Preliminary Drainage Study

Desert Green Solar Farm LLC

Modification to Major Use Permit 3300-09-012 (P09-012W1);
ER No. 09-05-001A

June 29, 2012
Revised August 31, 2012
Revised November 9, 2012
Revised February 20, 2013

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RBF JN 25-105388

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1. Existing and Proposed Conditions

1.1 Existing Condition

1.1.1 Project Location

The project is located approximately 0.45 miles north of Palm Canyon Drive and 1 mile east of Borrego Valley Road in Borrego Springs, northeastern San Diego County. The Borrego Valley Airport lies approximately 0.30 miles south of the project boundary. Refer to the vicinity map in Figure 1-1.

1.1.2 Drainage Patterns

The Borrego Valley Flood Management Report was created by Boyle Engineering in October 1989. The scour depth design standard described in this report is currently utilized by the County of San Diego for structures and equipment placed on piers. The report, herein referred to as BVFMR, presents information and guidelines for recommended scour depths within Borrego Valley.

The Flood Hazard Map for Borrego Valley Alluvial Fans (Appendix VII of the BVFMR), located in Appendix B of this report, shows that the project boundary lies along the valley floor of the Coyote Canyon alluvial fan within the Borrego Valley. The nearest defined alluvial wash is Coyote Creek, which is located approximately 3,000 feet east of the project. Alluvial fans typically occur in arid environments where steep mountains encounter a flat valley floor. These areas usually experience infrequent but intense storms. This particular combination of topography and climate tends to produce flash floods yielding high sediment loads along the steep mountainside, while channel braiding (washes) and sediment deposition occur along the gentle slopes of the valley floor.

Per the BVFMR, Coyote Creek has a drainage area of 144 square miles. The 100-year flow rate at the apex of the Coyote Creek alluvial fan is approximately 23,200 cubic feet per second (cfs). This flow is either distributed among shallow alluvial channels or sheet flows across the width of the alluvial fan. A portion of this flow travels across the project from northwest to southeast at a slope of approximately 0.8 percent.

The Federal Emergency Management Agency (FEMA) has prepared Flood Insurance Studies (FIS) identifying alluvial fans with calculated depths and velocities. These depth-velocity lines represent the velocity and depth that are likely to occur during a 100-year storm within a theoretical alluvial channel of a certain calculated width, which is dependent on the distance from the alluvial fan apex. Velocity and depth values are found on the Flood Hazard Map for Borrego Valley Alluvial Fans located in Appendix B. Per the flood hazard map, the velocity is 4.5 feet per second and the flow depth is one foot in the vicinity of the project.

The Federal Emergency Management Agency (FEMA) categorizes the site as Zone AO. Zone AO is defined as areas which have flow depths of one to three feet (usually sheet flow on sloping terrain) where average depths are determined. Refer to Figure 1-2 for the project Flood Insurance Rate Map. According to a site visit by RBF Consulting on May 12, 2009, the vegetation cover over the project site consists of moderately-vegetated salt brush scrub (See Figure 1-3).

1.2 Proposed Improvements

The proposed Project would result in the construction, operation and maintenance of a concentrated photovoltaic (CPV) solar farm within the community of Borrego Springs,

California in northeastern San Diego County. Desert Green Solar Farm LLC proposes to develop such facilities to allow for the long-term generation of clean energy from solar power that would ultimately be sold and distributed for public consumption. All of the proposed structures, including two 15-foot diameter water tanks, will be built on piers so that the lowest horizontal structural member is one foot above the base flood depth.

The Project consists of a development area encompassing approximately 50.63 acres, a 15-foot wide trail easement (w/o improved trail) along the westerly and northerly property line consisting of 2.61 acres, and onsite undisturbed open space consisting of approximately 124.68 acres. Additionally, approximately 110 acres of the 288-acre parcel would be designated as "Undeveloped" and are not proposed for development at this time. Access to the site is via a 30-foot private easement road off of Palm Canyon Drive.

Off-site improvements consist of a 24-foot all-weather access serving the project from Palm Canyon Drive via a private access/utility easement (2.53 acres) and a 4-inch water line serving the project site (0.63 acres) from Palm Canyon. The Project would be developed at one time and would not be phased. The County Assessor Parcel Number (APN) affected by the proposed project is 141-230-26 (288.29 acres, or approximately 288 acres). Additional parcels potentially affected by the Project improvements may include APNs 141-210-04, -05, -06, -25 and -26 [site access, generation-tie (Gen-tie) line and/or water line easement]; APNs 141-230-33 and -38 (private water line easement); and/or APN 141-060-08 (12kV Borrego Valley Road Access/Gen-tie Route).

On-site facilities will consist of an array of CPV solar panels, breakaway perimeter fencing, and supporting transmission facilities. An itemized list of proposed impervious surfaces is included in Appendix F of this report. Energy generated will be transferred to the existing Borrego Substation, located approximately one mile to the west of the project site, adjacent to Borrego Valley Road.

A non-toxic, biodegradable, permeable soil-binding agent or permeable rock material will be applied to all disturbed or exposed surface areas as follows: a) A permeable soil-binding agent suitable for both traffic and non-traffic areas shall be used. These agents shall be biodegradable, eco-safe, with liquid copolymers that stabilize and solidify soils or aggregates and facilitate dust suppression; or, b) Alternatively, a permeable rock material consisting of either river stone decomposed granite or gravel could be placed in a thin cover over all exposed surface area in-lieu of the binding agent referenced above. In-lieu of, or in combination with a) and b) above, the areas located between the arrays, and any non-drivable surface may be re-vegetated with native noninvasive plant species.

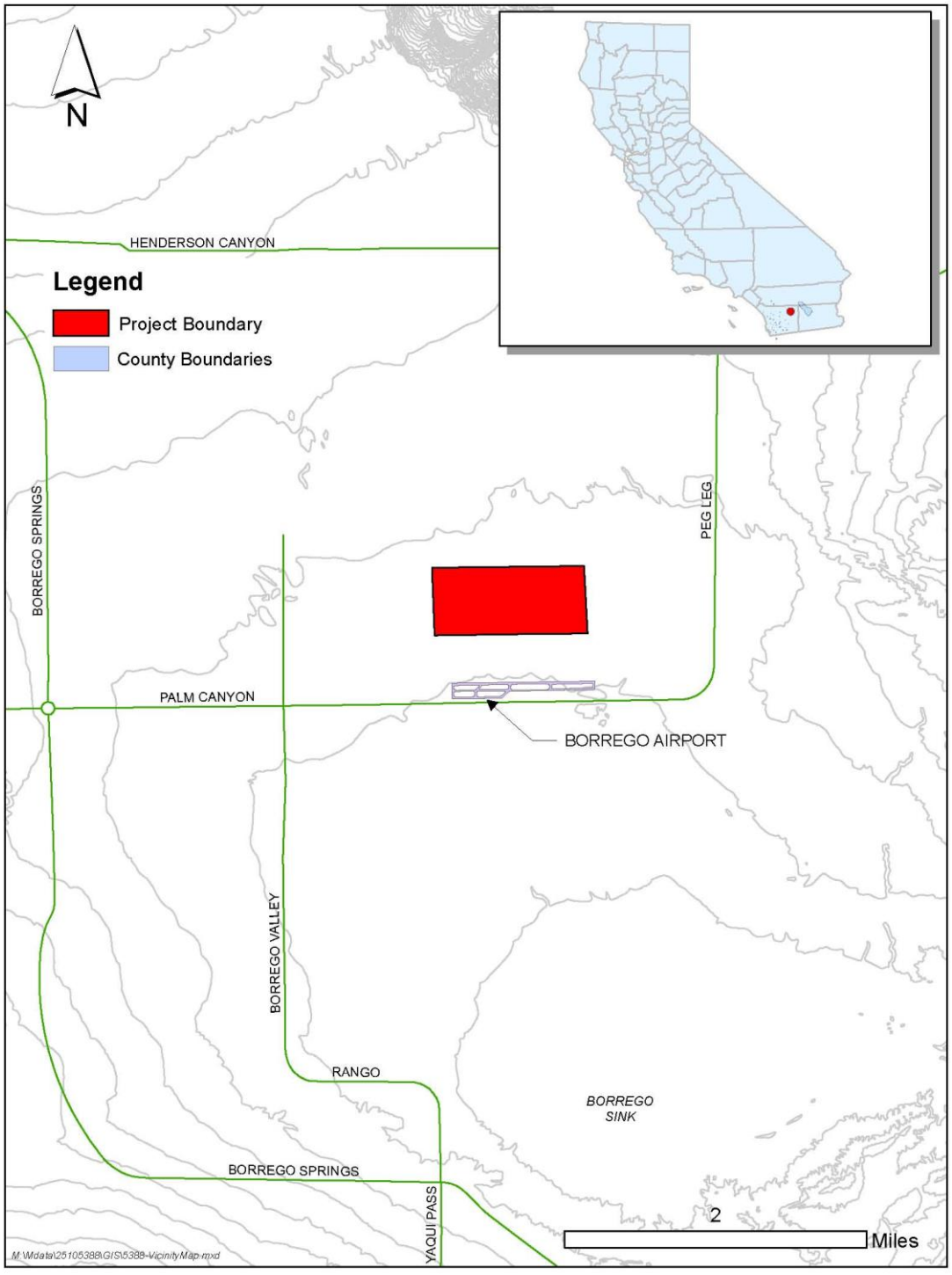


Figure 1-1 Project Vicinity Map

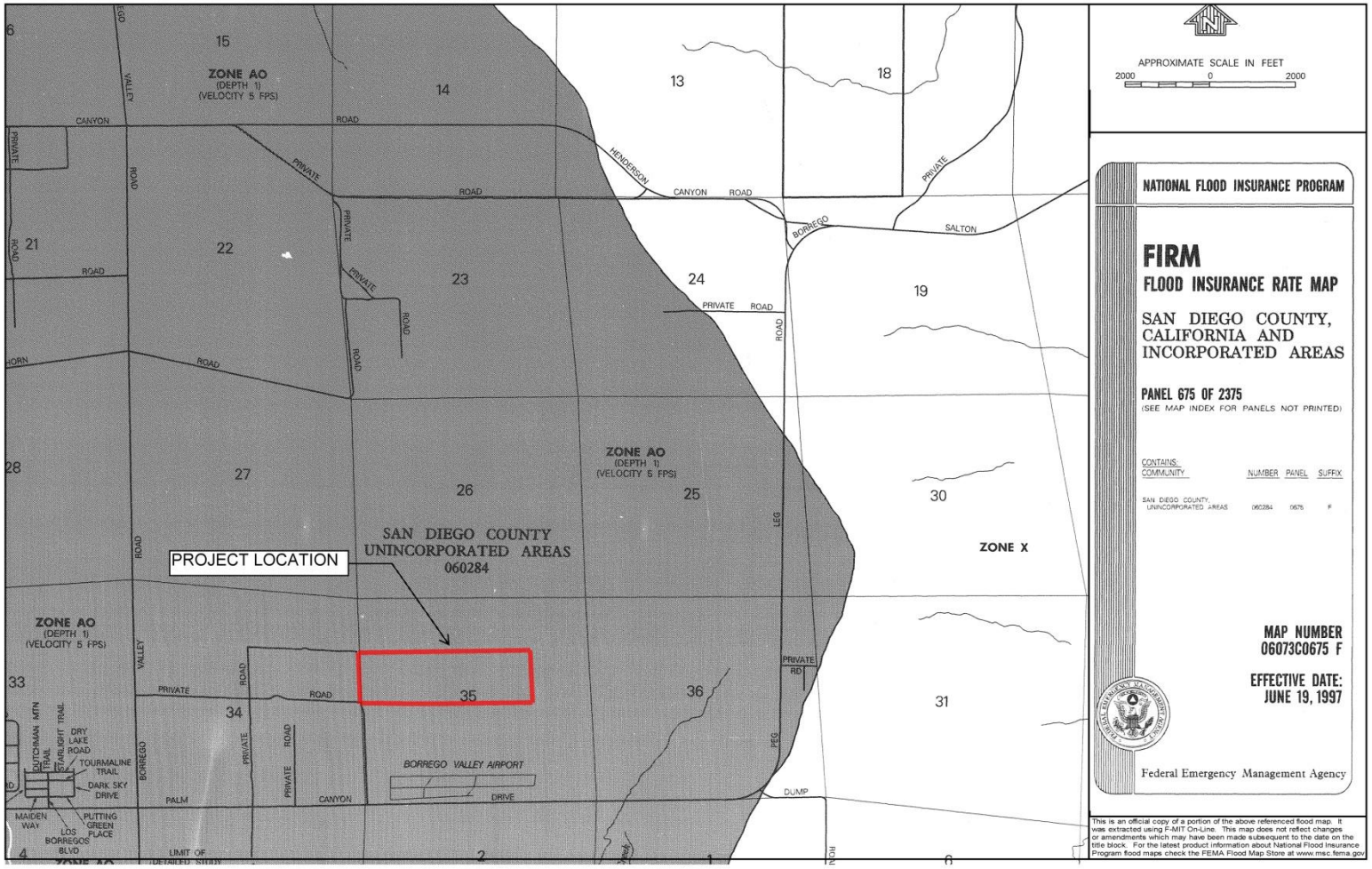


Figure 1-2 FEMA Flood Insurance Rate Map

Figure 1-3 Image of Vegetation at Project Site

2. Study Objectives

The objectives for this study include the following:

- Develop 100-year flow rates for pre-development and post-development conditions to assess the potential changes in the quantity and character of run-on and run-off for the project.
- Place all structures and equipment on piers such that the lowest horizontal structural member is one foot above the 100-year depth of flow.
- Utilize breakaway fencing for all stretches of fence that are no parallel to the direction of flow.
- Calculate the depth of scour, in accordance with the BVFMR, for the proposed structure foundations (including the piles for the solar panels) and recommend a minimum depth below grade for construction.

3. Methodology

3.1 Rational Method

Design peak flow rates for the project site were developed based upon the Rational Method methodologies described in the San Diego County Hydrology Manual (SDCHM). The Rational Method is a physically-based model that calculates peak flow rates (Q) as a function of the runoff coefficient (c), rainfall intensity (i), and drainage area (A):

$$Q = c * i * A$$

3.1.1 Runoff Coefficient (c)

The pre-development runoff coefficient value was developed based upon Table 3-1 (SDCHM), using hydrologic soil type A and B, and the classification of "Undisturbed Natural Terrain."

The post-development runoff coefficient was developed using an area-weighted composite runoff coefficient for the project site drainage basin, based on proposed impervious area (c=0.95) and hydrologic soil types A and B. All proposed impervious areas (support piers, inverter pads, etc) have been accounted for in the proposed condition runoff coefficient. Refer to Appendix F for an itemized list of proposed impervious areas.

The hydrologic soil type classifications were delineated using geology data from the Natural Resources Conservation Service (NRCS) Web Soil Survey. A project site soils map is provided in Attachment C.

3.1.2 Rainfall Intensity (i)

Rainfall intensity was developed based upon the following equation from the SDCHM (page 3-7):

$$i = 7.44 P_6 {T_c}^{-0.645}$$

The 6-hour precipitation depth (P_6) was taken from Appendix B of the SDCHM, and is included in Appendix F.

The duration (D) used to calculate rainfall intensity is the time of concentration. The time of concentration (Tc) for each drainage basin was calculated as the summation of the initial time of concentration and the total travel time through the drainage basin.

$$T_c = T_i + T_t$$

The initial time of concentration (T_i) was taken from Table 3-2 of the SDCHM based upon the slope and the assumption of "Natural" conditions. The travel time (T_t) through the project site drainage basin was developed using the Kirpich formula presented on Figure 3-4 of the SDCHM, which is valid for overland travel time through natural watersheds.

$$T_t = \frac{11.9L^3}{\Delta E}^{0.385}$$

No export or import of soil is proposed and there are no storm drain improvements proposed as part of this project; therefore, the post-development time of concentration will remain substantially unchanged from the pre-development condition.

3.1.3 Drainage Area (A)

The proposed approximate 288 acre project site drainage area (A) consists of 50.63 acres of development, 124.68 acres of open space, 110 acres of undeveloped area, and 2.61 acres of trail easement.

Clearing and grubbing (removal of existing vegetation) along with approximately 93,300 cubic yards of grading (remove and re-compact) will be required to install the proposed solar panels and associated transmission structures. The proposed project will not divert runoff, as compared to pre development conditions. Therefore, the project site drainage area is not expected to be significantly changed. A copy of the major use permit plot plan and grading plan are included in Appendix E.

3.2 Scour Analysis

Figure II-4 within the BVFMR uses the flow depth from the Flood Hazard Map for Borrego Valley Alluvial Fans to determine the scour depth for foundation pilings and a recommended pier length (See Appendix H).

The scour due to the free-fall of runoff from each solar panel face was calculated using the following U.S. Bureau of Reclamation (USBR) formula, adopted by Clark Co.:

$$Y = 1.32\ q^{0.54}\ \ H^{0.225}\ - TW$$

Where:

Y = Depth of scour due to free-fall overdrop (ft)

q = Discharge per unit width of 25'x48' solar panel face (cfs/ft)

H = Total drop (ft)

TW = Tailwater depth (ft)

Results from these calculations are shown in Appendix H.

4. Results and Conclusions

4.1 Results

4.1.1 Hydrology

Table 4-1 below presents a hydrologic summary of existing and proposed conditions. Nodes 100 represents the discharge location associated with the entire 288-acre project site.

Proposed improvements will increase the impervious area draining to Node 100 from 0 to 0.12 acres. All impervious areas have been accounted for in the composite runoff coefficient calculation, including the inverter platforms, storage structure, water tanks, emergency generator, switchgear pad, ultra capacitor pad, SCADA equipment, and thirty-inch diameter piers supporting the solar panels. Based on the size of the project site and the low magnitude of impervious area, the increase to the proposed condition composite runoff coefficient is less than 0.01.

Refer to Appendix F for the pre & post development 100-year rational hydrology calculations.

Table 4-1 Summary of 100-Year Flow Rates

Node	Pre Development Runoff Coefficient, C	Post Development Runoff Coefficient, C	Intensity, I (in/hr)	Drainage Area, A (ac)	Pre Development Q_{100} (cfs)	Post Development Q_{100} (cfs)
100	0.24	0.24	1.6	288.3	111	111

4.1.2 Proposed Fencing and Structures

Fencing will be installed along the perimeter of the project site for security measures. At a minimum, breakaway fencing will be installed at all locations where the fence line is not parallel to the direction of flow. Based on the alignment of the project site relative to the alluvial fan direction (shown on the Flood Hazard Map in Appendix B), the entire perimeter will likely consist of breakaway fencing.

The Borrego Valley Flood Hazard Map, found in Appendix B, shows a depth of one (1) foot and a velocity of four and a half (4.5) feet per second for the for the project area under 100-year flood conditions. In conformance with guidelines set forth by the County of San Diego, all lowest horizontal structural members, including the proposed water tank, will be set one foot above the 100-year depth of flow by the use of piers.

4.1.3 Scour Analysis

Figure 4-1 shows a profile sketch of the proposed solar panels and foundations. The foundations will be either 28 inch metal driven piles or 30 inch concrete drilled piers. The design scour depth for each foundation is 7.7 feet (assuming 30-inch piers – worst

case). The footing of each foundation should be constructed below this scour depth. Scour protection has been applied as outlined in the BVFMR. See Appendix H for calculations.

According to the USBR, the scour due to runoff from each solar panel face is 1.8 inches. Therefore, the free falling runoff from each solar panel will produce numerically insignificant scour.

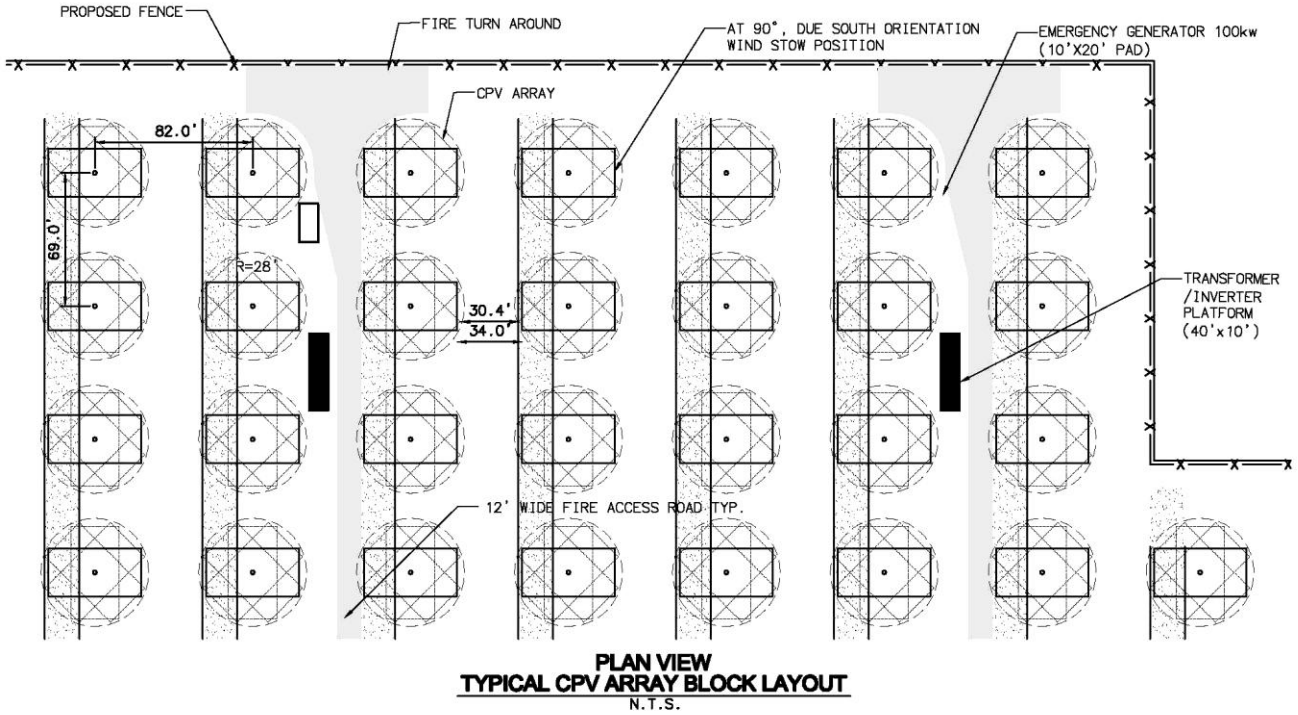


Figure 4-1 Typical Sketch Showing Foundation Spacing

4.2 Conclusions

- This project proposes a minimal increase in impervious area, which produces no increase in proposed condition flow rates. Consequently, there is neither an adverse impact downstream nor changes related to depth or velocity of flow within the Special Flood Hazard Area for the region.
- A proposed pier length in excess of 7.7 feet deep will be adequate to mitigate scouring impacts from alluvial flooding. Scour protection will be applied as recommended by the Borrego Valley Flood Management Report.
- All of the proposed structures, including the two 15-foot diameter water tanks, will be elevated utilizing piers so that the lowest horizontal structural member is at least one foot above the base flood depth

  Breakaway fencing sections will be used around the entire perimeter of the 50.63 acre project site.

5. CEQA Summary

5.1 Drainage

5.1.1 Erosion and/or Sedimentation

Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?

No. The project will not alter existing drainage patterns of the site area. Also, the project will not increase existing condition flow rates. Therefore, there will be no substantial changes to the natural erosion and siltation processes onsite or off-site.

5.1.2 Flooding

Does the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site*?*

No. The project will not alter existing drainage patterns of the site area. Also, the project will not increase existing condition flow rates. Therefore, flooding is not anticipated onsite or offsite.

5.1.3 Drainage System Capacity

Does the project create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems?

No.

The project does not drain to any existing drainage systems, nor does it propose any drainage systems. Additionally, the proposed project will not result in an increase in flow discharged from the site, as compared to pre development conditions.

5.2 Flood Hazards

5.2.1 Residential Flood Hazard

Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps?

No. Housing is not proposed for this project.

5.2.2 Flood Flow

Does the project place within a 100-year flood hazard area structures that would impede or redirect flood flows?

All proposed structures (including the two water tanks) will be placed on piers so that the lowest horizontal structural member is at least one foot above the base flood depth.

Breakaway fencing will be used around the entire perimeter of the 50.63-acre project site.

6. References

Boyle Engineering Corporation. *Borrego Valley Flood Management Report*. October, 1989.

Federal Highway Administration. *Hydraulic Engineering Circular No. 22, Second Edition: Urban Drainage Design Manual*. August 2001.

Natural Resources Conservation Service. *Hazard of Erosion and Suitability*. December 17, 2007.

San Diego County Department of Public Works Flood Control Section. *Hydrology Manual (SDCHM)*. June 2003.

San Diego County. *Drainage Design Manual*. July 2005

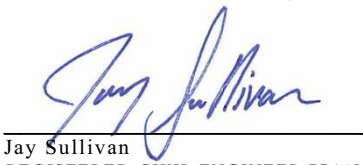
Soil Conservation Service (SCS). *Soil Survey San Diego Area, California*. December 1973.

TerraCosta Consulting Group. *Flood Hazard Evaluation and Foundation Recommendations.* Borrego Springs Subdivision. August 2, 2006.

7. Declaration of Responsible Charge

I hereby declare that I am the Civil Engineer of Work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current design.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as Engineer of Work, of my responsibilities for project design.

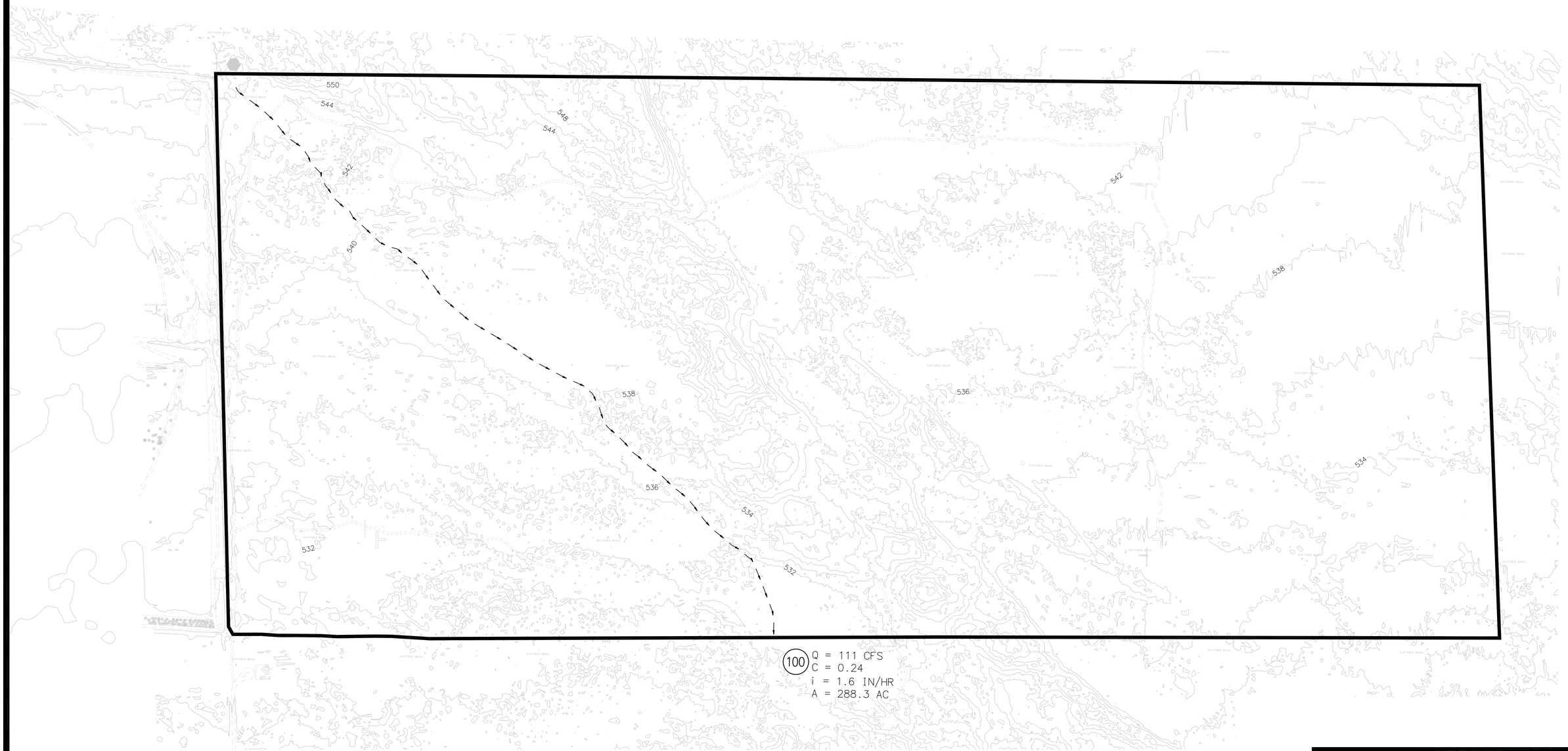


Jay Sullivan
REGISTERED CIVIL ENGINEER 77445

3-6-13
DATE

Appendix A

Existing Condition Hydrologic Work Map



LEGEND

100 NODE

FLOW PATH

PROJECT SITE

200 100 0 200 400 600

SCALE: 1"=200'

SCALE: 1"=200'

DESERT GREEN SOLAR FARM

EXISTING CONDITION HYDROLOGIC WORK MAP

PROJECT LOCATION

BORREGO SPRINGS, CA

DRAFTED BY	DATE	SCALE
KC	6/29/2012	1"=200'

RBF JOB NO.

25-105388

RBF CONSULTING

PLANNING ■ DESIGN ■ CONSTRUCTION

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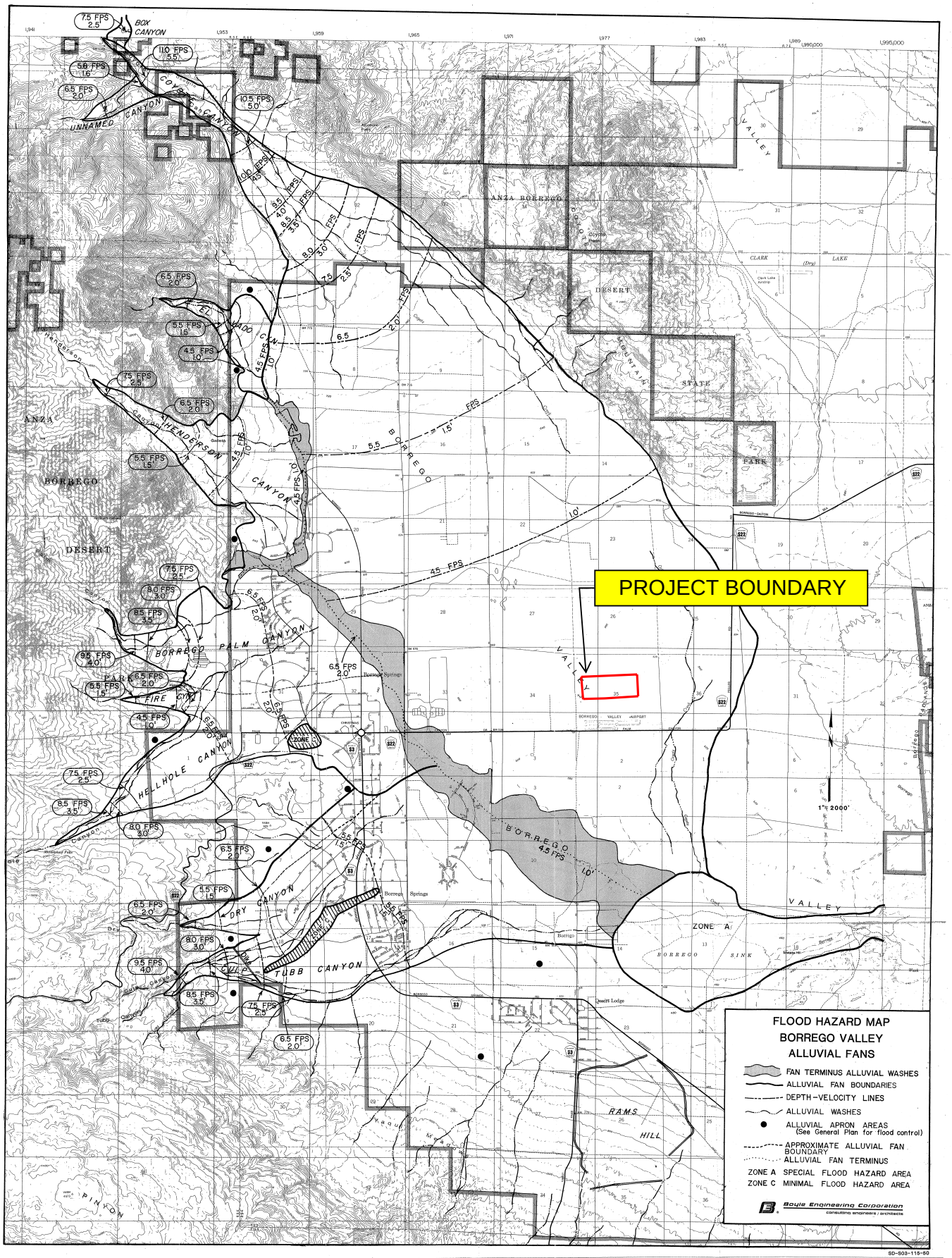
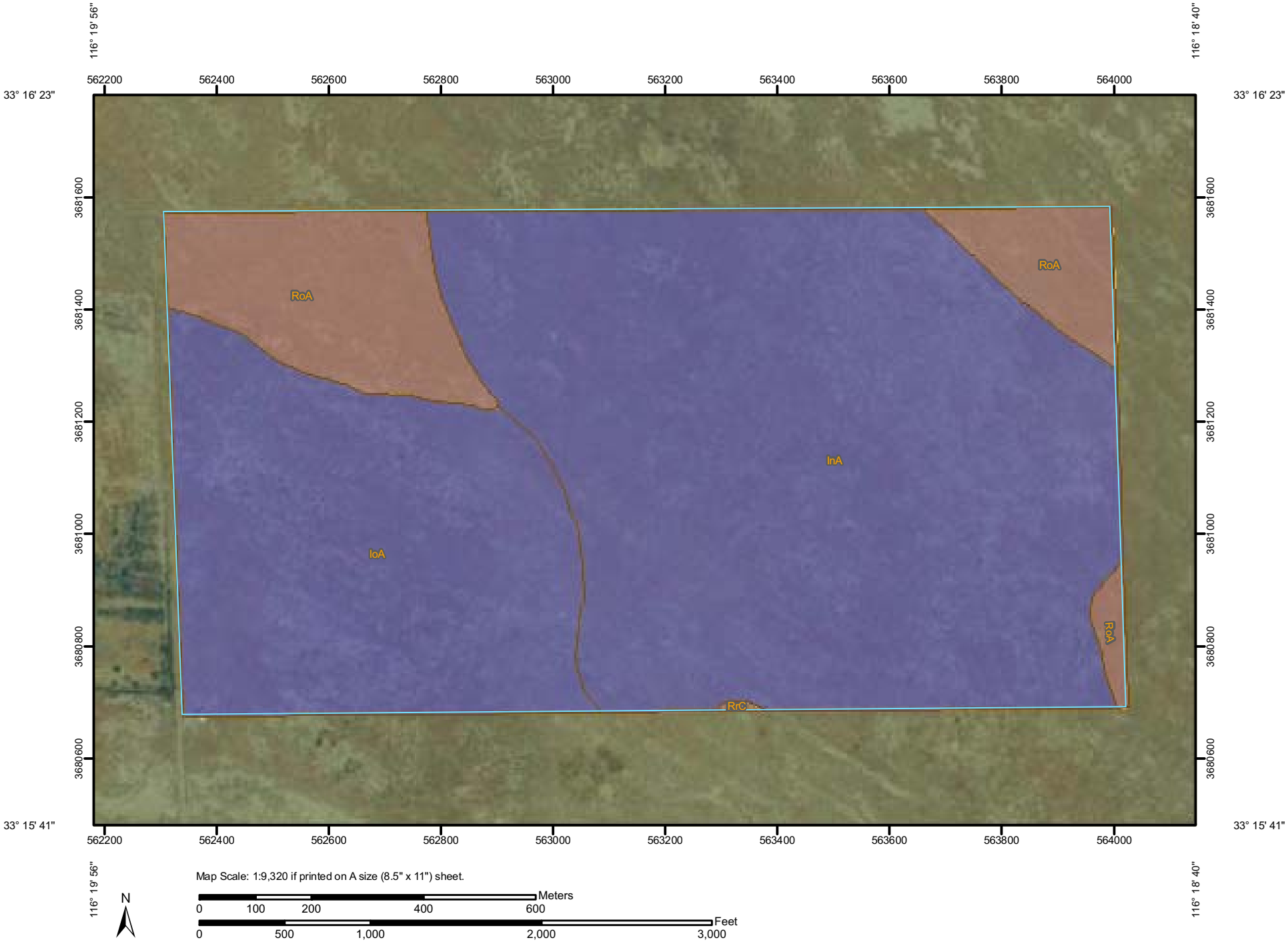
Appendix B

Flood Hazard Map for Borrego Valley Alluvial Fans


PROJECT BOUNDARY
FLOOD HAZARD MAP
BORREGO VALLEY
ALLUVIAL FANS
FAN TERMINUS ALLUVIAL WASHES
ALLUVIAL FAN BOUNDARIES
DEPTH-VELOCITY LINES
ALLUVIAL WASHES
ALLUVIAL APRON AREAS
(See General Plan for flood control)
APPROXIMATE ALLUVIAL FAN BOUNDARY
ALLUVIAL FAN TERMINUS
ZONE A SPECIAL FLOOD HAZARD AREA
ZONE C MINIMAL FLOOD HAZARD AREA
Boyle Engineering Corporation
consulting engineers / architects
1" = 2000'
ZONE A
ZONE C
BORREGO SINK
RAMS HILL
BORREGO VALLEY
ANZA BORREGO DESERT STATE PARK
CLARK LAKE (Dry)
BOX CANYON
UNNAMED CANYON
COYOTE CANYON
HENDERSON CANYON
PALM CANYON
FIRE GULCH
HELLHOLE CANYON
DRY CANYON
TUBB CANYON
BORREGO SPRINGS
SD-503-115-60

Appendix C

NRCS Soils Information


116° 19' 56"
116° 18' 40"
562200
562400
562600
562800
563000
563200
563400
563600
563800
564000
33° 16' 23"
33° 15' 41"
3681600
3681400
3681200
3681000
3680800
3680600
RoA
InA
IoA
RrC
Map Scale: 1:9,320 if printed on A size (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 500 1,000 2,000 3,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:9,320 if printed on A size (8.5" × 11") sheet.

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

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

Soil Survey Area: ANZA-BORREGO AREA, CALIFORNIA
Survey Area Data: Not available

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 6, Dec 17, 2007

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 5/31/2005

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — ANZA-BORREGO AREA, CALIFORNIA (CA804)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
No soil data available for this soil survey area.				
Subtotals for Soil Survey Area			**—**	**—**
Totals for Area of Interest			**372.8**	**100.0%**

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
InA	Indio silt loam, 0 to 2 percent slopes	B	219.2	58.8%
IoA	Indio silt loam, saline, 0 to 2 percent slopes	B	103.6	27.8%
RoA	Rositas fine sand, 0 to 2 percent slopes	A	49.8	13.4%
RrC	Rositas fine sand, hummocky, 5 to 9 percent slopes	A	0.3	0.1%
Subtotals for Soil Survey Area			**372.8**	**100.0%**
Totals for Area of Interest			**372.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

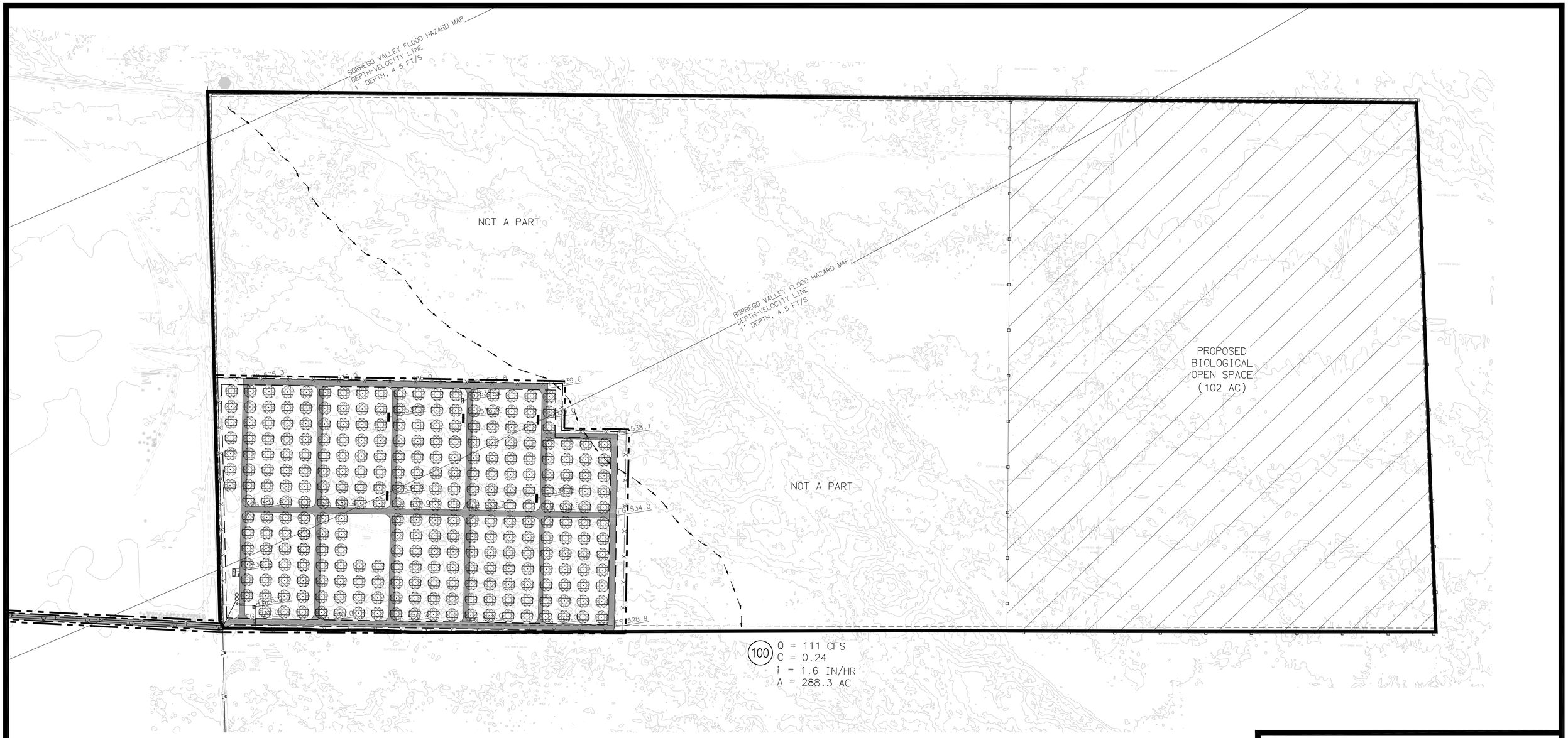
Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Appendix D

Proposed Condition Hydrologic Work Map



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SCALE: 1"=200'

DESERT GREEN SOLAR FARM

PROPOSED CONDITION HYDROLOGIC WORK MAP

PROJECT LOCATION

BORREGO SPRINGS, CA

DRAFTED BY	DATE	SCALE
KC	8/30/2012	1"=200'

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Appendix E

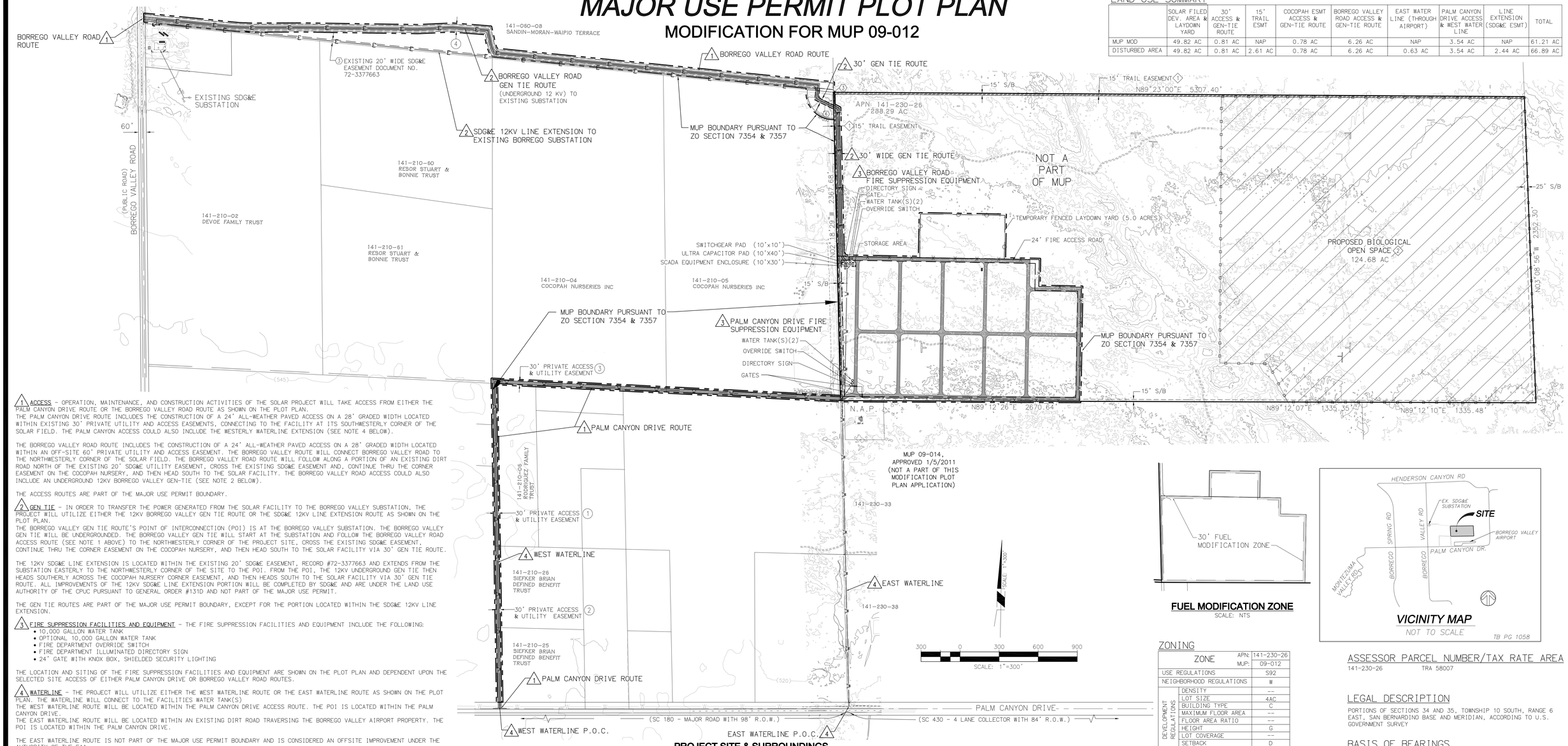
Major Use Permit Plot Plan and Grading Plan

MAJOR USE PERMIT PLOT PLAN

MODIFICATION FOR MUP 09-012

LAND USE SUMMARY

	SOLAR FILED DEV. AREA & LAYDOWN YARD	30' ACCESS & GEN-TIE ROUTE	15' TRAIL ESMT	COCOPAH ESMT ACCESS & GEN-TIE ROUTE	BORREGO VALLEY ROAD ACCESS & GEN-TIE ROUTE	EAST WATER LINE (THROUGH AIRPORT)	PALM CANYON DRIVE ACCESS & WEST WATER LINE	LINE EXTENSION (SDG&E ESMT)	TOTAL
MUP MOD	49.82 AC	0.81 AC	NAP	0.78 AC	6.26 AC	NAP	3.54 AC	NAP	61.21 AC
DISTURBED AREA	49.82 AC	0.81 AC	2.61 AC	0.78 AC	6.26 AC	0.63 AC	3.54 AC	2.44 AC	66.89 AC



PROJECT SITE & SURROUNDINGS

SCALE: 1"=300'

FUEL MODIFICATION ZONE

SCALE: NTS

VICINITY MAP

NOT TO SCALE

TB PG 1058

ZONING

ZONE	APN:	141-230-26
	MUP:	09-012
USE REGULATIONS		S92
NEIGHBORHOOD REGULATIONS		W
DEVELOPMENT REGULATIONS	DENSITY	--
	LOT SIZE	4AC
	BUILDING TYPE	C
	MAXIMUM FLOOR AREA	--
	FLOOR AREA RATIO	--
	HEIGHT	G
	LOT COVERAGE	--
	SETBACK	D
	OPEN SPACE	--
SPECIAL AREA REGULATIONS		C

ASSESSOR PARCEL NUMBER/TAX RATE AREA

141-230-26 TRA 58007

LEGAL DESCRIPTION

PORTIONS OF SECTIONS 34 AND 35, TOWNSHIP 10 SOUTH, RANGE 6 EAST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO U.S. GOVERNMENT SURVEY

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM (NAD83) ZONE 6,AS DETERMINED BY THE LINE BETWEEN NATIONAL GEODETIC SURVEY (NGS) STATIONS '13 AAR ECC' AND 'BOR 12' WITH A BEARING OF N42°35'10"W.

BENCHMARK

NGS STATION BOR 9, A 4" BRASS DISK IN 6" CONCRETE BASE 4.5' SOUTHEAST OF POWER POLE #319 AND 30' NORTHEAST OF THE EDGE OF BORREGO VALLEY

ROAD. ELEVATION = 521.86 DATUM: NAVD88

APPLICANT

DESERT GREEN SOLAR FARM LLC
c/o CLARK CRAWFORD,
ATTORNEY-IN-FACT
16650 VIA ESPRILLO
SAN DIEGO, CA 92127
CONTACT: PATRICK BROWN
(619) 733-2649

SHEET INDEX

1 ACCESS - OPERATION, MAINTENANCE, AND CONSTRUCTION ACTIVITIES OF THE SOLAR PROJECT WILL TAKE ACCESS FROM EITHER THE PALM CANYON DRIVE ROUTE OR THE BORREGO VALLEY ROAD ROUTE AS SHOWN ON THE PLOT PLAN.
THE PALM CANYON DRIVE ROUTE INCLUDES THE CONSTRUCTION OF A 24' ALL-WEATHER PAVED ACCESS ON A 28' GRADED WIDTH LOCATED WITHIN EXISTING 30' PRIVATE UTILITY AND ACCESS EASEMENTS, CONNECTING TO THE FACILITY AT ITS SOUTHWESTERLY CORNER OF THE SOLAR FIELD. THE PALM CANYON ACCESS COULD ALSO INCLUDE THE WESTERLY WATERLINE EXTENSION (SEE NOTE 4 BELOW).

THE BORREGO VALLEY ROAD ROUTE INCLUDES THE CONSTRUCTION OF A 24' ALL-WEATHER PAVED ACCESS ON A 28' GRADED WIDTH LOCATED WITHIN AN OFF-SITE 60' PRIVATE UTILITY AND ACCESS EASEMENT. THE BORREGO VALLEY ROUTE WILL CONNECT BORREGO VALLEY ROAD TO THE NORTHWESTERLY CORNER OF THE SOLAR FIELD. THE BORREGO VALLEY ROAD ROUTE WILL FOLLOW ALONG A PORTION OF AN EXISTING DIRT ROAD NORTH OF THE EXISTING 20' SDG&E UTILITY EASEMENT, CROSS THE EXISTING SDG&E EASEMENT AND, CONTINUE THRU THE CORNER EASEMENT ON THE COCOPAH NURSERY, AND THEN HEAD SOUTH TO THE SOLAR FACILITY. THE BORREGO VALLEY ROAD ACCESS COULD ALSO INCLUDE AN UNDERGROUND 12KV BORREGO VALLEY GEN-TIE (SEE NOTE 2 BELOW).

THE ACCESS ROUTES ARE PART OF THE MAJOR USE PERMIT BOUNDARY.

2 GEN TIE - IN ORDER TO TRANSFER THE POWER GENERATED FROM THE SOLAR FACILITY TO THE BORREGO VALLEY SUBSTATION, THE PROJECT WILL UTILIZE EITHER THE 12KV BORREGO VALLEY GEN TIE ROUTE OR THE SDG&E 12KV LINE EXTENSION ROUTE AS SHOWN ON THE PLOT PLAN.
THE BORREGO VALLEY GEN TIE ROUTE'S POINT OF INTERCONNECTION (POI) IS AT THE BORREGO VALLEY SUBSTATION. THE BORREGO VALLEY GEN TIE WILL BE UNDERGROUNDED. THE BORREGO VALLEY GEN TIE WILL START AT THE SUBSTATION AND FOLLOW THE BORREGO VALLEY ROAD ACCESS ROUTE (SEE NOTE 1 ABOVE) TO THE NORTHWESTERLY CORNER OF THE PROJECT SITE, CROSS THE EXISTING SDG&E EASEMENT, CONTINUE THRU THE CORNER EASEMENT ON THE COCOPAH NURSERY, AND THEN HEAD SOUTH TO THE SOLAR FACILITY VIA 30' GEN TIE ROUTE.

THE 12KV SDG&E LINE EXTENSION IS LOCATED WITHIN THE EXISTING 20' SDG&E EASEMENT, RECORD #72-3377663 AND EXTENDS FROM THE SUBSTATION EASTERLY TO THE NORTHWESTERLY CORNER OF THE SITE TO THE POI. FROM THE POI, THE 12KV UNDERGROUND GEN TIE THEN HEADS SOUTHERLY ACROSS THE COCOPAH NURSERY CORNER EASEMENT, AND THEN HEADS SOUTH TO THE SOLAR FACILITY VIA 30' GEN TIE ROUTE. ALL IMPROVEMENTS OF THE 12KV SDG&E LINE EXTENSION PORTION WILL BE COMPLETED BY SDG&E AND ARE UNDER THE LAND USE AUTHORITY OF THE CPUC PURSUANT TO GENERAL ORDER #131D AND NOT PART OF THE MAJOR USE PERMIT.

THE GEN TIE ROUTES ARE PART OF THE MAJOR USE PERMIT BOUNDARY, EXCEPT FOR THE PORTION LOCATED WITHIN THE SDG&E 12KV LINE EXTENSION.

3 FIRE SUPPRESSION FACILITIES AND EQUIPMENT - THE FIRE SUPPRESSION FACILITIES AND EQUIPMENT INCLUDE THE FOLLOWING:
- 10,000 GALLON WATER TANK
- OPTIONAL 10,000 GALLON WATER TANK
- FIRE DEPARTMENT OVERRIDE SWITCH
- FIRE DEPARTMENT ILLUMINATED DIRECTORY SIGN
- 24' GATE WITH KNOX BOX, SHIELDED SECURITY LIGHTING

THE LOCATION AND SITING OF THE FIRE SUPPRESSION FACILITIES AND EQUIPMENT ARE SHOWN ON THE PLOT PLAN AND DEPENDENT UPON THE SELECTED SITE ACCESS OF EITHER PALM CANYON DRIVE OR BORREGO VALLEY ROAD ROUTES.

4 WATERLINE - THE PROJECT WILL UTILIZE EITHER THE WEST WATERLINE ROUTE OR THE EAST WATERLINE ROUTE AS SHOWN ON THE PLOT PLAN. THE WATERLINE WILL CONNECT TO THE FACILITIES WATER TANK(S)
THE WEST WATERLINE ROUTE WILL BE LOCATED WITHIN THE PALM CANYON DRIVE ACCESS ROUTE. THE POI IS LOCATED WITHIN THE PALM CANYON DRIVE.
THE EAST WATERLINE ROUTE WILL BE LOCATED WITHIN AN EXISTING DIRT ROAD TRAVERSING THE BORREGO VALLEY AIRPORT PROPERTY. THE POI IS LOCATED WITHIN THE PALM CANYON DRIVE.

THE EAST WATERLINE ROUTE IS NOT PART OF THE MAJOR USE PERMIT BOUNDARY AND IS CONSIDERED AN OFFSITE IMPROVEMENT UNDER THE AUTHORITY OF THE FAA.

NOTES

1. GROSS AREA: 288.29 ACRES (APN 141-230-26)
2. NET AREA: 288.29 ACRES (APN 141-230-26)
3. TOPOGRAPHIC SOURCE: VERTICAL MAPPING, FLOWN 5/8/09 & & INTERMAP FLOWN 2005
4. ASSOCIATED REQUESTS: NONE
5. THE APPROVAL OF THIS MAJOR USE PERMIT MODIFICATION (MUP) AUTHORIZES THE FOLLOWING: CONSTRUCTION, OPERATION, AND MAINTENANCE OF A CPV SOLAR FARM PURSUIT TO SECTION 6952 OF THE SAN DIEGO COUNTY ZONING ORDINANCE.
6. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OF APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.
7. ALL STRUCTURES TO BE CONSTRUCTED OF NON-COMBUSTIBLE MATERIALS (CONCRETE, BLOCK, METAL) OR SIMILAR.
8. NO LANDSCAPING PROPOSED.
9. LIGHTING FOR MAINTENANCE AND SECURITY PROPOSES ONLY. SHIELDED LIGHTING LOCATED AT GATES AND SHALL CONFORM TO COUNTY OF SAN DIEGO OUTDOOR LIGHTING REQUIREMENTS. SEE DETAIL ON SHEET 3.
10. PHASING - PROJECT WILL BE IMPLEMENTED IN SEVERAL PHASES WITHOUT REGARD TO SEQUENCE WITHIN DEVELOPMENT AREA.
11. ALL DISTURBED AREAS WOULD BE COVERED WITH GRAVEL OR A BINDING AGENT TO REDUCE DUST.
12. SEE PRELIMINARY GRADING PLAN FOR PROPOSED GRADING.
13. ONLY DIRECTIONAL, LIMITS OF OPEN SPACE AND SAFETY SIGNAGE ARE PROPOSED.
14. NO DEVELOPMENT WILL OCCUR IN THE AREAS IDENTIFIED ON THE PLOT PLAN AS "OPEN SPACE".
15. SEE SHEET 2 FOR LEGEND.
16. THE ENTIRE SITE IS SUBJECT TO INUNDATION BY THE 100-YEAR FLOOD AND IS WITHIN FEMA MAP NO. 06073C0675F THE LIMITS OF THE 100-YEAR FLOOD ALONG THE WATERCOURSE WHICH FLOWS THROUGH THE PROPERTY.
17. SITE ACCESS GATE(S) TO BE EQUIPPED WITH FIRE DEPARTMENT APPROVED KNOX KEY-OPERATED SWITCH.
18. SOLAR RELATED FACILITIES (PANELS, ELECTRICAL CONNECTIONS, TRANSFORMER/ INVERTER PLATFORM, STORAGE BUILDING, EMERGENCY GENERATOR, FENCING, INTERNAL ACCESS AND SWITCHGEAR PLATFORM, ETC.) SHOWN ON THE PLOT PLAN MAY BE RELOCATED, RECONFIGURED, AND/OR RESIZED WITHIN THE SOLAR FACILITY DEVELOPMENT AREA (EXCLUSIVE OF THE OPEN SPACE AREAS) WITH THE ADMINISTRATIVE APPROVAL OF THE DIRECTOR OF PDS WHEN FOUND IN CONFORMANCE WITH THE INTENT AND CONDITIONS OF PERMIT'S APPROVAL. TRANSFORMER/INVERTER/GENERATOR SIZE, LOCATIONS, BRAND, ELECTRICAL SIZE CAN BE RELOCATED, REPLACED OR RECONFIGURED WITHOUT REQUIREMENT OF MINOR DEVIATION. THE TRANSFORMER/INVERTER/GENERATOR MUST COMPLY WITH NOISE ORDINANCE AND MUST BE ELEVATED 1' ABOVE BASE FLOOD ELEVATION. THE 24' WIDE FIRE ACCESS ROAD WIDTHS MAY BE REDUCED ADMINISTRATIVELY WITH THE APPROVAL OF THE COUNTY FIRE AUTHORITY AND THE BORREGO SPRINGS FIRE PROTECTION DISTRICT.
19. THE ENTIRETY OF THE PARCEL ENCUMBERED BY MUP 09-012 (APN 141-230-26-00) IS SUBJECT TO THE RESTRICTIONS AND TERMS OF A COUNTY AVIATION EASEMENT.
20. TOTAL SOLAR TRACKER HEIGHT WILL NOT EXCEED 30 FEET.
21. WATER DISTRICT: BORREGO WATER DISTRICT.
22. ALL STRUCTURES, TRANSFORMER/INVERTER PLATFORM AND ELECTRICAL PADS TO BE ON PIERS.
23. 10,000 GAL. WATER TANK(S) WITH FIRE DEPARTMENT CONNECTION.
24. NO DEVELOPMENT IS ALLOWED WITHIN THE NOT A PART AREA WITHOUT A SUBSEQUENT PERMIT AND/OR DISCRETIONARY REVIEW.
25. PROVIDE OVERRIDE SWITCH CONTROL NEAR MAIN ENTRY TO ALLOW FIRE DEPARTMENT TO MOVE TRACKERS INTO STOW POSITION.
26. TRAIL EASEMENT TO ALLOW UTILITY LINES UNDERGROUND.

PROPOSED EASEMENTS

	DESCRIPTION
1	15' TRAIL EASEMENT
2	OPEN BIOLOGICAL SPACE EASEMENT (SHT. 1)

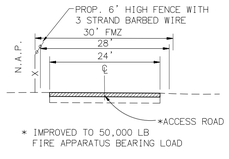
EXISTING EASEMENTS*

	DESCRIPTION	DISPOSITION
5	SDG&E EASEMENT	TO REMAIN
6	ACCESS & UTILITY EASEMENT (200' RADIUS)	TO REMAIN

○ BASED ON DATA FROM PRELIMINARY TITLE REPORT BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. 11-725137943-D-PP, DATED MAY 16, 2012.

RECORDED EASEMENTS

	DESCRIPTION
1	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-0235574
2	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-235573
3	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-0282029
4	50' PRIVATE ACCESS & UTILITY EASEMENT



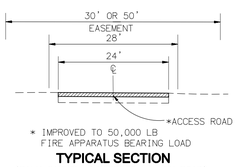
* IMPROVED TO 50,000 LB FIRE APPARATUS BEARING LOAD

TYPICAL SECTION

24' PERIMETER ACCESS ROAD

NOT TO SCALE

TYPICAL LOCATION UNLESS SHOWN OTHERWISE ON SITE PLAN



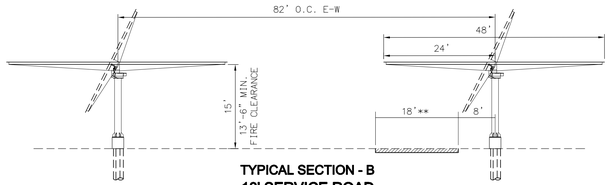
* IMPROVED TO 50,000 LB FIRE APPARATUS BEARING LOAD

TYPICAL SECTION

(PALM CANYON / BORREGO VALLEY ROAD)

PRIMARY ACCESS ROAD / EASEMENT

NOT TO SCALE

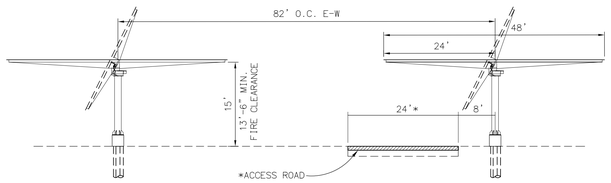


TYPICAL SECTION - B

18' SERVICE ROAD

NOT TO SCALE

** IMPROVE TO 15,000 LB SERVICE ROAD



* IMPROVED TO 50,000 LB FIRE APPARATUS BEARING LOAD

TYPICAL SECTION - A

24' INTERIOR ACCESS ROAD (FIRE)

NOT TO SCALE

DESERT GREEN SOLAR FARM
BORREGO SPRINGS, CA

MODIFICATION FOR MUP 09-012
(NO CHANGE TO MUP 09-014)
ER NO. 09-05-001A
TITLE SHEET

FEBRUARY 22, 2013
SHEET 1 OF 3

RBF CONSULTING
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858.614.5000 • FAX 858.614.5001 • www.RBF.com

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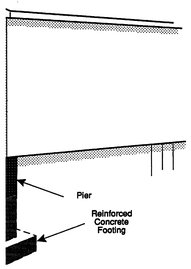
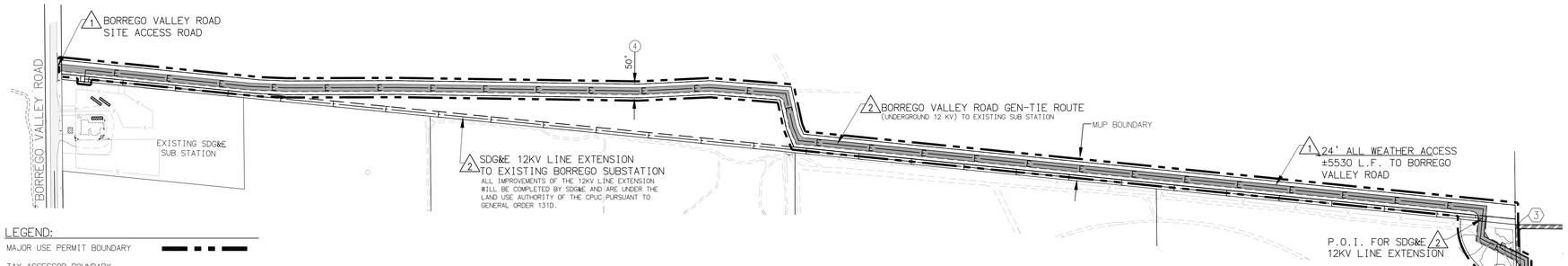
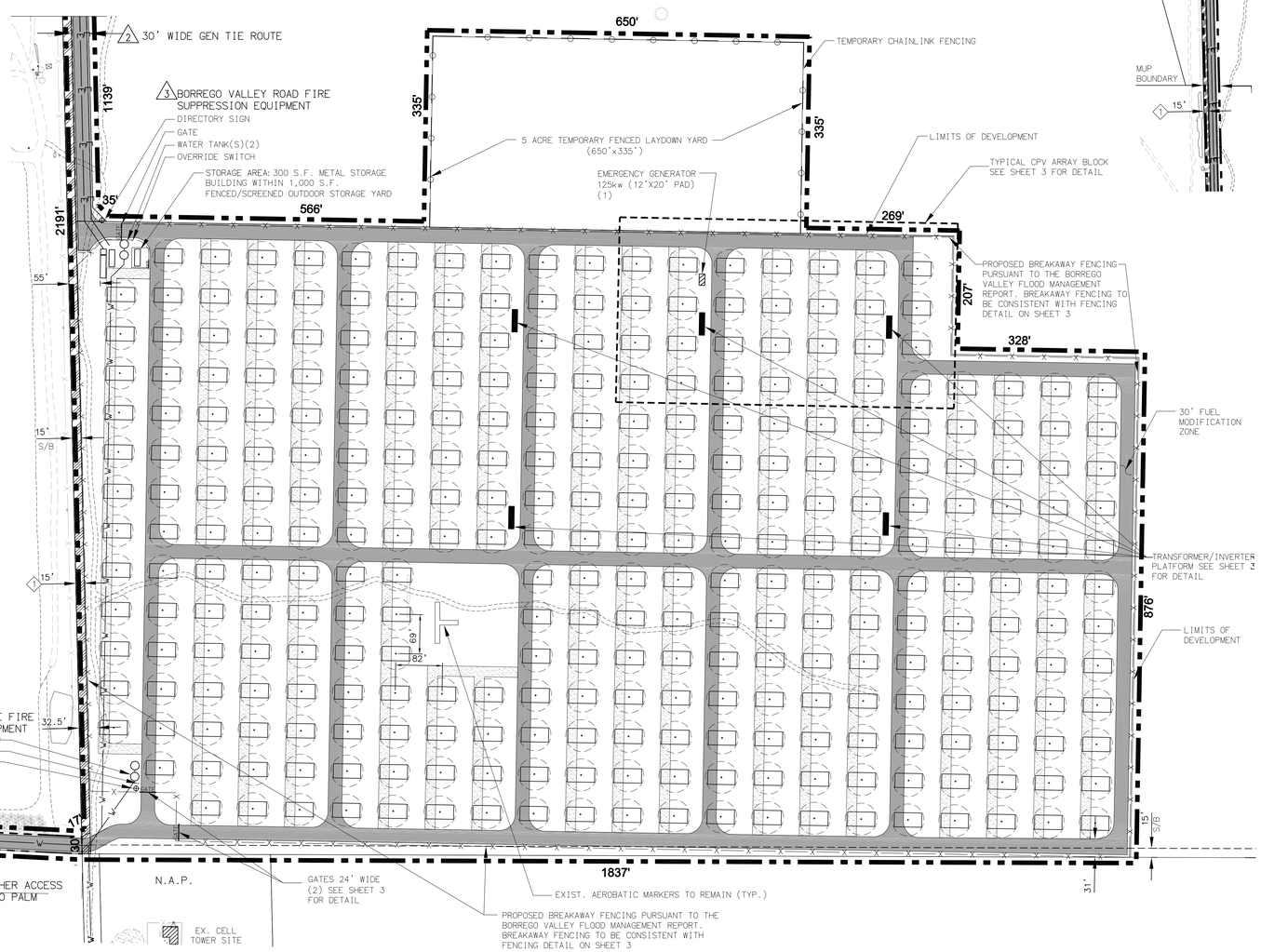
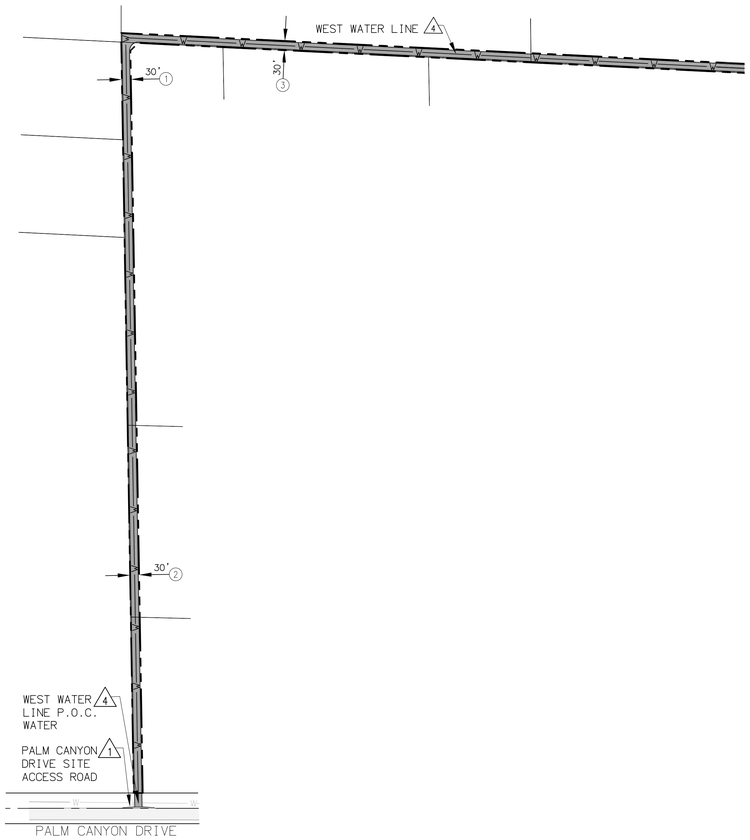


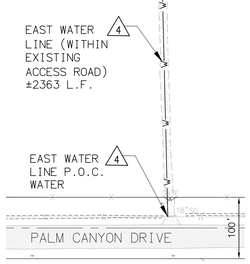


LEGEND:

- MAJOR USE PERMIT BOUNDARY
- TAX ASSESSOR BOUNDARY
- LIMITED BUILDING ZONE LINE
- EX. 6' CHAINLINK FENCE — X —
- PROP. 6' CHAINLINK BREAKAWAY FENCE WITH 3 STRAND BARBED WIRE — X — X —
- TEMPORARY FENCING — O — O —
- PROP. 24' FIRE ACCESS ROAD-ALL WEATHER (10% GRADIENT MAX) 50,000 LB.
- PROP. 18' SERVICE ROAD 15,000 LB.
- PROP. TRAIL EASEMENT (1)
- BUILDING SETBACK LINE (S/B)
- PROP. WATER LINE — W —
- PROP. UNDERGROUND POWER LINE — E —
- TRANSFORMER/INVERTER PLATFORM (4 - DUAL 630kw & 1 - DUAL 720kw INVERTER PLATFORM)
- EMERGENCY GENERATOR PLATFORM
- CPV ARRAY (308)
- PROP. BIOLOGICAL OPEN SPACE (124.68 AC.) WITH OPEN SPACE SIGNAGE SEE DETAIL ON SHEET 3

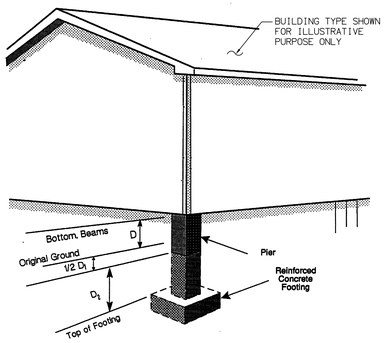






MAJOR USE PERMIT PLOT PLAN

MODIFICATION FOR MUP 09-012



PIER FOUNDATION

Depth of Erosion Protection

Footings for slab foundations must be constructed to a depth below the prevailing ground level as shown in Figure II-1.Sht. 1 The necessary depth of construction for these footings is based on the Borrego Valley Alluvial Fan Map.

The flood depth (D) shown for the particular location is converted to a construction depth (D_1) based on the velocity shown on the map, using the following table:

Velocity (V)	Construction Depth (D_1)
4 Feet/Second	D_1 = D
6 Feet/Second	D_1 = D
8 Feet/Second	D_1 = 1.8 X D
Over 8 Feet/Second	Study Required

Where: D_1 = Depth Below Ground (Feet)
D = Depth Shown on Alluvial Fan Map (Feet)
V = Velocity Shown on Alluvial Fan Map (Feet/Second)

Erosion protection made of rock, gabions, or rip-rap must be installed to the depth D_1.

D_2 Pier Scour
Depth of Scour (feet)

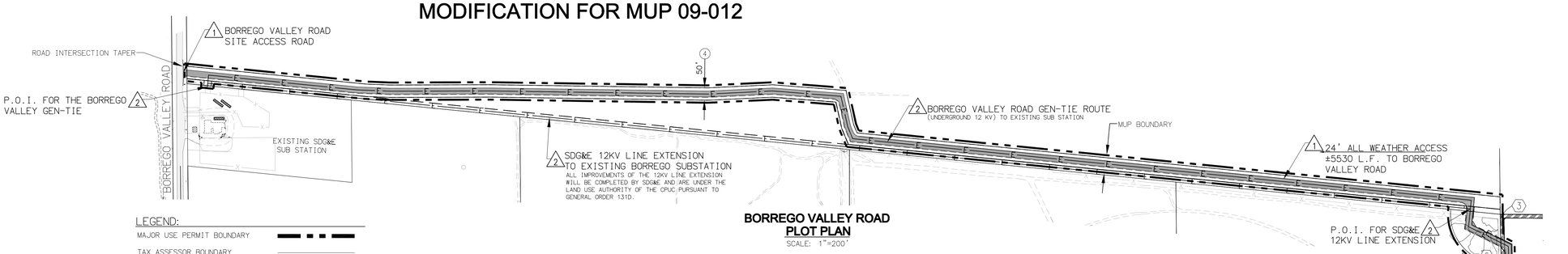
Velocity (fps)	Vertical Member Diameter (inches)				
	4	6	8	10	12
1	.75	1.00	1.25	1.50	1.75
2	1.00	1.25	1.50	1.75	2.00
4	1.50	1.75	2.00	2.25	2.75
6	1.75	2.00	2.50	2.75	3.25
8	2.00	2.25	2.75	3.25	3.50
10	2.25	2.50	3.00	3.50	4.00
15	2.50	3.00	3.50	4.00	4.50

TYPICAL SECTION
FOUNDATION FOOTING OPTIONS
TRANSFORMER / INVERTER PLATFORM
STORAGE, CABINETS, O&M STRUCTURE

N.T.S.

SOURCE: BORREGO VALLEY FLOOD MANAGEMENT REPORT DATED OCT. 1989

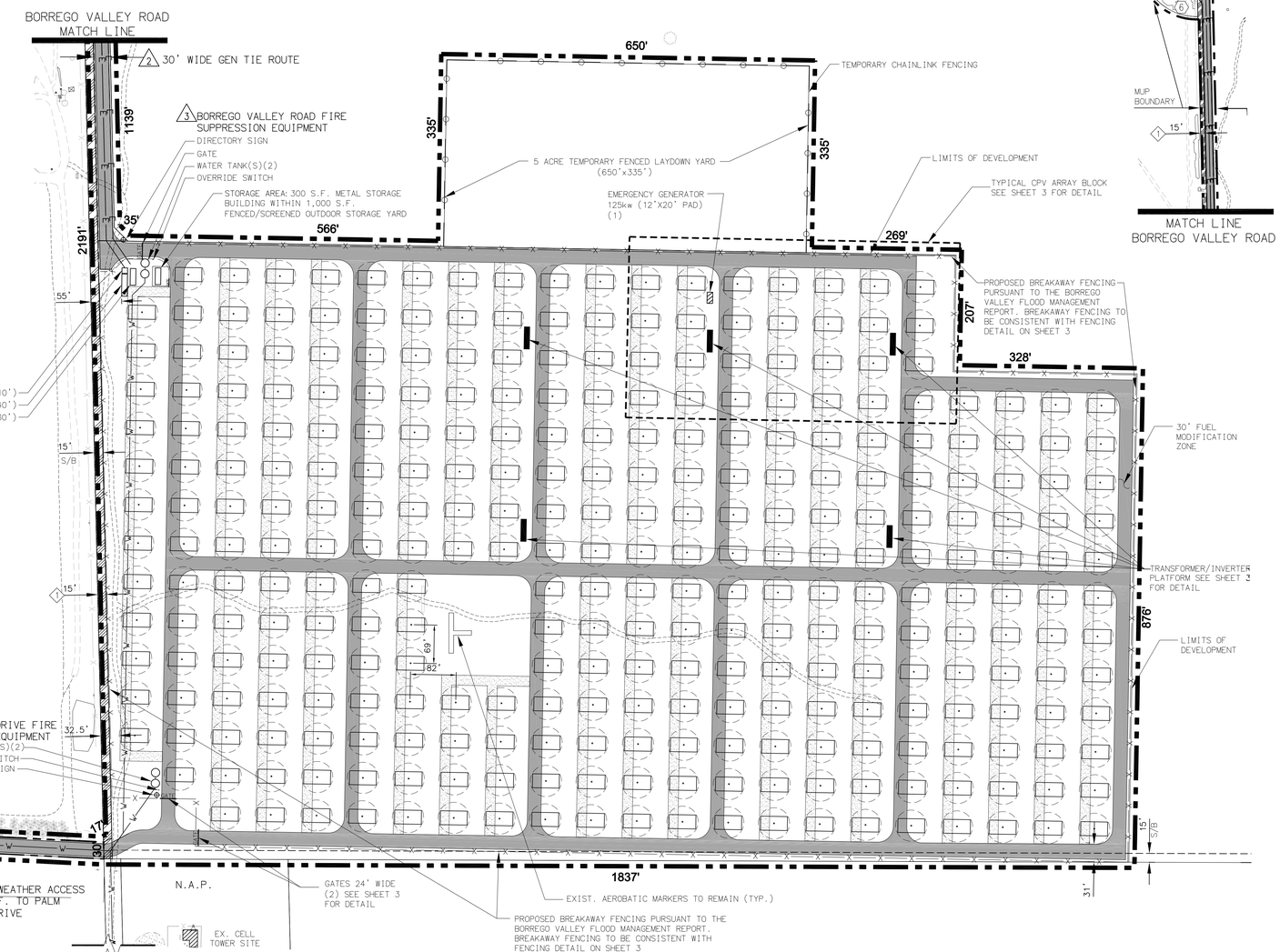
NOTE: A PIER FOUNDATION DESIGN IS SELECTED TO RAISE THE BUILDINGS SO THEY ARE AT LEAST 1' ABOVE THE BASE FLOOD ELEVATION. THEN A CLOMR/LOMR PROCESS IS NOT NEEDED.



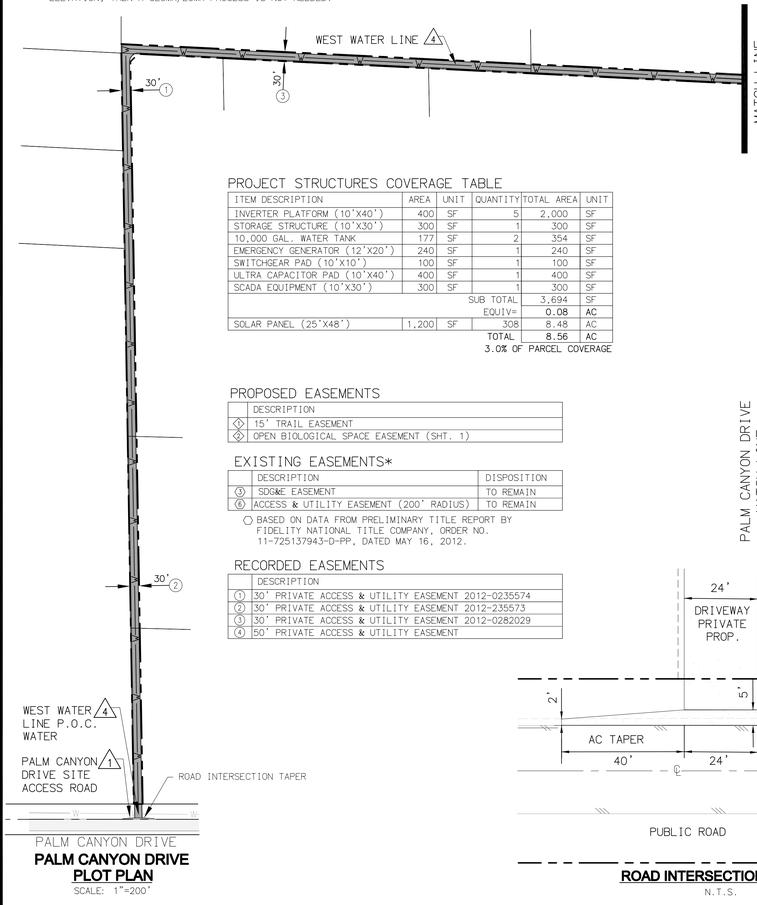
BORREGO VALLEY ROAD
PLOT PLAN
SCALE: 1"=200'

LEGEND:

- MAJOR USE PERMIT BOUNDARY
- TAX ASSESSOR BOUNDARY
- LIMITED BUILDING ZONE LINE
- EX. 6' CHAIN_LINK FENCE
- PROP. 6' CHAIN_LINK BREAKAWAY FENCE WITH 3 STRAND BARBED WIRE
- TEMPORARY FENCING
- PROP. 24' FIRE ACCESS ROAD-ALL WEATHER (10% GRADIENT MAX) 50,000 LB.
- PROP. 18' SERVICE ROAD 15,000 LB.
- PROP. TRAIL EASEMENT 1
- BUILDING SETBACK LINE (S/B)
- PROP. WATER LINE
- PROP. UNDERGROUND POWER LINE
- TRANSFORMER/INVERTER PLATFORM (4 - DUAL 630kw & 1 - DUAL 720kw INVERTER PLATFORM)
- EMERGENCY GENERATOR PLATFORM
- CPV ARRAY (308)
- PROP. BIOLOGICAL OPEN 2 SPACE (124.68 AC.) WITH OPEN SPACE SIGNAGE SEE DETAIL ON SHEET 3



PLOT PLAN
SCALE: 1"=100'



PALM CANYON DRIVE
PLOT PLAN
SCALE: 1"=200'

PROJECT STRUCTURES COVERAGE TABLE

ITEM DESCRIPTION	AREA	UNIT	QUANTITY	TOTAL AREA	UNIT
INVERTER PLATFORM (10'X40')	400	SF	5	2,000	SF
STORAGE STRUCTURE (10'X30')	300	SF	1	300	SF
10,000 GAL. WATER TANK	177	SF	2	354	SF
EMERGENCY GENERATOR (12'X20')	240	SF	1	240	SF
SWITCHGEAR PAD (10'X10')	100	SF	1	100	SF
ULTRA CAPACITOR PAD (10'X40')	400	SF	1	400	SF
SCADA EQUIPMENT (10'X30')	300	SF	1	300	SF
			SUB TOTAL	3,694	SF
			EQUIV=	0.08	AC
SOLAR PANEL (25'X48')	1,200	SF	308	8.48	AC
			TOTAL	8.56	AC

3.0% OF PARCEL COVERAGE

PROPOSED EASEMENTS

	DESCRIPTION
1	15' TRAIL EASEMENT
2	OPEN BIOLOGICAL SPACE EASEMENT (SHT. 1)

EXISTING EASEMENTS*

	DESCRIPTION	DISPOSITION
3	SDG&E EASEMENT	TO REMAIN
6	ACCESS & UTILITY EASEMENT (200' RADIUS)	TO REMAIN

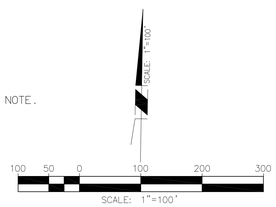
○ BASED ON DATA FROM PRELIMINARY TITLE REPORT BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. 11-725137943-D-PP, DATED MAY 16, 2012.

RECORDED EASEMENTS

	DESCRIPTION
1	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-0235574
2	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-235573
3	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-0282029
4	50' PRIVATE ACCESS & UTILITY EASEMENT

ROAD INTERSECTION TAPERS
N.T.S.

1 ACCESS - SEE SHEET 1 FOR NOTE.
2 GEN TIE - SEE SHEET 1 FOR NOTE.
3 FIRE SUPPRESSION FACILITIES AND EQUIPMENT - SEE SHEET 1 FOR NOTE.
4 WATERLINE - SEE SHEET 1 FOR NOTE.



DESERT GREEN SOLAR FARM
BORREGO SPRINGS, CA
MODIFICATION FOR MUP 09-012
(NO CHANGE TO MUP 09-014)
ER NO. 09-05-001A
PLOT PLAN

FEBRUARY 22, 2013
SHEET 2 OF 3

RBF CONSULTING
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SAN DIEGO, CALIFORNIA 92124-1324
858.614.5000 • FAX 858.614.5001 • www.RBF.com

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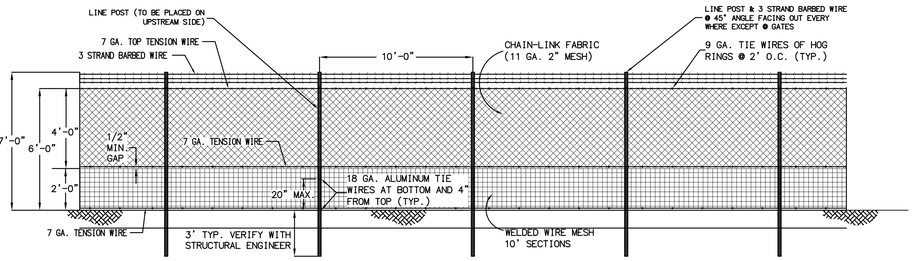
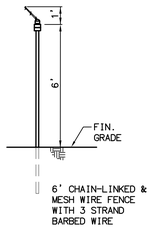
MAJOR USE PERMIT PLOT PLAN

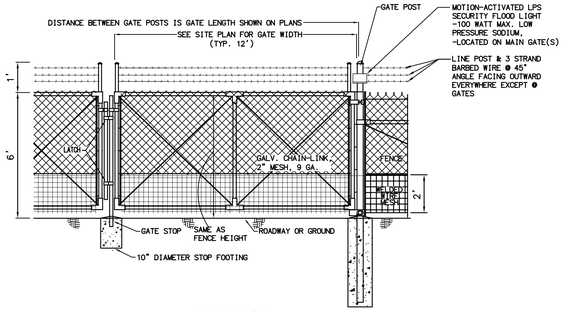
MODIFICATION FOR MUP 09-012



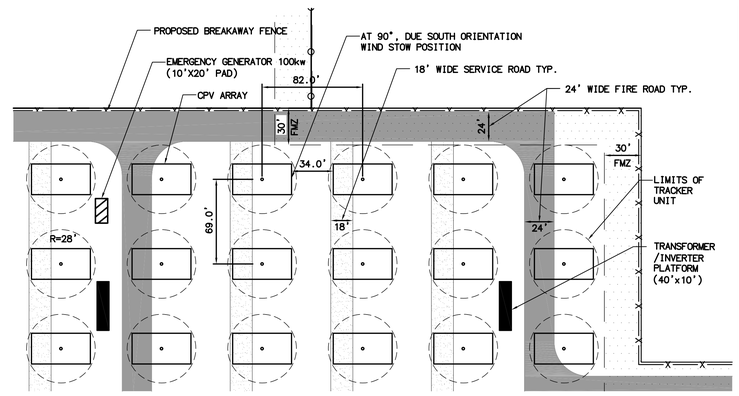
ELEVATION
BREAKAWAY FENCING DETAIL
N.T.S.



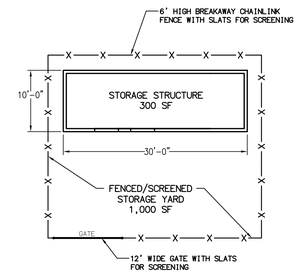
SECTION
TYPICAL FENCE
N.T.S.



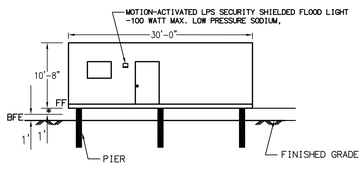
ELEVATION
HALF / DOUBLE DRIVE GATE
N.T.S.



PLAN VIEW
TYPICAL CPV ARRAY BLOCK LAYOUT
N.T.S.

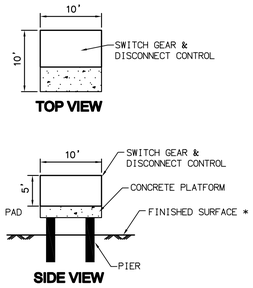


FLOOR PLAN
STORAGE STRUCTURE
N.T.S.



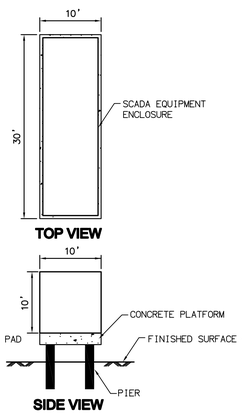
ELEVATION
STORAGE STRUCTURE
N.T.S.

- * FINISH FLOOR SHALL BE ELEVATED AT LEAST ONE FOOT ABOVE THE ANTICIPATED INUNDATION DEPTH ESTABLISHED WITHIN THE HYDROLOGY AND HYDRAULIC BASIS OF DESIGN STUDY.



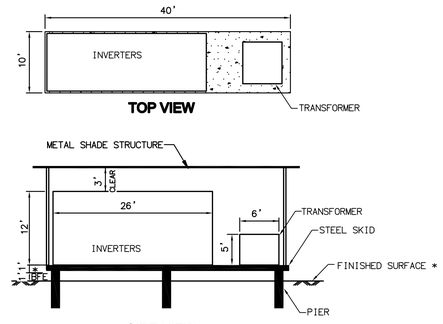
SWITCHGEAR PLATFORM
N.T.S.

- ALL ACCESSORY STRUCTURES SHALL BE PAINTED OR VISUALLY TREATED TO BLEND WITH THE SURROUNDINGS
- * PLATFORM SHALL BE ELEVATED SO THAT THE LOWEST HORIZONTAL STRUCTURAL MEMBER IS AT LEAST ONE FOOT ABOVE THE ANTICIPATED INUNDATION DEPTH ESTABLISHED WITHIN THE HYDROLOGY AND HYDRAULIC BASIS OF DESIGN STUDY.



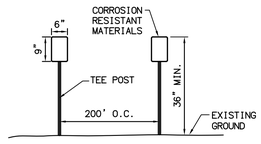
SCADA EQUIPMENT ENCLOSURE
N.T.S.

- ALL ACCESSORY STRUCTURES SHALL BE PAINTED OR VISUALLY TREATED TO BLEND WITH THE SURROUNDINGS
- * PLATFORM SHALL BE ELEVATED SO THAT THE LOWEST HORIZONTAL STRUCTURAL MEMBER IS AT LEAST ONE FOOT ABOVE THE ANTICIPATED INUNDATION DEPTH ESTABLISHED WITHIN THE HYDROLOGY AND HYDRAULIC BASIS OF DESIGN STUDY.

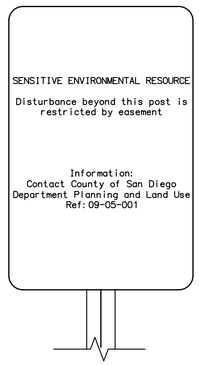


TRANSFORMER / INVERTER PLATFORM
N.T.S.

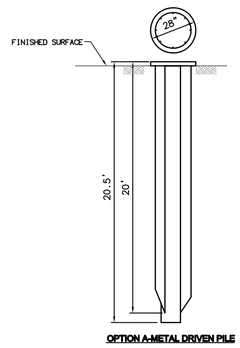
- ALL ACCESSORY STRUCTURES SHALL BE PAINTED OR VISUALLY TREATED TO BLEND WITH THE SURROUNDINGS
- * ALL TRANSFORMER / INVERTER PLATFORM SHALL BE ELEVATED SO THAT THE LOWEST HORIZONTAL STRUCTURAL MEMBER IS AT LEAST ONE FOOT ABOVE THE ANTICIPATED INUNDATION DEPTH ESTABLISHED WITHIN THE HYDROLOGY AND HYDRAULIC BASIS OF DESIGN STUDY.
- NUMBER OF PLATFORMS: 4 - DUAL 630kw & 1 - DUAL 720kv INVERTER PLATFORM
- THE TRANSFORMER / INVERTERS WILL BE PLACED WITHIN A METAL ENCLOSURE OR COVERED BY A METAL SHADE STRUCTURE TO PROTECT THE EQUIPMENT FROM THE ELEMENTS.



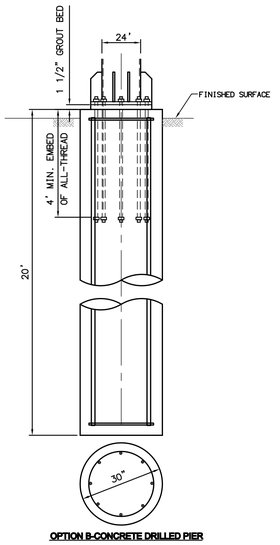
NOTE:
PLACE SIGN ON 200' INTERVALS TO DENOTE OPEN SPACE. SIGNS CAN ALSO BE ATTACHED TO PROPOSED FENCE OR ON TEE POST



TYPICAL
OPEN SPACE SIGNAGE
N.T.S.



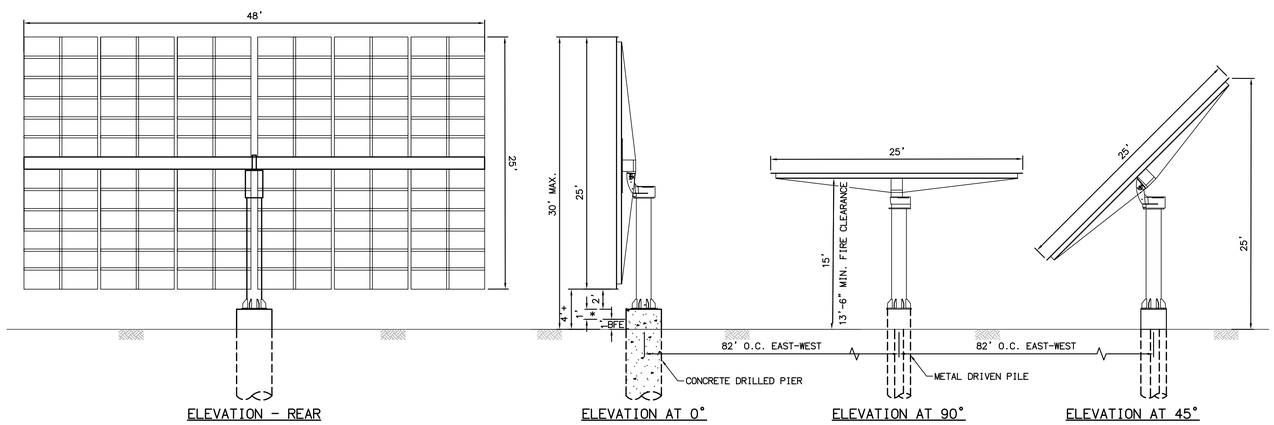
OPTION A-METAL DRIVEN PILE



OPTION B-CONCRETE DRILLED PIER

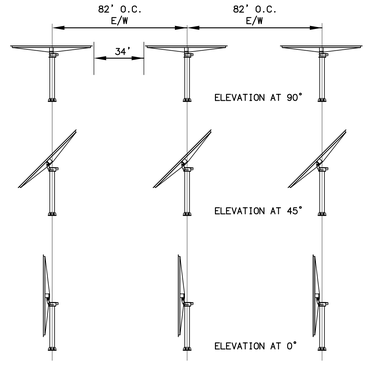
PRELIMINARY FOUNDATION DETAILS
N.T.S.

- DEPTH / TYPE OF FOOTING TO BE DETERMINED BY STRUCTURAL ENGINEER
- ALL SOLAR PANELS (AT MAXIMUM TILT) AND TRANSFORMER/INVERTER PLATFORM, SWITCH GEAR PAD, GENERATOR AND WATER TANK SHALL BE ELEVATED SO THAT THE LOWEST HORIZONTAL STRUCTURAL MEMBER IS AT LEAST ONE FOOT ABOVE THE ANTICIPATED INUNDATION DEPTH ESTABLISHED WITHIN THE HYDROLOGY AND HYDRAULIC BASIS OF DESIGN STUDY.

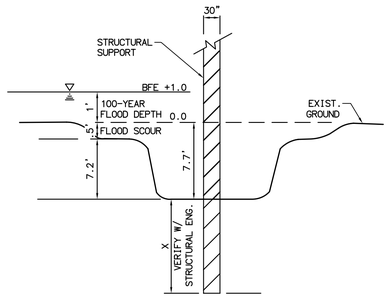


ELEVATIONS
ARRAY TRACKER
N.T.S.

- DEPTH / TYPE OF FOOTING TO BE DETERMINED BY STRUCTURAL ENGINEER
- * ALL SOLAR PANELS (AT MAXIMUM TILT) AND TRANSFORMER / INVERTER PLATFORM SHALL BE ELEVATED SO THAT THE LOWEST HORIZONTAL STRUCTURAL MEMBER IS AT LEAST ONE FOOT ABOVE THE ANTICIPATED INUNDATION DEPTH ESTABLISHED WITHIN THE HYDROLOGY AND HYDRAULIC BASIS OF DESIGN STUDY.



CPV ARRAY
SPACING DETAIL
N.T.S.



TYPICAL
SECTION
SCOURING DETAIL
N.T.S.

SOURCE: BORREGO VALLEY FLOOD MANAGEMENT REPORT DATED OCT. 1989

DESERT GREEN SOLAR FARM
BORREGO SPRINGS, CA

MODIFICATION FOR MUP 09-012
(NO CHANGE TO MUP 09-014)
ER NO. 09-05-001A

PROPOSED ELEVATIONS/DETAILS

FEBRUARY 22, 2013
SHEET 3 OF 3

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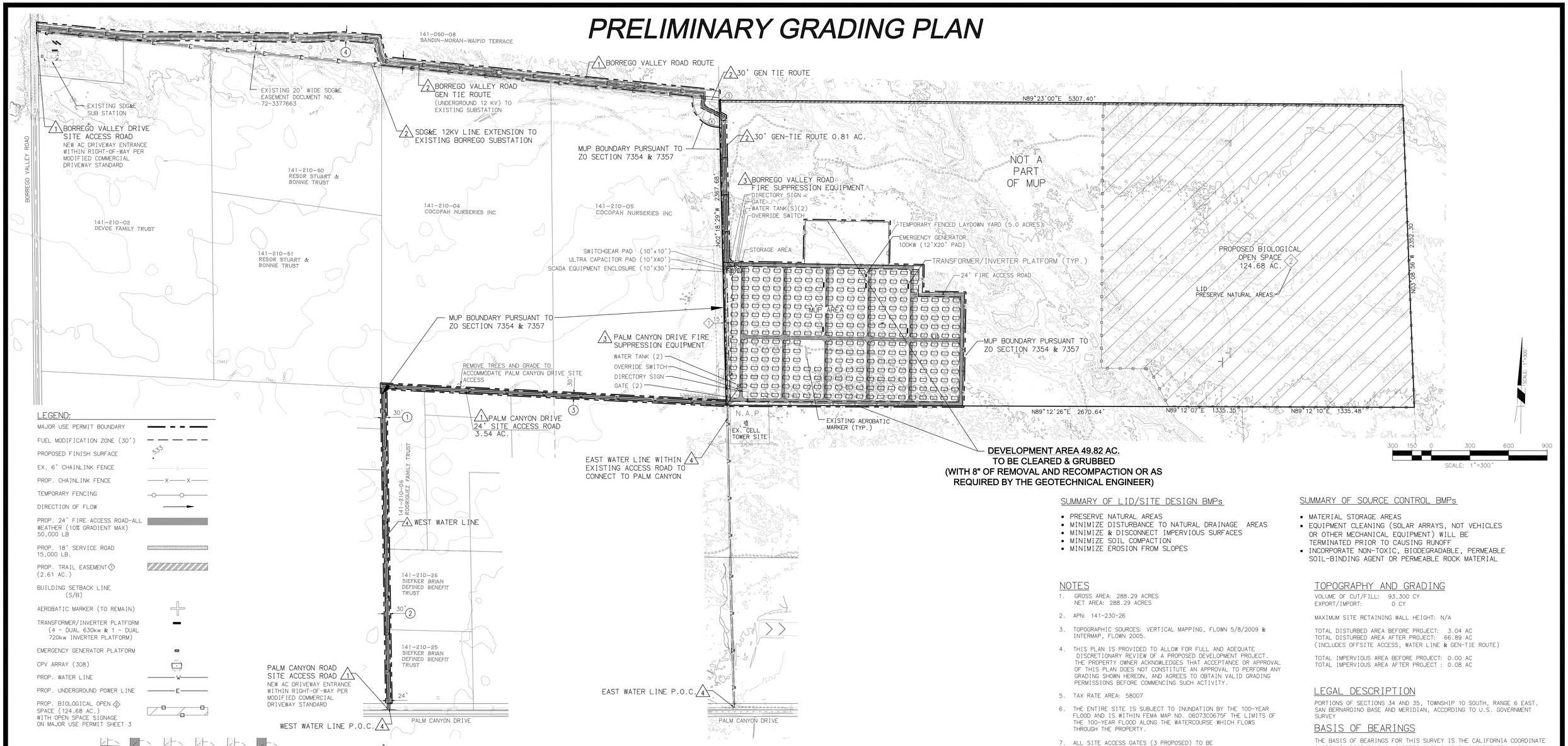
PRELIMINARY GRADING PLAN

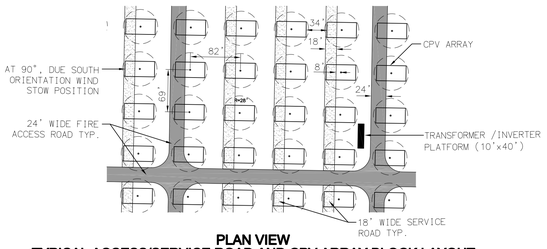


LEGEND:

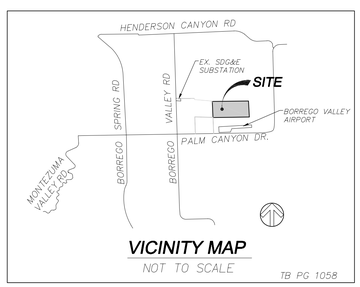
- MAJOR USE PERMIT BOUNDARY
- FUEL MODIFICATION ZONE (30')
- PROPOSED FINISH SURFACE (533)
- EX. 6' CHAINLINK FENCE
- PROP. CHAINLINK FENCE
- TEMPORARY FENCING
- DIRECTION OF FLOW
- PROP. 24' FIRE ACCESS ROAD-ALL WEATHER (10% GRADIENT MAX) 50,000 LB
- PROP. 18' SERVICE ROAD 15,000 LB.
- PROP. TRAIL EASEMENT (2.61 AC.)
- BUILDING SETBACK LINE (S/B)
- AEROBATIC MARKER (TO REMAIN)
- TRANSFORMER/INVERTER PLATFORM (4 - DUAL 630kw & 1 - DUAL 720kw INVERTER PLATFORM)
- EMERGENCY GENERATOR PLATFORM
- CPV ARRAY (308)
- PROP. WATER LINE
- PROP. UNDERGROUND POWER LINE
- PROP. BIOLOGICAL OPEN SPACE (124.68 AC.) WITH OPEN SPACE SIGNAGE ON MAJOR USE PERMIT SHEET 3

PALM CANYON ROAD SITE ACCESS ROAD 1
NEW AC DRIVEWAY ENTRANCE WITHIN RIGHT-OF-WAY PER MODIFIED COMMERCIAL DRIVEWAY STANDARD

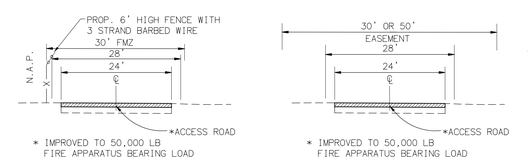
1 ACCESS - SEE SHEET 1 FOR NOTE.
2 GEN TIE - SEE SHEET 1 FOR NOTE.
3 FIRE SUPPRESSION FACILITIES AND EQUIPMENT - SEE SHEET 1 FOR NOTE.
4 WATERLINE - SEE SHEET 1 FOR NOTE.



PLAN VIEW
TYPICAL ACCESS/SERVICE ROAD AND CPV ARRAY BLOCK LAYOUT
N.T.S.



VICINITY MAP
NOT TO SCALE
TB PG 1058

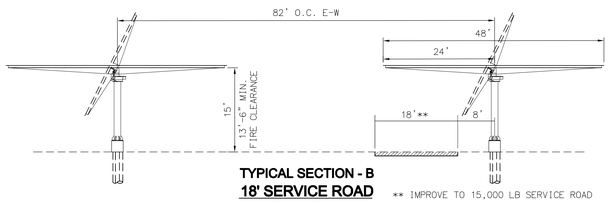


* IMPROVED TO 50,000 LB FIRE APPARATUS BEARING LOAD

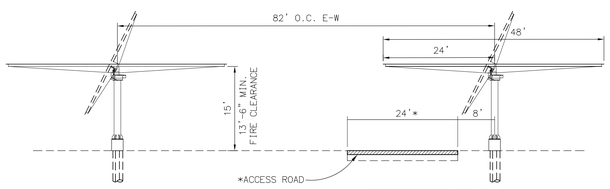
TYPICAL SECTION
24' PERIMETER ACCESS ROAD
NOT TO SCALE
TYPICAL LOCATION UNLESS SHOWN OTHERWISE ON SITE PLAN

* IMPROVED TO 50,000 LB FIRE APPARATUS BEARING LOAD

TYPICAL SECTION
(PALM CANYON / BORREGO VALLEY ROAD)
PRIMARY ACCESS ROAD / EASEMENT
NOT TO SCALE



TYPICAL SECTION - B
18' SERVICE ROAD
NOT TO SCALE
** IMPROVE TO 15,000 LB SERVICE ROAD



TYPICAL SECTION - A
24' INTERIOR ACCESS ROAD (FIRE)
NOT TO SCALE
* IMPROVED TO 50,000 LB FIRE APPARATUS BEARING LOAD

SUMMARY OF LID/SITE DESIGN BMPs

- PRESERVE NATURAL AREAS
- MINIMIZE DISTURBANCE TO NATURAL DRAINAGE AREAS
- MINIMIZE & DISCONNECT IMPERVIOUS SURFACES
- MINIMIZE SOIL COMPACTION
- MINIMIZE EROSION FROM SLOPES

SUMMARY OF SOURCE CONTROL BMPs

- MATERIAL STORAGE AREAS
- EQUIPMENT CLEANING (SOLAR ARRAYS, NOT VEHICLES OR OTHER MECHANICAL EQUIPMENT) WILL BE TERMINATED PRIOR TO CAUSING RUNOFF
- INCORPORATE NON-TOXIC, BIODEGRADABLE, PERMEABLE SOIL-BINDING AGENT OR PERMEABLE ROCK MATERIAL

NOTES

1. GROSS AREA: 288.29 ACRES
   NET AREA: 288.29 ACRES
2. APN: 141-230-26
3. TOPOGRAPHIC SOURCES: VERTICAL MAPPING, FLOWN 5/8/2009 & INTERMAP, FLOWN 2005.
4. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.
5. TAX RATE AREA: 58007
6. THE ENTIRE SITE IS SUBJECT TO INUNDATION BY THE 100-YEAR FLOOD AND IS WITHIN FEMA MAP NO. 06073C0675F THE LIMITS OF THE 100-YEAR FLOOD ALONG THE WATERCOURSE WHICH FLOWS THROUGH THE PROPERTY.
7. ALL SITE ACCESS GATES (3 PROPOSED) TO BE EQUIPPED WITH KNOX KEY-OPERATED SWITCH.
8. PROPOSED SLOPE RATIOS: NOT GREATER THAN 1.5 TO 1 ON CUT SLOPE
   NOT GREATER THAN 2 TO 1 ON FILL SLOPE
9. LIGHTING FOR MAINTENANCE AND SECURITY PROPOSES ONLY. SHIELDED LIGHTING LOCATED AT GATES, ENTRANCES AND STORAGE BUILDING AND SHALL CONFORM TO COUNTY OF SAN DIEGO OUTDOOR LIGHTING REQUIREMENTS.
10. ALL DISTURBED AREAS WOULD BE COVERED WITH GRAVEL OR A BINDING AGENT TO REDUCE DUST.
11. THE ENTIRETY OF THE PARCEL ENCUMBERED BY MUP 09-012 (APN 141-230-26-00) IS SUBJECT TO THE RESTRICTIONS AND TERMS OF A COUNTY AVIATION EASEMENT.
12. ALL UNDERGROUND CABLE DEPTHS SHALL BE A MINIMUM DEPTH OF 42".

PROPOSED EASEMENTS

	DESCRIPTION
1	15' TRAIL EASEMENT
2	OPEN BIOLOGICAL SPACE EASEMENT (SHT. 1)

EXISTING EASEMENTS*

	DESCRIPTION	DISPOSITION
5	SDG&E EASEMENT	TO REMAIN
6	ACCESS & UTILITY EASEMENT (200' RADIUS)	TO REMAIN

○ BASED ON DATA FROM PRELIMINARY TITLE REPORT BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. 11-725137943-D-PP, DATED MAY 16, 2012.

RECORDED EASEMENTS

	DESCRIPTION
1	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-0235574
2	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-235573
3	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-0282029
4	50' PRIVATE ACCESS & UTILITY EASEMENT

TOPOGRAPHY AND GRADING

VOLUME OF CUT/FILL: 93,300 CY
EXPORT/IMPORT: 0 CY

MAXIMUM SITE RETAINING WALL HEIGHT: N/A

TOTAL DISTURBED AREA BEFORE PROJECT: 3.04 AC
TOTAL DISTURBED AREA AFTER PROJECT: 66.89 AC
(INCLUDES OFFSITE ACCESS, WATER LINE & GEN-TIE ROUTE)

TOTAL IMPERVIOUS AREA BEFORE PROJECT: 0.00 AC
TOTAL IMPERVIOUS AREA AFTER PROJECT : 0.08 AC

LEGAL DESCRIPTION

PORTIONS OF SECTIONS 34 AND 35, TOWNSHIP 10 SOUTH, RANGE 6 EAST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO U.S. GOVERNMENT SURVEY

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM (NAD83) ZONE 6,AS DETERMINED BY THE LINE BETWEEN NATIONAL GEODETIC SURVEY (NGS) STATIONS '13 AAR ECC' AND 'BOR 12' WITH A BEARING OF N42°35'10"W.

BENCHMARK

NGS STATION BOR 9, A 4" BRASS DISK IN 6" CONCRETE BASE 4.5' SOUTHEAST OF POWER POLE #319 AND 30' NORTHEAST OF THE EDGE OF BORREGO VALLEY ROAD. ELEVATION = 521.86 DATUM: NAVD88

APPLICANT

DESERT GREEN SOLAR FARM LLC
c/o CLARK CRAWFORD, ATTORNEY-IN-FACT
16650 VIA ESPRILLO
SAN DIEGO, CA 92127
CONTACT: PATRICK BROWN
(619) 733-2649

ENGINEER / PLANNING

RBF CONSULTING
TRUDI LIM
9755 CLAIREMONT MESA BLVD.
SUITE 100
SAN DIEGO, CA 92124
(858) 614-5000

ENGINEER OF WORK

TRUDI LIM, R.C.E. 61213 DATE 2/22/2013
EXP. 6-30-2013

REGISTERED PROFESSIONAL ENGINEER — TRUDI LIM — No. 61213 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

DESERT GREEN SOLAR FARM
BORREGO SPRINGS, CA

MODIFICATION FOR PLOT PLAN FOR MUP 09-012
(NO CHANGE TO MUP 09-014)
ER NO. 09-05-001A

PRELIMINARY GRADING PLAN

FEBRUARY 22, 2013
SHEET 1 OF 2

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SAN DIEGO, CALIFORNIA 92124-1324
858.614.5000 FAX 858.614.5001 www.RBF.com

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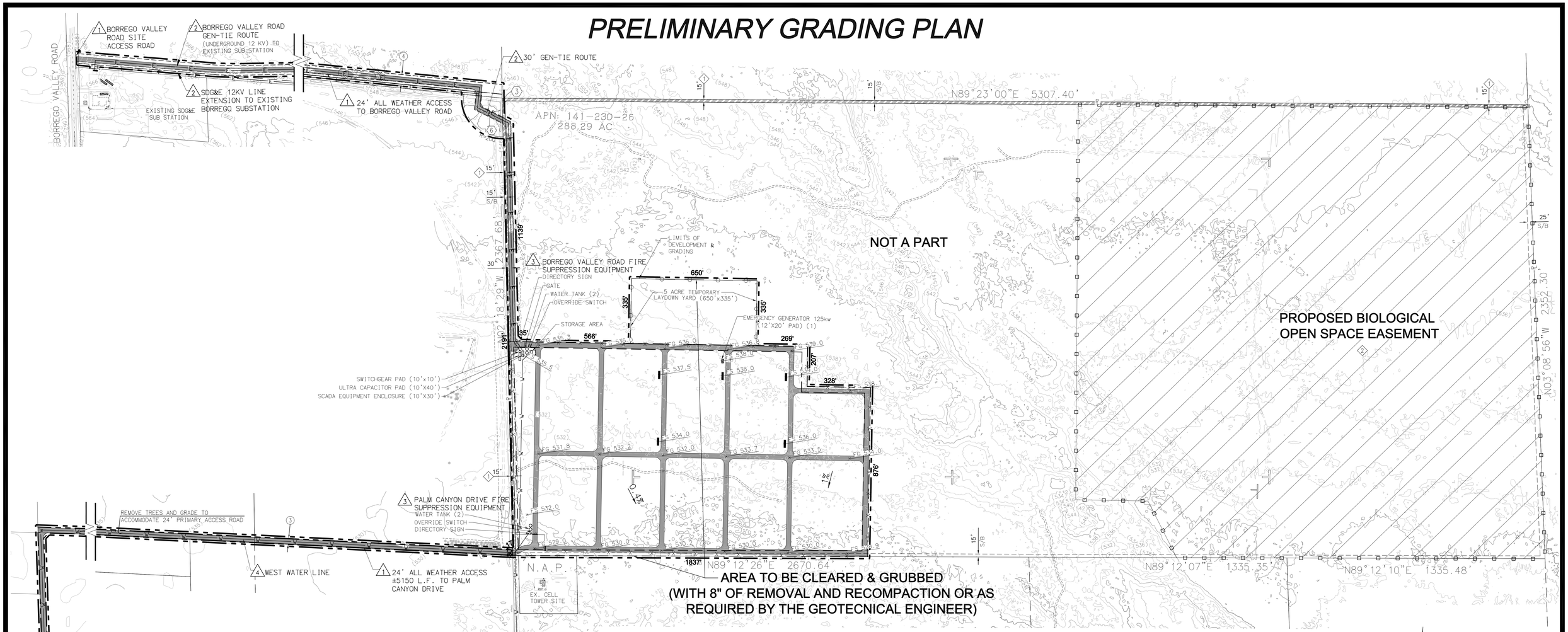
PRELIMINARY GRADING PLAN



PROJECT STRUCTURES COVERAGE TABLE

ITEM DESCRIPTION	AREA	UNIT	QUANTITY	TOTAL AREA	UNIT
INVERTER PLATFORM (10'X40')	400	SF	5	2,000	SF
STORAGE STRUCTURE (10'X30')	300	SF	1	300	SF
10,000 GAL. WATER TANK	177	SF	2	354	SF
EMERGENCY GENERATOR (12'X20')	240	SF	1	240	SF
SWITCHGEAR PAD (10'X10')	100	SF	1	100	SF
ULTRA CAPACITOR PAD (10'X40')	400	SF	1	400	SF
SCADA EQUIPMENT (10'X30')	300	SF	1	300	SF
			SUB TOTAL	3,694	SF
			EQUIV=	0.08	AC
SOLAR PANEL (25'X48')	1,200	SF	308	8.48	AC
			TOTAL	8.56	AC

3.0% OF PARCEL COVERAGE

PROPOSED EASEMENTS

	DESCRIPTION
1	15' TRAIL EASEMENT
2	OPEN BIOLOGICAL SPACE EASEMENT (SHT. 1)

EXISTING EASEMENTS*

	DESCRIPTION	DISPOSITION
3	SDG&E EASEMENT	TO REMAIN
6	ACCESS & UTILITY EASEMENT (200' RADIUS)	TO REMAIN

* BASED ON DATA FROM PRELIMINARY TITLE REPORT BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. 11-725137943-D-PP, DATED MAY 16, 2012.

RECORDED EASEMENTS

	DESCRIPTION
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2	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-235573
3	30' PRIVATE ACCESS & UTILITY EASEMENT 2012-0282029
4	50' PRIVATE ACCESS & UTILITY EASEMENT

1 ACCESS - SEE SHEET 1 FOR NOTE.

2 GEN TIE - SEE SHEET 1 FOR NOTE.

3 FIRE SUPPRESSION FACILITIES AND EQUIPMENT - SEE SHEET 1 FOR NOTE.

4 WATERLINE - SEE SHEET 1 FOR NOTE.

LEGEND:

- MAJOR USE PERMIT BOUNDARY
- FUEL MODIFICATION ZONE (30')
- PROPOSED FINISH SURFACE (533)
- EX. 6' CHAINLINK FENCE
- PROP. CHAINLINK FENCE
- TEMPORARY FENCING
- DIRECTION OF FLOW
- PROP. 24' FIRE ACCESS ROAD-ALL WEATHER (10% GRADIENT MAX) 50,000 LB
- PROP. TRAIL EASEMENT 1 (2.61 AC.)
- BUILDING SETBACK LINE (S/B)
- AEROBATIC MARKER (TO REMAIN)
- TRANSFORMER/INVERTER PLATFORM (4 - DUAL 630kw & 1 - DUAL 720kw INVERTER PLATFORM)
- EMERGENCY GENERATOR PLATFORM
- PROP. WATER LINE (W)
- PROP. UNDERGROUND POWER LINE (E)
- PROP. BIOLOGICAL OPEN 2 SPACE (124.68 AC.) WITH OPEN SPACE SIGNAGE ON MAJOR USE PERMIT SHEET 3
- EXISTING CONTOUR (535)

SCALE: 1"=200'

200 100 0 200 400 600

SCALE: 1"=200'

DESERT GREEN SOLAR FARM
BORREGO SPRINGS, CA

MODIFICATION FOR PLOT PLAN FOR MUP 09-012 RPL 3
(NO CHANGE TO MUP 09-014)
ER NO. 09-05-001

PRELIMINARY GRADING PLAN

FEBRUARY 22, 2013
SHEET 2 OF 2

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SAN DIEGO, CALIFORNIA 92124-1324
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Appendix F

Pre & Post Development 100 Year Rational Hydrology Calculation

Existing Condtion

Node	Total Area (ac)	Weighted C	Rainfall		Initial Time of Concentration (Ti)					Travel Time (Tt)					Tc (min)	i (in/hr)	Q100 (cfs)
			P6, 100YR (in)	P24, 100YR (in)	US Elev (ft)	DS Elev (ft)	Length (ft)	Slope (%)	Ti (min)	US Elev (ft)	DS Elev (ft)	Length (ft)	Slope (%)	Tt (min)			
100	**288.3**	**0.24**	2.5	3.5	546	545	70	1.4%	12.5	545	530	3330	0.5%	32	44.7	**1.6**	**111**

Unmitigated Proposed Condition

Node	Total Area (ac)	Weighted C	Rainfall		Initial Time of Concentration (Ti)					Travel Time (Tt)					Tc (min)	i (in/hr)	Q100 (cfs)
			P6, 100YR (in)	P24, 100YR (in)	US Elev (ft)	DS Elev (ft)	Length (ft)	Slope (%)	Ti (min)	US Elev (ft)	DS Elev (ft)	Length (ft)	Slope (%)	Tt (min)			
100	**288.3**	**0.24**	2.5	3.5	546	545	70	1.4%	12.5	545	530	3330	0.5%	32	44.7	**1.6**	**111**

Note:
1. Assumes 30" diameter concrete drilled piers for solar panel support

Notes:
1. Rainfall intensity (i) = 7.44*P6*Tc^-0.645 (SDCHM, p. 3-7)
2. Runoff coefficient (C) (SDCHM, Table 3-1 & SDCHM, p. 3-5)
3. Hydrologic Soil Group (SDCHM Appendix A)
4. Initial travel time (Ti) (SDCHM, Table 3-2)
5. Travel time calculated using Kirpich formula. (SDCHM, Figure 3-4)

Project Site: Existing Condition		
Land Use	Node 100	
	Area (ac)	C
Soil Type A, Natural	40.37	0.20
Soil Type B, Natural	247.96	0.25
Total	**288.33**	-
Weighted C		**0.24**

Project Site: Proposed Condition		
Land Use	Node 100	
	Area (ac)	C
Impervious (solar panel piers, inverters, etc.)	0.12	0.95
Soil Type A, Natural	40.35	0.20
Soil Type B, Natural	247.86	0.25
Total	**288.33**	-
Weighted C		**0.24**

Proposed Impervious

Concrete Drilled Piers - Solar Panel Support

Diameter (in)	Area (in^2)	Area (ft^2)
30	707	4.9

Invertor Platform

Length (ft)	Width (ft)	Area (ft^2)
40	10	400.0

Emergency Generator Pad

Length (ft)	Width (ft)	Area (ft^2)
20	12	240.0

Storage Structure

Length (ft)	Width (ft)	Area (ft^2)
10	30	300.0

Switchgear Pad

Length (ft)	Width (ft)	Area (ft^2)
10	10	100.0

Water Tank

Diameter (ft)	Area (ft^2)
15	176.6

ULTRA Capacitor Pad

Length (ft)	Width (ft)	Area (ft^2)
40	10	400.0

SCADA Equipment

Length (ft)	Width (ft)	Area (ft^2)
30	10	300.0

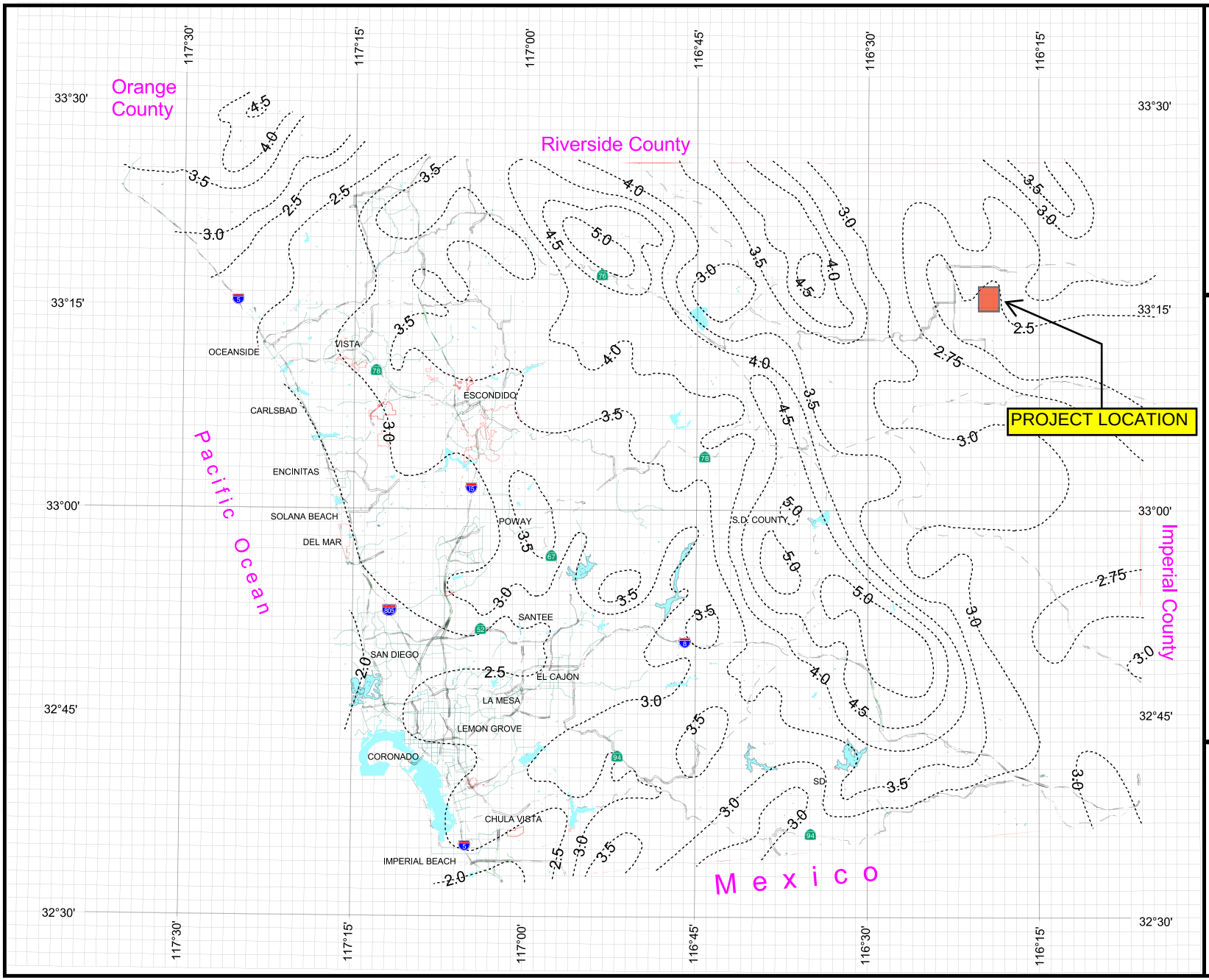
Total Proposed Impervious

Description	Quantity	Unit	Area (SF)	Total (SF)
Concrete Drilled Piers - Solar Panel Support	308	EA	4.9	1511.1
Inverter Platform	5	EA	400.0	2000.0
Emergency Generator Pad	1	EA	240.0	240.0
Storage Structure	1	EA	300.0	300.0
ULTRA Capacitor Pad	1	EA	400.0	400.0
Switchgear Pad	1	EA	100.0	100.0
Water Tank (10,000 GAL.)	2	EA	176.6	353.3
SCADA Equipment	1	EA	300.0	300.0
			TOTAL =	**5,204.4**

TOTAL IMPERVIOUS SURFACES = 0.12 AC

County of San Diego Hydrology Manual

Rainfall Isopluvials



100 Year Rainfall Event - 6 Hours

---------- Isopluvial (inches)

P6 = 2.5 in

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N
W E
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3 0 3 Miles

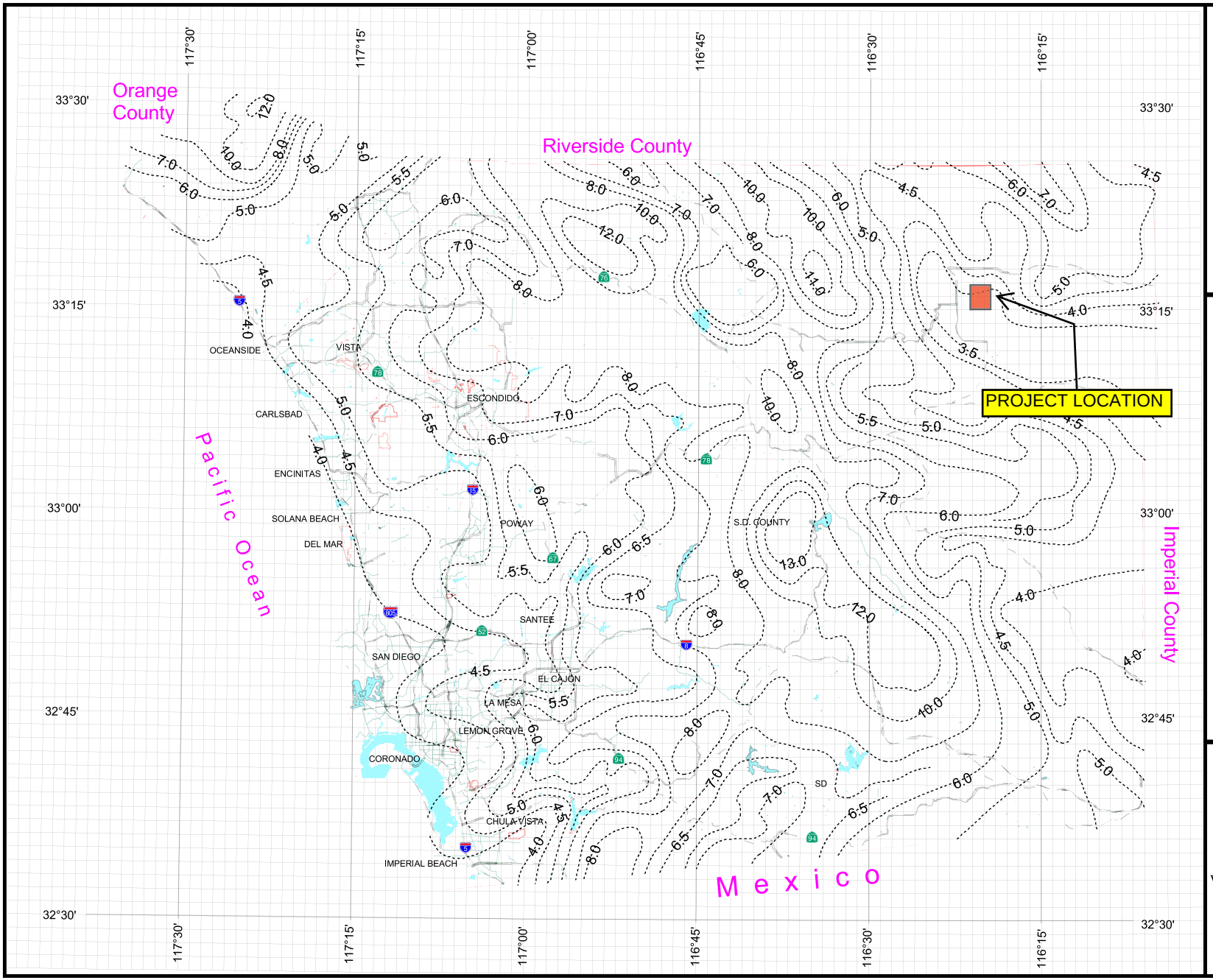
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

---------- Isopluvial (inches)

P24 = 3.5 in



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N W E S

3 0 3 Miles

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

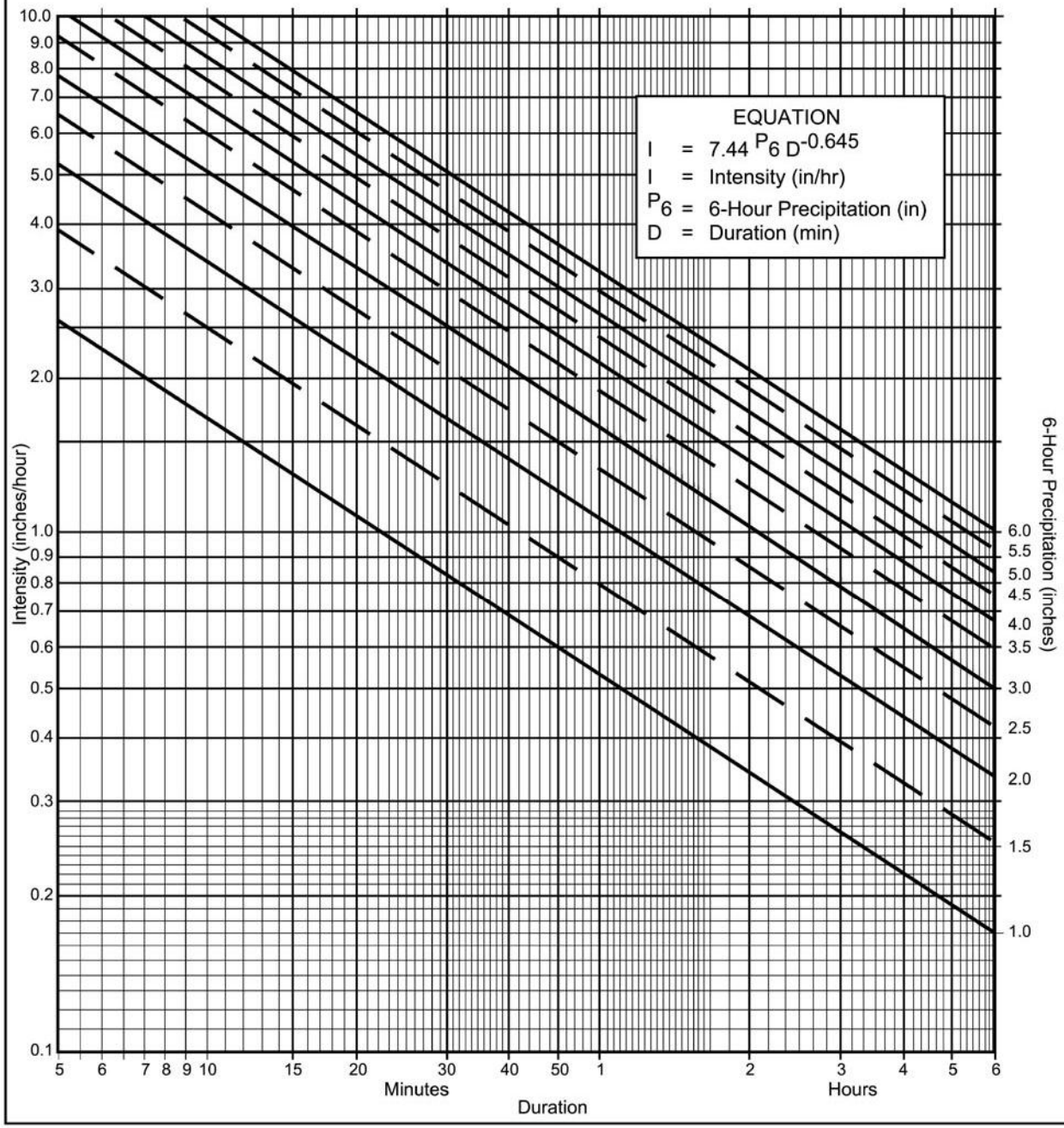
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency _____ year

(b) P_6 = _____ in., P_{24} = _____, $\frac{P_6}{P_{24}}$ = _____ %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

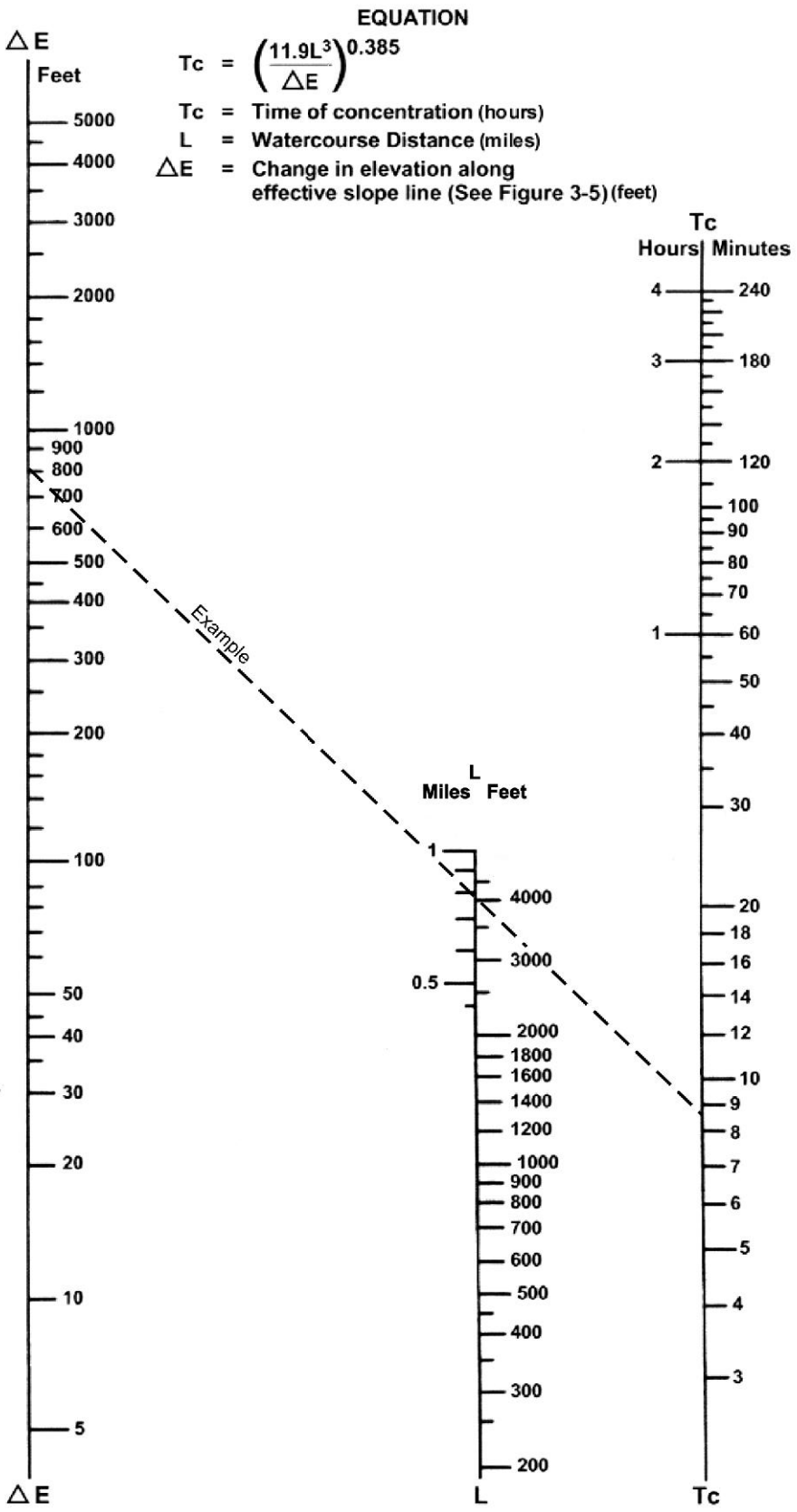
Intensity-Duration Design Chart - Template

FIGURE 3-1

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds

Appendix G

Scour Calculations

Design Scour Calculations

Pier Diameter =	30	in
Velocity from Flood Hazard Map =	4.5	ft/s
Depth from Flood Hazard Map (D) =	1	ft
Construction Depth (D1)** =	1	ft
Pier Scour (D2)* =	7.2	ft
Design Scour Depth (1/2 D1 + D2) =	**7.7**	**ft**

* From Figure II-4

** From Borrego Valley Flood Management Report, Page 17

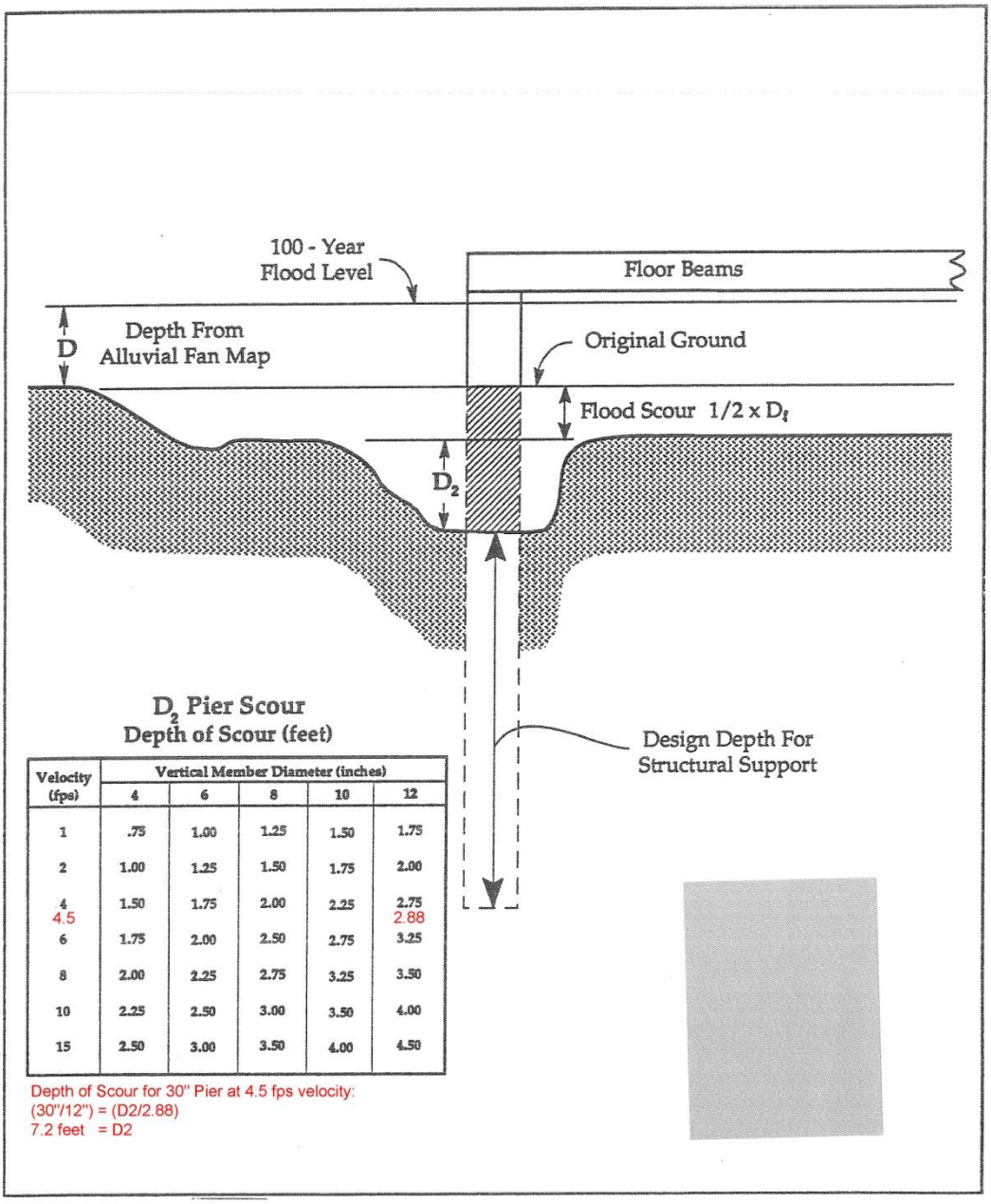
Scour Due to Vertical Force at Each Solar Panel
Source: U.S. Bureau of Reclamation (USBR), Adopted by Clark Co.

$$Y = 1.32 * q^{0.54} * H^{0.225} - TW$$

Y = Depth of scour due to free-fall overdrop (ft)
q = Discharge per unit width of 25'x48' solar panel face (cfs/ft)
H = Total drop (ft)
TW = Tailwater depth (ft)

q =	0.0105	cfs/ft
H =	4	ft
TW =	0	ft

Y =	0.15	ft	(equivalent to 1.8 inches)



D_2 Pier Scour
Depth of Scour (feet)

Velocity (fps)	Vertical Member Diameter (inches)				
	4	6	8	10	12
1	.75	1.00	1.25	1.50	1.75
2	1.00	1.25	1.50	1.75	2.00
4 4.5	1.50	1.75	2.00	2.25	2.75 2.88
6	1.75	2.00	2.50	2.75	3.25
8	2.00	2.25	2.75	3.25	3.50
10	2.25	2.50	3.00	3.50	4.00
15	2.50	3.00	3.50	4.00	4.50

Depth of Scour for 30" Pier at 4.5 fps velocity:
(30"/12") = (D2/2.88)
7.2 feet = D2

FIGURE II - 4. ADDITION OF SCOUR DEPTHS FOR PILINGS

Source: Boyle (1989)

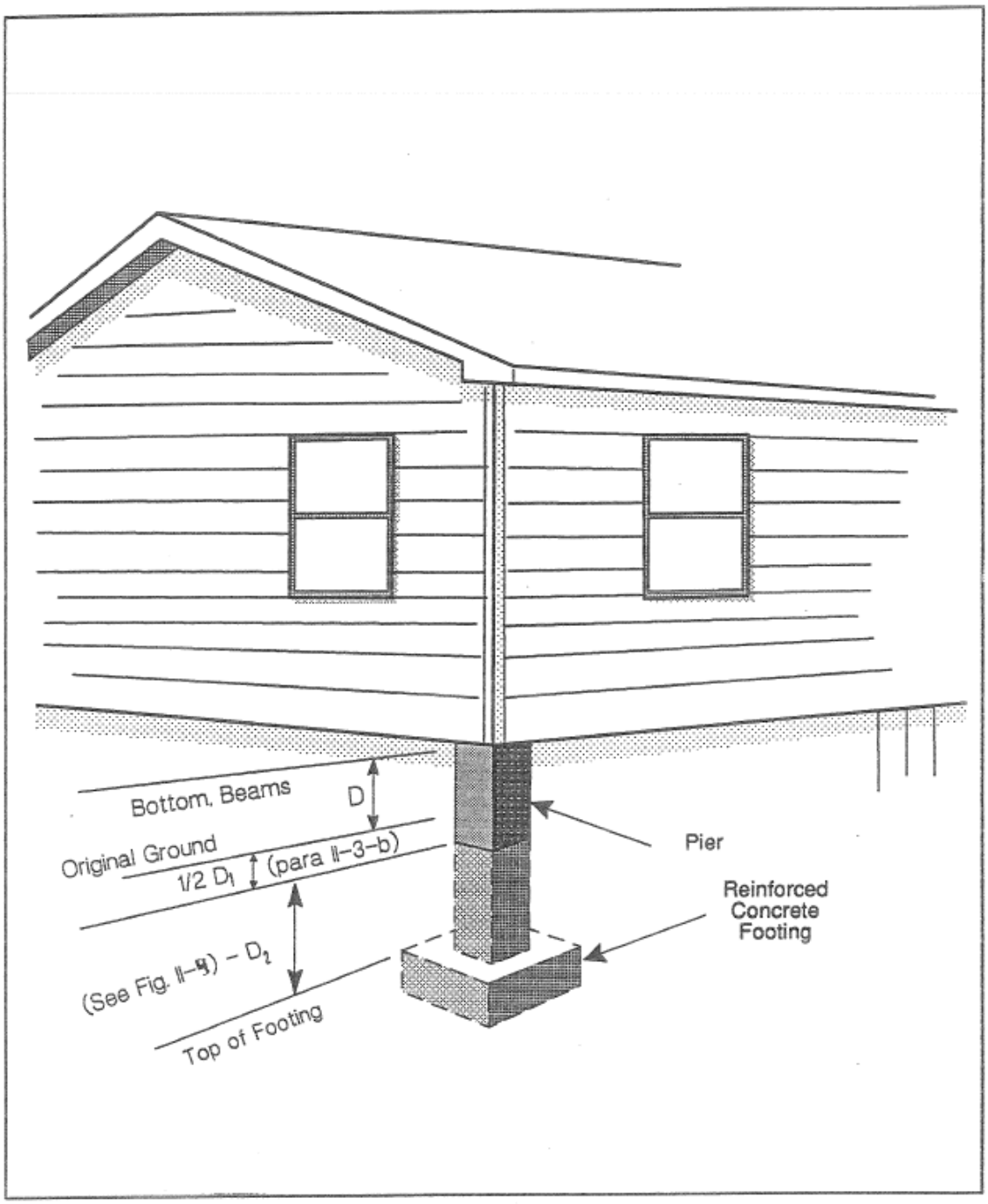


FIGURE II-5. THE SOLE METHOD OF SUPPORT FOR PIERS IS A REINFORCED CONCRETE FOOTING

Source: Boyle (1989)

3. Foundations

a. Structures

Structures must be constructed in such a way that foundations will be protected from erosion. Refer to Figures II-1 through II-5 for typical examples of foundation protection. Other types of protection can be used with appropriate engineering design.

The criteria given in this section are the minimum recommended for foundation protection. The variable nature of desert flooding makes determination of protection difficult.

The criteria defined may not provide protection from all future flood events. As part of any construction project, more stringent criteria for foundation protection may be used. The option of developing a more detailed flood hazard analysis is also available.

b. Depth of Erosion Protection

Footings for slab foundations must be constructed to a depth below the prevailing ground level as shown in Figure II-1. The necessary depth of construction for these footings is based on the Borrego Valley Alluvial Fan Map.

The flood depth (D) shown for the particular location is converted to a construction depth (D_1) based on the velocity shown on the map, using the following table:

Velocity (V)	Construction Depth (D_1)
4 Feet/Second	$D_1 = D$
6 Feet/Second	$D_1 = D$
8 Feet/Second	$D_1 = 1.8 \times D$
Over 8 Feet/Second	Study Required

Where: D_1 = Depth Below Ground (Feet)
D = Depth Shown on Alluvial Fan Map (Feet)
V = Velocity Shown on Alluvial Map Map (Feet/Second)

Erosion protection made of rock, gabions, or rip-rap must be installed to the depth D_1.

Source: Boyle (1989)

Floor beams may be elevated to allow for parking, open areas, flood-proof storage, etc. below the floor.

c. Pilings and Piers

Pilings and piers may be used to elevate structures on alluvial fans. The lowest part of the floor beams must be above the 100-year flood elevation. Pilings must have extra length to include the effects of erosion.

(1) The depth (D) (as shown on the alluvial fan map) to elevate the structure above flood level.

(2) An amount equal to 1/2 x D_1 (as shown in Figure II-4) to allow for general flood scour. D_1 is reduced by 50 percent because a solid foundation causes more flow obstruction.

(3) An amount equal to D_2 (as shown in Figures II-4 and II-5) to allow for additional scouring around the base of the pier (or piling).

Piers (as shown in Figure II-5) must have the entire footing below the potential erosion level.

4. Special Hazards

a. Existing Alluvial Washes

Major washes on alluvial fans and alluvial aprons are shown on the alluvial fan map (scale 1" = 2,000'). Exact locations of washes are also found by on-site inspection and from the orthophoto contour maps (scale 1" = 200').

Projects must intercept the flood water, carry it around the structure, and reintroduce it in a manner similar to previous conditions, without adversely affecting downstream properties.

b. Fan Terminus Alluvial Wash

Where the large Coyote Creek fan meets the smaller fans from the western canyons, a natural depression conveys floods to the Borrego Sink. It is identified by a shaded area on the Borrego Valley Alluvial Fan Map.

A HEC-2 analysis of this ares has been done by the County Department of Public Works. Development within this area must be designed to allow flows to pass.

Source: Boyle (1989)