proposed slopes lack sufficient geologic information to prepare a geologic cross-section and/or conduct slope stability analysis. In TSI's opinion, the slope of most concern is a cut slope that is proposed in the northwest portion of the site, which is up to 40 feet in height, and is located directly behind several existing homes. Two small diameter borings (BH-5 and BH-6) were excavated in the area of this proposed slope. These borings were sampled approximately every five feet. In both borings, at a depth of approximately 25 feet, siltstone is described as being encountered. The boring logs indicate no apparent bedding was observed in the samples collected. However, these borings were logged by an Engineer-in-Training who is not trained to analyze geologic conditions, and the observations were based on the limited sampling (every 5 feet). The cross-section (A-A', Drawing No. 4), which was prepared for this slope, does not provide geologic interpretations. Regional bedding attitudes and bedding observed by TSI elsewhere at the site indicated a significant potential for siltstone bedding that could dip 15 to 30 degrees out of the slope. The proposed cut slope up to 40 feet in height could potentially remove natural resisting forces to landsliding along these beddings planes and could represent a significant hazard to the offsite properties and existing homes at this location along Regal Canyon Drive.

The slope along Grand Avenue consists of variable cut, fill, and in some locations, fill over the existing slope. As discussed earlier, the central hill portion of the site along Grand Avenue is underlain by a landslide. The proposed cut slope in this area will most likely not remove all the landslide debris, and the underlying cause(s) of the landslide. The geologic conditions (including the presence of the landslide) have not been modeled by Converse for the differing conditions along the length of this proposed slope. No specific stability analysis was provided for any of this variable slope which is nearly 2000 feet in length and up to 80 feet in height. Grand Avenue is a major roadway within the City of Walnut and is located at the toe of this proposed slope. Therefore, understanding the stability of this slope is a critical aspect of this project.

Temporary slope conditions have generically been addressed by Converse (Page 29, Section 10.1). However, due to the potential for weak out-of-slope bedding and other potential discontinuities, proposed temporary conditions remain a hazard and have not been suitably addressed by the Converse report. Specifically, out-of-slope weak bedding planes (siltstone and shale) may be encountered for any east-facing slope where remedial removals and/or proposed cuts for keyways are proposed.

2.5 Remedial Removals

According to the Converse report;

"Loose, disturbed or unsuitable alluvial soils encountered in the drainage canyons shall be removed to firm natural soils and/or bedrock and then replaced as compacted fill. Loose and unsuitable alluvial soils shall be cleaned out of the canyon bottoms prior to the placement of compacted fills and canyon bottom subdrains."

This statement is difficult to interpret and is not well defined as to the precise depths and/or criteria for remedial removal in the canyon bottom area. A definition of "loose and

unsuitable soils" is not provided within the report. Since the alluvial deposits are greater than 21.5 feet (BH-1 and BH-2) in depth, removal of unsuitable alluvium may be a significant issue as it relates to earthwork quantities and overall stability and cost to the project. Deep removals on the order of 20 feet or more may also result in destabilizing the adjacent natural slopes and could become a significant issue as geologic conditions are properly modeled. For example, the removal of alluvium at the south end of the project, could destabilize the adjacent properties and homes along Stonybrook Avenue (due to the potential for out-of-slope bedding within the bedrock).

If alluvial deposits are left in place beneath the deep fills proposed, then there may be significant settlement within the alluvium which could affect the proposed structures. Discussion and/or analysis of these conditions should have been provided in the report.

Page 19 indicates that soft, yielding soil conditions may be encountered. However, the report does not further elaborate where these conditions may occur. It is TSI's opinion that the extent of soft, yielding soils should be explicitly defined to address other potential impacts of these conditions.

Removal of alluvium along Grand Avenue, where the alluvium will be the thickest, has not been discussed and/or modeled. If alluvium is left in place adjacent/beneath Grand Avenue and additional filling is proposed over the alluvium, then there is potential that this condition will result in settlement under the proposed earthfill as well as induce settlement beneath Grand Avenue. Settlement of Grand Avenue and the underlying major utilities that likely exist within the road prism may be a significant issue. A discussion of this potential condition was not discussed or analyzed in the Converse report.

Remediation of the landslide materials that exist within the central hillside area, and other areas of the site, will consist of total removal of the landslide debris to competent bedrock. In addition to normal remedial removals a thorough evaluation, including subsurface investigations, of the underlying weak bedrock conditions must be conducted to determine the width and depth of a shear key that will likely be necessary to stabilize the proposed development. The Converse report indicated that a "Fill Slope Stabilization Keyway" was necessary for portions of the site (Drawing No. 2). However, their key was not based on specific slope stability analysis and was not recommended for cut slopes and/or areas of landsliding or potential slope stability issues.

2.6 Inconsistencies between Boring Logs and Laboratory Data

The boring logs for BH-1 through BH-22 describe the variable earth materials that were encountered at the site, and also present moisture and density information based on the collected soil samples. In many cases the description of the materials encountered appears to be inconsistent with the laboratory testing results. Typically, sand and gravelly sand has relatively higher dry densities and lower moisture contents than a clayey material. In borings BH-12, through BH-15, BH-17 through BH-19, BH-21, and BH-22 the moisture content within many of the samples tested ranged from 23 to 42 percent with dry densities often below 99 (pcf). These materials were often described/depicted as conglomerate and/or sandstone on the boring logs. This

combination of relatively high moisture content in conjunction with relatively low density is not typical of granular sandy materials. It is much more typical of clayey or even diatomaceous materials (common within the Yorba member of the Puente Formation). Converse does not provide a discussion of this unusual condition and the potential impacts if these materials are present near finish pad grades or are used within the fill materials near finish grades. If diatomaceous materials are present at the site, these materials are often very difficult to compact to project specifications, because they are highly sensitive to the moisture content. These earth material characteristics should have been discussed in the Converse report.

2.7 Subdrains

On Page 19 of the Converse report, recommendations for canyon bottom subdrains are provided and the approximate locations are indicated on their Drawing No. 2. The report recommends that Class 2 permeable (Caltrans) materials be used to surround the recommended subdrain pipe without filter fabric surrounding the system. While many agencies accept the use Class 2 materials, most agencies require the use of filter fabric around the gravel drain rock that surrounds the recommended pipe. This is because over time fine materials may clog the gravel drain rock (even Class 2) without the use of the filter fabric. As proposed by Converse, the potential for the long-term performance of a canyon type drain can be compromised. In addition, with remedial removals, the project requires pre-determined elevations and locations for the proposed canyon subdrain outlets and an indication how remedial removals may impact the proposed subdrain locations.

2.8 Perimeter Fill Slopes

The Converse report recommends constructing perimeter fill and cut slopes using a 2 to 1 slope cutting/benching technique where small vertical slopes are etched into these otherwise graded or natural slopes. While this method may have been based on recommendations by an environmental consultant (Helix), TSI believes that these benched slopes are very difficult to construct and result in preferential paths of erosion due to irregularities in the earth materials that the benches are cut into. Once erosional paths are formed in a slope then the erosional path expands and may undermine the integrity of a slope and/or adjacent slopes.

3.0 DEFICIENCIES AND CONSEQUENCES

TSI has reviewed the geotechnical report prepared by Converse (2014) regarding the subject project. Our review of the geotechnical report has discovered many very significant deficiencies in the baseline geologic data and geotechnical analysis. This has resulted in conclusions that are not well supported. In some cases, there is no discussion and/or analysis of significant issues that could impact the stability and safety of the subject site and equally important, the adjacent offsite properties, homes, and Grand Avenue. The primary deficiencies and consequences include:

- Geologic Model – Insufficient surface and subsurface information is available to determine/model the earth materials that are present, and the geologic structure throughout the site. The subsurface explorations conducted by Converse placed a

substantial number of boring holes outside of areas with high landslide potential and areas of potential slope instability depicted on the LA County Engineer Landslide Potential Map (1974) and California Geological Survey (CGS) Open File Report 88-21 Map No. 12 (1988). Data is lacking to create a geologic map and geologic cross-sections that illustrate the site geologic model. The report lacks subsurface data obtained from direct observations of excavations (borings and/or trenches) by a competent geologist. Most of the borings were logged by an Engineer-in-Training whom is not qualified to properly characterize bedrock conditions. Where slopes are proposed, large-diameter borings, that are downhole logged, are lacking which is the best method for observing subsurface geology and geologic structures. The existing small diameter borings indicated bedding that varied from near vertical to near horizontal. However, regional geology maps indicate bedding that dips uniformly to the east-northeast. No explanation is provided as to why there are changes in bedding (geologic structure) contrary to published geologic mapping. Faulting is not investigated and explained. If there is folding then the fold axis has not been modeled and explained. The lack of a proper geologic models has led to a lack of identification of potentially significant geologic hazards. The result is that the proposed project is likely unstable as proposed and more importantly may undermine the stability of the offsite properties including the adjacent residential properties and Grand Avenue.

- A discussion of existing, and potential landslides at the site including mitigation was not presented in the Converse report. The obvious, existing landslide at the center of the site was not identified and therefore, was not properly investigated and modeled. Geologic cross-sections were not prepared to show the subsurface projection of landslides and stability analyses were not conducted to determine if remedial measures were feasible. Geomorphic features that may represent potential landslides were not investigated and/or analyzed.

- General slope stability modelling and discussion was not provided, especially regarding the slope along Grand Avenue, the proposed cut slope below the existing homes, and the natural slopes of the project. These areas may be underlain by unstable bedrock. Based on the small diameter borings bedding is variable throughout the site. Where remedial removals are recommended, these removals may further undermine the stability of existing slopes on a temporary or long-term basis. Further, subsurface data should be obtained from direct observations of excavations (borings and/or trenches) by a competent geologist. Significant laboratory testing and analysis was omitted that would provide appropriate shear strengths of the anticipated shale, siltstone, potential weak bedding, and landslide rupture surfaces. Without comprehensive stability analyses under both static and dynamic conditions, the geotechnical integrity of the proposed earthfill and impacts to offsite properties cannot be determined.

- Liquefaction was only discussed in relation to the southern canyon area and one boring within this canyon. The northern canyon is larger and has deeper alluvium than the southern canyon leaving significant deficiencies in the liquefaction analysis. The total depth of alluvium was not modeled or investigated near Grand Avenue within the northern canyon. Additional Investigation should conducted to determine the total depth

of alluvium and to obtain subsurface information for the full length of the canyon which is necessary for a proper liquefaction evaluation and determination of remedial removals and the settlement characteristics of any alluvium proposed to be left in place. The use of CPT methods and rotary wash drilling are the most appropriate methods for gathering subsurface information below groundwater. Given the identified potential for liquefaction (State Maps), the lack of a sufficient liquefaction analysis, and the limited data provided, the stability of the proposed earthfill, and the long-term integrity of Grand Avenue cannot be demonstrated.

- Remedial removals were discussed however, estimated depths of removal and the criteria to determine when removals are sufficient were not provided. It is likely that remedial removals in the northern and southern canyons could exceed 20 feet in depth. The remedial removals of the landslide in the central knob area are also likely to exceed 20 feet in depth. The key to stabilize the cut and fill slope along Grand Avenue and the unstable landslide conditions will also generate significant remedial removals/keyways. It is likely that the required remedial removals will include 100's of thousands of cubic yards of removal and re-compaction. The remedial removal quantities have not been discussed in the Converse report or provided on the grading plans (Psomas). Typically reviewing agencies require a summary of the remedial quantities in order to assess the proper agency fees and provide an accurate schedule of grading.

- Remedial Removal depths of can affect many other issues including total and differential settlement, potential for collapse, and the stability of existing slopes. A remedial measures map is typically included in a grading plan review report, but was not present in the Converse report. The remedial map would typically indicate all the recommended remediation necessary for safely grading the site.

4.0 SUMMARY

It is TSI's opinion that there are significant deficiencies in the subsurface investigations, discussions, and analysis presented in the Converse report. In our opinion, this report does not meet the minimum standards required by City, County, and State codes/guidelines and standards of practice for a geotechnical investigation of a hillside development in the southern California area. Because of these deficiencies, the proposed project could result in unstable conditions that could significantly undermine the stability of the proposed project and offsite properties. As presented, the proposed project could also result in significant negative impacts to Grand Avenue.

It is TSI's opinion that significant additional surface and subsurface investigations are necessary to properly characterize/model site conditions. These subsurface investigations must include direct observation of geologic features by a Professional Geologist and Engineering Geologist. Further geotechnical investigations and analysis are likely to reveal other significant issues that have not been identified in this review that require further analysis and mitigation.

Terrestrial Solutions Inc. appreciates the opportunity to present this report. Should you have any questions, please contact the undersigned at (949) 201-3388.

Respectfully submitted,

Terrestrial Solutions Inc.

Don Terres, President, Principal Geologist
PG 4349, CEG 1362, Reg. Exp.: 01-31-19

Additional References:

California Geologic Survey (CGS), 1988, Landslide hazards in the Puente and San Jose Hills, southern California, Open File Report 88-21, edited by Tan, S., 1988.

DIBBLEE, T.W. and MINCH, J.A., 2002, Geologic map of the San Dimas and Ontario Quadrangles, Los Angeles and San Bernardino Counties, California: Dibblee Geological Foundation DF-91, scale 1:24,000.

City of Walnut, General Plan Plates I and II, Prepared by the County of Los Angeles, dated April 1974.

Central Hill Landslide Area (close up and broader view)

East Side of Landslide
Escarpment (February 11, 2017)

Photo 3

West Side of Landslide
Escarpment (February 11, 2017)

Photo 4

Terrestrial Solutions Inc. Geotechnical Services

To: United Walnut Taxpayers

August 31, 2017
Project No.: 17-088

Attention: Mr. Dennis G. Majors

Subject: Geotechnical Review of Converse Report concerning The West Parcel Landslide, Mt. San Antonio College West Parcel Solar Project, Walnut, California.

Reference: Converse Consultants, 2014, Geotechnical Study Report, Proposed Fill Placement at the West Parcel, Mount San Antonio College, Walnut, California, Project No. 13-31-339-01, dated December 19, 2014.

Converse Consultants, 2017, West Parcel - Landslide Toe Test Pit Trench Study, Mt. San Antonio College West Parcel Solar Project, Walnut, California, Converse Project No. 13-31-339-30, dated July 27, 2017.

Terrestrial Solutions Inc., 2017, Geotechnical Review of proposed Grading of the West Parcel Site for Mount San Antonio College, Walnut, California. Project No. 17-088, Dated June 29, 2017.

Terrestrial Solutions Inc. (TSI) has conducted a geotechnical review of the referenced 2017 Converse Consultants (Converse) document regarding an investigation of the West Parcel Landslide adjacent to Grand Avenue. This review is supplemental to the review conducted by TSI (2017) regarding the referenced 2014 Converse report. The purpose of this review is to determine if there are geotechnical issues which have not been sufficiently addressed, and/or could result in unstable conditions both for the proposed development and/or for adjacent offsite properties.

Converse Investigation:

Converse excavated 4 test pits in the area immediately adjacent to Grand Avenue where TSI (2017) previously identified a landslide. Converse had not indicated this landslide in their 2014 report. The logs for these trenches are presented at the end of their report and the locations are indicated on their Drawing No. 1 (see Figure 1). They also added two bedding attitudes to Drawing No. 1 located outside the limits of the landslide. A cross-section line is shown on this drawing but the cross-section was not presented in the report. It is our understanding that Converse did not have a permit to conduct destructive field activities (excavation of test pits) and therefore, the trenching program was halted by enforcement agencies. A test pit was still open at the time when a representative visited the site. It appears that the open test pit is in the Location of Test Pit No. 4 (Converse, 2017). The reviewed report is apparently supplemental to their previous report (Converse, 2014) although they do not specifically say that it is.

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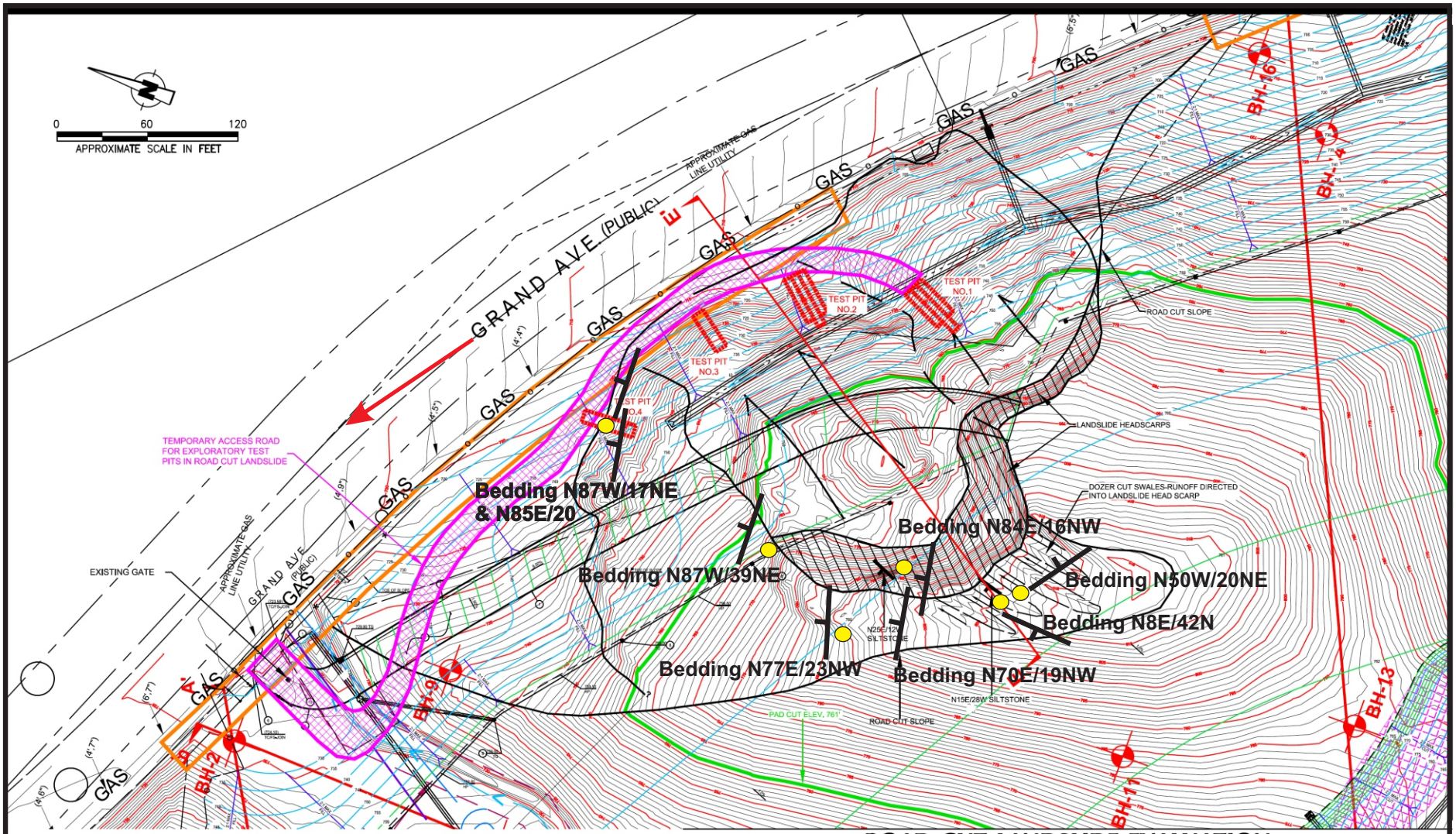


ROAD CUT LANDSLIDE EVALUATION

Converse Consultants

WEST PARCEL
MT. SAN ANTONIO COLLEGE
WALNUT, CALIFORNIA

Project No.	Drawing No.
13-31-339-02	1

Bedrock Bedding Attitude by TSI

Bedding N77E/23NW

Modified From Converse Drawing No. 1

Figure 1

Terrestrial Solutions Inc.

Summary of Converse Report Data/information:

The Converse report identifies a landslide in all four of the test pits excavated, and Drawing No. 1 has several lines possibly indicating the limits of the landslide or several landslides. The limits of the landsliding is unclear because not all lines are labeled and no legend is provided for Drawing No. 1. Four arrows are shown that likely indicate the direction of landsliding (one or two landslides) however, in the area of Test Pit No. 4 there are no arrows and the line which may show the limits of landsliding is discontinuous to the west and ends with a question mark. An area that is indicated as landslide headscarp is indicated on Drawing No. 1. There is no discussion in the text of the report regarding multiple landslides, multiple pieces of the same landslide, or the limits of landsliding.

All four test pits indicate that a landslide slip plane was encountered and that the bottom portion of the test pit encountered bedrock. There were no slip plane attitudes indicated in the trench logs, or descriptions of the slip plane (except possibly Test Pit #3). Bedding attitudes were noted within the bedrock in all four of the trenches. The bedding attitudes were variable within the test pits. However, within Test Pits 2 through 4 most of the bedrock bedding attitudes had nearly east-west strikes with dips ranging from 12 to 21 degrees to the north. In Test Pit No. 1 the bedding attitudes had a strike ranging from north 52 to 65 degrees east and northwesterly dips ranging from 12 to 22 degrees. The two attitudes near the headscarp had strikes that ranged from north 15 to 25 degrees east with dips of 12 and 28 degrees.

Converse (2017) Findings/Conclusions/Recommendations:

Converse concluded that the landslide observed occurred in the late 1970's due to previous grading activities and was likely triggered by higher than normal rainfall. In addition, they conclude that cuts made above the landslide channeled water into the headscarp area. They stated that the landslide has not been repaired and that it has continued to grow/move since the initial movement. They also conclude that additional movement is possible and it poses a potential hazard to Grand Avenue.

Converse provided recommendations to be implemented during rough grading of the site in relation to the landslide. Their recommendations repeated throughout the report included total removal of the landslide material and construction of a key near the toe of the slope. They indicate that the size, width and depth of the key will be increased during grading to remove the disturbed landslide deposits as necessary. They also indicate that subdrains will be installed to prevent build-up of hydrostatic pressure behind the compacted fills. There is no mention of conducting slope stability analysis or that a specific factor of safety will be achieved.

The Converse report also states that "the proposed grading of the West Parcel Solar Project will improve the overall slope stability along the west side of Grand Avenue and for the adjacent offsite properties and the homes along the west side of the property".

TSI review of the Converse 2017 Report:

The Converse (2017) report was specifically titled as addressing the West Parcel Landslide above Grand Avenue that was previously observed during our brief site visits on March 30, April 12, and June 20, 2017. This landslide was not indicated in the previous Converse report (2014). The recent report has many inconsistencies with their previous report and does not provide sufficient information and/or analysis to provide a conclusion whether or not the designed project will result in a stable slope condition. TSI's review will address the significant areas where there are inconsistencies, a lack of data, and/or where additional analysis is necessary according to agency guidelines/requirements.

The primary purpose of the Converse report was to investigate the landslide adjacent to Grand Avenue and provide recommendations for remedial grading. The first step in this process would normally be to model the landslide and the underlying bedrock conditions. Converse's investigation of the landslide did not generate sufficient information to provide a proper analysis of the landslide(s). They provide a map view of possible limits of landsliding however, as previously pointed out, the lines which provide the limits of the landslide are not clearly labeled and/or end suddenly. No cross-section is presented that shows the structural relationship between the landslide the underlying bedrock, the existing topography, and the proposed grading plan. Governing agencies, state, and local guidelines for geologic/geotechnical reports require geologic cross-section(s) be presented to model geologic conditions in hillside areas. In this case, several cross-sections would likely to be necessary to properly model the geotechnical conditions within the area of the landslide and to the east and west along Grand Avenue. Governing agencies, state and local guidelines also require that a Geotechnical Engineer (or a qualified Civil Engineer) conduct slope stability analysis of the modeled geologic conditions. This analysis must consider the various geologic conditions, including slip plane inclinations, bedding inclinations, the strength of the differing earth and bedrock materials, and the potential for deeper, weak bedding planes. Conducting slope stability analysis is the only way to determine the proper size of keys and other remedial measures that are necessary to stabilize a slope to meet the agency codes and standards of practice. The referenced report is not signed by a Geotechnical Engineer and therefore, does not meet agency requirements for a complete geotechnical report. Other areas of deficiencies include:

- No slip plane attitudes are presented on the test pit logs. The test pits only penetrate a few feet into the bedrock. Standard of practice for these geologic conditions would be to excavated large diameter borings that are down hole logged in order to identify bedding planes well below the landslide. The large diameter borings are also useful in identifying potential weak clay or bedding planes that may represent deeper potential failure planes. Borings would

typically be necessary above the landslide and adjacent to the landslide to verify the consistency of the bedrock conditions. The information presented so far by Converse indicates inconsistent geologic conditions.

- Converse states that the bedrock bedding attitudes found in the four test pits are "similar to the previously measured bedding attitudes measured for the project site". However, the previous report indicated (page 7, Converse 2014) that "Bedding attitudes ranged from 10 to 30 degrees east with bedding dips 8 to 25 degrees northwest". As indicated previously Test Pits 2 through 4 had bedding attitudes that generally had an east-west strike and northerly dip. Therefore, the bedding attitudes described in the test pits are <u>not</u> similar to those previously reported.
- TSI conducted brief mapping of the area above the landslide where Converse mapped bedding that strikes north 15 to 25 degrees east (similar to the previous report). Within this same area TSI observed bedrock bedding attitudes that were striking from north 50 degrees west to nearly east-west with northerly dips (see attached figure 1). These attitudes are similar to other bedrock attitudes indicated in the test pits 2 through 4. The Converse report (page 3) concluded that bedrock attitudes represent bedding that is favorable or neutral in relation to the proposed/existing slope. This statement is false as many/most of the attitudes presented in the test pits and observed in the ground surface have an out-of-slope (proposed and existing) dip component.
- The Converse report does not indicate that the out-of-slope bedding is a contributing factor to the landsliding that occurred, yet it is a likely a significant contributing factor.
- The hill near the landslide exposes bedrock that consists of interbedded siltstone, claystone, and sandstone, yet also visible at the top of the hill and to the south are conglomeratic bedrock materials. Converse (2107) has not modeled these bedrock conditions, indicated the different geologic units on their Drawing No.1, or provided any discussion of these differing bedrock materials in their recent report. Converse has not provided any geologic information of the bedrock conditions offsite and beneath Grand Avenue. Is it possible for the bedding inclinations to change in this area. There are many projects throughout southern California where bedding orientations are different offsite and resulted in less favorable geologic conditions. As indicated in TSI's previous review report (TSI, 2017) many of the hollow stem borings excavated by Converse (2014) encountered siltstones which are thinly bedded, and described as having vertical to horizontal bedding. The reasons for the variable bedrock materials and bedding orientations, and the potential impacts of the variable bedding has not been discussed or explained by Converse in either report.
- Test Pit No. 4 (Drawing 1d) indicates the presence of landslide debris in the upper portion of the test pit and along the back wall of the excavation. TSI's observation of this excavation did not indicate the presence of any significant landslide debris along the west wall or the back wall of this excavation. Photo 1 (A and B) clearly shows fractures within similar looking bedrock, that extend from near the surface to the total depth of the test pit. The test pit log describes the material above the slip plane (approximately 7 feet above the bottom of the pit)

as "disturbed, loose, broken" yet as indicated in the photos the material above and below this depth is very similar in consistency, and was not observed to be significantly disturbed, loose and broken. Bedding was observed to be consistent in the rear and side wall from near the surface to the bottom. TSI's interpretation of this Test Pit is that it is primarily bedrock which is significantly different than as presented by Converse on Drawing No. 1d. The bedrock at this location has out-of-slope dipping bedding.

- The logs for test pits No. 1 through 3 indicate that bedrock was encountered in the bottom few feet of each excavation. TSI is concerned that there may be additional slip planes below the depth of excavation. For example, the slip plane indicated in Test Pit 3 is shown as being encountered within a foot of the bottom of the excavation and nearly 20 feet below the top of the excavation. The structural relationship between the slip plane and the underlying bedrock is not provided in any of the test pits. Because geologic cross-sections are not provided the interpreted relationship between these geologic units is also not apparent. Therefore, Converse interpretation of this area as being part of the landslide may be wrong.
- The sequence of how the landslide(s) occurred as described by Converse is not consistent with the information provided by the former Mayor of the City of Walnut (TSI, 2017). According to the former mayor, a first landslide occurred after the road was widened. The failure apparently blocked the entire roadway, which was shut down. The County then cleared the roadway and re-graded the area of the landslide (visible in 1980 aerials from historicaerials.com). A second failure occurred at a later date (after 1980) that resulted in the current conditions.
- Converse's statements that the landslide continues to enlarge and represents a continued hazard to Grand Avenue, is not supported by specific evidence or slope stability analysis in their report. It is however, consistent with statements of the former Mayor of the City of Walnut that at least two landslides occurred at the subject site after Grand Avenue was expanded to its current four lane configuration in the late-1970's. According to the former Mayor, at least one of the landslides closed the road (Grand Ave.) and covered all the lanes (TSI, 2017).

Since the early 1980's when the second landslide likely occurred (approximately 35 years) there have been no reported road closures due to movement of the current landslide. In addition, no observations of movement was documented over this past winter which had significantly higher than normal rainfall. An examination of the current escarpment compared to the escarpment observed in the 1980 historicaerials.com photo, shows some erosion/raveling from 1980 to the present.

Conclusions and Recommendations:

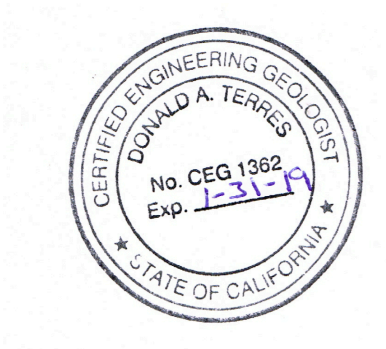
The Converse report was for the purpose of presenting a geologic model of the West Parcel Landslide that is adjacent to Grand Avenue. They also provided recommendations for stabilization of the landslide and the ultimate slope that is proposed for the West Campus Solar project. Based on the information presented in the subject report (Converse, 2017) and the previous report (Converse 2104), it is TSI's conclusion that the Registered Professional(s) that signed the report(s) have not followed state and local agencies requirements/guidelines for preparing a competent and complete geologic/geotechnical report that can be relied on to provide a project that is safe. There is not sufficient information presented in the subject report to properly model the landslide(s), the materials below the landslide, and adjacent areas. The author has not properly analyzed the data and made erroneous, misleading, and conclusionary statements that are not well supported by the data, and has not recommended or utilized other professionals which must be a part of the process. The numerous issues/deficiencies that were detailed in TSI's review of the Converse (2014) report have also not been addressed in their more recent report. The conclusions and recommendations presented in TSI's previous report are still applicable and must be addressed to provide a project that is safe and stable. Because of these deficiencies, the proposed project could result in unstable conditions that could significantly undermine the stability of the proposed project and offsite properties. As presented, the proposed project could also result in significant negative impacts to Grand Avenue.

It is TSI's opinion that significant additional surface and subsurface investigations are necessary to properly characterize/model site conditions. These subsurface investigations must include direct observation of geologic features by a competent Professional Geologist and Engineering Geologist. A Geotechnical Engineer is required by State guidelines for School sites and to provide slope stability analysis. The analysis, conclusions, and recommendations presented in the two Converse reports have not demonstrated that the registered professionals that signed these reports are capable of properly investigating and evaluating this proposed hillside development from a geotechnical viewpoint.

Terrestrial Solutions Inc. appreciates the opportunity to present this report. Should you have any questions, please contact the undersigned at (949) 201-3388.

Respectfully submitted,

Terrestrial Solutions Inc.



Don Terres CEG 1362
Reg. Exp.: 01-31-19

Test Pit No. 4

Photo 1A

Test Pit No. 4

Photo 1B

Terrestrial Solutions Inc. Geotechnical Services

To: United Walnut Taxpayers

August 31, 2017
Project No.: 17-088

Attention: Mr. Dennis G. Majors

Subject: Response to EIR planning session Comments, West Parcel Area, Mt. San Antonio College West Parcel Solar Project, Walnut, California.

Reference: Converse Consultants, 2014, Geotechnical Study Report, Proposed Fill Placement at the West Parcel, Mount San Antonio College, Walnut, California, Project No. 13-31-339-01, dated December 19, 2014.

Converse Consultants, 2017, West Parcel - Landslide Toe Test Pit Trench Study, Mt. San Antonio College West Parcel Solar Project, Walnut, California, Converse Project No. 13-31-339-30, dated July 27, 2017.

Terrestrial Solutions Inc., 2017a, Geotechnical Review of proposed Grading of the West Parcel Site for Mount San Antonio College, Walnut, California. Project No. 17-088, dated June 29, 2017.

Terrestrial Solutions Inc., 2017b, Geotechnical Review of proposed Grading of the West Parcel Site for Mount San Antonio College, Walnut, California. Project No. 17-088, dated August 29, 2017.

Introduction

Terrestrial Solutions Inc. (TSI) has reviewed Section 3.5 (Geology/Soils) of the West Parcel Solar Project, Tiered Project Draft EIR to 2012 Facilities Master Plan Program EIR (SCH 2002041161) prepared by Mt. San Antonio College, California. This review is supplemental to the previous reviews conducted by TSI (2017a and b) regarding the referenced 2014 and 2017 Converse reports. The purpose of this review is to respond to specific comments provided in the EIR documents. Some of the comments and responses are similar to those that are presented in TSI's previous reports.

Page 91: Second Paragraph

Regarding the draft comments and supporting documents: TSI has provided a geotechnical review of the two referenced reports by Converse Consultants (2104 & 2107). It is our understanding that these two review reports will be submitted by United Walnut Taxpayers (UWT) to the appropriate agency for consideration. The review reports were prepared by Don Terres whom is a Professional Geologist (PG 4349) and Certified Engineering Geologist (GEG 1362) in the State of California. His registrations are current, active, and Mr. Terres has been practicing Engineering Geology in the State of California for over 30 years. Mr. Terres vast experience includes his role as Geotechnical Reviewer for all reports submitted to the County of Orange, California.

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Pages 91 and 92: Executive Summary

The Executive Summary is stated as being a compilation from the 2014 Converse Consultant (Converse) Report. A specific section with all of these conclusions was not presented in the referenced reports. TSI's referenced report (2107a) provides a review of the Converse report and addresses most of the conclusions in this document. Several of the bulleted items are additionally addressed below.

Bullet #6 - While a liquefaction analysis was conducted for the site. This analysis was based on a boring that was not in one of the two areas of potential liquefaction as identified by the State of California. Boring BH-1 in the northern portion of the site would have been a more appropriate boring to analyze for liquefaction. However, to best characterize liquefaction potential, borings should have been excavated near the center of the mouth of the southern and the northern canyon areas. Until analysis of these areas is conducted, the analysis presented in the Converse report is not considered as sufficient to make a proper conclusion.

Bullet #8 – Remedial Grading of the site has not been well defined in either report. The depth of remedial removals has not been provided in the canyon areas. In addition, the keys for the designed slopes is not based on specific slope stability analysis for the variable conditions that will be encountered. These items are generally required by the governing agencies and standards-of-practice in the profession.

Bullet #9 – The statement regarding reducing the existing slope to a gradient less than 2:1 is misleading. Much of the existing slope along Grand Avenue is currently at a gradient less than a 2:1 inclination, therefore, increasing the design slope to a 2:1 slope is increasing the slope angle and height for much of this slope area. In addition, the underlying geologic conditions are much more critical than the angle of the proposed slope. The two Converse reports do not provide a geologic model that clearly indicates the underlying geologic conditions, nor do they provide complete geologic cross-sections. Complete geologic cross-sections are required by State and local guidelines and standards-of-practice for a proper geologic report.

Pages 93 through 134 in the EIR document are from sections of the Converse 2014 report that have been cut and pasted into the EIR document. For comments related to this report please see TSI's 2017a review report.

Section 3.5.2 Geology/Soil Impacts

CEQA checklist:

Item No. 1 – The conclusion is correct, although the Converse report does not provide the correct distance to the closest Active Fault (TSI 2107a).

Item No. 2 – Liquefaction: As discussed above and in TSI's referenced report (2017a), liquefaction has not been appropriately addressed. Therefore, this conclusion is not considered appropriate at this time.

Item No. 3-There is not a specific section in the Converse reports that addresses mass movements and/or landsliding in general. This is required by State and local guidelines and standards-of-practice. The referenced section E-7 only briefly addresses seismically induced landslides. There is a significant difference between addressing mass-movements/landsliding in general and the potential for seismically induced landslides. Neither has been properly and thoroughly addressed in the referenced Converse reports.

The statement regarding removing or reducing slopes to a 2:1 gradient is misleading. There is no analysis presented that indicates that a slope steeper or flatter than 2:1 is stable or not stable. The underlying geologic conditions is much more critical than the slope inclination. For the slope along Grand Avenue the geologic conditions have not been properly modeled, and much of this slope will have an increase in inclination and height. The remediation of this slope which has an active landslide, must be based on specific slope stability analysis on multiple cross-sections. Significant additional geologic information is necessary to accurately model the geologic relationships in this area, including the limits of the weak siltstone bedrock units.

The 2:1 cut slope proposed at the rear of the homes along Regal Canyon Drive is modeled by cross-section A-A'. However, this cross-section is incomplete. The hollow-stem borings in this area indicate that siltstones may be encountered near the toe of this slope. Hollow stem borings are not the appropriate tool for modeling geologic bedding conditions. However, bedding in this area is likely out-of-slope. Therefore, the homes above this slope may be exposed to unstable conditions as a result of this project. This proposed slope and the homes above could be in danger of failing if this slope is excavated. This slope area must be properly addressed prior to grading of the site.

There may be other similar areas of the site that will expose weak siltstone and clay beds that dip to the northeast and may result in unstable natural, existing, and/or designed slopes along the western edge of the site. There is no aerial photograph review of the geomorphology, and no discussion of the potential to undermine this area during remedial grading. More investigation excavations should have been conducted near the future daylight areas to address this potential condition.

Item No.4- There is a large landslide that exists on the site that was not identified by Converse in 2014. This is an unstable condition that is partly due to underlying unstable bedrock conditions. The underlying geologic unit in this area and throughout much of the site is a weak siltstone and claystone (identified in the borings) which have an out-of-slope bedding orientation. This is an "unstable geologic unit". The statement that the "project upon completion will not result in on- or off-site landslides" is a false/misleading conclusion. The section referenced (E7) only refers to seismically induced landslides. Landslides occur with and without seismic influences. The conclusionary statement provided (or either Converse report) does not address the potential for landslides to be caused by remedial removals, and does not address whether or not any of the existing slopes along the western perimeter of the site is underlain by landsliding.

If there is a potential for liquefaction at the mouth of the southern and/or the northern canyon areas as identified by the State of California, then the potential for lateral spreading and/or other seismic phenomena must also be addressed proposed in these areas.

Comments from June 7, 2017 meeting:

The text refers to comments made by Mr. Hassan Sassi as erroneous. His specific comments were not available for review. However, the indication that Mr. Sassi's statement indicating that the Converse report (2104) did not address landsliding is at least partially correct. The referenced Converse (2014) report did not address landslides that were unrelated to seismic activity. It also does not address the potential for unstable slope due to the proposed grading or remedial grading. This is a requirement of geologic reports. This same Converse report did not identify the obvious landslide that exists within the central portion of the site along Grand Avenue. Therefore, Mr. Sassi's comment is accurate and very appropriate. As discussed above Converse's statement regarding the potential for seismically induced landslide is not based on an accurate model of the underlying geology, and is also very misleading. TSI considers that the potential for landsliding related to this project is a significant geotechnical concern and has not been appropriately addressed by either report by Converse. This is consistent with Mr. Mansfield Collin's statement.

A statement is made that "*Grading for the project will result in a site with improved stability, not less, and no future landslide or substantial settlement is likely with the completion of the project*". The statement of improved stability is not supported by specific analysis. The slope to be excavated below the homes on Regal Canyon Drive will not have "improved" stability and may not be stable in it's proposed configuration. The homes above this proposed slopes could be in danger and will be less stable because of the proposed project. This is the same for the slope near BH-13 where the existing slope will be made steeper (less stable). The stability of the entire slope proposed along Grand Avenue has not been demonstrated with proper geologic modeling and slope stability analysis.

N10. Additional Trenching Investigations

TSI provided a review of the additional trenching as provided in the referenced report by Converse (2107). This investigation only addressed the specific landslide along Grand Avenue and did provide any specific information or discussion of potential for landsliding for the remainder of the site. The information presented in this report did not provide a model of this landslide nor did it provide specific slope stability analysis. It is TSI's opinion that this supplemental report did not provide sufficient information or provide well supported remedial recommendations to provide a site or slope that will be stable upon completion.

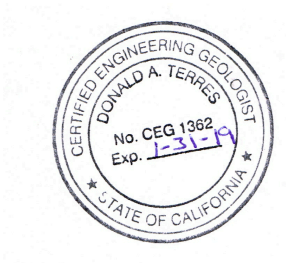
Conclusion

It is TSI's opinion that significant additional surface and subsurface investigations are necessary to properly characterize/model site conditions. These subsurface investigations must include direct observation of geologic features by a competent Professional Geologist and Engineering Geologist. A Geotechnical Engineer is required by State guidelines for School sites and to provide slope stability analysis. The analysis, conclusions, and recommendations presented in the two Converse reports have not demonstrated that the registered professionals that signed these reports are capable of properly investigating and evaluating this proposed hillside development from a geotechnical viewpoint.

Terrestrial Solutions Inc. appreciates the opportunity to present this report. Should you have any questions, please contact the undersigned at (949) 201-3388.

Respectfully submitted,

Terrestrial Solutions Inc.



Don Terres CEG 1362
Reg. Exp.: 01-31-19

DONALD A TERRES

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ENGINEERING GEOLOGIST

EDUCATION/REGISTRATIONS

Master of Arts, Geological Science, 1984 — University of California, Santa Barbara, California
Bachelor of Sciences, Geological Science, 1981 — Principia College, Elsah, Illinois
Summer Field Camp, 1980 — Indiana University, Whitehall, Montana

Certified Engineering Geologist, California, CEG 1362, Since 1987
Professional Geologist, California, PG 4349, Since 1987
City of Los Angeles Deputy Methane Inspector – Lic. No. P031442

EMPLOYMENT HISTORY

Mr. Terres' initial career began at Leighton and Associates Inc. in 1984 where he rapidly advanced from staff geologist to Director of Geologists and assistant Office Manager for their Orange County operations. Next Mr. Terres was employed by Pacific Soils Engineering, Inc., for over 6 years, as a Certified Engineering Geologist, Manager of the Tustin office, and Manager of Geological Services of the Corona Office. Since the beginning of 2010 Mr. Terres has been the Principal Geologist for Terrestrial Solutions Inc.

PROFESSIONAL RESPONSIBILITIES

Mr. Terres' career has included many responsibilities including the following:

- Provided management and training of geologic staff.
- Financial and Marketing duties related to office operations.
- Project Management of complex and multi-million dollar projects.
- Review and Preparation of geotechnical reports.
- Conduct geotechnical field investigations and laboratory data analyses.
- Performs site reconnaissance, geologic mapping, aerial photographic analysis, detailed logging of test borings and trenches, and in-grading inspections and geologic mapping.

My Terres' 30 year career has been conducted throughout California and has included residential, Institutional, commercial, industrial, public works and other projects. While Mr. Terres' primary focus has been as a geotechnical consultant he has also experience as an Environmental Geologist. He is a professional Geologist and Certified Engineering Geologist in the State of California, and a Deputy Methane Inspector for the City of Los Angeles.

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Highlighted Experience:

- His diversity includes large residential tracts, Custom homes, infill projects and multi-story apartment homes. He has also worked on many institutional project including school sites for the Los Angeles Unified School District, the Irvine Unified School District and the Capistrano Unified School District. Mr. Terres has worked on projects in Los Angeles County, Orange County, Inyo County, Alameda County, Riverside County, San Bernardino County and Other counties throughout southern and northern California.

- Mr. Terres' expertise includes Fault investigations, slope stability analysis in complex geologic terrain. His experience includes pre-construction site characterization and analysis, construction feasibility, and geologic mapping during construction to verify anticipated conditions. He has worked on many infill projects with restricted perimeters requiring shoring and other precautionary procedures in order to safely complete the project.

- Mr. Terres was the Interim Geotechnical Reviewer for the County of Orange, California – March 2013 through October 2013; Reviewed geotechnical aspects of all private development projects within unincorporated County of Orange sphere of influence. This was an interim position that was necessary while the County was searching for a permanent applicant.

CUSTOM HOME PROJECTS

Hidden Mountain Estates, City of San Juan Capistrano:
Multiple Custom homes were constructed in this private gated community in Southern Orange County. Each homes site had been mass graded, however the individual homes required careful evaluation of the geotechnical condition in relation to their own plan requirements. Mr. Terres was the primary contact for geotechnical services for these custom homes.

Pelican Hill:
Pelican Hill is very private community in Newport Coast. Mr. Terres was the primary geologist during multiple phases of mass grading of this project and then assisted in providing geotechnical services during design and construction of many of the large custom homes in this neighborhood. Development of the custom home frequently involved re-grading of lots, and construction of retaining structures to achieve the desired home

Ritz Cove
Ritz Cove is located adjacent to the Ritz Carlton, with amazing beachfront and ocean views. Mr. Terres was the engineering geologist for multiple custom home sites within this community. The geotechnical issues included construction on relatively narrow lots with existing constructed homes and often underground structures. Shallow groundwater conditions created challenges for several of the homes.

Vista Del Sol
Project manager and geologist during the design phase for a large custom home in South Laguna Beach. The proposed home was to be constructed on a narrow lot on a steep hillside with adverse geologic conditions beneath three exiting homes. The design concept was altered to best match the geotechnical conditions, and to provide a cost effect option for development of the lot. Multiple piles, tiebacks and other unique remediation methods were proposed to stabilize the proposed project.

South Laguna Beach Bluff Home
Geotechnical services were provided during the due diligence phase to evaluate the stability of the bluff and home site above the ocean where an existing structure was and future home planned. The evaluation included a rocky shoreline where waves actively were eroding, and included a sea cave at the base of the bluff. This home site is still in the planning stage.

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RESIDENTIAL PROJECTS

Parcels C and D, Lomas San Juan in the City of San Juan Capistrano:
The project included development of a large (250 acre) canyon area with over 30 separate landslides and deep compressible alluvium. Unique approaches were developed to stabilize the multiple landslides and create a long term maintenance association for repair of any potential future problems. The project was graded on a lump-sum basis, based on the competency of the geotechnical documents. It was completed under budget and on time.

Standard Pacific's Development of a major ridgeline in the City of Orange:
The project was conducted from the late 1980's through the late 1990's. It included grading of more than 20-million cubic yards of earth for the construction of over 750 single-family and multi-family homes. Geologic hazards that were remediated included multiple landslides, a potentially active fault zone, slope stability issues adjacent to existing developments, unsuitable soils, settlement of deep fills, and naturally occurring tar sands. Mr. Terres was the manager for geotechnical services and project geologist for the entire project, which included multiple owners and multiple public agencies.

Glenwood at Aliso Viejo for Shea Homes:
The golf course was re-designed to incorporate the construction of approximately 500 single family and multi-family dwelling units. This project also included construction of a Clubhouse for the Golf course and a community facility with a large swimming complex. Geotechnical hazards that were remediated included cut slopes adjacent to existing developments, removal of deep unsuitable soils, and placement of diatomaceous fills for support of future structures.

Pacific Point Development in San Juan Capistrano:
This project involved development of residential structures on a single mile-wide landslide with multiple adjacent unstable slopes and existing developments. Investigation of the landslide included many deep continuous core holes and correlating an abundance of geologic information. The project was closely peer reviewed by the City and other geotechnical firms due to the sensitive nature of the project. A successful model of the landslide and adjacent terrain was generated and accepted by multiple geotechnical firms.

Multiple Projects in the Foothill/Trabuco Specific Plan area of Orange County:
From the late 1990's to the present eight projects ranging from approximately 12 lots to over 250 lots have been in various stages of development in this hillside area of Orange County. The Foothill/Trabuco Specific Plan project require special investigative methods and analysis in order to satisfy the rigorous requirements for development. Geotechnical services have been provided for all of these projects with multiple and diverse owners, public agencies and project team members. These projects are currently in various phases of the development process.

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COMMUNITY ASSOCAITIONS

Terrestrial Solutions Inc. (TSI) staff has provided evaluations for many different community associations and homeowners throughout the Orange County area. Many of these are related to slope issues due to erosion and/or landsliding after heavy winter rainfall. Another problematic geologic condition within community associations is shallow groundwater and/or seepage. TSI provides evaluation services to determine if the seepage is a result of overwatering or natural groundwater, and provides recommendation to mitigate this common hazard. Below are brief summaries of projects that the TSI staff has worked on.

Community in the City of San Juan Capistrano:
After a winter of significant rainfall an evaluation was performed on several small landslides and erosion areas in adjacent open areas and within community association property. These areas were studied to determine the potential impact to association property. Recommendations were provided for repair and or additional maintenance.

Community Association in the City of Orange:
Movement of a landslide within the Association property was evaluated to determine if it would impact existing homes. The landslide had also destroyed drainage ditches and disrupted the irrigation system. Recommendations were provided to mitigate the hazard posed by the landslide movement.

Community Association in the City of Laguna Niguel:
An evaluation of the existing slopes within a community in the City of Laguna Niguel was performed. While the evaluation focused on the slopes other areas were also evaluated. A few areas of distress were documented and recommendation provided to investigate and/or mitigate the distress were provided.

Community Associations in Huntington Beach
A few homes within a community were experiencing seepage and shallow water conditions. Inexpensive monitoring systems were installed to determine the origin of the seepage. Based on the observation and monitoring recommendations were provided to reduce the excess subsurface water. Similar services have been provided for several community properties in the city of Huntington Beach.

Turtle Rock, Irvine Community Association.
An association was experiencing shallow groundwater problems and was concerned about how these would affect proposed additions that were being planned. The seepage was evaluated and recommendation provided to mitigate the problems during construction of the improvements.

Multifamily Dwelling unit in San Clemente
A Three story structure in San Clemente had experienced over 6 inches of differential settlement. Analysis indicated that the underlying soils were settling due to improper construction practices. Recommendations were provided and implemented to stop the structure from further settlement.

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COMMERCIAL / INDUSTRIAL PROJECTS

Temescal Canyon Industrial Complex in South Corona, California:
This multi-phased project initiated with evaluation for and construction of a rip-rap revetment for a large mass graded parcel. The revetment was designed for prevention of bank erosion from the Temescal canyon drainage. A storage facility was constructed on a portion of the project. A later phase included evaluation of a small channel for erosion and construction of a 20 feet high reinforced earthen flexible wall system. A pending phase will be for usage as a RV storage facility.

Brea Shopping Plaza Re-development:
This project included evaluation of the existing geotechnical conditions to determine the feasibility of removing the existing retail center and rebuilding a modern two story mall, hotel, restaurants and other facilities. Geotechnical issues included saturated unsuitable soils adjacent to existing structure that were to remain. This project also included construction of a portion of the new retail center over a new box culvert over a major drainage channel.

Retail Center in Foothill Ranch, Lake Forest:
This project involved evaluation of a previously graded site where potentially unstable earth materials were left beneath engineered fill. Careful analysis indicated that the left-in-place materials were suitable for the support of the proposed retail center use. The project was completed in several phases.

Industrial Warehouse, Ontario, California:
A new 100-thousand square feet warehouse was proposed in a previously developed area. Previous uses and underlying geologic conditions were evaluated, including the potential for liquefaction. Foundation recommendations were provided to mitigate the potential for differential settlement in this large structure.

Clubhouse, Community and Aquatic Center, Aliso Viejo:
The clubhouse, community Center and Aquatic center were adjacent facilities constructed as part of the Glenwood at Aliso Viejo project. Portions of this site were proposed to be constructed over previously placed non-engineered and unsuitable fill materials. In addition the on-site soils were highly diatomaceous. Remediation and placement of engineered fills required close monitoring during the grading process. Construction of the clubhouse included a subterranean garage. The aquatic center had three separate pools and children's water play area. Heavy reinforcement of foundation elements was necessary due to the expansive nature of the underlying earth materials.

City of Villa Park Fire Station:
The proposed fire station was sited near a potentially active fault and adjacent to a large Power substation. The investigation for this site involved careful review of existing geotechnical data and exhaustive field investigations including fault trenching. The firehouse was successfully sited away from potential faulting and in a location with easy access to major roadways.

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INSTITUTIONAL PROJECTS

Institutional projects require special knowledge and procedures as compared to typical development projects. They are considered as essential facilities that have a higher standard of care, especially in California where the potential for seismic shaking and other potential seismic hazards is prevalent. Geotechnical reports must be submitted to the California Division of State Architects and the California Geological Survey. The geotechnical issues during development of these schools often involved evaluation of previous consultant's work on the site and then providing remedial recommendation that are necessary for the essential facilities. Several projects listed have not been constructed. Services for these projects were provided during the design phase only to date.

Stonefield Elementary School – Irvine Unified School District:

Woodbury Elementary School – Irvine Unified School District

Portola Springs Elementary School – Irvine Unified School District: Design Phase

Wagon Wheel Elementary School – Capistrano Unified School District

Las Flores Middle School – Capistrano Unified School District

Vista Verde Elementary & Middle School – Irvine Unified School District

Northwood High School Aquatic Center Addition – Irvine Unified School District

Quail Hill Elementary School – Irvine Unified School District

Joplin Boys Ranch – County of Orange

St. Michael's Abby and Preparatory School – County of Orange: Design Phase

PA 40 Middle School – Irvine Unified School District; Design Phase for two potential sites.

Ocean Institute – Dana Point Harbor – County of Orange

Boy Scouts of America, Newport Beach Sea Base – City of Newport Beach.

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WATER STORAGE PROJECTS

City of Huntington Beach Reservoir Project:
The Springdale underground reservoir was constructed to elevations below the adjacent groundwater levels. Geotechnical issues included dewatering of the site during the construction phase and the suitability of the soils to support the proposed structures. Close coordination with multiple city agencies was necessary. Unique solutions were required during construction to remediate the geotechnical conditions.

Design and Construction Phases of twin, City of San Juan Capistrano California, Reservoirs:
Construction of the above ground reservoirs included construction of an access road and installation of the utilities necessary for operation of the twin reservoir site. Geotechnical hazards that were remediated included several landslides and slope stability issues, and stabilization of soft alluvial soils. Biologically sensitive wetlands were avoided and enhanced as part of the projects scope of work.

Construction of two Municipal Emergency Water Wells, City of Palo Alto, California: These water wells were constructed to depths of 460 and 540 feet and included 18 inch diameter well casing that were capable of each producing over 1000 gallons per minute. Construction of the wells was in residential areas and involved working 24 hours a day for nearly 3 weeks each. Coordination with multiple public agencies was critical to the projects success.

Development of two Reservoir Sites in the City of Orange, California:
One of the above ground reservoir sites was along an unstable ridgeline and required realignment of the access road to provide more reliable servicing to the facility. The second reservoir was built over engineered fill that was 50 feet in depth. Selective grading and above standard compaction criteria was required to provide a uniform and stable fill column that was capable of supporting this above ground structure. As part of this work the existing nearby "Diemer" 72-inch diameter water main was evaluated to assure that settlement was not a concern.

Repair of two 5 million gallon underground reservoirs for the City of Laguna Beach: Both reservoirs were drained and evaluated for settlement and adjacent slope stability issues. Subsurface investigation methods required avoidance of existing underground utilities and structures. Remediation included grouting to mitigate slope creep and settlement concerns. Timing of geotechnical investigation and quick response times were critical to the success of this project.

Solana Ridge Reservoir Site, Las Vegas, Nevada:
active.This project included evaluation for rippability, and an active Fault near the proposed reservoir site. Rippability was characterized for proposed cuts of over 100 feet in depth in granitic-like terrain. Long fault trenches were excavated to determine the nature and location of faults. Fault zones that were previously called active were downgraded to potentially

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TRANSPORTATION PROJECTS

Pacific Coast Highway Landslide, Dana Point/San Clemente, California:
This project involved remediation of a large landslide which closed both Pacific Coast Highway (PCH) and the rail link between Los Angeles and San Diego. This national APWA project of the year included re-construction of a natural bluff above PCH with an artificial but natural looking wall. The landslide, slope, and wall was stabilized using multiple rows of tie-backs and caissons with a shot-crete, sculptured facing. The project encompassed two cites, and Caltrans and railroad right of ways. The Caltrans roadway was opened on time and under budget.

Eastern Transportation Corridor (ETC), County of Orange, California:
Geologist in charge of all technical aspect during the final design and construction phases for mountain sections of this 700 million dollar project. The ETC project consisted of excavation of over 67-million cubic yards of earth and 23 miles of road construction. The project cut through several large hills, with cuts up 300 feet in depth in a diverse and complicated geologic terrain. The primary geotechnical issues that were resolved included slope stability, suitability of soils to support large bridge structures and earth embankments well over 200 feet in height. The toll road was opened early and was successfully completed under budget.

Sections 11, 12 and 13 of the San Joaquin Transportation Corridor:
Geologic conditions were evaluated for three sections of the toll road during this 65% design phase. These Sections were in mountainous areas and had numerous complex geotechnical issues including slope stability, foundation support for bridge structures and construction of the road adjacent to existing developments.

Design and Construction, Imperial Highway through to Cannon Street, City of Orange: This major arterial roadway was constructed over a major ridgeline. The major geotechnical issues included slope stability and construction adjacent to existing developments. The road also crossed a potentially active fault zone and a major regional water line. A bridge was constructed over the primary drainage and required coordination with multiple agencies.

Widening of Moulton Parkway-Irvine Center Drive:
A geotechnical document was created in support of the EIR for wideneing this major roadway in central and southern Orange County. This challenging project included widening the existing major arterial route through highly developed areas. Challenges included retaining walls, crossing major drainages, slope stability, and the suitability of existing soils to support the roadway.

Design and Construction of Newport Coast Drive in the City of Newport Beach:
This major roadway was constructed over and around an existing landfill. Geotechnical issues included slope stability, and suitability of existing soils to support the roadway. Portions of the landfill were stabilized using dynamic compaction methods. A second area was stabilized using geofabric due to the weakness of the native soils. Many existing pipelines were stabilized during construction activities using piles and grouting to form a support structure. Extending above and below ground drainage structures was required for the ongoing landfill operations.

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LANDFILL AND GROUNDWATER PROJECTS

Expansion of the Coyote Canyon Landfill, Orange County, California:
Landfill expansion was accomplished in several phases. Geotechnical input was provided regarding perimeter stability issues, generation of landfill cover materials, and dynamic compaction of landfill material for construction of an arterial roadway. Services included design and implementation of a complex subdrain system beneath proposed expansion areas.

Evaluation of a City landfill in Compton, California. Geotechnical evaluation was provided for potential to convert the landfill site into a residential home development. Geotechnical issues involved evaluation of the type and distribution of the existing landfill material, evaluation of a "Alquilt-Priolo" zoned active fault within the property limits.

Forrester Canyon landfill/landslide, City of San Juan Capistrano, California:
This property was evaluated for construction of single-family homes or possible equestrian use. The site was used as a city dump for miscellaneous residential debris and waste. The site is also underlain entirely by a large landslide complex. Geotechnical evaluation included slope stability issues and characterization of the landfill material including the type of materials and distribution. Removal of portions of the landfill materials was proposed. Groundwater characterization was a critical aspect of the project, for both leachate issues and landslide stabilization issues.

Parcel C2, Lomas San Juan, San Juan Capistrano, California:
This was a groundwater extraction and induction project with the purpose of accelerating long term settlement. Approximately 40 wells were designed and installed. The wells were interconnected and automated for both induction and extraction of groundwater. The system operated daily for approximately 2 years prior to abandonment. Ground settlement was closely monitored and evaluated for correlation with groundwater induction and extraction. Accelerated settlement was achieved as predicted.

Marblehead Coastal Project, San Clemente, California:
Responsibilities included modeling groundwater and surface water flow and budgets for maintenance of a large wetland area. This analysis required characterization of current groundwater conditions, as well as predicting post development groundwater conditions. The project required review and approval from the California Coastal Commission.

Master's Thesis-1984-Thermal Water Systems of the Western Transverse Ranges:
The thesis characterized approximately ten sources (hot springs) of water in Ventura and Santa Barbara Counties. Each was mapped and analyzed to determine the groundwater source and geologic conditions present at each location. A model was developed that characterized provenance of the groundwater and linked many of the springs to similar groundwater aquifers or geologic conditions.

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