DOCKET
09-AFC-9
DATE FEB 10 2010
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February 10, 2010

Eric Solorio
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: Ridgecrest Solar Power Project (RSPP), Docket No. 09-AFC-9, Responses to CEC Data Requests for Biological Resources (DR 62), Cultural Resources (DR 106 to 109), Soils & Water (DR 145, 148, 182-184, 186), Land Use/Recreation/Wilderness (DR 253 to 256), Traffic (DR 195, 197, 199-201, 203) and Noise (DR 263-264), and Air Permit Application for an Emergency Generator.

Dear Mr. Solorio:

As requested, attached please find Ridgecrest Solar I, LLC's responses to CEC Data Requests BIO-62, CULT-106 to 109, S&W 145, 148, 182-184, 186, LURW-253 to 256, TRAFFIC-195, 197, 199-201, 203 and Noise 263-264.

Conceptual Engineering Drawings of the reconfigured RSPP are provided in this package as Attachment DR-S&W-145. These drawings complete the responses to Data Requests BIO-62, S&W-145, 148, 182-184, 186, Traffic-197, 201, and 203.

Attached please also find the Air Permit Application for an Emergency Generator, which was submitted to the Kern County Air Pollution Control District. If you have any questions on these data responses to the Staff's Data Requests, please feel free to contact Billy Owens directly at 510-809-4662 (office) or 949-433-4049 (cell).

Sincerely,

Alice Harron
Senior Director, Development

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BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
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APPLICATION FOR CERTIFICATION
For the *RIDGECREST SOLAR POWER PROJECT*

Docket No. 09-AFC-9

PROOF OF SERVICE
(Revised 2/4/2010)

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DECLARATION OF SERVICE

I, Elizabeth Copley, declare that on February 10, 2010, I served and filed copies of the attached Ridgecrest Solar Power Project (Docket No. 09-AFC-9) Supplemental Data Response Information: for Biological Resources, DR-BIO-62; for Cultural Resources, DR-CULT-106 through 109; for Soils & Water DR-S&W-145, 148, 182, 183, 184 and 186; for Traffic, DR-TRAFFIC-195, 197, 199, 200, 201 and 203; for Land Use/Recreation/Wilderness, DR-LURW-253 through 256; and for Noise, DR-NOISE-263 and 264. Also included is the Air Permit Application for an Emergency Generator submitted to Kern County Air Pollution Control District. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solar_millennium_ridgecrest].

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

For service to all other parties:

__ sent electronically to all email addresses on the Proof of Service list;

X by personal delivery or by overnight delivery service or depositing in the United States mail at Oakland, California with postage or fees thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

X sending an original paper copy and one electronic copy, mailed and emailed Respectively, to the address below (preferred method);

OR

__ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-9
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
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I declare under penalty of perjury that the foregoing is true and correct.

Ridgecrest Solar Power Project
(Docket No. 09-AFC-9)

Supplemental Biological Resources

Data Response Information

DR-BIO-62

Submitted February 10, 2010

DR-BIO-62

Information Required:

Please provide a detailed discussion, with supporting analysis, for the implementation of a low impact development approach to managing stormwater flows. This should include completed engineering plans with re-vegetated channels and features that enhance use of the channel as wildlife movement corridors such as vegetated terraces and wide partially vegetated channels. FEMA floodplains and other non-State Waters alluvial features should remain intact and connected to the re-routed channels to the maximum extent practicable to retain the hydrologic and ecological functions of those features. A monitoring plan should accompany the re-routed channel plan that includes re-vegetation goals and a monitoring program to reach and maintain those goals (success criteria) (see number 13 below).

Response:

A natural vegetated buffer around the El Paso Wash is being incorporated into the site plan to further contribute to a low impact development approach. Attenuation design would result in not significantly diverting natural flow, in terms of volume and occurrence, away from the El Paso Wash, so that the natural communities supported by the wash would be minimally impacted. These measures will retain the wash's hydrologic and ecological functions and allow for the continued use of the El Paso Wash as a wildlife movement corridor. Please see the response to DR-BIO-66, submitted to the CEC on January 25, 2010, for more information regarding the restoration and revegetation strategy for the portions of the El Paso Wash that would be permanently and temporarily impacted by the crossings and drainage channel tie-ins described above.

Regarding stormwater management within the Project footprint, the resource management agencies have expressed a preference to move water as quickly through the Project site as possible in order to reduce water quality impacts and to avoid the collection of standing water that could attract ravens or result in other indirect adverse impacts. Therefore, the remaining smaller watercourses and the washlets and swale complexes impacted by the facility footprint will be designed as engineered channels. They will not be enhanced or revegetated and as such mitigation credit for re-creation of these aquatic features is not being requested. The absence of revegetation or other enhancement also would reduce the likelihood that the engineered channels, which require maintenance as part of facility operations, would become an attractive nuisance to wildlife species. The RSPP is currently pursuing mitigation opportunities for impacts to State jurisdictional waters. The on-site drainage improvements would seek to replicate the existing flow patterns as closely as possible and each of the proposed off-site channels are being sized to contain the peak flow of the 100-year flow rate. Impacts to the existing downstream drainage patterns and flow rates would be minimized, but would be slightly changed due to minor changes in contributing drainage areas and times of concentration. Please see the response to DR-BIO-63 submitted to the CEC on January 25, 2010, for more information on downstream effects.

The original design for this site has been revised to incorporate a low-impact development approach to the stormwater flows. The proposed area of development has been pulled away from the El Paso Wash so that the flows in the Wash are not re-routed as a result of this project. The revised site plan keeps the developed area of the solar fields out of the channel and above the banks of the Wash at all locations. The vegetation and biology in the 2.5 miles of El Paso Wash that is adjacent to the site is intended to remain undisturbed except for one new pipe bridge crossing which is approximately 100-feet wide, and some localized drainage channel connections between the Project site and the El Paso Wash. The existing Arizona crossing of the Wash at Brown Road has been maintained and is not proposed to be modified.

The FEMA floodplain would remain intact with all localized drainage from the pre-development site continuing to be discharged to the Wash through redirected channels as part of the drainage plan for the post-development site. Engineering plans for the re-designed project site are provided in Attachment DR-S&W-145 and a new drainage report for the re-designed site will be provided on February 24, 2010.

A monitoring plan for the re-routed channels, including re-vegetation goals and a monitoring program to reach and maintain those goals (e.g., success criteria), was provided in the Draft Channel Maintenance Plan in Attachment DR-BIO-65, submitted to the CEC on January 25, 2010.

Ridgecrest Solar Power Project
(Docket No. 09-AFC-9)

Supplemental Cultural Resources

Data Response Information

DR-CULT 106 through 109

Submitted February 10, 2010

DR-CULT-106

Information Required:

Please explicitly discuss the efficacy of modeling the potential archaeological characteristics and spatial distribution of at-this-time unknown Native American traditional use areas on the basis of available ethnographic information and theoretical principles of ethnogeography.

Response:

Please see the document Traditional Use Areas at the Ridgecrest Solar Power Project (AECOM 2010), provided in Attachment DR-CULT-106 at the end of this section.

DR-CULT-107

Information Required:

If reasonably practicable, please develop such a model and submit for staff review and approval a research plan for the field verification in the APE of the model's predictions and recordation of identified traditional use areas.

Response:

Please see the document Traditional Use Areas at the Ridgecrest Solar Power Project (AECOM 2010), provided in Attachment DR-CULT-106 at the end of this section.

DR-CULT-108

Information Required:

Please implement the staff-approved plan and provide to staff a report on the results and a comprehensive discussion of the traditional use areas in and adjacent to the project APE that may be subject to the visual impact of the construction, operation, and maintenance of the proposed project (e. g., landforms in sight of the APE on which sacred or other traditional activities took place). Please include any additional DPR 523 site forms in an appendix.

Response:

Please see the document Traditional Use Areas at the Ridgecrest Solar Power Project (AECOM 2010), provided in Attachment DR-CULT-106 at the end of this section.

DR-CULT-109

Information Required:

Please provide a simulation (three-dimensional view) of the proposed power plant in the surrounding landscape, as seen from the following UTM locations in the El Paso Mountains: Note: the locations below are not known locations of features sacred to Native Americans, but were chosen by staff as possible vantage points from which the plant site would be visible from the mountains.

A. Zone 11 E430160/N3933940
B. Zone 11 E430714/N3934268
C. Zone 11 E428660/N3931024
D. Zone 11 E427744/N3931690
E. Zone 11 E428488/N3930238
F. Zone 11 E430083/N3926845

Response:

Staff has expressed concerns about a sacred area identified by the Native American Heritage Commission that may encompass parts or all of the El Paso Mountains, southwest of the RSPP site. The El Paso Mountain also likely represent a “traditional use area” (see response to DR-CULT-106-108) defined as locations and suites of locales associated with specific subsistence, settlement, and spiritual practices of cultural relevance to Native Americans prior to the historical disruption of those practices wrought by the incursion of non-native peoples. As defined, traditional use areas are not places, items, or features of significance to *modern* peoples, but archaeological resources of presumed importance to *past* peoples.

Simulations of the view of the proposed Project from six UTMs selected by Staff in and at the base of the El Paso Mountain range have been developed by the Applicant. Potential visibility for locations A through F were determined by completing a seen area (viewshed) analysis using ArcINFO 9.3 and a 10-meter digital elevation model (DEM) and viewer height at 6 feet. The analysis determined the extent of the RSSP that would be visible. Only two sites, A. Zone 11 E430160/N3933940 and D. Zone 11 E427744/N3931690, would have a view of the RSSP. Maps modeling the viewshed from each of the six locations and visual simulations of the plant site from location A and location D are located in Attachment DR-CULT-109, provided at the end of this section.

Location A is located approximately 0.3 miles west of the nearest Project limit of disturbance, approximately 50 feet above the plant site elevation along the eastern base of a low basalt outflow. From this location nearly adjacent to the plant site, visible features would be the transmission line and wind fence, and solar arrays and power block cooling tower. Location D is over three miles from the nearest Project limit of disturbance and has limited visibility of only the tops of power block structures and the far northern edge of the solar arrays.

The UTMs selected by Staff are not known Native Americans sacred sites. As defined in Executive Order 13007 (May 24, 1996), sacred sites are defined as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion”; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." There is no review of such a determination by a Federal agency.

Other development including infrastructural features as well as the City of Ridgecrest are also present in the viewshed from many locations in the range. While the RSPP plant site may be visible from some points in the El Paso Mountains, consultation with Native American representatives regarding the area is needed to determine potential impacts. Locations that might have significance to living Native Americans, and/or sacred sites should be addressed using the procedures set out by the BLM Manual (Section 8110.22[d]) for the identification of properties of traditional cultural or religious importance to Native Americans (absent guidance from the state of California[1]):

> Specific properties, or categories of properties, of traditional cultural or religious importance should be known to the group that ascribes traditional value to them. Accordingly, such properties are not identified using survey methods analogous to archaeological survey. Instead, they are identified by consulting with the cultural groups known to have traditional interests in the target area. (BLM Manual Section 8110.22[d][2])

The Applicant is engaged in an ongoing Native American outreach program which will be used to solicit information regarding the location of, access to, and use of sacred sites, sacred areas and traditional use areas in order to identify potential impacts, if any, to such resources and determine effective measures to mitigate any impacts.

1. The California Environmental Quality Act (Public Resources Code 21000-21177) does not define a resource type similar to the federal *traditional cultural property.* The term "California Native American culturally significant sites" is used in § 21083.2(c) within the discussion of Archaeological Resources; Determination of Effect of Project; EIR or Negative Declaration; Mitigation Measures. No definition is given for the term, nor any special procedures for such resources with the exception of sites containing Native American human remains, which are given special consideration.

Attachment DR-CULT-106

Traditional Use Areas at the Ridgecrest Solar Power Project

TRADITIONAL USE AREAS
AT THE RIDGECREST SOLAR POWER PROJECT

Response to California Energy Commission
Data Requests 106-108

Prepared for:
Ridgecrest Solar I, LLC

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February 2010

Keywords: Traditional Use Areas, Natural Resources, Native American, Ridgecrest, California Energy Commission, Kern County

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Introduction

Response to Data Requests DR-CR-106, 107, and 108
California Energy Commission Data Requests Set 1 (09-AFC-9 #79-118)
dated December 22, 2009

BACKGROUND
Staff knows that the region in which the proposed project is located has areas the use of which continue to contribute to the maintenance of cultural cohesion in known groups of Native Americans. Staff surmises that such areas played a similar role for Native Americans prior to a catastrophic disruption of traditional practices, such as the profound degradation of oral history that occurred in the early historic period among many Native American groups. To complete its analysis of the potential impacts of the proposed project on cultural resources, staff needs information on the possible presence of traditional use areas in or adjacent to the APE.

DATA REQUESTS
106. Please explicitly discuss the efficacy of modeling the potential archaeological characteristics and spatial distribution of at-this-time unknown Native American traditional use areas on the basis of available ethnographic information and theoretical principles of ethnogeography.

107. If reasonably practicable, please develop such a model and submit for staff review and approval a research plan for the field verification in the APE of the model's predictions and recordation of identified traditional use areas.

108. Please implement the staff-approved plan and provide to staff a report on the results and a comprehensive discussion of the traditional use areas in and adjacent to the project APE that may be subject to the visual impact of the construction, operation, and maintenance of the proposed project (e. g., landforms in sight of the APE on which sacred or other traditional activities took place). Please include any additional DPR 523 site forms in an appendix.

RESPONSE
In this submittal, Ridgecrest Solar I, LLC (Applicant) provides a discussion of *traditional use areas* at the Ridgecrest Solar Power Project (RSPP) in response to Data Requests 106, 107, and 108 posed by the CEC in their Data Requests Set 1 (#79-118), dated December 22, 2009, and as verbally amended by Beverly Bastian of the CEC on January 4, 2010. At present, the Applicant understands the CEC's direction to be that the CEC technical staff (Staff) requires the development of a model of prehistoric Native American traditional use areas at the RSPP, but does not expect a field verification component as specified in Data Request 108.

In the January 4, 2010 communication, Ms. Bastian limited the expression "adjacent to the project APE," as used in Data Request 108, to the extent of the CEC-mandated 200-foot survey buffers around the proposed Project disturbance areas. Although we discuss landscape features that are greater than 200 feet from the RSPP footprint in this response, our discussion of those is

intended to place the RSPP in a larger cultural landscape of traditional activity and thought. This discussion is not meant to imply that distant cultural and natural features are linked to, or would necessarily be affected by, the construction and operation of the proposed RSPP facility.

Traditional Use Areas

In their Data Requests, Staff use the term "traditional use areas," which is not a commonly used term in archaeology or cultural resources management. For the purposes of this response, and reflecting clarifications from Staff, traditional use areas are defined as locations and suites of locales associated with specific subsistence, settlement, and spiritual practices of cultural relevance to Native Americans prior to the historical disruption of those practices wrought by the incursion of non-native peoples. As defined, traditional use areas are therefore distinct from the federally defined term "traditional cultural properties"[1] in that they are not places, items, or features of significance to *modern* peoples, but archaeological resources of presumed importance to *past* peoples, specifically the ancestral Native American groups of the Mojave Desert. In this analysis, we do not attempt to interpret or predict modern attachment to the land or specific places, but rather we use extant ethnographic and archaeological data to build a model of past traditional use of the RSPP site and vicinity.

The RSPP is located at the northern edge of the El Paso Mountains in the western Mojave Desert. Located at the southern end of Indian Wells Valley, this area was part of the Pleistocene Owens drainage system extending from Mono Basin south to the Owens and Indian Wells Valleys, then east to the Searles, Panamint and Death Valleys (Hall 1992; Mehringer 1986). Although the Mojave Desert had limited resources and surface water, the region supported a long human occupation with population density increasing in the Holocene (Mosely and Smith 1962). In this region, the archaeological character and distribution of cultural features and natural resources associated with past Native American traditional practices may be modeled with reference to historical, ethnographic, and archaeological accounts. European intrusion into the Mojave Desert began when Spanish missionaries and explorers entered the area in the 18th century, though this area was considered remote and difficult to access. More permanent impacts from non-native settlers did not occur with great intensity until the second half of the 19th century, when permanent settlements in the western Mojave were motivated by mining, homesteading and railroad development (Norris and Carrico 1978, Westbrook n.d., Coombs et al. 1979).

Little systematic ethnographic work has been completed in this area of the western Mojave. However, many Native American communities in the region with many tribal affiliations

[1] Traditional cultural properties are defined by the National Historic Preservation Act of 1966, as amended, and further defined in National Register Bulletin 38 (Parker and King 1998). The Bureau of Land Management Manual Section 8110.22(d)(1) defines traditional cultural properties as "specific, definite places that figure directly and prominently in a particular group's cultural practices, beliefs, or values, when those practices, beliefs, or values (i) are widely shared within the group, (ii) have been passed down through the generations, and (iii) have served a recognized role in maintaining the group's cultural identity for at least 50 years."

maintain oral traditions and close ties to their landscapes. Based on ethnographic records and tribal knowledge, the RSPP project area is located on the boundary (such as one can be defined) of the traditional territory of the Kawaiisu. However, their core homeland or concentrated occupation was in the southern Sierra Nevada Mountains. The RSPP project area, east of their core area, was a "transitional zone" used by many tribes to access important desert resources like salt and obsidian. While not a core area for any single tribe, the Kawaiisu, Tubatulabal, Yokuts and Kitanemuk are all known to have used the area. Neighboring groups included the Tubatalubal to the north, the Southern Yokuts to the west, and the Kitanemuk and Serrano groups to the south. During the initial period after European contact, the Kawaiisu claimed a major portion of the western Mojave Desert as their territory, including the Fremont Valley (Sutton 1991). Ethnographic information indicates that the Kawaiisu traveled as fareast as the Panamint Mountains, and Steward (1937, 1938) assigns the southern portion of Panamint Valley to this group (Cleland 2003).

Ethnographic works, oral histories, and consultation with present-day Native American populations highlight a number of issues: (1) Native American consultants, past and present, consistently place a high value on the entire landscape and insist that ancestral remains and the natural landscape are interconnected in important ways; (2) the significance of these interconnections is such that damage to any part results in damage to the whole; (3) within this complex cultural landscape there are specific areas that are particularly important; and (4) songs and oral traditions relate the creation and history of Native American groups as they lived, migrated, and traveled across this landscape. Often, meaningful places are associated with an abundance of specific archaeological features including rock features, petroglyphs, cleared circles, trails, ceramics scatters, or lithic scatters (see, for example, Altschul and Ezzo 1994; Baksh 1997; Sutton 1988; Sutton et al. 2007; von Werlhof 1987; Woods, et al. 1986 for discussions relevant to desert environments). Human remains may be present at these locations as well. Features such as lithic scatters and ceramics scatters may be indicative not only of domestic habitation and subsistence practices but also certain ceremonial or religious activities.

Food Resources

As today, edible plants and animals were distributed unevenly across the desert landscape. The vicinity of the RSPP represented a transitional corridor used during seasonal migrations to collect desert plant resources and likely exploit the margin along Lake China for water fowl or other lacustine resources when present. Ethnographically, the valley was lightly used as it held limited permanent water sources, thereby limiting available food resources and long-term settlement, and native peoples remained predominantly in the spring-fed mountains adjacent to the valley (Indian Wells Valley Water District 1979:2). Archaeological evidence for past food procurement and processing activities that might have occurred within the RSPP include ground stone artifacts, portable milling features, and rock rings.

The RSPP is characterized by low density creosote bush scrub, with creosote bush (Larrea tridentata) and white bursage (Ambrosia dumosa) the dominant species. Within the sandy flats

and emerging desert pavement the vegetation is dominated by creosote bush, with saltbushes (Atriplex spp.) occurring where the soil becomes more alkaline. Along seasonal washes, the vegetation is denser, though with the same variety of species. Cholla (Opuntia spp.) and native grasses can be found at the lower elevations in the northern portion of the RSPP.

Zigmond (1981) produced a comprehensive ethnographic survey of plant resources used by the Kawaiisu for subsistence, medicine, utilitarian and ceremonial purposes. Desert plants played only a minor role in Kawaiisu subsistence and medicinery, with mesquite and screwbean the desert species most frequently utilized (Zigmond 1986:399). Neither is present in the RSPP. However, creosote is also known to have been used by native groups as an important medicinal plant, the leaves of which were brewed as a tea good for treating upset stomach and cough and also as a traditional treatment for muscle pain and inflammations (see Bean and Saubel 1972, Owen 1962:109).

Within the RSPP, prehistoric sites with milling features and groundstone appear primarily in southwestern area of the RSPP and outside of the project in that direction, where a large seasonal wash cuts into the valley. Populations near the Indian Wells Valley likely spent short, sporadic periods in the valley while traveling from more stable mountain resource areas.

The Indian Wells Valley represents the dry basin of Pleistocene Lake China (China Lake). Some researchers have proposed an early lacustrine adaptation by the early human groups associated with such lakes in the area of the western U.S. (Bedwell 1970, Hester 1973). The elevation of the RSPP indicates that it was above the maximum stand of pluvial Lake China (Davis and Panlaqui 1978a), and was, therefore, never inundated by the lake, its location in the valley in the vicinity of this ancient pluvial lake bed, provides the potential for lacustrine use to the northeast of the RSPP. For Late Holocene times, Sutton has described settlement models for the western Mojave, reflecting shifts in settlement resulting from these apparent variations in precipitation. The proposed shifts begin with a focus on stream and spring associated settlement, and then a shift to lake shore settlement, and then back to a stream and spring associated pattern (Sutton 1996). Not too surprising, then, in a desert environment, water availability has had a significant influence in determining the location of prehistoric habitation sites in the APE through time.

Habitation

As elsewhere over space and time, habitation in and use of the Mojave Desert region was pragmatic, though the food and water procurement, and ceremonial considerations, such as locations preferred for ritual ceremonies that sometimes entailed the gathering of fairly large social groups for multiple-day events and the establishment of residential area for these events. Habitation sites are reported archaeologically and ethnographically in locations favored for food procurement, as described above, and adjacent to reliable water sources such as springs, seeps, streams, and rivers. Some habitation sites are also found in association with established trade routes and trails. Locations of habitations associated with ceremonial activities are more difficult to model on the basis of environmental factors, but can be modeled based on ethnographically

identified areas of high ceremonial importance. Prominent landscape features such as mountains, rock outcrops, caves, rockshelters, and springs are all likely candidates for special treatment in the past. Some habitation indicators would be predicted at such locations. Habitation sites typically show evidence of a variety of occupation debris, including multiple artifact classes, subsistence wastes, fire-affected rock, and/or domestic architecture. This can include living areas (see also rock rings above), cooking hearths, subsistence remains (fish or mammal bone), middens, artifact scatters, and often discrete activity areas, such as lithic reduction, milling, or other subsistence-related locales.

No occupation sites or features associated with habitation such as rock rings or hearths have been identified in the RSPP, though rock rings have been documented in the Last Chance Canyon Archaeological District approximately one mile to the southeast of the project area as well as on the western side of the basalt ridge located directly southeast of the RSPP (Donald Storm, personal communication, January 5, 2010). Ethnographic sources indicate that the arid Indian Wells Valley was not a habitation location, but was instead traversed during spring migrations from the Piute Mountains to the Argus Range (Walker in Zigmond 1986:398).

Mineral, Stone, and Other Natural Resources

Archaeological correlates of flaked stone tool extraction locations are flaking stations, tested cobbles, and generalized flaked stone scatters. Groundstone quarries are identified by the presence of outcrops of suitable coarse stone materials, scatters of extremely large flakes, distinctive hammerstones, and abandoned preforms (Schneider 1993). Evidence of prehistoric lithic activity in and around the RSPP is in the form of low-density flaked lithic and groundstone tool scatters and isolated artifacts. However, the majority of these lie outside the southwestern corner of the Project or along the major drainage/wash running approximately north-south outside the RSPP limits of disturbance. These prehistoric sites and isolates include groundstone and flaked stone tools, and flaked stone debitage. This distribution may have been influenced by the prehistoric procurement and use of locally available lithic raw materials.

Several local sources of lithic materials used to make prehistoric tools have been identified outside of, but near to, the RSPP (Davis and Panlaqui 1978b). To the south and southwest, in the El Paso Mountains area, are known sources for chalcedony and jasper from the Red Rock and Last Chance Canyon areas, and for agate and chalcedony from the Sheep Springs and Rainbow Canyon areas (Davis and Panlaqui 1978b; McGuire et al. 1982; Warren 1984). Several of the small drainages and washes that emanate from the El Paso Mountains, extend north into Indian Wells Valley. Wickstrom and Donahue (2003) have observed that within this area and vicinity, prehistoric cultural materials could be expected to more likely occur in areas where the younger alluvium is present on the surface, versus in areas of older alluvium. This appears most likely to be as a result of a greater content of CCS materials in the younger alluvium in the form of angular cobbles and pebbles (cf. Taylor 1989). Also present to a greater degree are cobbles of basalt, the most commonly used material for groundstone tools observed in the RSPP. The bedrock sources of these raw materials are also located on (e.g., basalt), or in proximity to, the

RSPP in the El Paso Mountains to the south and west. The presence of these raw materials, frequently used prehistorically for flaked stone and groundstone tool manufacture, could possibly account for the pattern of occurrence of the prehistoric sites in and around the RSPP area. Obsidian occurring at sites in this area is commonly assumed to most likely have derived from sources in the Coso Mountains 30 to 35 miles (48 to 56 km) to the north of the RSPP (Gilreath and Hildebrandt 1997).

Located, nearby, to the south and southwest, in the El Paso Mountains area, are known sources of chalcedony and jasper from the Red Rock and Last Chance Canyon areas, and of agate and chalcedony from the Sheep Springs and Rainbow Canyon areas (Davis and Panlaqui 1978b; McGuire et al. 1982; Warren 1984). Association of these lithic sources with Early Holocene and Late Holocene complexes has also been made by some of these researchers (Davis and Panlaqui 1978b; McGuire et al. 1982; Warren 1984). Several small drainages and washes, emanating from the El Paso Mountains, extend north through the APE into Indian Wells Valley.

Religion and Ritual

The archaeological identification of locations favored for past ceremony and ritual is often predicated on analogies to ethnographically documented beliefs and practices. By their very nature, such locations tend to defy environmentally grounded predictive models. In general, prominent landscape features like distinctive rock outcrops, mountains, caves, rockshelters, and springs were the loci of ceremonial importance. These places are often named and associated with pivotal moments in myth and history as is the case of the Kawaiisu (see Zigmond 1980, Zigmond 1986:407, Figure 6). In particular, the El Paso Mountains to the south of the RSPP were of great ritual and mythological importance to the Kawaiisu. As recounted in Faull et al. (n.d.:2), Black Mountain in the El Pasos was an annual meeting place for intertribal ceremonies during which many adjacent tribes who used the western Mojave came together.

Archaeological correlates of ritual activities may consist of rock art, geoglyphs, rock alignments, rock cairns, small rock rings, small cleared circles, cremated human bone, concentrations of ceramics scatters (possible ceremonial offerings), concentrations simple flaking stations (also possible ceremonial offerings), and trails (see below). The El Pasos also contain rock rings and Coso style petroglyphs at such rock art loci as the Sheep Springs, Therese and Black Mountain sites, evidence of more intensive occupational and ceremonial use, whether collective or individual in nature. Approximately eight miles to the northeast of the RSPP is the Coso Rock Art District, consisting of multiple canyons containing over 20,000 petroglyphs. In present times, the El Paso Mountains have also been the location for the reburial of ancestral Native American remains (Faull et al. n.d.:7). Further, in the early 1990s Kawaiisu elders indicating that the peaks of upper Last Chance Canyon were a religious site where important ceremonies were held. Other unidentified ceremonial areas and sites in the peaks of the El Paso Mountains were also mentioned (Faull et al. n.d.:8). Access to these sites, as described by the elders, is discussed below.

Trails

As a resource procurement and transitional zone between groups, travel to and through this area of the western Mojave was a key use of the area. Travel was associated with seasonal movement, ceremonial aggregation, trade, and conflict. Major trails, clearly identified in some desert areas such as the Chuckwalla Valley in the upper Colorado Desert approximately 200 miles to the southeast, were maintained to facilitate such travel and they typically connect major habitation areas and also major locations of ceremonial significance. In the Mojave Desert, a major thoroughfare following the Mojave River was used not only prehistorically but by Spanish and American explorers leading from the Colorado River to the Mission San Gabriel/Los Angeles area on the coast (Earle 2008). The Mojave Road or Mojave Trail, continues to be used as an off-road alignment today. Archaeologically, cultural trails are often associated with lithic scatters, ceramics scatters, cairns, cleared circles and other cultural features, but they can also be devoid of any associated materials for considerable distances. Animal trails are occasionally mistaken for cultural trails, and sometimes the two may be difficult to distinguish. While less developed pavements may preserve cultural trails, these are best preserved on stable geological surfaces such as well-developed desert pavements which are not present in the RSPP.

The desert to the east of the Kawaiisu core area was used transitorily for seasonal trips to exploit desert resources. Trips were made to obtain salt at Saltdale, a dry lake, and to the opposite side of Randsburg for obsidian. A trail system emanating from the Kawaiisu core area encouraged the flow of people and resources (Zigmond 1986), though no trails have been identified within or adjacent to the RSPP. Instead access to ceremonials sites identified by Kawaiisu elders, like upper Last Chance Canyon and sites in the El Paso Mountains, was obtained using "several different routes (along ridge lines) that led to the peaks of Black Mountain and that different tribes used their own routes" (Faull et al. n.d.:8).

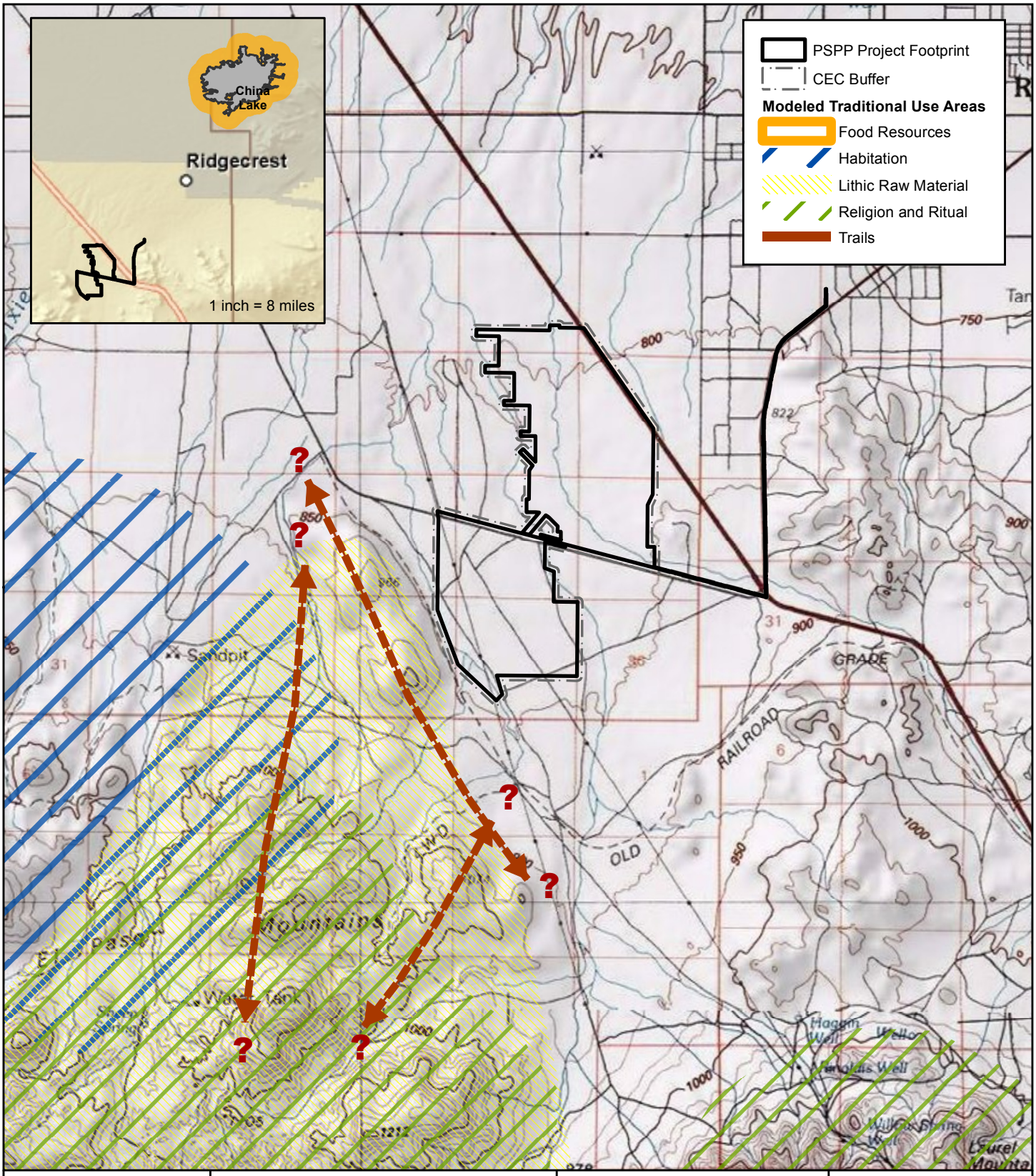
Historical Events

There is little documented information regarding Native American use of the RSPP area during the historical period. The Kawaiisu were regarded as a generous people, and the area in the vicinity of the RSPP, as a peripheral part of their territorial sphere and a place of travel and interaction, likely saw little conflict. Contact with the Spanish is thought to have begun in the mid-1700s with Franceso Garcés' expedition through Kawaiisu territory. During the initial period after European contact, the Kawaiisu claimed a major portion of the western Mojave Desert as their territory, including the Fremont Valley (Sutton 1991). During the protohistoric and historic periods, the Yokuts and Tubatulabal to the northwest of the RSPP were allied with the Mohave people to the east The represented the northernmost extension of a larger system of trade and alliance relationships termed the "Northern Sonoral Desert Amity-Enmity System" (Bean and Vane 1978:5-3).

There appeared to be little involvement by non-indigenous peoples in this area of the western Mojave until the mid-19th century, when American John Charles Frémont encountered Native Americans in what was likely Kawaiisu territory approximately 40 miles to the west near Weldon. The vicinity of the RSPP, however, does not appear to have been the site of post-contact interaction. Instead, the second half of the 19th century saw the core of the Kawaiisu area overtaken with mining claims, which began a pattern of tension and conflict that spread beyond the Kawaiisu to encompass neighboring tribal groups and ended in an 1863 massacre of Native Americans from various tribes in Tubatulabal territory (Zigmond 1986:9). As mining spread to the Indian Wells Valley in the latter part of the 19th century, with (kind) mines opened in or in the vicinity of the RSPP, American influence in industry and settlement began to overtake Native use of the RSPP area. As tribal peoples were forced to become more sedentary and geographically centralized, the area of the RSPP likely became less utilized as a resource exploitation and transportation locale. In 1986, Zigmond wrote that "[a]s a tribal entity, the Kawaiisu have ceased to be," noting that their traditions and arts had disappeared (1986:410). However, affiliation with the region and in particular the traditional sacred sites of the El Paso Mountains remains present among today's Kawaiisu representatives and representatives of intertribal interests, reflecting the interconnection of groups, people and geographies that has extended for millennia in the Indian Wells Valley. Today, the area of the RSPP is considered traditional tribal lands of the Kawaiisu, Tubatulabals, Yokuts and Kitanemuk, and has been identified by the Tubatulabals of Kern Valley as within their present-day tribal area of influence.

Summary

Based on this model several general observations can be made about the traditional use of the RSPP. As graphically displayed in Figure 1, the traditional use of the RSPP is predicted to have been largely focused on the El Paso Mountains to the south and southeast and on the shoreline of Lake China during wet climatic episodes. Within the RSPP plant site, food and other natural resources are scarce and fresh water was typically nonexistent. Plant food procurement may have focused on the shores of Lake China to the northeast of the Project, where lacustrine and marsh resources may have developed in wet periods. Habitation sites have been observed to the west of the Project, though no evidence of habitation has been observed in the alluvial plain of the RSPP site itself. Ceremonial activities, including human interments and rock art, are concentrated in the canyons and peaks of the El Paso Mountains and in the shorelines of Lake China to the northeast. No trails have been identified in the vicinity of the Project. Remains of any formal trails that may have traversed the vicinity of the RSPP were likely obscured by the alluvial and aolian action that continually affects this landscape. The archaeological record in the vinicity of the RSPP is likely to reflect the sporadic and low intensity use of this portion of the floor of the Indian Wells Valley.



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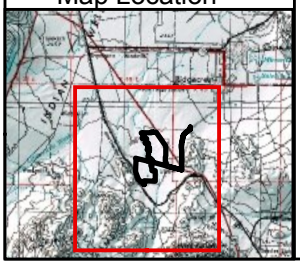

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1 inch = 6,000 feet

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Source: ESRI 2009; AECOM 2009

Ridgecrest Solar Power Project

Figure 1
Modeled Native American Traditional Use Areas

Solar Millennium

AECOM

Date: February 2010

Path: P:\2009\0908\080 Sol Mil Ridgecrest\6.0 GIS\6.3 Layout\Reports\ClassIIArchyReport\4_jan2010_CEC_DataRequests\DR-CUL-106 PSPP traditional use areas.mxd, 02/05/10, wilsons5

References Cited

Altschul, Jeffery H., and Joseph A. Ezzo

1994 The Expression of Ceremonial Space Along the Lower Colorado River. In *Recent Research Along the Lower Colorado River*, edited by Joseph A. Ezzo, pp. 51-68. Technical Series No. 51, Statistical Research, Tucson, Arizona.

Baksh, Michael

1997 *Native American Consultation for the Chemgold Imperial Project*. Document on file with Bureau of Land Management, El Centro, and Tierra Environmental Services, San Diego, California.

Bean, Lowell J., and Katherine Saubel

1972 *Temalpakh: Cahuilla Indian Knowledge and Usage of Plants*. Malki Museum Press, Banning, California.

Bean, Lowell J., and Sylvia Brakke Vane

1978 *Persistence and Power: A Study of Native American Peoples in the Sonoran Desert and Devers-Palo Verde High Voltage Transmission Line.* Report submitted to Southern California Edison Company. Cultural Systems Research, Menlo Park, California.

Bedwell, Stephen F.

1970 Prehistory and Environment of the Pluvial Fort Rock Lake Area of Southcentral Oregon. Unpublished Ph.D. Dissertation in Anthropology, University of Oregon, Eugene.

Cleland, Jamie

2003 Cultural Resources Survey of Target Buffer Areas, South Range Naval Air Weapons Station, China Lake, California.

Coombs, Gary B., Richard McCarty, Tara Shepperson, and Sharon Dean

1979 *The Archaeology of the Western Mojave.* Prepared for U.S. Department of the Interior Bureau of Land Management. On file at EDAW San Diego.

Davis, Emma Lou, and Carol Panlaqui

1978a General Background. In *The Ancient Californians: Rancholabrean Hunters of the Mojave Lakes Country*, E. L. Davis, editor, pp. 4-21. Natural History Museum of Los Angeles County Science Series 29.

1978b Stone Tools, The Action Units. In *The Ancient Californians: Rancholabrean Hunters of the Mojave Lakes Country*, E. L. Davis, editor, pp. 30-76. Natural History Museum of Los Angeles County Science Series 29.

Earle, David D.
2008 The Native Context of "The Old Spanish Trail" in California...Traditional Native Travel and Exchange across the Mojave Desert and the Hispanic Desert Frontier. Paper presented at the National Spanish Trails Symposium, Southern Utah University, October 2008.

Faull, Mark, Alan Garfinkel, Andy Gree, and Albert Knight.
n.d. The El Paso Mountains: Sacred Landscape of the Kawaiisu. Draft Manuscript on file at the Bureau of Land Management Ridgecrest Field Office.

Gilreath, Amy J., and William R. Hildebrandt
1997 *Prehistoric Use of the Coso Volcanic Field.* Contributions of the University of California Archaeological Research Facility no. 56.

Hall, Matthew C.
1992 *Cultural Resources Survey of a Portion of the Former Southern Pacific Mojave Owenyo Branch Railroad, Inyo and Kern Counties, California.* Unpublished report on file at the Southern San Joaquin Valley Information Center.

Hester, Thomas R.
1973 Chronological Ordering of Great Basin Prehistory. *University of California Archaeological Research Facility Contributions* 17. Berkeley, California.

Indian Wells Valley Water District
1979 Environmental Impact Statement for Archaeological Values Prepared for Various Projected Facilities of the IWVCWD. Unpublished report on file at the Southern San Joaquin Valley Information Center.

McGuire, Kelly R., Allan P. Garfinkle, and Mark E. Basgall
1982 *Archaeological Investigations in the El Paso Mountains of the Western Mojave Desert: The Bickle and Last Chance Sites (CA-KER-250 and -261*). Far Western Anthropological Research Group, Davis, California. Report on file at the Southern San Joaquin Valley Archaeological Information Center, California State University, Bakersfield.

Mehringer, P. J., Jr.
1986 Prehistoric Environments. In Great Basin, edited by Warren d'Azevedo, pp. 31-50. Handbook of North American Indians, vol. 11, W. G. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

Mosely, M., and G. A. Smith
1962 Archaeological Investigations of the Mojave River Drainage. *San Bernardino County Museum Association Quarterly 9*:3. Redlands.

Norris, Frank, and Richard Carrico
1978 *A History of Land Use in the California Desert.* Prepared for U.S. Department of the Interior Bureau of Land Management. On file at EDAW San Diego.

Owen, Roger C.
1962 The Indians of Santa Catarina, Baja California Norte, Mexico: Concepts of Disease and Curing. Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.

Parker, Patricia L., and Thomas F. King
1998 Guidelines for Evaluating and Documenting Traditional Cultural Properties, *National Register Bulletin* 38, U.S. Department of Interior, National Park Service. Bulletin available online, http://www.nps.gov/history/NR/publications/bulletins/pdfs/nrb38.pdf.

Schneider, Joan S.
1993 Aboriginal Milling-Implement Quarries in Eastern California and Western Arizona: A Behavioral Perspective. Unpublished Ph.D. dissertation, Department of Anthropology, University of California Riverside.

Steward, Julian H.
1937 Linguistic Distribution and Political Groups of the Great Basin Shoshoneans. American Anthropologist 39(4):625-634.

1938 Basin-Plateau Aboriginal Sociopolitical Groups. Bureau of American Ethnology 120. Washington. (Reprinted, University of Utah Press, Salt Lake City, 1970).

Sutton, Mark Q.
1988 *An Introduction to the Archaeology of the Western Mojave Desert, California*. Coyote Press Archives of California Prehistory No. 14.

1991 Archaeological Investigations at Cantil, Fremont Valley, Western Mojave Desert, California. *Occasional Papers in Anthropology*, No. 1. California State University, Bakersfield.

1996 The Current State of Archaeological Research in the Mojave Desert. *Journal of California and Great Basin Anthropology* 18:221-257.

Sutton, Mark Q., Mark E. Basgall, Jill K. Gardner, and Mark W. Allen
2007 Advances in Understanding Mojave Desert Prehistory. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 229-245. Alta Mira Press, Walnut Creek, California.

Taylor, Thomas T.
1989 *Archaeological Survey Report Inyokern-Kramer 220 kV Transmission Line Conductoring Project Tower Sites, Pulling Area, Sleeve Area, and Wire Setups Kern and San Bernardino Counties, California.* Unpublished report on file at the Southern San Joaquin Valley Information Center.

von Werlhof, Jay
1987 *Spirits of the Earth, A Study of Earthen Art in the North American Deserts,* Volume I: The North Desert. Imperial Valley College Museum, Ocotillo, California.

Warren, Claude N.
1984 *The Desert Region.* In California Archaeology, edited by M. J. Moratto, pp. 339-430, Academic Press, Orlando.

Westbrook, Janet
n.d. A Concise History of Indian Wells Valley. Electronic document available at: http://www.high-desert-memories.com/history.html. Retrieved August 12, 2009.

Wickstrom, Brian, and Mike Donahue
2003 *Archaeological Survey Report for the Inyokern Four Lane Project, Kern County, California.* Unpublished report on file at the Southern San Joaquin Valley Information Center.

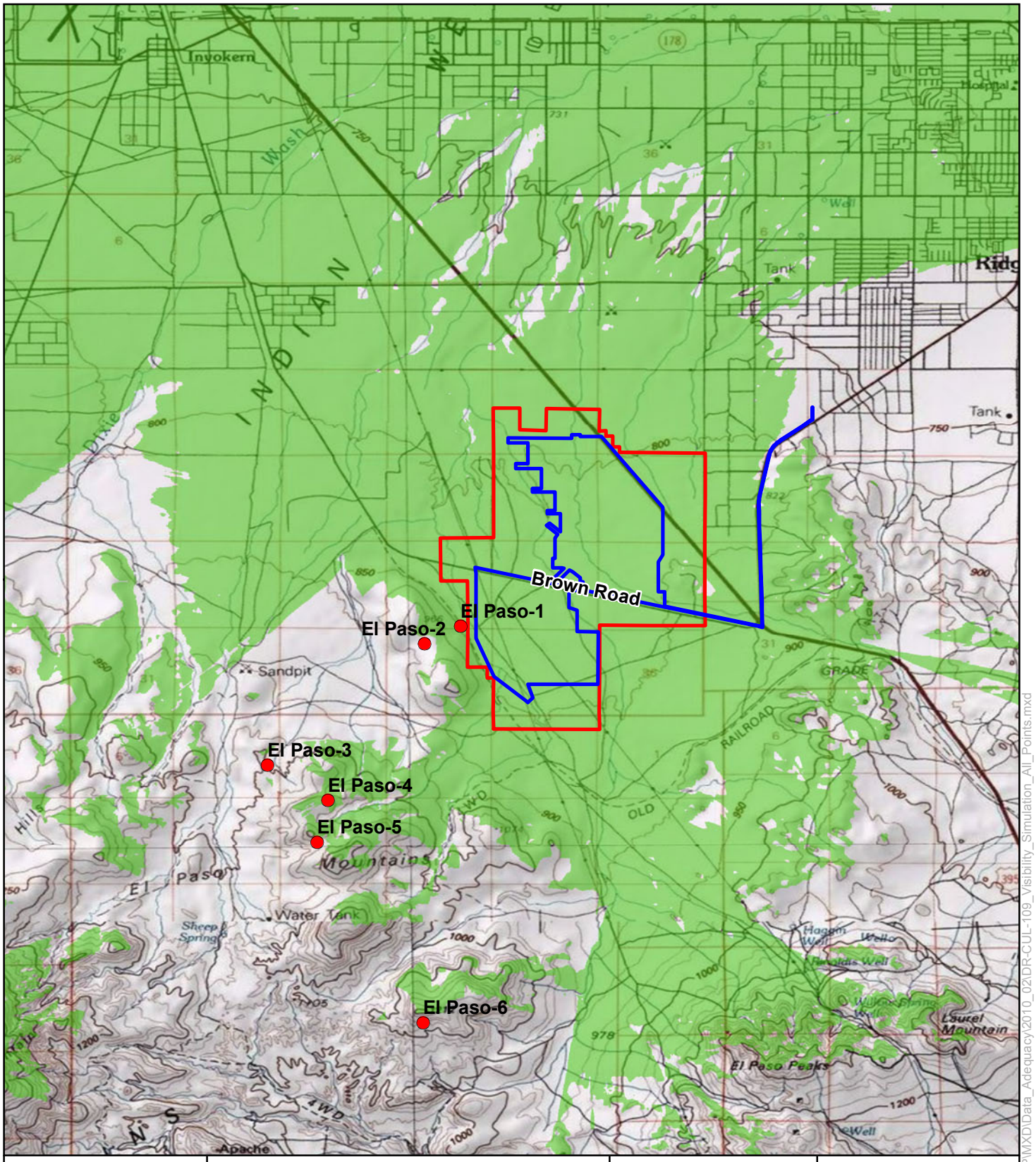
Woods, Clyde M., Shelly Raven, and Christopher Raven
1986 *The Archaeology of Creation: Native American Ethnology of Cultural Resources at Pilot Knob*. Report prepared for the Bureau of Land Management, El Centro, California.

Zigmond, Maurice
1980 Kawaiisu Mythology, An Oral Tradition of South-Central California. *Ballena Press Anthropological Papers* No. 18. Menlo Park, California.

1981 *Kawaiisu Ethnobotany*. University of Utah Press. Salt Lake City, Utah.

1986 Kawaiisu. In *Handbook of North American Indians, Volume 11, Great Basin*, edited by Warren L. D'Azevedo, pp. 398-411. Smithsonian Institution Press, Washington, D.C.

Attachment DR-CULT-109
Visibility Simulation Figures



Map Location

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- Right-of-Way
- Viewshed

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Ridgecrest Solar Power Project DR-CUL-109 Visibility Simulation

Solar Millennium

AECOM

Date: February 2010

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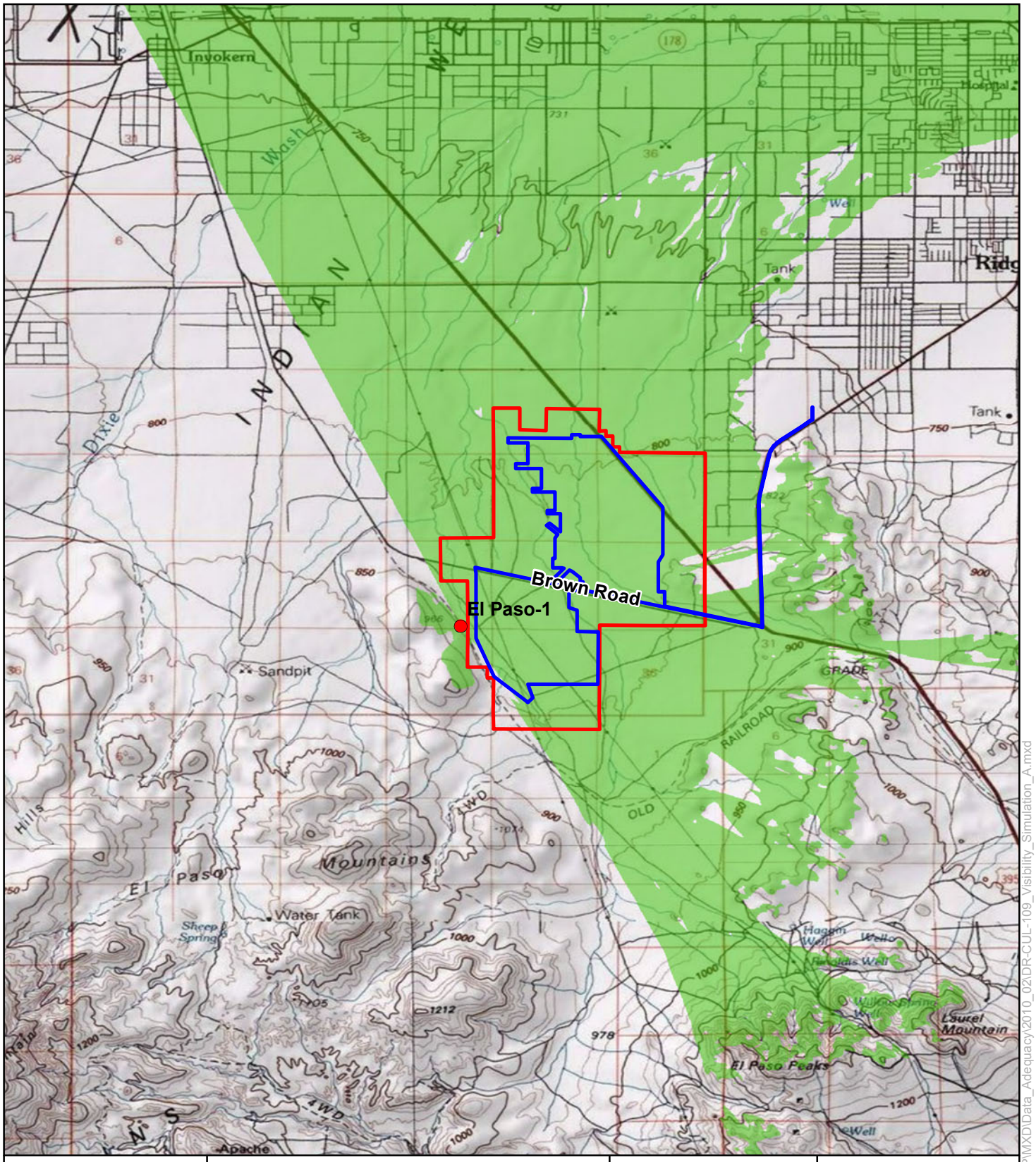

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- Right-of-Way
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Ridgecrest Solar Power Project
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Visibility Simulation
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N3933940

Solar Millennium

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Date: February 2010

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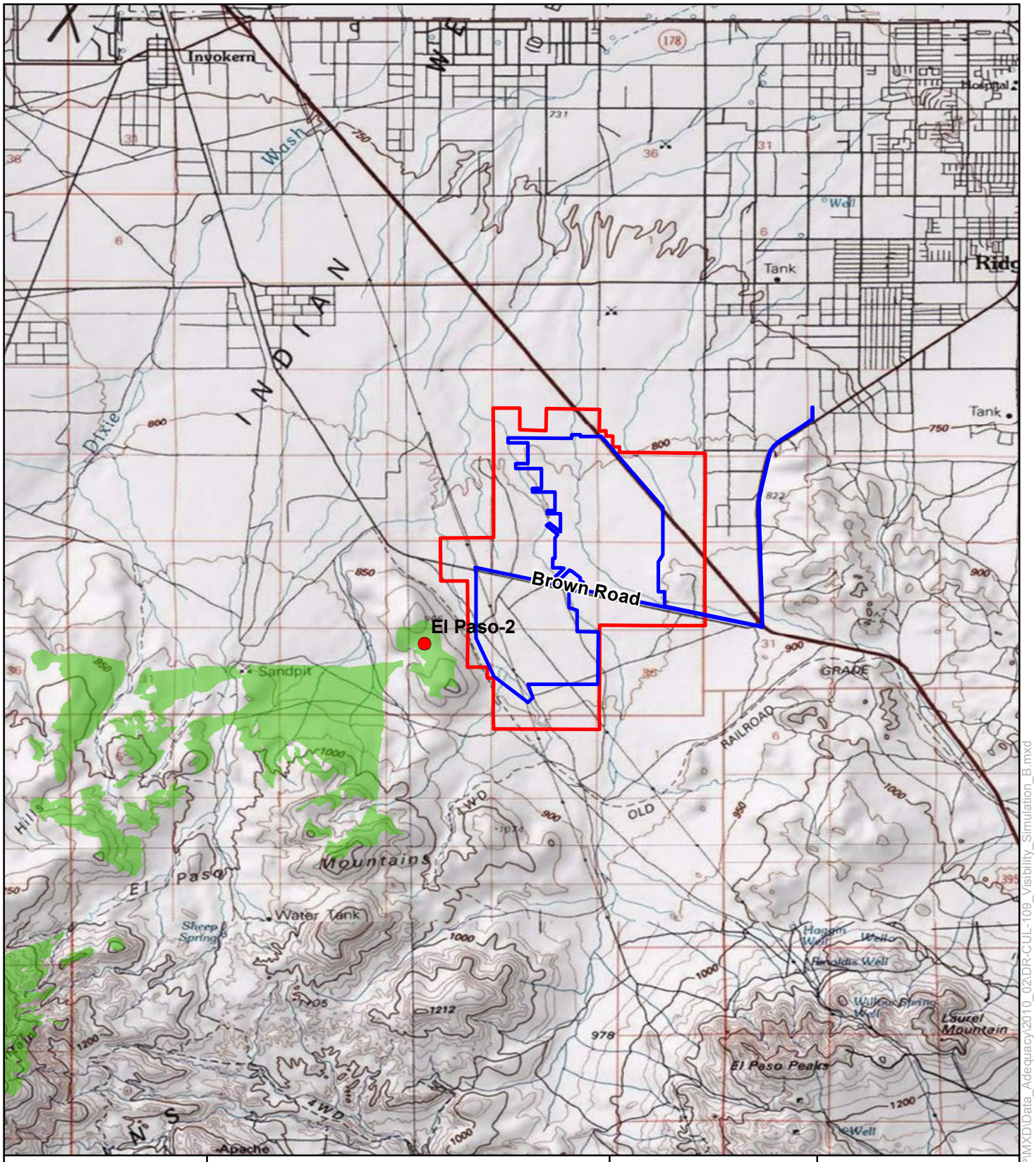

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- Right-of-Way
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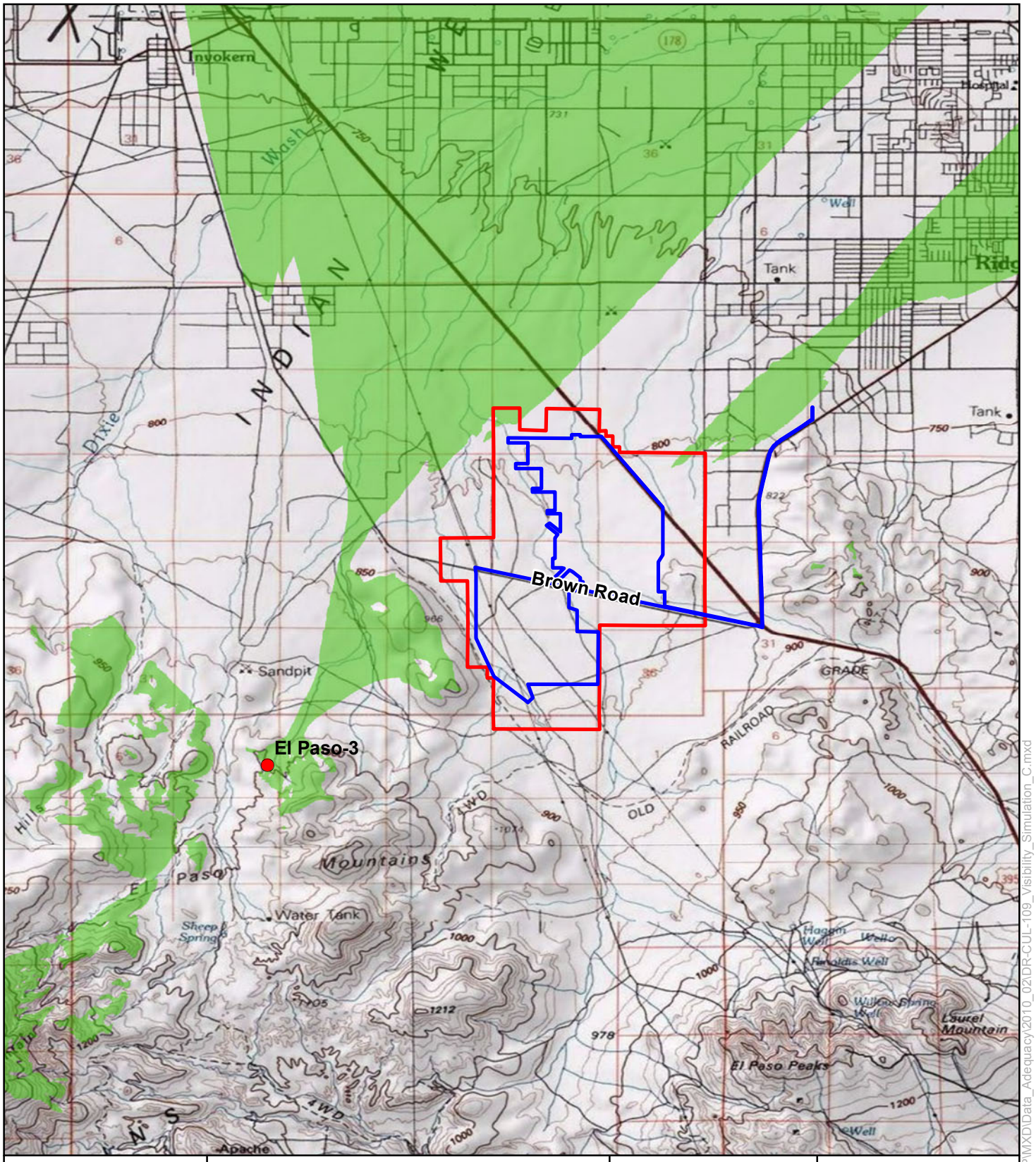

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- Viewshed

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Visibility Simulation
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Solar Millennium

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Date: February 2010

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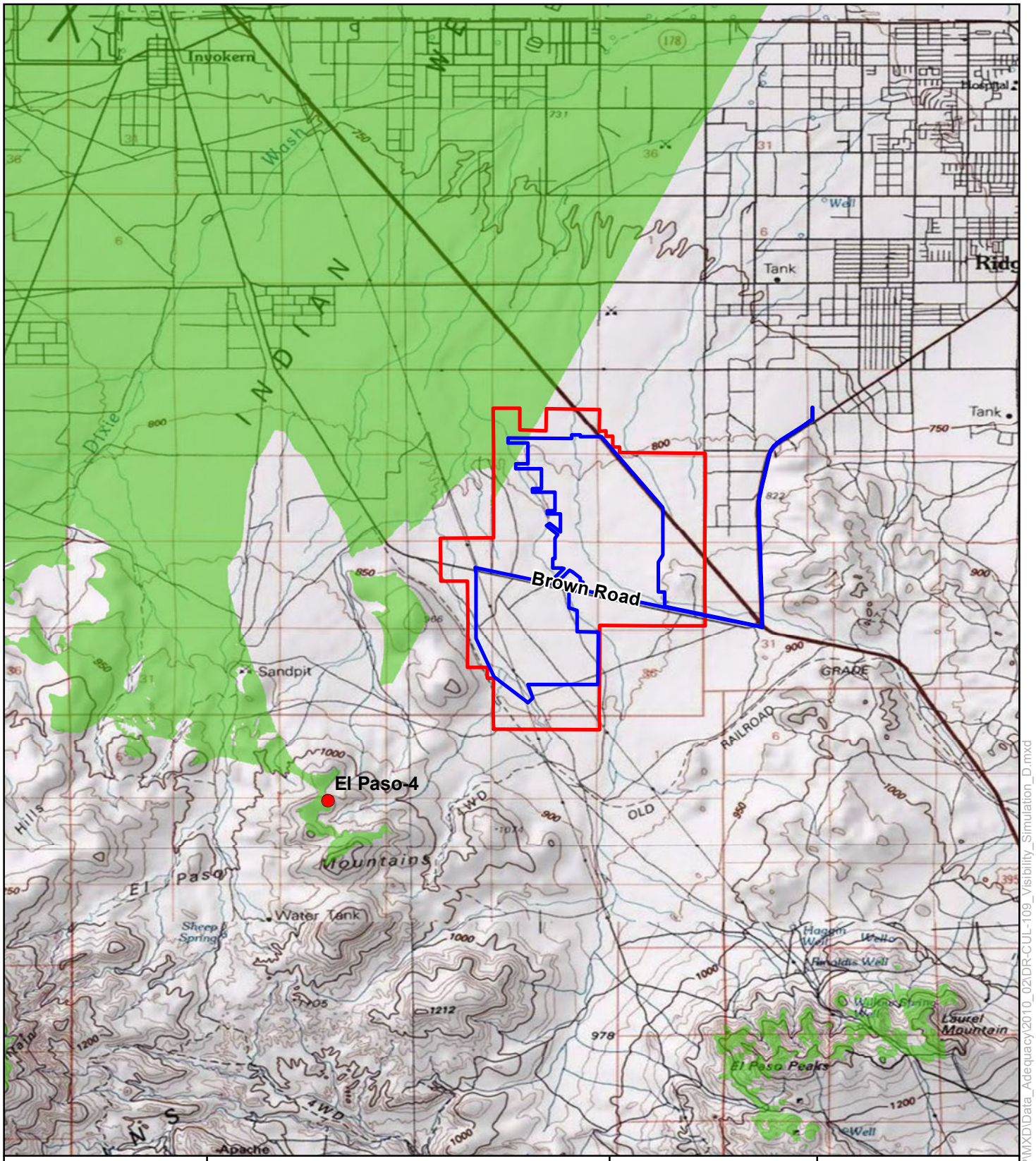

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- Right-of-Way
- Viewshed

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Solar Millennium

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Date: February 2010

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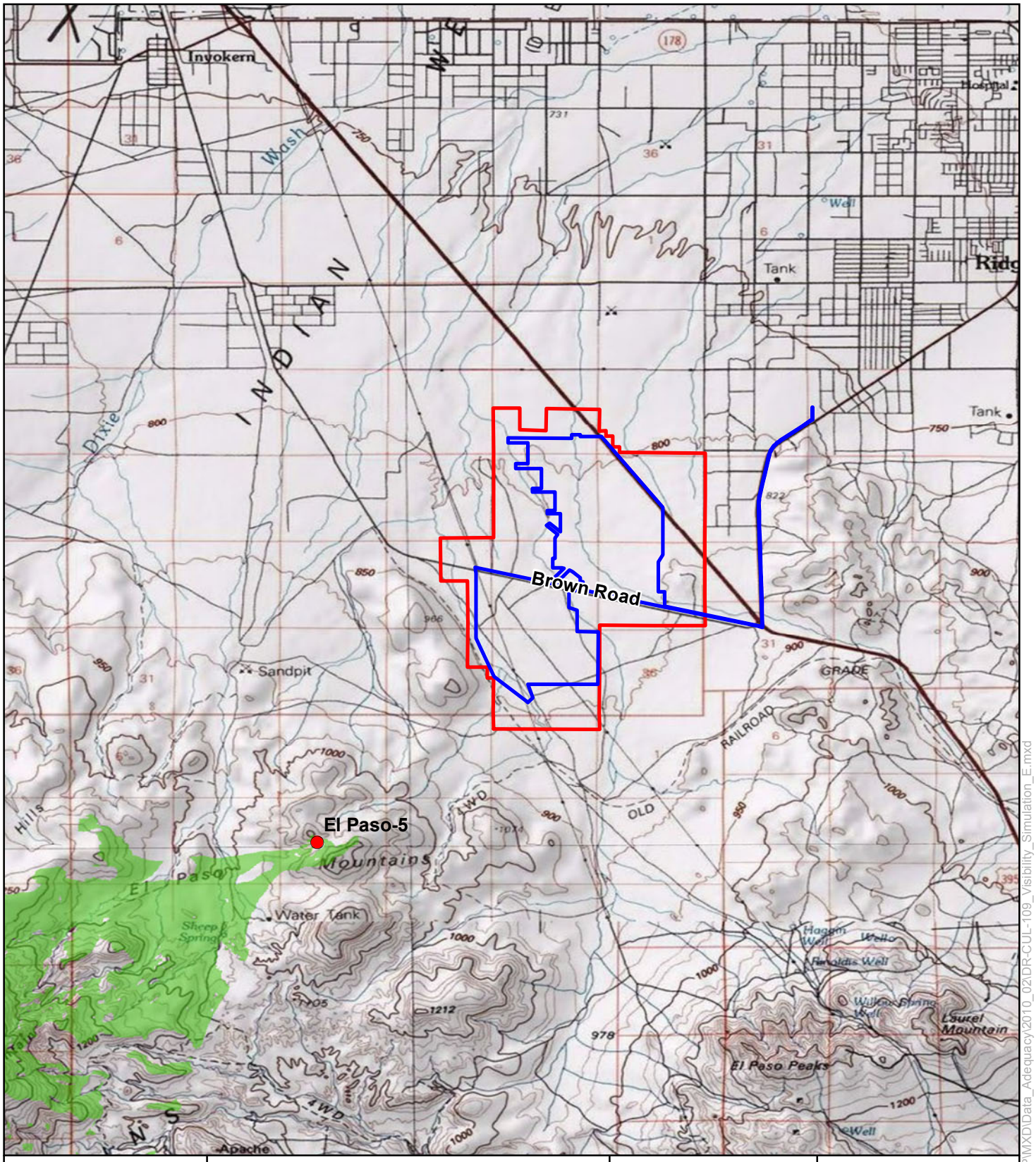

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Solar Millennium

AECOM

Date: February 2010

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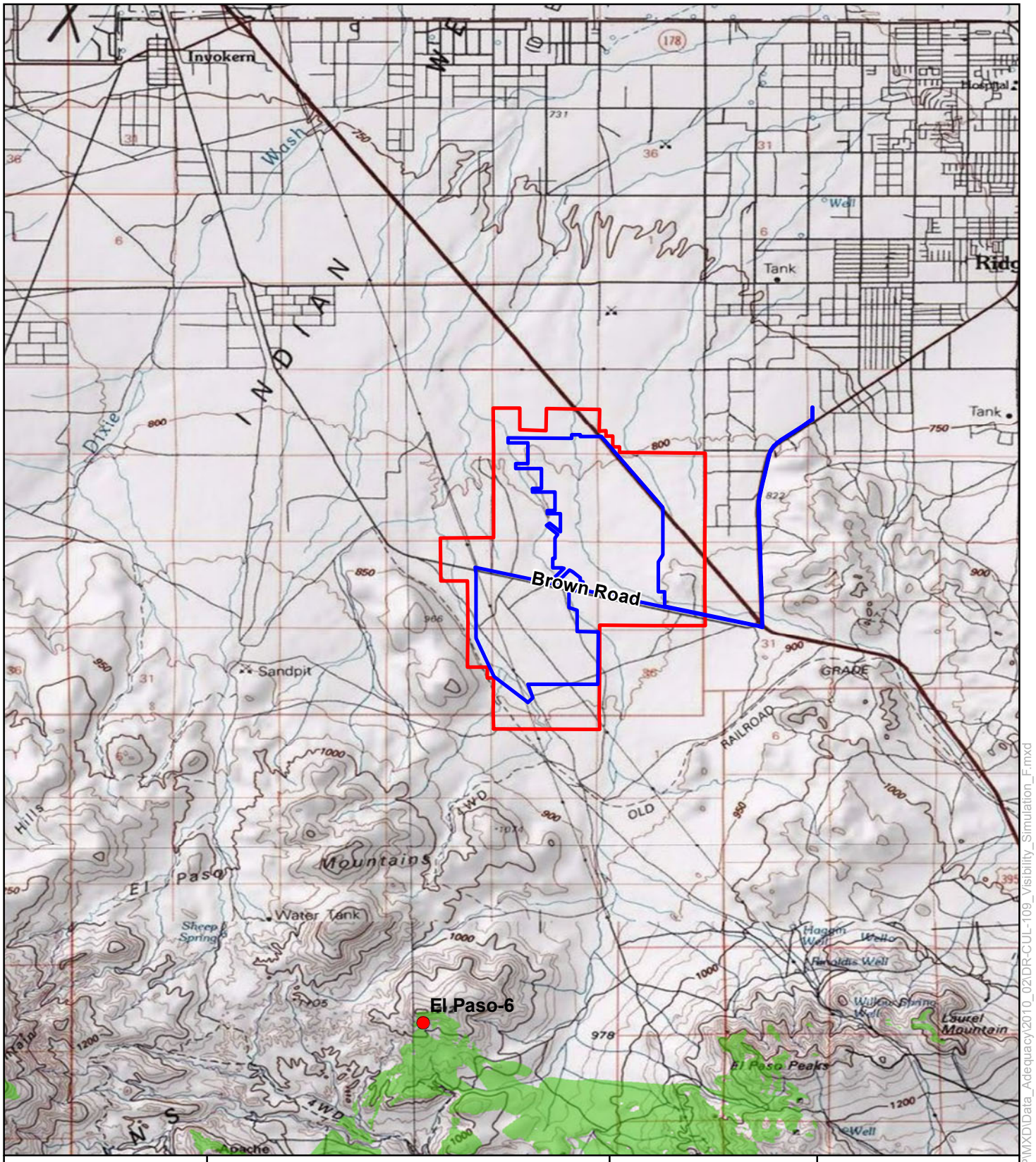

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- Right-of-Way
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Ridgecrest Solar Power Project
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Visibility Simulation
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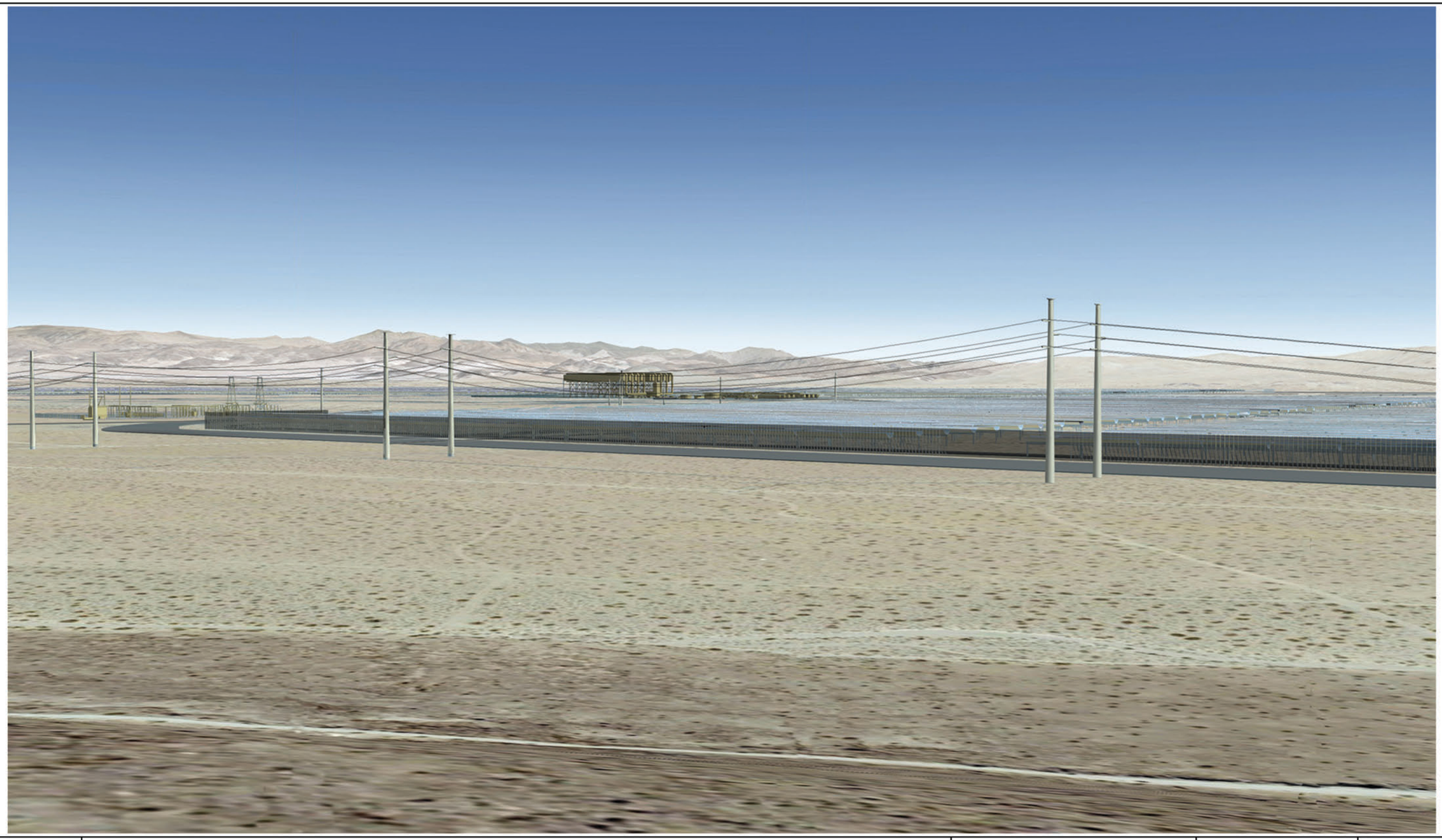

Map Location

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Ridgecrest Solar Power Project
DR-CUL-109
Visibility Simulation
Plant Simulation from Location A, Zone 11
E430160/N3933940

Solar Millennium

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Date: February 2010

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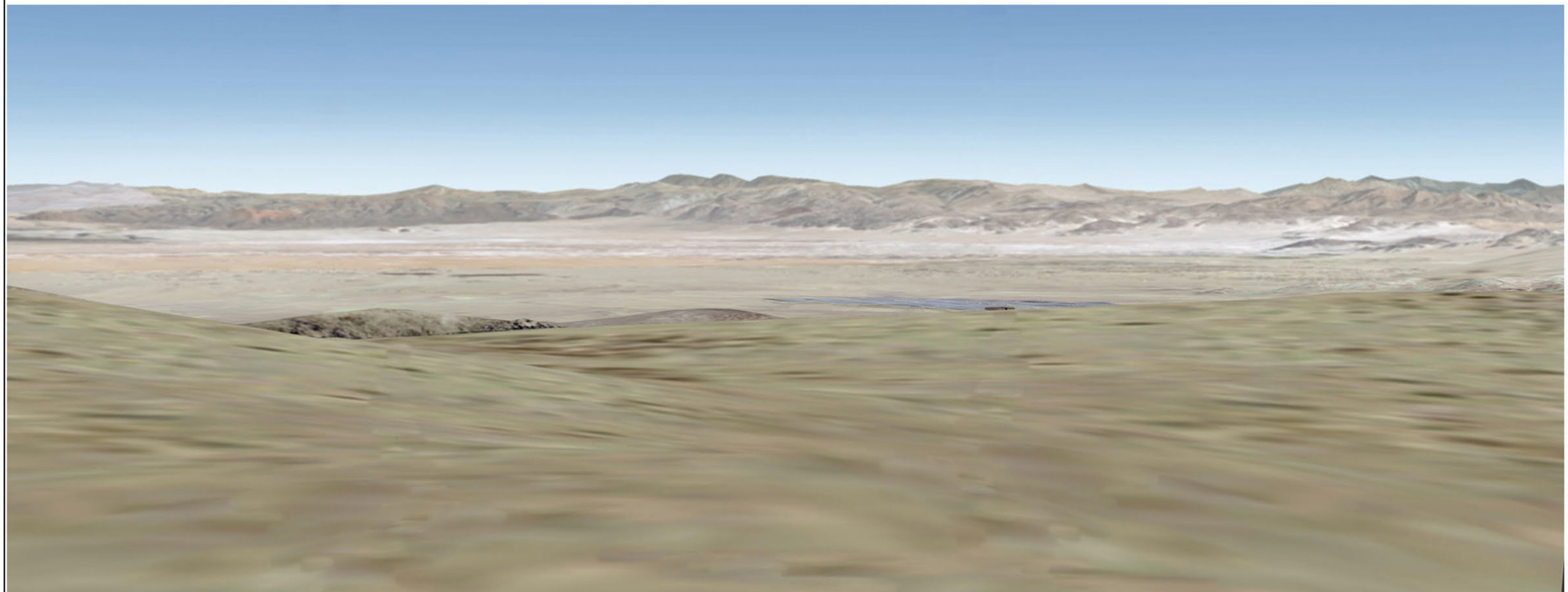

Map Location

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Not to Scale

Ridgecrest Solar Power Project
DR-CUL-109
Visibility Simulation
Plant Simulation from Location D, Zone 11
E427744/N3931690

Solar Millennium

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Date: February 2010

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Ridgecrest Solar Power Project
(Docket No. 09-AFC-9)

Supplemental Soils & Water

Data Response Information

DR-S&W-145, 148, 182, 183, 184 and 186

Submitted February 10, 2010

DR-S&W-145

Information Required:

Please identify how much cut and fill would occur at the site.

Response:

Approximately 7.5 million cubic yards of cut and 7.5 million cubic yards of fill will occur at the site as represented in the Sheets C-04 to C-06 of the Conceptual Engineering Drawings, provided in Attachment S&W-145 at the end of this section.

DR-S&W-148

Information Required:

Please provide plans and maps showing how sheet and channel flow into and across the project site, over roads, around the mirrors, and off the site would be managed through engineering controls.

Response:

The grading plans depict how the sheet and channel flow occurs across the site. The engineering controls consist of providing established grades with minimum slope in the field areas to minimize any erosion and maximize infiltration, providing swales between the solar loops at predetermined locations to collect the field drainage, collection channels are located at the ends of the swales so that they collect the water from the fields, and these collection channels direct the drainage to the primary drainage channels that are located on the perimeter of the site. The grading plans can be seen as Sheets C-04 to C06 of the Conceptual Engineering Drawings, provided in Attachment S&W-145 at the end of this section.

DR-S&W-182

Information Required:

Please provide design details that show the proposed channels control or prevent bank erosion and headcutting due to the interception of flows by the proposed diversion channels. All bank protection and erosion control measures, including grade control structures, must be traversable (4:1 slope or flatter) and not present an entrapment hazard to wildlife. More specifically, it has been determined the project site is Desert Tortoise habitat, and as such, bank protection measures such as dumped riprap, stacked gabions, or gabion mattresses would not be acceptable. Soil cement has been identified as the most probable alternative as it would prevent headcutting due to flow over the channel banks and would provide a traversable and quasi-natural surface. The use of bio-stabilization measures and/or geotextiles are not considered viable alternatives.

Response:

All slopes associated with the drainage channels and bank protection measures are 3:1 or flatter in accordance with provisions noted by CDF&G for desert tortoises. There is no riprap, gabions, or geotextile fabrics used on the Project. All bank protection measures will be provided by using soil cement. Details associated with the application of soil cement on embankments can be seen in the Conceptual Engineering Drawings, provided in Attachment S&W-145 at the end of this section.

DR-S&W-183

Information Required:

Provide detailed grading plans showing the geometry of the proposed diversion channels and how they would tie into existing grade.

Response:

Engineering grading plans and details associated with the Project, specifically related to drainage will be provided as Sheets C-04 to C-10 in the Conceptual Engineering Drawings, provided in Attachment S&W-145 at the end of this section.

DR-S&W-184

Information Required:

Provide profiles for each channel that include existing and proposed grade along both the finished flowline as well as right and left top of banks. These drawings should be at a scale of no smaller than 1"= 200'. Also, please provide cross-sections through the collector/diversion channels every 100' which show existing and proposed grade and clearly demonstrate how these channels will tie into existing grade and into the proposed facility.

Response:

The channel profiles will be provided as part of the Conceptual Engineering Drawings, provided in Attachment S&W-145 at the end of this section. Details of the connections between the channels and the existing grade are provided as part of these plans.

DR-S&W-186

Information Required:

If required to reduce channel slope and velocity to acceptable values, provide detailed design plans for grade control structures. The use of channels without bank protection around the periphery and through the project would require it be demonstrated there are not significant side flows entering the channel, and that 10-year flow velocities are within the acceptable range for site specific conditions. Please clearly delineate all channel reaches where no bank protection is proposed and provide specific and detailed data to demonstrate compliance with the previously stated criteria.

Response:

Detail plans for the grade control structures/drop structures are shown on the detail sheets as part of the Conceptual Engineering Drawings, provided in Attachment S&W-145 at the end of this section. Detail plans are also provided for the bank protection around the periphery and in the areas of side flow entering the channel. The grading plans will delineate the areas where no bank protection is proposed.

Attachment DR-S&W-145
Conceptual Engineering Drawings

Ridgecrest Solar Power Project
(Docket No. 09-AFC-9)

Supplemental Traffic

Data Response Information

DR-TRAFFIC-195, 197, 199, 200, 201 and 203

Submitted February 10, 2010

DR-TRAFFIC-195

Information Required:

Please provide discussion pertaining to known traffic problems, congestion (non-peak) and accidents for these routes.

Response:

Currently most roadways in the Project vicinity operate well below capacity as indicated in the response to DR-Traffic-194 and DR-Traffic-196. All roadways and intersections currently operate at an LOS A/B, or very well in terms of capacity. Caltrans has completed several improvement projects on local highways in the area including the grade separation of SR-178 and U.S. Highway 395 and widening of sections of SR-178, which have improved both traffic safety and reduced highway congestion. Most highways in the area typically have a rural character with a single lane in each direction and no median area. Vehicle speeds are regularly relatively high and Caltrans has indicated the 85th speed percentile on sections of U.S. Highway 395 can exceed 70 MPH.

In terms of specific traffic problems beyond those regularly found on rural highways, the section of U.S. Highway 395 between Brown Road/ South China Lake Boulevard and SR-178 has been identified by Caltrans as having an accident rate of approximately 2.8 times the average rate for this type of facility. In addition, the intersection of U.S. Highway 395 with Brown Road/ South China Lake Boulevard has experienced a total of seven accidents over the last five years based upon a review of accident records (SWITRS, CHP, 2010) as further described in the response to DR-TRAFFIC-199.

DR-TRAFFIC-197

Information Required:

Please provide scaled plans (40-scale) for each access point into the proposed project site, the access to the laydown/construction area for Brown Road from US 395 so that proper analysis of site access can be performed.

Response:

Scaled plans showing access including design radii, grades lane widths, etc., will be developed during the design process as the Project moves forward. The Conceptual Engineering Plans, provided in Attachment DR-S&W-145, depict the access points to the site from Brown Road and the alternate access point of connection to U.S. Highway 395. We believe that this information would be sufficient for Staff to conduct its CEQA/NEPA level of review to determine impacts. Additionally, the Staff Assessment/Draft Environmental Impact Statement should reflect that all work on Brown Road will be completed in conformance with Kern County standards, the Caltrans Traffic Manual, the American Association of State Highway and the Transportation Officials Geometric Policy on Street and Highway Design. The compliance of the design with appropriate standards will be monitored and approved by Kern County through the Encroachment Permit Process. That process requires the plans be approved by the County prior to initiating any construction in the public right of way (ROW) and then continues with the County providing inspection services during construction and a final signoff that all construction was completed in a satisfactory manner and in accordance with all requirements.

DR-TRAFFIC-199

Information Required:

Please provide traffic accident statistics for US Hwy. 395, SR-14 and SR-178, including the intersection of Brown Road and US 395, and causes for accidents on those roadways identified in the AFC.

Response:

Accident records for U.S. Highway 395, SR-14, and SR-178 were obtained from the California Highway Patrol for the five year period of 2004 through 2008, the most recent 5-year period available.

On U.S. Highway 395, between South China Lake Boulevard and SR-178 East, a total of 45 accidents were reported during the five year period. Of these, seven occurred at the intersection of U.S. Highway 395 and China Lake Boulevard. The remainder occurred between SR-178 and China Lake Boulevard with a limited number of them also at the intersection of U.S. Highway 395 and Bowman Road. A total of 12 accidents involved hitting an object, thirteen were broadsides and three were head-on collisions.

On SR-14 between SR-178 West and SR-178 East, a total of 12 accidents were reported during the five year period of 2004 through 2008. Of these, seven involved an improper turn including two broadsides and one sideswipe. There were several that were alcohol or drug related.

Relative to the intersection of U.S. Highway 395 and Brown Road/ South China Lake Boulevard, a review of the records showed a total of seven accidents during the five year interval. Of those seven accidents, four were broadsides, one was a rear-end, one was a vehicle hitting a fixed object, and one was a sideswipe. Six of the seven were caused by a failure to yield the right of way. Five of the accidents occurred during daylight hours.

Traffic problems and accidents for the roadways are also described in DR-TRAFFIC-195.

DR-TRAFFIC-200

Information Required:

Please provide any other known roadway hazards, such as poor sight distances or turning radii associated with accessing the project site and on roadways identified in the AFC.

Response:

Over the last 20 years, Caltrans has completed several highway improvements in the greater Project area to correct safety hazards. These include the grade separation of the intersection of U.S. Highway 395 with SR-178 (Inyokern Road), widening of sections of SR-178 and assorted smaller intersection related improvements in the area. These improvements have corrected most safety improvements in the area particularly along SR-178. However, the intersection of U.S. 395 with Brown Road/South China Lake Boulevard does have a higher than average accident rate (2.8 times state average for similar at-grade intersections). This accident rate is believed to be the result of several issues. Both Brown Road and South China Lake Boulevard intersect the highway at an angle, there is a large curve in the highway immediately to the south, and there is a downhill grade from the south that can result in significant speeds on the highway. Caltrans has indicated that the 85th speed percentile can exceed 70 MPH on sections of the highway.

DR-TRAFFIC-201

Information Required:

Please consult Caltrans and Kern County to determine an acceptable alternative to access the proposed project site from US 395. Also, please provide plans and sets to the Energy Commission and Caltrans.

Response:

The Applicant is currently engaged in evaluating two alternatives for providing access to the site. The proposed site access route is described in the Application for Certification (AFC) and depicted in the reconfigured site plan (Figure DR-ALT-49 in the Alternatives section of the Data Response submittal to the CEC on January 25, 2010). This alternative proposes improvements to the existing intersection of U.S. Highway 395 and Brown Road/China Lake Boulevard relative to existing geometrics, sight distance, and accident records. For this alternative, the Applicant is gathering and reviewing accident reports and topographic mapping to identify potential causes of accidents and determine, in close coordination with Caltrans, appropriate types of modifications to correct existing hazards as well as modifications needed to accommodate project-related construction and operations traffic safely (turn pockets, acceleration and deceleration lanes, etc.). A key part of the evaluation of this alternative will be the identification of needed improvements versus grading requirements to construct them. The potential for implementation of Caltrans' proposed long-term improvement, which includes the re-alignment of China Lake Boulevard and Brown Road together with widening U.S. Highway 395, is not being pursued at this time due to the extended time needed to acquire additional ROWs. Caltrans has acknowledged they do not expect to complete this project for at least the next ten years or more and does not have the necessary ROW assembled yet.

The second alternative proposes a new driveway to U.S. Highway 395 at a minimum of one mile north of Brown Road and includes both a potential for a new driveway/access point with U.S. Highway 395 and the extension of the roadway onto the site. Conceptual Engineering Plans are provided in Attachment DR-S&W-145 and show this alternate access point of connection to U.S. Highway 395. Adding turn movements directly to and from a State highway is generally not an acceptable practice, and Caltrans will need to confirm that any new location of an access to and from U.S. Highway 395 north of Brown Road would be done at their direction and demand.

At this time, the Applicant expects to move forward with two alternative points of access with the ongoing review of alternatives and selection of a preferred occurring as project design and development continues. The Applicant is currently coordinating and will continue to coordinate with Caltrans and Kern County staff during the evaluation and selection process. The actual design and construction of improvements associated with either alternative will be completed under Caltrans/Kern County encroachment permit processes, during which all design and Project construction is subject to those agencies' requirements.

DR-TRAFFIC-203

Information Required:

Please provide locations and designs (geometrics such as turning radii, load capacities, grades, etc.) per Kern County design standards for potential emergency access routes.

Response:

Emergency access to the site is by way of Brown Road. The primary access into the site from Brown Road will be provided with a paved width of 24 feet, capable of allowing an emergency vehicle onto the site. A secondary point of access from Brown Road to the area of the warehouse can be provided if required by Kern County. All roadways at the site have grades less than 5 percent for access to the occupied areas. The internal turning radius for all the roadways will be a minimum of 35 feet to comply with the Kern County requirements. All roads to occupied areas will be a minimum of 20 feet in width, paved, and provided with a structural section capable of H-20 loading, which will meet or exceed the Kern County requirements for their emergency fire vehicles.

Scaled plans showing emergency access including design radii, grades lane widths, etc., will be developed during the design process as the project moves forward. Conceptual engineering plans are provided in Attachment DR-S&W-145. All emergency access work will be designed and completed in conformance with the Kern County Fire Marshall's standards and requirements. The compliance of the design with appropriate standards will be reviewed and approved by Kern County through the building permit process, during which the Project will be subject to the approval of the County's Fire Marshall.

Ridgecrest Solar Power Project
(Docket No. 09-AFC-9)

Supplemental Land Use/Recreation/Wilderness

Data Response Information

DR-LURW-253 through 256

Submitted February 10, 2010

DR-LURW-253

Information Required:

Please identify parties to the annexation process and provide a proposed timetable for IWVWD annexation of adjacent lands.

Response:

There is no need for annexation of the Project by IWVWD to serve the RSPP. However, IWVWD has inidicated that the District may be annexing the site and other property in the future. No timetable for this process was provided.

DR-LURW-254

Information Required:

(a) Please provide a table indicating width and jurisdiction for road and/or utility rights-of-way and easements that would be used for installation of the proposed water lines and any other public utilities. Include information for project alternatives, if different from the preferred project alternative.

(b) Please specify whether ROWs or easements currently exists, if facilities will be constructed above or below ground, and if existing ROWs or easements are sufficient to accommodate the proposed construction.

(c) Please specify height of any above-ground installations.

Response:

a) The water pipeline will require a construction zone of 30 feet within the existing County ROW along Brown Road and China Lake Blvd. The water pipeline will cross Caltrans's US Highway 395 easement via a drilled crossing; only temporary workspace on each side of the highway crossing will be needed for installation. Installation of utilities into existing public ROW's are allowed under Franchise Agreements between the public agencies that own the ROWs and the various utility companies. The Project design provided in the AFC filing has been reconfigured and is no longer a viable design. Thus, there are no project alternatives.

Table DR-LURW-254 Road and Utility ROWs

Project Element	Width	Jurisdiction
Water Pipeline (parallel encroachment of S. China Lake Blvd.)	400 feet (total existing road ROW) Water pipeline requires 30 feet (within the above ROW)	Kern County
Water Pipeline (parallel enchroachment of Brown Road)	80 feet (total existing road ROW Water pipeline requires 30 feet (within the above ROW)	Kern County
Water Pipeline (U.S. Highway 395 drilled crossing)	250 feet (total existing road ROW) Drilled crossing, no permanent easement, temporary space ~50' x 75' for drilling pit and ~50' X 50' for receiving pit; elsewhere in the Caltrans easement either side of the drilled crossing, the water pipeline will require a 30 foot wide construction easement	CalTrans
Water Pipeline (from S. China Lake Blvd to IWVWD pumping facility)	Existing ROW width unknown; water pipeline to be installed within an existing Indian Wells Valley Water District (IWVWD) easement, adjacent an existing water pipeline; 30-foot wide construction easement required	City of Ridgecrest
Rerouted 115kV and 230kV SCE Transmission Line	375 feet (proposed)	BLM

b) The ROWs for this water pipeline currently exist. The facilities will be constructed below ground. There is sufficient ROW on the north side of Brown Rd and on the west side of China Lake Blvd for the water pipeline. The proposed relocation of the SCE transmission lines will require a new easement from BLM. These transmission lines will be installed on above ground steel monopoles.

c) The relocated SCE transmission lines will be constructed on 120-foot tall monopoles.

DR-LURW-255

Information Required:

Amend AFC Land Use Figure 5.7-1 to reflect changes in preferred project ROW and facilities boundaries, and indicate off-site route(s) needed for any telephone or other utility connections. Site configuration should represent the amended project boundaries, as presented at the January 5-6 workshops.

Response:

The revised Figure 5.7-1 is provided at the end of this section. There are no other offsite routes other than for the water pipeline. The offsite water pipeline route is also shown as in the Conceptual Engineering Plans submitted to the CEC.

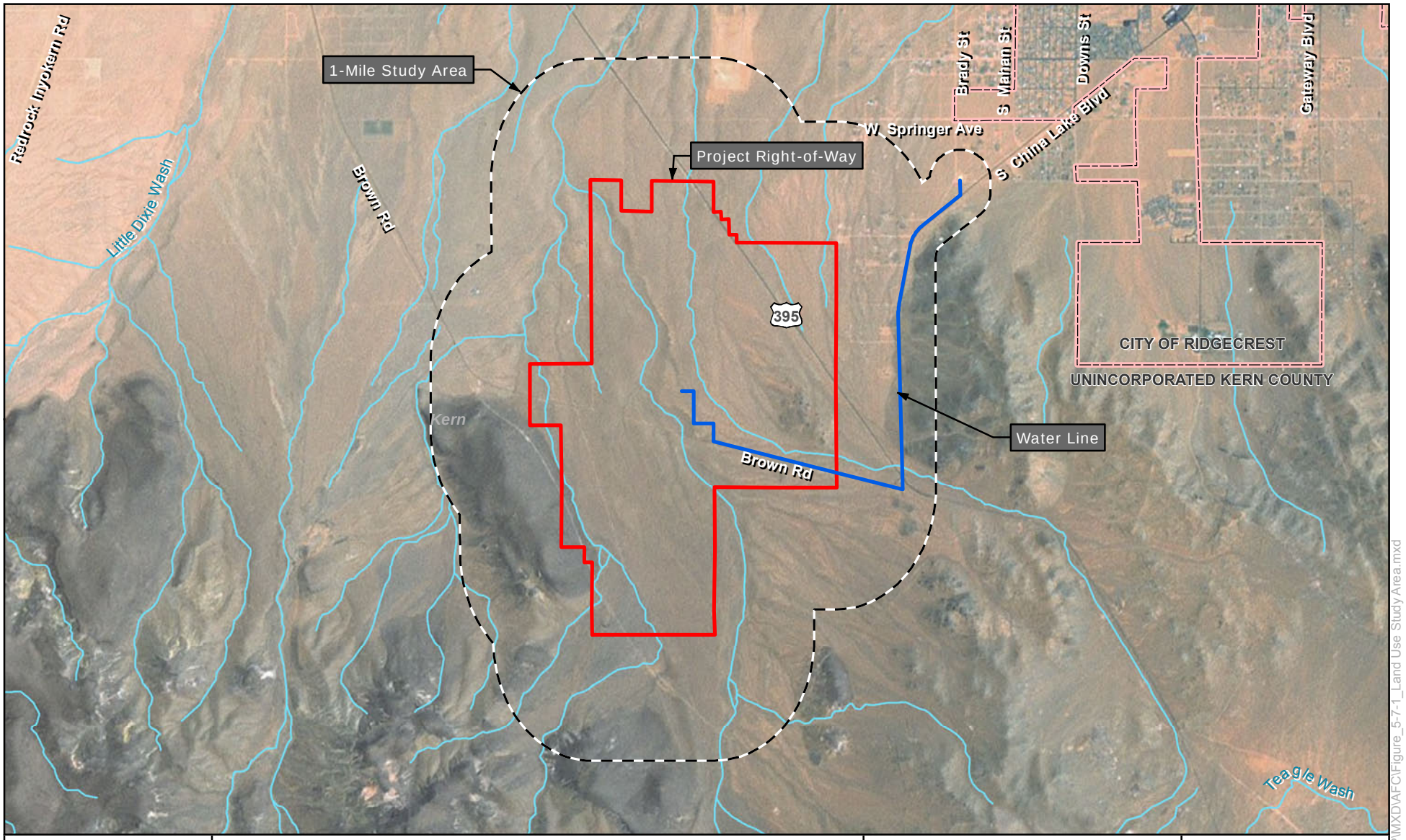
DR-LURW-256

Information Required:

Please discuss any ROWs that would need to be expanded or new ROWs that might be needed to accommodate off-site utility installation(s). Identify the process(es) to amend existing ROWs or other agreements, if necessary; jurisdictional agency; and the status of any actions already taken or negotiations currently in progress.

Response:

There are no ROW's that need to be expanded for the offsite utility and there are no new ROW's that are needed for the off site utility.



Map Location

Legend

- Project Right-of-Way
- 1 Mile Study Area
- City Limits
- Water Line

1 inch = 6,000 feet

0 6,000 12,000 Feet

N W E S

Ridgecrest Solar Power Project

Figure 5.7-1
Land Use Study Area

Solar Millennium

AECOM

Date: February 2010

Y:\Projects\Solar_Millennium\RSPP\MXD\AFC\Figure_5-7-1_Land Use Study Area.mxd

Ridgecrest Solar Power Project
(Docket No. 09-AFC-9)

Supplemental Noise

Data Response Information

DR-NOISE-263 and 264

Submitted February 10, 2010

DR-NOISE-263

Information Required:

Please quantify the distances from the nearest sensitive receptors to the power block for the reconfigured site plan.

Response:

The nearest sensitive receptor to the power block is a residence located approximately 5,000 feet to the west of the site.

Below is an an analysis that evaluates how noise impacts will change with the RSPP reconfiguration, as compared to the noise analysis presented in Section 5.8 Noise of the Application for Certification (AFC), submitted to the California Energy Commission (CEC) on September 1, 2009. To address resource management agencies' comments, the Applicant has reconfigured the site plan to minimize the impacts to natural stormwater flows across the El Paso Wash. The reconfiguration includes the relocation of the power block north of Brown Road, closer to the few residences that are near the site. Thus, there are potential changes to Project noise levels generated during construction and operation of the Project, and to the resulting noise levels at these sensitive noise receptors.

As described below, the distance between the reconfigured noise sources and residences is substantial enough to completely avoid construction and operational noise levels above significance thresholds. In other words, although the reconfiguration will move Project noise sources closer to sensitive receptors, those changes will not result in any significant noise impacts.

Sensitive Noise Receptors

As a result of the reconfiguration of the RSPP, the residence closest to the Project boundary is now 2,500 feet east of the revised eastern boundary, instead of a residence approximately 3,200 feet west of the original northwest boundary (see revised Figure 5.8-1 provided at the end of this section). The relocation of the power block approximately 3,300 feet north-northwest from the south side of Brown Road to the north side moves the power block closer to the few residences in proximity to the site. The residence nearest the power block remains the residence west of the site, but the power block is now 1,300 feet closer to that residence (6,300 feet with the original project versus 5,000 feet with the reconfiguration). Impacts to these sensitive noise receptors are discussed below.

The several other residences close to the site, approximately 3,250 to 3,575 feet east of the previous eastern site boundary, are also closer to the revised power block location (10,000 feet originally, 7,500 feet with the reconfiguration). However, as discussed below, this distance is sufficient to attenuate noise levels below significance at these eastern residences. In addition, vehicle traffic noise of U.S. Highway 395 in between the Project and residences to the east elevate day-night ambient noise levels at the residences in proximity to the highway. This makes the Project construction and operational noise less noticeable to these residences, as compared to the residence to the west without nearby highway traffic noise.

Project Size and Configuration

The proposed equipment of the power block has only changed in terms of the air-cooled condenser (ACC), which has a larger footprint and more fans, but is not different in height. Some of the other equipment was shifted to accommodate the increase in the ACC footprint. The previous ACC had an area of 296 feet by 245 feet with 35 cells; the revised ACC is 480 feet by 300 feet with 48 cells, a cell increase of 37 percent. In addition, the ACC configuration has changed from a single area configuration to a "split design" with the header pipe separating the ACC into two areas. Operation of the ACC produces one of the highest noise levels of the plant; however, the 37 percent increase in the number of ACC cells would generate an increase of only 1.4 decibels (dBA) at the ACC.

Potential Noise Impacts

Construction

The nearest noise sensitive human receptor to the revised Project site boundary is a residence approximately 2,500 feet east of the eastern boundary/solar field. The anticipated noise levels from construction equipment and vehicles of 85 dBA Equivalent Continuous Noise Level (Leq) at 50 feet, when the activities are occurring at the site boundary near the nearest residence, would attenuate over distance to approximately 52 dBA Leq at the eastern residence, assuming intervening topography or structures. There are topographic changes (slopes and ridges) between the site boundary and the residence for the U.S. Highway 395 right of way, including its vehicle traffic noise which would elevate ambient noise levels, further reducing the effects of the construction noise.

As shown in Table 5.8-5 of the AFC, the average ambient Leq at the residence east of the site (now the nearest from the revised site boundary) is approximately 46 dBA Leq. The difference between this ambient level and highest potential construction noise level at the residence of 52 dBA Leq (when construction is at the nearest site boundary) would be slightly greater than a 3-dBA change (which is barely perceptible to the human ear). Therefore, the potential average Project construction noise level at the residence when construction is nearest the site boundary would be barely noticeable. Moreover, construction near the site boundary from grading activities and solar collector installation would occur near the residence for a very short time and then move to another location on the site, further away from the residence.

The Kern County Noise Ordinance does not limit construction noise levels. Rather, the ordinance limits only the hours of construction activities when the noise is audible to a person within 150 feet of the construction and if the construction activity is within 1,000 feet of an inhabited residence. Typical construction noise levels of 85 dBA Leq are audible at 150 feet (76 dBA Leq). However, because the Project construction activities are 1,000 feet from an inhabited residence, they not are subject to these time limits.

The majority of site construction activities, including stationary construction noise, would be concentrated in the center of the site at the power block (approximately 5,000 feet east of the nearest residence). Construction noise from activities at the power block would attenuate over this distance to approximately 45 dBA Leq at the western residence. The average ambient Leq at the western residence nearest the power block was measured at approximately 52 dBA Leq, which is less than a 3-dBA change from ambient noise levels and therefore not perceptible at the residence. However, when construction activity occurs at and near the site boundary, increased noise levels may be occasionally noticeable at the residence during daytime hours. This activity near the site boundary would occur for a brief period while the solar arrays are constructed about the site during a portion of the overall 28-month construction schedule. For these reasons, construction activities are not expected to result in significant noise impacts on sensitive receptors.

As part of the process of readying the Project's steam turbine for startup, a process known as a "steam blow" is initiated. A series of these "steam blows", lasting two or three minutes each, are performed daily several times for two or three weeks. High-pressure steam blows can produce extremely high noise levels (up to 130 dBA at 100 feet). Even with silencing, noise levels would still be loud. There are newer, quieter steam blow techniques that use lower pressure steam over a continuous period of about 36 hours and result in peak noise levels of approximately 80 dBA at 100 feet. The Project will use a low-pressure steam blow technique with reduced noise levels. Under the site reconfiguration, the power block in the interior of the plant site would be approximately 1,300 feet closer to the nearest residence (west of the site), at approximately 5,000 feet away. The low-pressure steam blow sound level would attenuate over this distance to approximately 46 dBA at the western residence, which would be 2 dBA higher than the estimated noise level for the original distance in the AFC. The steam blows would still be a temporary (36-hour), one-time event for the start-up of the plant. For these reasons, the steam blows will yield less than significant noise impacts on the nearest (and other) sensitive receptors.

Operation

The results of the modeling are shown on revised Figure 5.8-1 as daytime operational noise contour lines in increments of 5 dBA Leq from 90 dBA Leq at the Project's loudest daytime noise source, radiating out to 45 dBA Leq contour. The original figure (Figure 5.8-1 of AFC Section 5.8, Noise) has been revised to relocate these contours over the new power block location. With the changes in the plant's ACC, an increase of 1.4 dBA was approximated and is included in this analysis. Although the nearest residence to the power block (western residence) is still located outside of the 45-dBA Leq contour, the residence is now closer to that contour. Based on the distance of approximately 5,000 feet from the approximate center of the power block to the nearest residence, the modeled daytime operational plant noise levels would attenuate over this distance to approximately 44 dBA Leq at the residence. Adding the 1.4-dBA increase estimated for the revised Project's expanded ACC results in an estimated revised plant noise level of approximately 45 dBA Leq, which is 3 dBA higher than the plant noise at the nearest residence in the AFC, during daylight hours. This increase is not a significant impact by itself or when combined with the originally-projected 42-dBA noise level.

During the hours between sunset and sunrise, the Project would be in the shutdown mode with its noisiest components not operational. Project noise during the non-daylight hours is anticipated to be approximately 20 dBA lower than during the daytime (25 dBA Leq). Comparing this estimated non-daylight noise level with the corresponding background noise level (L90) of the lowest measured Leq of 36 dBA at the quietest time of the night (3:00 A.M.) shows that there would be no increase over the existing lowest L90 noise level as a result of the plant reconfiguration. The CEC's significance criterion provides that an increase of less than 5 dBA in the L90 at a noise-sensitive receptor during the quietest hours of the night would be considered an insignificant impact. Since the revised resulting noise level of the Project operation at the residence would represent *no* increase in dBA Leq, there would be no significant operational noise impact.

The corresponding Day/Night Average Sound (Ldn) for the modeled Project noise at the residence would be approximately 45 dBA Ldn. When combined with the measured ambient Ldn at the residence of 52 dBA Ldn, the resultant future Ldn with the Project would be 53 dBA Ldn (combining a difference of 6-9 dBA results in an increase of one dBA to the higher Ldn value). The future Ldn with the Project of 53 dBA Ldn would be less than the maximum Ldn of 65 dBA Ldn considered to be compatible with residential uses, as established by the Noise Element of the Kern County General Plan. The increase of 1 dBA Ldn above the ambient Ldn of 52 dBA would be less than a 3-dBA increase, and therefore not a perceptible increase above existing noise levels or levels projected for the original Project configuration.

Noise impacts of the revised Project would remain less than significant for the same reasons as in the AFC, as follows:

- While there may be occasional higher noise levels during construction (when construction activity occurs at/near the closest site boundary), average construction noise levels would be barely perceptible at the residence nearest the site boundary. This is because average construction noise levels would attenuate to levels slightly higher than ambient levels. In addition, the construction period itself would be temporary; use of heavy equipment and other activities with high noise emissions would be limited to daytime hours; the Project would use low noise, longer duration steam blow techniques; all practicable noise abatement measures would be implemented for noise-producing equipment; and if needed, acceptable mitigation would be arranged with the residence owner.

- The 65 dBA Ldn limit at the nearest residence, as identified by the Noise Element of the County General Plan, would not be exceeded during construction or operation.

- The five dBA threshold above the lowest measured L90 at any noise sensitive receptor, the key measure of whether or not a significant adverse impact would occur, would not be exceeded during plant operation; and

- The Ldn increase of one dBA with the Project would not be a substantial increase above levels existing without the Project.

Since there are no significant noise impacts, no mitigation measures are required. However, the noise reduction measures recommended in the AFC to minimize off-site noise levels would still be applicable to the reconfigured Project.

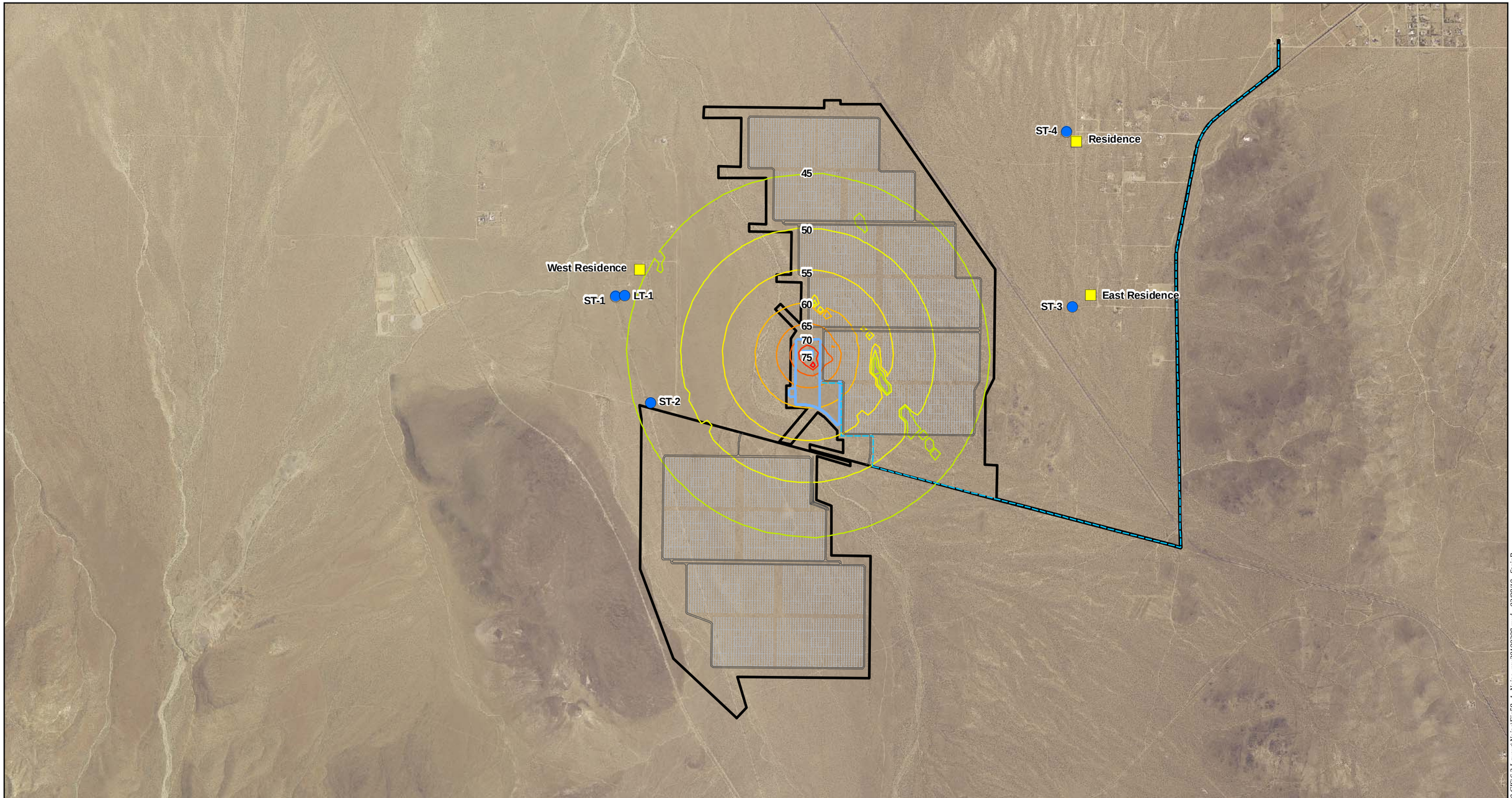
DR-NOISE-264

Information Required:

Please provide a revised Figure 5.8-1 showing the locations of the nearest sensitive receptors in relation to the new site configuration.

Response:

A revised Figure 5.8-1 is provided at the end of this section.



Map Location

Legend

- Disturbance Area
- Facilities Layout
- Solar Loops
- Power Block
- Water Line Route
- Residence
- Noise Measurement Location

Noise Contours

- 45 dBA Leq
- 50 dBA Leq
- 55 dBA Leq
- 60 dBA Leq
- 65 dBA Leq
- 70 dBA Leq
- 75 dBA Leq
- 80 dBA Leq

Source: NAIP 2005; CNDDB 2009; AECOM 2009; EDAW 2009

N W E S

1 inch = 2,500 feet

0 2,500 5,000 Feet

Ridgecrest Solar Power Project

Figure 5.8-1
Noise Measurement Locations and Noise Contours

Solar Millennium

AECOM

Date: February 2010

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Ridgecrest Solar Power Project
(Docket No. 09-AFC-9)

Air Permit Application for an Emergency Generator

Prepared for:
Ridgecrest Solar I LLC
Ridgecrest Solar Power Project

Permit Application for an Emergency Generator for the Ridgecrest Solar Power Project

AECOM Environment
February 2010
60139696-5230

AECOM
Environment

Prepared for:
Ridgecrest Solar I LLC
Ridgecrest Solar Power Project

Permit Application for an Emergency Generator for the Ridgecrest Solar Power Project

Prepared By Allison Wakita, Staff Specialist

Reviewed By Russell Kingsley, Program Manager, CPP

February 2010

60139696-5230

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1.0 Introduction

1.1 Introduction

Solar Millennium LLC proposed to construct a solar thermal electric power generating facility, herein referred to as the Ridgecrest Solar Power Project (RSPP or Project). Since the submittal of the original application, the Applicant has formed a project-specific entity that will own and operate the Project known as Ridgecrest Solar I, LLC (RSI). RSI is a wholly owned subsidiary of Solar Millennium and is the single applicant for the RSPP.

This application is being submitted by the RSI (also referred to herein as the Applicant) to make changes to the Project. The Applicant initially proposed to use a 300-horsepower (Hp) emergency generator engine for the Project. After re-evaluating the power requirements of an emergency shutdown situation, the Applicant has determined that a two megawatt (output) generator driven by a 2,922-horsepower (Hp) diesel-fired engine will be required. With this application, RSI is requesting a cancellation of the 300-Hp engine application and is requesting the approval of the new 2,922 Hp engine.

This document serves as the Authority to Construction (ATC) application and has been prepared consistent with District requirements. **Section 2.0** of this document provides the equipment description and proposed usage of the engine. **Section 3.0** presents criteria and toxic air contaminant (TAC) emissions and calculation methodologies. **Section 4.0** provides a review of the applicable rules regulations. The proposed engine is compliant with BACT standards. The Kern County Air Pollution Control District (KCAPCD or District) application forms for the emergency generator engine are provided in **Appendix A**.

1.2 Facility Background Information

The RSPP will have a nominal output of 250 megawatts (MW). Because this project will be a thermal power plant of more than 50 MW, the primary permitting authority will be the California Energy Commission (CEC). As such, the CEC will look to the District to issue a Determination of Compliance (DOC) rather than the normal Permit to Construct (PTC). The original permit application for the DOC for RSPP was submitted to the KCAPCD in September 2009.

1.3 Contact Information

The facility contact information is as follows:

Name / Address:	**Ridgecrest Solar Power Project** Within Bureau of Land Management (BLM) Right-Of-Way (ROW) Near Brown Road Mailing address to be determined
Facility Contact:	Mr. Billy Owens 1625 Shattuck Ave., Suite 270 Berkeley, CA 94709
Phone:	(510) 809-4662
Fax:	(510) 524-5516
E-mail:	owens@solarmillennium.com

Application preparation contact information is as follows:

Name / Address: Russell Kingsley, Program Manager
AECOM Environment
1220 Avenida Acaso
Camarillo, CA 93012
Phone: 805-388-3775
Fax: 805-388-3557
E-mail: Russ.Kingsley@aecom.com

2.0 Equipment/Process Description

2.1 Equipment Description

The Applicant is proposing to use a 2200 kVa emergency generator, powered by a 2,922-Hp diesel-fired engine to supply electricity to the facility in emergency conditions. Engine specifications are listed in **Table 2-1**. Manufacturer's specification sheets for the generator engine are provided in **Appendix B** and the MSDS for ultra-low sulfur diesel is provided in **Appendix C**.

Table 2-1 Emergency Generator Engine Specifications

Manufacturer	Cummins
Model	QSK60-G6
Type	4-cycle, Turbocharged, After-cooled
Rating	1,800 rpm, 60 Hz
Fuel Type	Diesel
Maximum Fuel Usage	141.4 gallons/hr
EPA Tier Rating:	Tier 2

At this time, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 horsepower is the Tier 2 standard. The Applicant proposed a Tier 2 engine for the emergency generator based on the emission standards identified in 40 Code of Federal Regulations (CFR), Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Pursuant to Section 60.4202(a)(2) of that subpart, engines with a maximum rating of more than 50 horsepower must meet the emission standards listed in 40 CFR 89.112 for all pollutants beginning in 2007. The emission standards listed in 40 CFR 89.112 for engines with rated power greater than 560 kilowatt (kW) (750 Hp) are Tier 2 standards which are: 6.4 grams per kilowatt hour (g/kWh) for NOx and non-methane hydrocarbons (NMHC) combined, 3.5 g/kWh for CO and 0.20 g/kWh for PM.

If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. According to the ATCM, new stationary emergency engines must meet the standards for off-road engines of the same model year and maximum rated power as specified in the Off-Road Compression Ignition Engines Standards (Title 13, California Code of Regulations (CCR), Section 2423). Title 13 CCR Section 2423 sets emission standards for the generator engine with model years 2011 and later. The Interim Tier 4 standard applies to the Project generator engine as the engine would be larger than 900 kW (750 horsepower) and would be manufactured between 2011 and 2014. The standards are 0.67 g/kWh for NOx, 0.40 g/kWh for NMHC, 3.5 g/kWh for CO and 0.10 g/kWh for PM.

2.2 Process Description

The emergency generators are required to provide motive power to three principle areas of the facility: 1) Freeze Protection Pump; 2) Balance of Plant (BOP) Motor Control Center (MCC); and 3) Heat Transfer Fluid (HTF) MCC. The equipment for the BOP MCC and HTF MCC that require emergency power are shown in **Table 2-2**, and there may be other small loads connected to the power supply to allow the facility to shut down safely.

The engine will burn California Air Resources Board (CARB)-specification ultra-low sulfur diesel fuel; a Material Safety Data Sheet for the fuel is provided in **Appendix C**.

Table 2-2 Emergency Loads

BOP MCC	HTF MCCs	
Heat Trace XFMR	Power supply cabinet channel A - H	Anticondensation heater LV-motors
Main Fire Alarm Panel	Nitrogen system Heater switchboard	HTF control valve behind reheater 1 to 4
CEMS HVAC	Nitrogen system Junction Box-Power	Centralization box signals
480V Power Panel	PLC Main nitrogen supply	Anticondensation heater LV-motor
STG Turning Gear	Field Supervisory Control 1 and 2	Fire alarm control panel supply 1 and 2
ST Turbine Lube Oil Pump	Fiber optic termination cabinet	Centralization box signals
Fire Water Jockey Pump	HTF control system supply 1 and 2	Distribution box heaters
Battery Charger A	Nitrogen control valves in front of expansion vessels	Filler valve of HTF system
UPS Bypass	Tracing of main service water pipe	Tracing of overflow vessel 1 to 8
CEMS Skid	Control valve in ullage pipe	Control valve in ullage pipe
Gen Breaker	Transformer temperature monitoring cabinet	Anticondensation heater LV-motors
GSU Fans Feeder	Shutoff devices	Overflow return pumps
	Control valve in front of reclamation flash vessel	HTF drain pumps

2.3 Operating Schedule

The emergency generator will be operated for a maximum of one hour per day, for a total of 50 hours per year for maintenance and testing purposes.

3.0 Emissions

This section provides an overview of the assumptions and calculation methods used to estimate the emissions from the emergency generator. Criteria pollutant emissions are addressed in **Section 3.1**, and TAC emissions are addressed in **Section 3.2**. More detailed calculations are provided in **Appendix D**.

Tier 2 emission standards were used in the emission calculations. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standard and NOx, NMHC and PM10 emissions would be lower than the emissions from the Tier 2 engine.

3.1 Criteria Pollutant Emissions

RSPP will operate one 2,922-Hp diesel-fired emergency generator engine. Criteria pollutant emissions (i.e., NOx, SOx, CO, VOC, PM10, and PM2.5) are expected from the emergency generator during normal facility operations for maintenance and testing purposes. In accordance with KCAPCD permit application guidelines, the Maximum Hourly (Hourly), Maximum Daily (Daily) and Annual Average (**Annual**) emissions were calculated for the generator engine.

The assumptions made regarding emergency engine operation used as the basis for emission calculations include:

- One 2,922-Hp diesel-fired emergency generator engine;
- The engine will use ultra-low sulfur (15 parts per million by weight [ppmw]) diesel fuel;
- The engine has Tier 2 Certification;
- The engine operating hours are based on a single one-hour test per week, not to exceed 50 hours per year, and does not reflect emergency use;
- 100 percent of the PM10 emissions are PM2.5 emissions;
- 100 percent of the PM10 emissions are Diesel Particulate Matter (DPM) emissions; and
- Maximum controlled emissions are equal to maximum uncontrolled emissions because emergency engines do not have add-on controls.

Emission estimates for NOx, VOC, CO and PM10 are based on emission factors for EPA Tier 2 certified engines. Note that the Tier 2 emission standard for non-methane hydrocarbons (NMHC) is combined with NOx. For these emission estimates, the NOx fraction is assumed to be 95 percent of the combined emissions and the balance NMHC. NMHC is assumed to be equivalent to VOC. The calculation procedure for NOx, VOC, CO, and PM10 are similar to one another, only the emission factors differ between the calculations. The Tier 2 emission factors used in the calculations are presented in **Table 3-1**.

Table 3-1 Generator Engine Emission Factors

Pollutant	Tier 2 Emission Factor (g/bHp-hr)
NOx + NMHC	4.8
NOx	4.56
VOC	0.24
CO	2.6
PM10	0.15

Emission estimates for SOx are based on estimated fuel use and fuel sulfur content. Emission estimates for SOx are based on estimated fuel use of 141.4 gallons per hour and fuel sulfur content of 15 ppmw.

3.1.1 NOx, CO, VOC, PM10 and PM2.5 Emission Calculations

The daily emissions are based on operating the engine one hour per day at full load for readiness testing. The engine will be operated no more than once per day for testing; therefore, the daily emissions are equal to the hourly emissions. The engine use will be limited to 50 hours per year for maintenance and testing. The maximum hourly (**Hourly**) emissions are calculated using Equation 3-1, the maximum daily calculations (**Daily**) are calculated using Equation 3-2, and the maximum annual (**Annual**) emissions are calculated using Equation 3-3. These emissions estimates do not include emissions from emergency operations.

Maximum Hourly (**Hourly**) Emissions

The maximum hourly emissions are calculated according to Equation 3-1.

Hourly (lb/hr) = emission factor x Hp ÷ conv. factor (lb/g) (Eq. 3-1)

Maximum Daily (**Daily**) Emissions

Because engine testing will be operated no more than once per day for one hour for maintenance and testing purposes, the maximum daily emissions are equal to the hourly emissions.

Daily (lb/day) = **Hourly** x 1 hour/day (Eq. 3-2)

Maximum Annual (**Annual**) Emissions

The annual average emissions are determined by multiplying the maximum hourly emissions by the annual hours of operation. The engines will be limited to 50 hours per year for maintenance and testing.

Annual (ton/yr) = **Hourly** x 50 hr/yr ÷ 2000 ton/yr (Eq. 3-3)

3.1.2 SOx Emission Calculations

SOx emissions are based on fuel use and fuel sulfur content of 15 ppmw. As stated in **Section 2.0**, the maximum fuel usage of the engine is 141.4 gallons/hour.

Maximum Hourly (**Hourly**) Emissions

Hourly emissions are calculated according to Equation 3-4.

Hourly (lb/hr) = Fuel x density x duration x sulfur content x weight ratio (SO_2 to sulfur) (Eq. 3-4)

The daily (**Daily**) and annual (**Annual**) sulfur emissions are calculated similar to the NOx, CO, VOC, and PM10 emissions using Equations 3-2 and 3-3 respectively. The results of the emissions calculations are presented in **Table 3-2**.

Table 3-2 Emergency Generator Engine Criteria Pollutant Emissions (One 2,922-Hp Engine)

Pollutant	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (ton/yr)
NOx	29.35	29.35	0.73
VOC	1.54	1.54	0.039
CO	16.73	16.73	0.42
PM10	0.97	0.97	0.024
PM2.5	0.97	0.97	0.024
DPM	0.97	0.97	0.024
SOx	0.031	0.031	0.001

3.2 Change in Project Emissions

In the DOC application, which was submitted to the KCAPCD in September 2009, the Applicant requested the use of a 300-Hp engine for the emergency generator. The emissions for the original 300-Hp emergency generator engine are presented in **Table 3-3** and the emissions for the original Project are presented in **Table 3-4**.

Table 3-3 Original Emergency Generator Engine Emissions (One 300-Hp Engine)

Pollutant	Emissions		
	(lb/hr)	(lb/day)	(tpy)
NOx	1.88	1.88	0.05
VOC	0.10	0.10	0.002
CO	1.72	1.72	0.04
PM10	0.10	0.10	0.002
PM2.5	0.10	0.10	0.002
SOx	0.003	0.003	0.0001

Table 3-4 Original Project Criteria Pollutant Emission Summary (tpy)

Source	Pollutant					
	NOx	**VOC**	**CO**	**PM10**	**PM2.5**	**SOx**
Auxiliary Boiler	0.32	0.14	1.07	0.28	0.28	0.32
HTF Heater	0.10	0.04	0.33	0.09	0.09	0.10
Emergency Fire Pump Engine	0.05	0.002	0.04	0.002	0.002	0.0001
Emergency Generator (300-Hp)	0.05	0.002	0.04	0.002	0.002	0.0001
Auxiliary Cooling Tower	--	--	--	0.06	0.06	--
HTF Expansion Tank/Ullage System w/fugitives	--	0.95	--	--	--	--
Land Treatment Unit	--	0.02	--	--	--	--
Original Project Total	**0.52**	**0.97**	**1.49**	**0.43**	**0.43**	**0.42**

Since the Applicant is requesting to replace the 300-Hp engine with a 2,922-Hp engine, this requires the 300-Hp engine to be deleted from the total Project emissions before adding the new generator's emissions to the Project. The criteria pollutant emissions from the other sources of the RSPP will not change. **Table 3-5** shows the a summary of Project's emissions with the new 2,922-Hp emergency generator, and **Table 3-6** shows the change in the Project emissions between this application and the DOC application that was submitted in September 2009.

Table 3-5 Summary of Project Criteria Pollutant Emissions (tpy)

Source	Pollutant					
	NOx	**VOC**	**CO**	**PM10**	**PM2.5**	**SOx**
Auxiliary Boiler	0.32	0.14	1.07	0.28	0.28	0.32
HTF Heater	0.10	0.04	0.33	0.09	0.09	0.10
Emergency Fire Pump Engine	0.05	0.002	0.04	0.002	0.002	0.0001
Emergency Generator (2,922-Hp)	0.73	0.039	0.42	0.024	0.024	0.001
Auxiliary Cooling Tower	--	--	--	0.06	0.06	--
HTF Expansion Tank/Ullage System w/fugitives	--	0.95	--	--	--	--
Land Treatment Unit	--	0.02	--	--	--	--
New Project Total	**1.19**	**1.20**	**1.86**	**0.45**	**0.45**	**0.42**

Table 3-6 Change in Project Emissions (tpy)

Source	Pollutant					
	NOx	**VOC**	**CO**	**PM10**	**PM2.5**	**SOx**
Original Total	0.52	0.97	1.49	0.43	0.43	0.42
New Total	1.19	1.20	1.86	0.45	0.45	0.42
Change in Emissions	**0.67**	**0.04**	**0.38**	**0.02**	**0.02**	**0.001**

3.3 Toxic Air Contaminant (TAC) Emissions

TAC emissions from the emergency generator engine was quantified for routine testing and maintenance operation, which will be limited to no more than one hour per day, 50 hours per year, per engine. Emissions were not calculated for emergency use.

The TAC emissions were characterized as aggregate particulate emissions (diesel particulate matter [DPM]) from diesel-fired engines. The DPM emissions are assumed to be equal to the PM10 emissions. Emission calculations for PM10 are provided in **Appendix D**, and the results of these calculations are presented in **Table 3-2**, and a summary of the new Project's stationary source DPM emissions are presented in **Table 3-7**.

Table 3-7 Total Stationary Source Diesel Particulate Emissions

	Maximum Hourly (lb/hr)	**Maximum Annual (ton/yr)**
Fire Water Pump[1]	0.10	0.002
Emergency Generator (2,922-Hp)	0.97	0.024
Total Project DPM Emissions	**1.17**	**0.026**

[1]Fire water pump application was submitted in September 2009. Fire water pump engine emissions shown here are reported so that the total DPM emissions from RSPP can be summarized.

4.0 Rule Compliance Determination

4.1 Regulation I General Provisions

4.1.1 Rule 108.2 Emission Statement

Upon request of the Air Pollution Control Officer (APCO) and as directed by him, an owner or operator of any source operation emitting or with the potential to emit NOx or reactive organic gases (ROG) shall provide the District with a written statement, in such form as prescribed, showing actual emissions of NOx and ROG from such source. RSPP will comply with the requirements of this rule by providing the specified emission report in a timely manner.

4.1.2 Rule 111 Equipment Breakdown

The owner or operator shall notify the APCO of any occurrence which constitutes a breakdown condition; such notification shall identify the time, specific location, equipment involved, and (to the extent known), the cause(s) of the occurrence and shall be given as soon as reasonably possible, but no later than one hour after its detection unless the owner or operator demonstrates, to the satisfaction of the APCO, that a longer reporting period was necessary. Within 10 days after a breakdown occurrence has been corrected, the owner or operator shall submit a written report to the APCO which includes specific information. RSPP will comply with the requirements of this rule if a breakdown occurs.

4.2 Regulation II Permits; Rule 210.1 New and Modified Stationary Source Review

This rule provides for preconstruction review of new and modified stationary sources of affected pollutants to insure emissions will not interfere with attainment of ambient air quality standards; insures appropriate new and modified sources of affected pollutants are constructed with Best Available Control Technology (BACT); and provides for no significant net increase in emissions from new and modified stationary sources for all non-attainment pollutants and their precursors.

<u>BACT</u>

An applicant must provide BACT for all affected pollutants expected to be emitted from a new emissions unit. The emergency generator will comply with BACT with the use of a Tier 2 compliant engine, ultra low sulfur diesel and good combustion practices.

As noted elsewhere, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 horsepower is the Tier 2 standard. The Applicant proposed a Tier 2 engine for the emergency generator based on the emission standards identified in 40 CFR, Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California ATCM for Stationary Compression Ignition Engines.

<u>Offsets</u>

An applicant must provide offsets for new or modified stationary source of PM10, SOx, NOx or VOC for the source's potential to emit when the source's potential to emit equals or exceeds the offset trigger levels listed in the rule and shown in **Table 4-1**. If offsets are required, they must be provided at specified ratios.

The total Project emissions were presented in **Table 3-6**. As shown in the **Table 4-1**, offsets are not required for the modified Project.

Table 4-1 Offset Determination

Pollutant	Offset Threshold (tpy)	Project Emissions (tpy)	Offsets Required? (Yes/No)
PM10	15	0.45	No
NOx	25	1.19	No
SOx	27	0.42	No
VOC	25	1.20	No

4.3 Regulation III Fees, Rule 301 Permit Fees

This application package contains the information necessary to process the emergency generator engine application. In accordance with KCAPCD Rule 301(I), application filing fees in the amount of $120.00 is provided with this submittal.

The Applicant is requesting Priority Processing for this application. The Applicant understands that the Priority Processing Fee will be charged at a rate equal to 1.5 times an Air Quality Engineer II, step 5 hourly salary multiplied by the total actual overtime hours worked. The Applicant agrees to the Priority Processing Fee and is willing to pay for up to 40 hours of overtime for application processing.

The Applicant also understands that it will be assessed fees in accordance with Rule 302 upon issuance of the DOC (ATC).

4.4 Regulation IV Prohibitions

4.4.1 Rule 401 Visible Emissions

A person shall not discharge into the atmosphere, from any single source of emission whatsoever, any air contaminant for a period or periods aggregating more than three (3) minutes in any one hour which is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke which is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart. The emergency generator meets BACT, and will comply with this Rule with the use ultra-low sulfur diesel fuel.

4.4.2 Rule 402 Nuisance

A person must not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property. The emergency generator meets BACT, and is expected to comply with this Rule by combusting ultra-low sulfur diesel fuel.

4.4.3 Rule 404.1 Particulate Matter Concentration – Desert Basin

Rule 404.1 applies to any person who discharges particulate matter (PM) emissions into the atmosphere from any single source or operation. The rule limits PM emissions to less than 0.1 grains per standard cubic foot (gr/scfm) of gas at standard conditions. The emergency generator engine is subject to this rule.

As shown in **Table 3-2** the PM10 emissions from the emergency generator engine are 0.97 pounds per hour. The exhaust gas flow rate from the engine is expected to be 3,518 standard cubic feet per minute (scfm). The PM10 concentration is calculated as shown below, which complies with the rule.

PM10 = 0.97 lb/hr x 7,000 gr/lb / 3,518 scfm/60 min/hr = 0.032 gr/scfm

4.4.4 Rule 407 Sulfur Compounds

A person shall not discharge into the atmosphere sulfur compounds, which would exist as a liquid or gas at standard conditions, exceeding in concentration at the point of discharge of 0.2 percent (2,000 ppmv) by volume calculated as SO_2. The emergency generator engine will emit SOx.

The SOx emissions from the emergency generator engine operation is 0.031 pounds per hour (see **Table 3-2**). The exhaust gas flow rate from the engine is expected to be 3,518 scfm. The SOx concentration is then:

SOx = 0.031 lb/hr / 0.0749 lb/ft^3 / 3,518 scf/min / 60 min/hr x 29.95/64 x 1,000,000 = 0.92 ppm

As shown, the stack SOx concentration for the emergency generator engine will comply with the rule.

4.4.5 Rule 409 Fuel Burning Equipment - Combustion Contaminants

Fuel burning equipment, the construction or modification of which commenced after August 17, 1971, shall not discharge into the atmosphere PM, SO_2 or NOx in excess of the EPA Standards of Performance (see Rule 422). In addition, a person shall not discharge into the atmosphere from any other fuel burning equipment combustion contaminants exceeding in concentration at the point of discharge, 0.1 grain per cubic foot of gas calculated to 12 percent of carbon dioxide (CO_2) at standard conditions.

The combustion contaminant emissions (i.e., PM10) from the emergency generator engine are 0.97 pounds per hour (see **Tables 3-2**). The exhaust gas flow rate from is engine is expected to be 3,518 scfm. As shown in **Section 4.4.3**, the combustion contaminant concentration is 0.032 gr/scfm, which complies with the rule.

4.4.6 Rule 419 Nuisance

A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property. Due to the use a Tier 2 compliant engine, and the use of ultra-low sulfur diesel, and the distance from the emission sources to any potential receptors, compliance with this rule is expected.

4.4.7 Rule 422 New Source Performance Standards

Provisions of 40 CFR Part 60 (New Source Performance Standards [NSPS]), in effect November 7, 2002, are adopted by reference into the KCAPCD rules. The NSPS are discussed in **Section 4.6**, and applies to the RSPP emergency generator engine.

4.4.8 Rule 427 Stationary Piston Engines (Oxides of Nitrogen)

The purpose of this rule is to limit NOx emissions from existing stationary piston engines to levels consistent with RACT to satisfy Health and Safety Code (HSC) Section 40918 (b) and 1990 Federal Clean Air Act (CAA) Amendments, Section 182(f). CO emissions are also limited to insure maintenance of efficient combustion at reduced NOx levels. This rule applies to all rich-burn, lean-burn, and diesel engines of more than 50 Hp, except for emergency standby, and low-use-rate engines operating less than 200 hours per year as documented by an elapsed operating time meter and engines used exclusively for firefighting purposes or flood control.

The proposed emergency generator engine for this Project is a low-use-rate engine which will operate less than 200 hours per year each and which will be used for emergency electrical generation. The engine will operate less than 50 hours per year to comply with the California ATCM, unless operating for emergency purposes. RSPP will install and maintain an elapsed operating time meter on the engine to substantiate compliance.

4.5 Federal Major Source Programs

There are several federal permitting and CAA programs that are applicable primarily to major sources of emissions. These programs include the Prevention of Significant Deterioration (PSD) regulations, the Operating Permits Program under Title V of the CAA Amendments of 1990, National Emission Standards for Hazardous Air Pollutants (NESHAP), which are codified in two parts: 40 CFR Part 61 and 40 CFR Part 63, and the Risk Management Program under Title III of the CAA Amendments of 1990, codified at 40 CFR Part 68. The emissions from the RSPP are well below the thresholds for these programs, and hence these regulations not applicable to this Project.

4.6 New Source Performance Standards

4.6.1 Subpart A General Provisions

Any source subject to an applicable standard under 40 CFR Part 60 is also subject to the general provisions of Subpart A. Because the Project is potentially subject to Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, the requirements of Subpart A also will apply. RSPP will comply with the applicable notifications, performance testing, recordkeeping and reporting outlined in Subpart A.

4.6.2 Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines that commence construction after July 11, 2005. Relevant to the proposed Project, the rule applies to the emergency fire water pump and generator CI engines as follows:

- Non-fire water pump engines manufactured after April 1, 2006;
- Fire water pump engines with less than 30 liters per cylinder manufactured after 2009, or

- Fire water pump engines manufactured as a certified National Fire Protection Association (NFPA) fire water pump engine after July 1, 2006.

For the purpose of this rule, "manufactured" means the date the owner places the order for the equipment. Based on the timeline projected for obtaining approval of the Project, the applicant expects that the engines will be ordered (and thus manufactured) in 2010. Owners and operators of non-fire water pump engines must comply with the emission standards listed for all pollutants. The limits for the proposed emergency generator are 2.6 g/Hp-hr for CO, 4.8 g/Hp-hr for NMHC and NOx combined, and 0.15 g/Hp-hr for PM. The proposed emergency generator engine meets these standards.

If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California ATCM for Stationary Compression Ignition Engines. According to the ATCM, new stationary emergency engines must meet the standards for off-road engines of the same model year and maximum rated power as specified in the Off-Road Compression Ignition Engines Standards (Title 13, CCR, Section 2423). Title 13 CCR Section 2423 sets emission standards for the generator engine with model years 2011 and later. The Interim Tier 4 standard applies to the Project generator engine as the engine would be larger than 900 kW (750 horsepower) and would be manufactured between 2011 and 2014. The standards are 0.67 g/kWh for NOx, 0.40 g/kWh for NMHC, 3.5 g/kWh for CO and 0.10 g/kWh for PM.

4.7 California Airborne Toxic Control Measure for Stationary Compression Ignition Engines

The California ATCM for CI engines specifies operating requirements and exhaust emission standards for stationary CI engines. In California, DPM is regulated as a TAC. The ATCM for CI engines requires the use of CARB diesel fuel (15 parts per million [ppm] sulfur by weight) and also includes emission standards for criteria pollutants.

At this time, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 horsepower is the Tier 2 standard. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards.

The operator will limit the hours of operations of the emergency generator engine to one hour per week, not to exceed 50 hours per year, and will install a totalizing hour meter to substantiate compliance with the use limitation. The facility will use only CARB diesel fuel in the generator engine and retain purchase records and MSDSs to substantiate compliance with the fuel sulfur requirement.

4.8 California Environmental Quality Act (CEQA)

Through a Memorandum of Understanding between the two agencies, the BLM and California Energy Commission (CEC) are conducting a joint review of the RSPP. This joint process will allow BLM to discharge its obligations under the National Environmental Policy Act (NEPA), 42 United States Code §§4321-4347, and also allow the CEC to meet its obligations under CEQA, California Public Resources Code §§21000-21177. Although CEQA and NEPA differ in several respects, they are sufficiently similar and flexible that a single environmental document can be prepared that will comply with both laws. The BLM and CEC will jointly prepare a combined NEPA/CEQA document. The potential environmental impacts of the Project have been addressed by the Applicants in an Application for Certification (AFC) filed with the CEC on September 1, 2009. This AFC is intended to support compliance by BLM and the CEC with the requirements of both NEPA and CEQA in the planned combined NEPA/CEQA document. The CEC will look to the District to issue a DOC rather than the normal ATC. The original permit application for the DOC

was submitted to the KCAPCD in September 2009. KCAPCD Environmental Information Form and Initial Study Evaluation are provided in **Appendix A.**

Appendix A

Application Forms

KERN COUNTY AIR POLLUTION CONTROL DISTRICT
2700 "M" STREET SUITE 302, BAKERSFIELD, CA 93301-2370
PHONE: (661) 862-5250 • FAX: (661) 862-5251 • www.kernair.org

APPLICATION FOR AUTHORITY TO CONSTRUCT, PERMIT TO OPERATE, EXEMPTION, AND BANKING CERTIFICATE

Operator Information

Business Name to Appear on Permit:	Owner's Name:		Phone No:
Ridgecrest Solar I, LLC	Solar Millennium LLC		(510) 809-4662
Mailing Address: 1625 Shattuck Ave., Suite 270		Business E-mail Address: owens@solarmillennium.com	
City: Berkeley	State: CA	Zip: 94709	Fax No: (510) 524-5516

Equipment Location

Street Address:	City:	Zip:
Within BLM ROW near Brown Road	Ridgecrest	93555
General Nature of Business: Solar electric power generation		S.I.C. CODE(S) *If Known*: 4911

Assessors' Parcel No: _____ OR _____/4 SECTION _____ TOWNSHIP 27 south RANGE 39 east

Application Type *See ATC/PTO Instructions for appropriate filing fee*

☒ Authority To Construct (ATC)	☐ Permit To Operate (PTO)	☐ Exemption
☐ ATC – Modification	☐ PTO – Modification	☐ Exemption Renewal
☐ ATC – Renewal	☐ PTO – Transfer of Ownership	☐ Banking Certificate
☐ Transfer of Location	☐ Change of Business Name	

Description of Equipment or Modification for which application is made (*include Permit #'s if known*)

Emergency Generator Engine, 2922 HP, diesel-fired

Use Additional Sheets if Necessary

Check all that apply

Is this Facility within 1,000 feet of the outer boundary of a school? ☐ YES ☒ NO
Have all necessary land-use authorizations been obtained? ☐ YES ☒ NO (*If "NO" attach explanation*) Currently in AFC review process
Is there any other equipment in the KCAPCD jurisdiction operated by the same operator? ☐ YES ☒ NO
Is this application being submitted as the result of a Notice of Violation or Notice to Comply? ☐ YES ☒ NO
If YES, NOV/NTC #: _____
Is this equipment portable AND will it be operated at different locations within KCAPCD jurisdiction? ☐ YES ☒ NO

Print Contact Name: Billy Owens Consultant? ☐ YES ☒ NO If YES, please attach Assignment of Agent

Title: Director, Proj. Dev Phone: (510) 809-4662 E-Mail Address: owens@solarmillennium.com

Signature: Billy Owens Date: 1-28-10

DATE RECEIVED **Validation (for KCAPCD use)**

ATC No: _____ **Filing Fee: $**_____
Equip Dscrpt: _____ **Receipt No:** _____
Equip Code: _____ **Date:** _____

KERN COUNTY AIR POLLUTION CONTROL DISTRICT

ENVIRONMENTAL INFORMATION FORM AND INITIAL STUDY EVALUATION

Applicant: Ridgecrest Solar I, LLC
Contact: Billy Owens
Title: Director, Project Development **Phone:** (510) 805-4662
Project Description: Solar Electric Power Generation

Environmental Information	**Yes**	**No**	**Maybe**
Will the proposed project with regard to the proposed location:			
a. Conflict with the adopted environmental plans and goals of the community?	[ ]	[X]	[ ]
b. Have a substantial, demonstrable negative aesthetic effect?	[ ]	[X]	[ ]
c. Substantially affect a rare or endangered species of animal or plant or the habitat of the species?	[ ]	[ ]	[X]
d. Interfere substantially with the movement of any resident or migratory fish or wildlife species?	[ ]	[X]	[ ]
e. Substantially diminish habitat for fish, wildlife or plants?	[ ]	[ ]	[X]
f. Breach published national, state, or local standards relating to solid waste or litter control?	[ ]	[X]	[ ]
g. Substantially degrade water quality or contaminate a public water supply?	[ ]	[X]	[ ]
h. Substantially degrade or deplete ground water resources or interfere substantially with ground water recharge?	[ ]	[X]	[ ]
i. Disrupt or adversely affect a prehistoric or historic archeological site or a property of historic or cultural significance to a community or ethnic or social group; or a paleontological site except as part of scientific study?	[ ]	[ ]	[X]
j. Induce substantial growth or concentration of population?	[ ]	[X]	[ ]
k. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system?	[ ]	[X]	[ ]
l. Displace a substantial number of people?	[ ]	[X]	[ ]
m. Encourage activities which result in the use of large amounts of fuel, water or energy?	[ ]	[X]	[ ]
n. Use fuel, water or energy inefficiently?	[ ]	[X]	[ ]

o. Increase substantially the ambient noise level for adjoining areas?	[ ]	[X]	[ ]
p. Cause substantial flooding, erosion or siltation?	[ ]	[X]	[ ]
q. Expose people or structures to major geologic hazards?	[ ]	[X]	[ ]
r. Extend a sewer trunk line with capacity to serve new development?	[ ]	[X]	[ ]
s. Disrupt or divide the physical arrangement of an established community?	[ ]	[X]	[ ]
t. Create a potential public health hazard or involve the use, production, or disposal of materials which pose a hazard to people or animal or plant populations in the area affected?	[ ]	[X]	[ ]
u. Conflict with established recreational, educational, religious or scientific uses?	[ ]	[X]	[ ]
v. Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land?	[ ]	[X]	[ ]
w. Interfere with emergency response or evacuation plans?	[ ]	[X]	[ ]
x. Violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations?	[ ]	[X]	[ ]

NOTE: Please attach any pertinent explanatory information.

CERTIFICATION:

I hereby certify the statement furnished above and in attached exhibits present the data and information required for this initial evaluation to the best of my ability, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Signature: Billy Owen **Date:** 1-28-10

Appendix B

Equipment Specifications

12502 Exchange Drive, Suite 404
Stafford, TX 77477 - USA
Phone: (281) 240-5335
Fax: (281) 240-4774
bschultz@hitecusa.com

February 11, 2009

Mark Freyenberger
Kiewit Power Engineers

Subject: Budgetary Quotation 09 -066 -HPP
KPE 2008045

Dear Mark.

We are pleased to offer the following budgetary proposal for the supply of one (1) 2200kVA, single output, Hitec CPS systems to provide uninterrupted, continuous and conditioned power to your critical applications.

As you will see, I have assumed our PGM and the GDP disconnect breaker are to be installed in the enclosure, and that the switchgear, line reactor, controls, etc will be installed in an existing building. The PGM module will include high deflection vibration mounts. We will design the enclosure for a seismic zone 4 application, but neither the enclosure nor other equipment has any seismic certifications or stamps. This standard Hitec equipment, as proposed, has been installed successfully by users at numerous locations in California.

Delivery time after receipt of a technically cleared purchase order is indicated on the proposal. A detailed project schedule will be developed by our assigned project manager upon receipt of the purchase order.

We hope that this proposal meets your requirements. Should you have any questions after your review, please contact us. We will be pleased to meet with you to discuss any of the features outlined in the following pages.

Best regards,

Bob Schultz
Hitec Power Protection, Inc.

cc: Jaime Hummer, Air Power Consultants, Lenexa, KS

12502 Exchange Drive, Suite 404
Stafford, TX 77477 - USA
Phone: (281) 240-5335
Fax: (281) 240-4774
bschultz@hitecusa.com

Budgetary Quotation: 09-066-HPP
Date: February 11, 2009

One Hitec Diesel Rotary CPS System rated 2200kVA (1760kW), Single Output, 480Vac, 60 Hz at 0.8pf in accordance with Hitec standard specification.

Item	Qty	Description
A1		CPS system to include
	1	Power Generating Module (PGM) with • Diesel engine • Free Wheel Clutch • Induction coupling • 480Vac, 60Hz alternator • PGM will have high deflection vibration mounts
	1	Unit Control Panel (UCP) – interface and controls for CPS
	1	Unit Reactor Panel (URP) – Line reactor Dry-type core and coil construction with bus stub connection at coils and Hitec standard enclosure.
	1	Redundant Diesel Starting System comprising: • Dual, redundant, starting motors • Batteries and external charger for redundant starting motors • Redundant Starting Panel (RSP) - rectifier to supply 24VDC from generator for redundant starting motors
	1	Daily fuel tank, UL142, 150 gallon with automatic and manual transfer pumps, level alarms, rupture basin and control
	1	Remote radiator (110°F max ambient) with single electric fan and motor starter
	1	Exhaust silencer, critical grade
	1	Main Power Board (MPB) - 480V Switchgear according to single line, Q1, Q2, Q3
	1	Generator Disconnect Panel (GDP) - 480V manually operated circuit breaker
	1	First fluid fill - includes engine oil, clutch oil, coolant and greases
	1	Black start control to allow starting of unit without presence of utility power
	1	Remote monitoring software package (QMS) with modem
	NOTE:	Load bank and LB breakers are not included. Fuel oil is not included; #2 diesel fuel to be supplied by others
A2	1	Sound attenuated drop-over enclosure for field installation by others of PGM Module and GDP. Included in enclosure are: • Day tank • Exhaust silencer • Ventilation louvers with controls • Enclosure lights, receptacles and service panel • Roof mounting structure for radiator • Radiator motor starter • Open bottom for mounting by others on belly tank • UL142 belly tank (approx 2500 gallon) - PGM, GDP and drop-over enclosure to be mounted on tank by others at site.
	NOTE:	Enclosure and tank quoted are Hitec's standard construction designed as zone 4 seismic. Seismic certification or engineer stamp not included.

Item	Qty	Description
A3	1	Factory witness testing of PGM per Hitec specification and procedure. Costs for travel expenses are not included in this quotation. Lodging and meals while at the factory for one trip of two individuals are included.
A4	1	Packing, loading and transport of the equipment according to Incoterms 2000, DDP (Delivered Duty Paid), Job Site or designated receiving location, contiguous 48 states.
A5	1	Start-up and commissioning of the Diesel CPS system at site after the electrical and mechanical installation work are completed by others. Customer is responsible for supplying one certified electrician to assist full time in installation review and correction as needed. Load banks and connection/disconnection are to be provided by others.
A6	1	Site Acceptance Testing per standard Hitec specification and procedures.
A7	1	Project Management and Application Engineering to assist with technical support, Hitec documentation and specifications, installation guidelines, data sheets, electrical drawings, etc.
A8	1	Training during 2 to 3 days at site following immediately after the start-up and commissioning
A9	1	Third party certification of all control panels supplied by Hitec to UL standards.
A10	1	All components - exclusive of the enclosure-mounted PGM and GDP - to be mounted and wired by others in existing building. Power and control wiring between enclosures and buildings by others. Electrical and mechanical work for installation of equipment is excluded. Compliance to state and local codes is the responsibility of the customer. Seismic certifications or stamps are not included.

Total Budgetary Price Items A1 - A10 **$2,175,000.00** **Lot net**

Prices are DDP, Job Site or designated receiving location, contiguous 48 states.
Prices do not include sales, use, excise or any similar taxes, fees, or permits that are not part of Incoterms 2000 DDP.

DELIVERY
Delivery is estimated 28 to 30 weeks ARO.

TERMS of PAYMENT
Prices are based on the following payments, subject to credit approval. All invoices are payable net 30 days from the date of the invoice.

- 30% invoiced at date of order.
- 30% invoiced at date of transmittal of submittal documents.
- 30% invoiced at date of factory acceptance test.
- 10% invoiced at date of site acceptance testing, not to exceed 45 days after date of delivery at designated receiving location.

Quotation is budgetary.

TERMS AND CONDITIONS OF SALES

GENERAL

The equipment materials and services (collectively, "Products") which are set forth on the face hereof will be sold by Hitec Power Protection, Inc. ("Company") only upon the following terms and conditions of sale. These terms are intended to cover all transactions of Company and Customer hereunder, including sales and use of Products and all related matters, including technical advice and services. This document, together with any additional writing signed by an officer of Company, represents a complete and exclusive statement of the agreement between the parties and may not be modified or supplemented by oral representations, Customer's purchase order or any other document submitted by Customer, a course of dealing, Company's performance or delivery of Products, or in any way other. Objection is made to any such attempted modification or supplementation. References on the face hereof to Customer's purchase order or to Customer's specification and similar requirements are solely to describe the Products and such purchase order or other communications are not incorporated herein. Catalogues, circulars, and similar pamphlets of Company are issued for general information purposes only and do not modify the provisions hereof. None of the Standard Terms and conditions of Sale herein set forth may be added to, modified, superseded, or otherwise altered, except by a written instrument, signed by an officer of Company. To the extent not otherwise provided herein, the terms of this agreement shall be those provided by the Uniform Commercial Code in effect in the State of Texas on the date hereof which would be provided if the parties were silent as to those terms.

QUOTATIONS

All purchase orders issued by Customer based on Company's quotations are subject to credit approval and final approval and acceptance by Company, and shall not constitute a contract of sale until such approval and acceptance is made in writing by Company's order acknowledgment or sales confirmation. Company's quotations are based on Company's understanding of the specifications and data submitted by Customer. Customer bears the responsibility for any ambiguity in such specifications and data. In the event any terms or provisions of a purchase order as accepted are inconsistent with these Standard Terms and Conditions of Sale, the terms and provisions of these Standard Terms and Conditions of Sale shall control.

SALES CONFIRMATIONS

A sales confirmation or order acknowledgment issued by Company pursuant to Customer's purchase order constitutes an expression of acceptance of such purchase order, but such expression of acceptance is expressly conditioned upon Customer's assent to the Standard Terms and Conditions of Sale as herein set forth, which assent will be deemed to have been given unless notice cancellation of the purchase order is received by Company within 10 days following the sales confirmation date. Where Company does not issue either a quotation or sales confirmation, and ships Products pursuant to Customer's purchase order, such sale shall be subject to Company's Standard Terms and Conditions of Sale, as set forth on Company's invoice. Each accepted purchase order shall constitute an independent transaction and Customer shall pay for same in accordance with the terms specified therein.

CANCELLATIONS AND POSTPONEMENTS

Purchase orders with respect to which Company has issued a sales confirmation or order acknowledgment may be canceled by Customer in writing within 10 days following the sales confirmation date; thereafter, no such purchase order may be canceled by Customer without written consent of Company (which consent Company may withhold in its sole discretion). Company's consent may, at its option, be predicated upon a cancellation charge. Any delays or postponements in work to be performed by Company, caused wholly or in part by or at the request of Customer, will allow Company to invoice Customer for the work performed up to the date of the delay or postponement.

PRICES

All quotations and sales prices are FOB Company's plant in Stafford, Texas unless otherwise noted. Prices are subject to adjustment by Company after 30 days from the date of the quotation unless otherwise stated. Except as provided on the face hereof, or as hereinafter provided, prices include packing and crating for Products destined within the continental United States, excluding Alaska. An additional charge will be made for export packing and crating. If Customer requests any modification of an accepted purchase order which change causes, in Company's sole discretion, an increase or decrease in the cost of or time required for performance of the affected purchase order by Company, an equitable adjustment shall be made in the applicable price or delivery schedule, or both, and the affected purchase order, as the case may be, shall be modified accordingly in writing. Nothing in this provision shall require Company to implement any change or to continue to perform under this agreement or any affected purchase order until mutual agreement has been reached in writing regarding any such equitable adjustments.

TAXES

Quotations and the prices set forth on the face hereof do not include sales, use, excise or other similar taxes. Unless Customer provides Company with a tax exemption certificate acceptable to the applicable taxing authorities, an amount equal to any sales, use, excise, or other tax which may be imposed upon the sales or use of the items covered by the quotation or this order acknowledgment, shall be added to the prices set forth on the face hereof. Customer shall be responsible for all sales, use, excise or other similar taxes imposed on this transaction, whether or not

included in Company's invoice, and whether or not such amount would, in the absence of this agreement, be due and payable by Customer or Company. If Customer fails to timely submit resale exemption information or if Customer's resale exemption is rejected by a taxing authority, Customer shall pay any tax due as a result.

ITEMS FURNISHED BY CUSTOMER

Prices and delivery dates for Products for which Customer furnishes components, plans, patterns, tools, or other items are based upon such items being received in usable condition, within the required time, and in such quantities as may be required, with transportation charges prepaid to Company's plant in Stafford, Texas. If defects are found in items furnished by Customer, Company will notify Customer and may charge additional expenses incurred, and extend the delivery dates of the Products, as a consequence of such defects. Company assumes no responsibility for loss or damage to items furnished by Customer where such loss or damage is due to circumstances beyond its control.

TERMS OF PAYMENT

Invoices shall be paid to Company at its offices in Stafford, Texas without setoffs or deductions of any kind. Payments on invoices shall be due thirty (30) days from the date of the invoice, unless otherwise specified on the face hereof. All invoices shall be dated (i) the date of shipment, unless Customer requests shipment to be delayed, in which case the invoice shall be dated the date of completion of manufacture of the Products or (ii), if milestones are specified, the date of the milestone event to which progress payments have been indexed in the quotation, specification, on the face hereof or in other contract documents. All purchase orders shall be accompanied by irrevocable standby letters of credit in the amount of the order, issued by a bank and in a form satisfactory to Company and valid for a period of 90 days after the last scheduled delivery date. Amounts not timely paid, whether related to a purchase order or any other indebtedness, shall bear interest thereafter at the rate of the lesser of (i) eighteen percent per annum or (ii) the maximum no usurious contract rate of interest permitted by law. Whenever reasonable grounds for insecurity arise with respect to performance by Customer, Company may demand modified terms of payment from those specified on the face hereof or on any invoice including without limitation accelerated payment terms, full payment prior to delivery, the provision of additional collateral or additional letters of credit, and Company may refuse to make delivery pending satisfactory modification of the terms of payment. Company retains title in all equipment sold, for security purposes only, until full payment is received. Customer grants Company a security interest in the Products sold hereunder, replacements therefore and additions thereto and all other equipment heretofore or hereafter sold by Company to Customer to secure Customer's present or future obligations to Company and the proceeds of all the foregoing. Company may file this instrument as a financing statement. Upon Company's request, Customer will execute financing statements evidencing the security interest granted herein. Customer appoints Company as it's attorney-in-fact to execute any such financing statement. Upon Company's request, Customer will execute financing statements evidencing the security interest granted herein. Customer appoints Company as its attorney-in-fact to execute any such financing statement. If Customer intends to relocate the Products sold hereunder prior to full payment therefore, Customer will give Company thirty (30) days' prior written notice thereof including therein the new address where such items will be kept. In the event Customer does not pay an invoice when due, Customer agrees to pay Company interest as provided above and any collection costs (including without limitation reasonable attorney fees) incurred by Company to obtain payment.

DELIVERY AND ACCEPTANCE

Unless otherwise specified herein, all shipments are FOB Company's plant in Stafford, Texas with Customer paying all shipping costs. In the absence of written shipping instructions from Customer, Company may ship the products collect freight to Customer by any common carrier which it deems in its sole discretion satisfactory. All delivery dates which may be set forth are estimates of the time normally required to deliver such Products and are subject to change without limitation by Company notwithstanding negotiations between Company and Customer. Delivery dates will be calculated from the date that Company has received all information necessary to permit Company to proceed with work immediately and without interruption. Company will make all reasonable efforts to conform to delivery estimates but will not be liable for delays resulting from its failure to deliver in accordance with delivery estimates. Company may make partial deliveries and invoice separately for each delivery. Customer shall inspect and accept or reject the Products within twenty (20) days after delivery. Failure to timely reject shall be deemed an acceptance. Acceptances are irrevocable. All claims whatsoever by Customer, except claims under applicable warranties, shall be made within such 20-day period or are waived.

TITLE: RISK OF LOSS

Customer shall obtain and maintain insurance coverage on the Products against all risks of loss or damage in an amount equal to at least the unpaid balance of the purchase price, if any. If Company shall so request, all such policies shall name Company as an additional insured and Customer will deliver to Company a completed certificate or certificates of insurance signed by an authorized representative of each of Customer's insurance carriers involved, certifying that such insurance has been issued and is in full force and that if such insurance is canceled or changed so as to affect the coverage, at least thirty days prior written notice of such cancellation of change will be sent to Company. Company's responsibility terminates upon the delivery of Products to a common carrier or Customer-furnished carrier for transportation, FOB Company's plant in Stafford, Texas. The Products herein referred to, the title thereto (except for security purposes as provided above), and any risk of loss, shall be considered as being transferred

to Customer upon delivery to the common carrier for transportation, Customer or Customer's designee. No claims for shortages, damages, or other failure in transit may be made by Customer against Company. Notwithstanding the foregoing, Products held by Company at Customer's request beyond the scheduled delivery date shall be at Customer's risk.

WARRANTY: LIABILITY LIMITATION

Company warrants that the Products and parts of its own design and manufacture shall be, at the time of delivery, free from defects in material and workmanship under normal use and service preventive maintenance performed per Hitec factory and manufacturers instructions within the Warranty Period (as defined). All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and, in any event, within the Warranty Period. The term "Warranty Period" refers to the period prior to the first to occur of (i) the date on which the Product is sold or transferred by Customer to any party, or (ii) eighteen (18 months) from shipment of the Products or (iii) twelve (12) months after the date of start-up. In the case of parts which are purchased from Company separately by Customer and are not installed by Company, claims must be made within ninety (90) days from shipment of the applicable item because Company has no control over the installation of such part or the equipment on which it is installed. Customer must notify Company in writing of any defect or warranty claim immediately upon discovery and shall permit Company to inspect the Product so Company may determine its warranty obligations. Failure of Customer to give Company written notice of nonconformance of Products to Company's warranty immediately upon discovery and, in any event, prior to expiration of the Warranty Period, shall be conclusive of (i) Customer's final acceptance of and full satisfaction with the Products and (ii) Company's fulfillment of its warranty in all respects. Company does not warrant any Products or parts which are used, rebuilt or not new or not manufactured by Company however, Company will assign to Customer whatever warranties Company has received from the manufacturer of any products or parts not manufactured cy Company to the extent such warranties can be assigned to Customer. Company's warranty covers parts, labor , travel and living expenses of Company personnel (within North America). Items not covered by this warranty are expendables such as fuses, light bulbs, fuel filters, etc. Customer shall be responsible for all third party charges associated with warranty services, including, but not limited to, rigging, drayage, and taxes. Company shall not be responsible for providing warranty service to remedy any defect caused by any replaced parts or by repairs, alterations, modifications or changes unless made by Company's authorized service personnel. Repairs or replacements are warranted as described herein for the remainder of the original Warranty Period. Company shall not be responsible for damages or defects resulting from shipment, improper handling, storage, installation, operation or maintenance. The determination of the cause and existence of a defect by Company shall be conclusive. Repairs and/or replacements not covered by the warranty shall be charged to Customer at Company's standard field service rates. Company's warranty does not guarantee that its Products will be electrically compatible with any other electrical or electronic equipment, when sold as an individual item. Customer's sole and exclusive remedy and Company's sole and exclusive liability under this warranty is expressly limited, at the sole option of Company, to the repair, replacement or refund of the purchase price of any Products which upon examination Company determines to its sole satisfaction to be defective within the Warranty Period. If Company elects to repair or replace Product which fail to conform to Company's warranty, Company shall have a reasonable time in which to make the repair or replacement and shall deliver the repaired or replaced Products to Customer, FOB, Company's plant in Stafford, Texas. Upon settlement of its obligations, if any, under this warranty, Company, at its option shall be entitled to the return of the defective Product or parts(s). **COMPANY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY (INCLUDING, WITHOUT LIMITAITON, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND ANY AGREEMENTS, REPRESENTATIONS, AFFIRMATION OR WARRANTIES, WHETHER ORAL OR WRITTEN, MADE BY ANY AGENT, EMPLOYEE OR REPRESENTATIVE OF COMPANY OR AS SET FORTH IN ANY PURCHASE ORDER OF CUSTOMER UNLESS AND EXCEPT AS SPECIFICALLY SET FORTH HEREIN.** Company shall not be liable for losses based on downtime, overhead, the negligence of Customer or Company or any of their employees or agents, property damage, lost production or profits or for incidental, consequential or special damages of any kind arising from or attributable to this agreement, the Products or the manufacture, assembly, sale, use, repair, maintenance, claim, whether in contract, tort (including negligence) or otherwise, arising out of, connected with or resulting from the manufacture, assembly, delivery, sale, use, repair, maintenance, replacement or operation of any Product sold hereunder will not exceed the price allocable to the Product or any part thereof which give rise to the claim. Every cause of action based on this agreement or the items sold hereunder by Customer against Company shall be brought not later than the expiration of the applicable Warranty Period. If Customer has assets of at least $5 million, Customer waives all provisions of the Texas Deceptive Trade Practices – Consumer Protection Act to the extent which such waiver is effective pursuant to Section 17.42 of the Texas Business and Commerce Code.

INDEMNITY

Customer hereby agrees to indemnify, defend and hold harmless Company, its affiliates, and their respective agents and employees (indemnities") from all claims, suits or proceedings based on a claim of personal injuries or death property damage, product liability or any other liability of any kind under any legal theory of liability arising out of or attributable to the manufacture, assembly, delivery, sale, use, repair, maintenance, replacement or operation of the Products without regard to whether the Products are alleged to have contributed to or caused the basis for such claim or whether such claim was alleged to be contributed to or caused by an indemnities sole or concurrent negligence,

defective products, or other breach of duty on the part of an indemnity, whether such claims suits or proceedings are by Customer or by third parties. Customer shall indemnify and hold harmless indemnities from and against any and all claims, damages, losses, liabilities, judgments, settlements, costs, and expensed (including but not limited to attorney's fees) incurred or awarded in such claims, suits or proceedings.

FORCE MAJEURE

Company shall not be liable for any losses, delays, or failure to deliver Products, repair or replace Products, or otherwise perform under this agreement resulting in whole or in part from any causes beyond its control. Such causes include without limitation strikes or other labor disputes involving its employees, the employees of common carriers, or the employees of suppliers, inability to obtain material or transportation, commercial impracticability, acts of God, acts of government, war, riot, insurrection, sabotage, fire, explosion, floods, weather, governmental orders or regulations, inability to secure any necessary governmental or other permits, court orders, breakdown of machinery, accidents, defects in part or equipment of whatever cause, actions or inactions of Customer or its agents, employees or representatives, or other causes, similar or dissimilar, over which the Company has no control.

MISCELLANEOUS

All notices, demands and other communications which may or are required to be given hereunder or with respect hereto shall be in writing, shall be given either by personal delivery, facsimile transmission or by registered or certified mail, return receipt requested, and shall be deemed to have been given or made when personally delivered, or when received as evidences by return receipt or confirmation of facsimile transmission addressed to the respective parties at the address shown on the front of this order acknowledgment. This agreement and the rights and obligations hereunder shall not be assignable by any party hereto without the prior written consent of all other parties. All of the terms and provisions of this agreement shall be binding upon and inure to the benefit of and be enforceable by the heirs, successors and permitted assigns of the signatories hereto.

The captions used in this agreement are for convenience only and are not to be construed in interpreting this agreement. This agreement may be signed and delivered in two or more counterparts, each of which shall be deemed an original and all of which together will constitute one and the same instrument. This agreement may be amended only by a written instrument signed by each party hereto. This agreement shall be governed by and construed in accordance with the substantive laws of the State of Texas without regard to principles of conflicts of law. Each party hereto hereby submits to the jurisdiction of the courts of the State of Texas and the federal courts in and for the Southern District of Texas in connection with any matter relating to this agreement and any other document executed in connection herewith.

THE TRADE TERMS OF THE INTERNATIONAL CHAMBER OF COMMERCE

WHAT IS A TRADE TERM?

A trade term is a combination of letters or words, which specifies certain obligations within the sales contract.

WHAT OBLIGATIONS DOES A TRADE TERM SPECIFY?

The trade term specifies the

1. Transfer of risk
- when the seller has the right to claim for the contract price even if the goods are lost, damaged or short-delivered.

2. Transfer of obligations
- where and how the seller must make the goods available to the buyer and how the buyer must take delivery of the goods.

3. Division of costs
- how the normal costs relating to the export and import of goods should be divided between the seller and the buyer.

WHAT ARE INCOTERMS?

INCOTERMS are a set of international rules for the interpretation of the 13 trade terms published by the International Chamber of Commerce (ICC).

Responsibilities are simply and clearly defined by referring to one of the ICC INCOTERMS. Thus the risk of misunderstanding and subsequent disputes is eliminated.

TRADE TERMS AND NAMED POINT OF DELIVERY

After the chosen trade term one should state
- the named point where the costs transfer and
- "...Incoterms 2000"

For instance "CIF Hamburg Incoterms 2000".

TRADE TERMS AND MODE OF TRANSPORT

The use of trade terms in connection with different modes of transport in the export and import of goods is described below.

+ = recommended
- = not recommended

TRADE TERM — MODE OF TRANSPORT

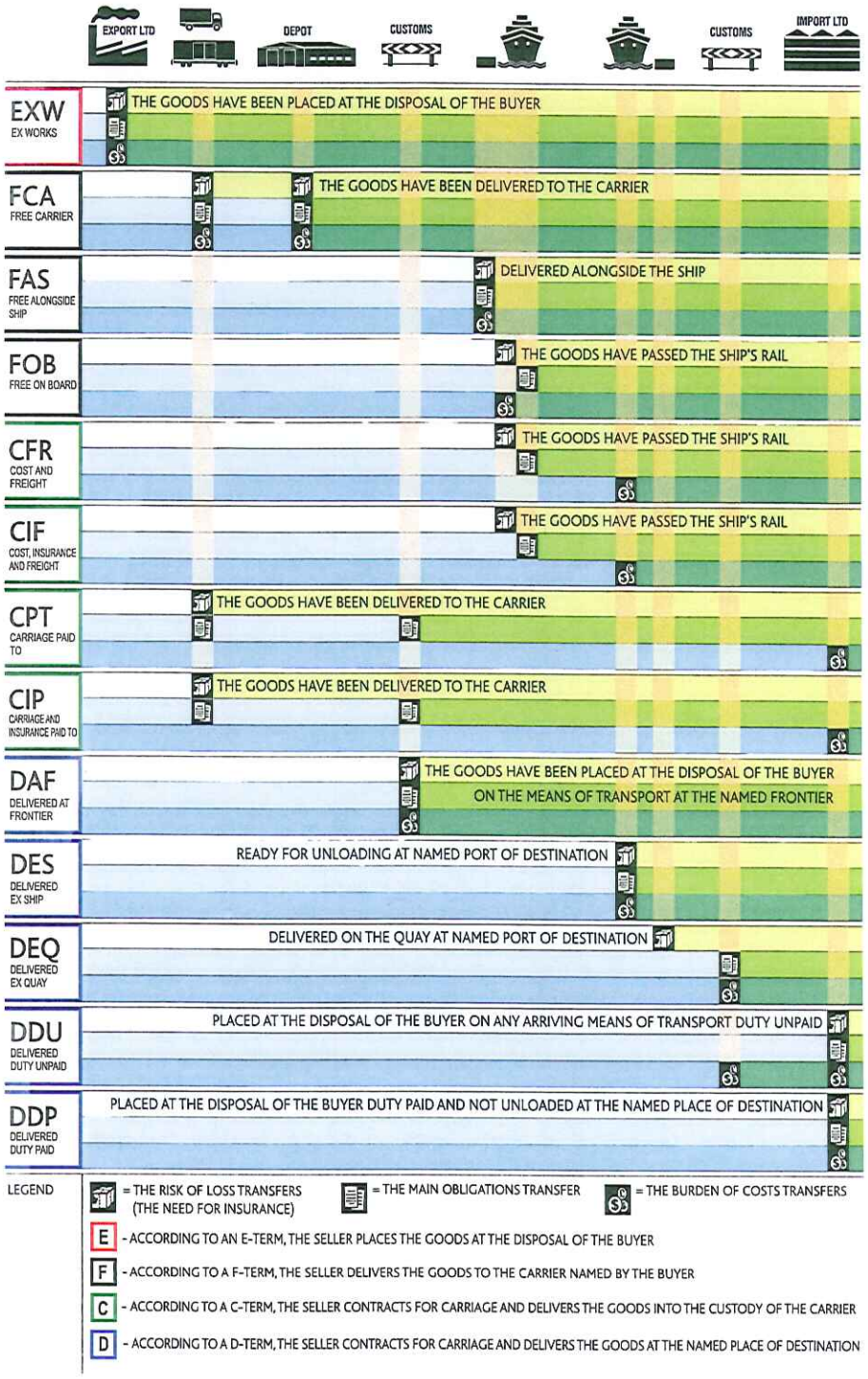
	Sea	Road	Rail	Air	Container	Combined transport
EXW	+	+	+	+	+	+
FCA	+	+	+	+	+	+
FAS	+	-	-	-	-	-
FOB	+	-	-	-	-	-
CFR	+	-	-	-	-	-
CIF	+	-	-	-	-	-
CPT	+	+	+	+	+	+
CIP	+	+	+	+	+	+
DAF	-	-	-	-	-	-
DES	+	-	-	-	-	-
DEQ	+	-	-	-	-	-
DDU	+	+	+	+	+	+
DDP	+	+	+	+	+	+

TRADE TERMS AND CARGO INSURANCE

The need for cargo insurance follows the risk of loss or damage, i.e. each party arranges for insurance for the part of the carriage when the goods are at his risk.

According to the terms CIF and CIP the seller must arrange cargo insurance in favour of the buyer.

This brochure is our summary of the contents of the trade terms.



	THE SELLER MUST		THE BUYER MUST	
EXW	- provide appropriate packing and marking - place the goods at the disposal of the buyer at the named place of delivery - on request assist the buyer with the export documentation		- take delivery of the goods and contract for the carriage to the final destination	EXW
FCA	- provide appropriate packing and marking - load the goods on the means of transport nominated by the buyer (delivery at the seller's premises) or place the goods at the disposal of the carrier nominated	by the buyer, not unloaded, in the seller's means of transport (delivery at the depot or elsewhere) - carry out the export procedures and provide the buyer with the document received for the delivery of the goods	- take delivery of the goods, loaded, on the means of transport (delivery at seller's premises) or take delivery of the goods on the arriving means of transport, not unloaded, and carry out unloading, storage, and loading of the goods (delivery at depot or elsewhere) - carry out import procedures and contract of carriage to the final destination	FCA
FAS	- provide appropriate packing and markin - place the goods at the disposal of the buyer alongside the ship - carry out the export procedures	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods alongside the ship - carry out the import procedures and the carriage to the final destination	FAS
FOB	- provide appropriate packing and marking - deliver the goods on board the ship at the port of shipment - carry out the export procedures	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on board the ship at the port of shipment - carry out the import procedures and the carriage to the final destination	FOB
CFR	- provide appropriate packing and marking - contract for the carriage and pay the freight to the port of destination - deliver the goods on board the ship at the port of shipment	- carry out the export procedures - provide the buyer with the transport document without delay	- accept delivery of goods at the port of shipment and receive them from the carrier at the port of destination - carry out the import procedures and the carriage to the final destination	CFR
CIF	- provide appropriate packing and marking - contract for the carriage and pay the freight to the port of destination - deliver the goods on board the ship at the port of shipment	- carry out the export procedures - contract and pay for agreed cargo insurance in favour of the buyer - provide the buyer with the transport document and cargo insurance document without delay	- agree on the cargo insurance with the seller - accept delivery of goods at the port of shipment and receive them from the carrier at the port of destination - carry out the import procedures and the carriage to the final destination	CIF
CPT	- provide appropriate packing and marking - contract for the carriage and pay the freight to the place of destination - deliver the goods to the carrier	- carry out the export procedures - provide the buyer with the transport document without delay	- accept delivery of goods at the place of dispatch and receive them from the carrier at the place of destination - carry out the import procedures and the carriage to the final destination	CPT
CIP	- provide appropriate packing and marking - contract for the carriage and pay the freight to the place of destination - deliver the goods to the carrier	- carry out the export procedures - contract and pay for agreed cargo insurance in favour of the buyer - provide the buyer with the transport document and cargo insurance document without delay	- agree on the cargo insurance with the seller - accept delivery of goods at the place of dispatch and receive them from the carrier at the place of destination - carry out the import procedures and the carriage to the final destination	CIP
DAF	- provide appropriate packing and marking - place the goods at the disposal of the buyer on the arriving means of transport at the frontier not unloaded	- carry out the export procedures - provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on the arriving means of transport, not unloaded - carry out the unloading of the goods from the means of transport of the seller, storage, import procedures and carriage to the final destination	DAF
DES	- provide appropriate packing and marking - carry out the export procedures - place the goods at the disposal of the buyer on board the ship at the named port of destination	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on board at the port of destination - carry out the unloading of the goods - carry out the import procedures and carriage to the final destination from the named port of discharge	DES
DEQ	- provide appropriate packing and marking - carry out the export procedures - place the goods at the disposal of the buyer on the quay at the named port of destination	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on the quay at the port of destination - carry out the import procedures and the carriage to the final destination	DEQ
DDU	- provide appropriate packing and marking - carry out the export procedures	- place the goods at the disposal of the buyer at the named place of destination not unloaded - provide the buyer with the document received for the delivery of the goods	- take delivery of the goods at the final destination - carry out the unloading of the goods - carry out the import procedures	DDU
DDP	- provide appropriate packing and marking - carry out the export and import procedures	- place the goods at the disposal of the buyer at the named place of destination not unloaded	- take delivery of the goods at the final destination - carry out the unloading of the goods	DDP

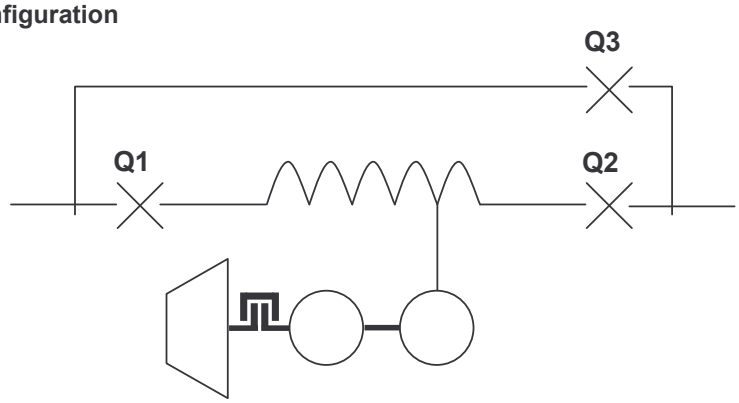
Typical Customer Provided Activities

The following items summarize some typical activities to be provided by customer's selected electrical, rigging and mechanical contractors.

- Crane rigging for placement of equipment at site and securing equipment in its final fixed location.
- Installation of the cooling system, including piping and flexes
- Installation of the exhaust system
- Installation of all fuel system and piping
- Installation of room ventilation system in existing building
- Installation of the PGM and GDP on base tank
- Electrical connections internal to the existing building
- Electrical connections internal to enclosure
- Field connections between PGM enclosure and components in existing building

Single UPS system

Configuration



Circuit breakers
Q1 : NB utility circuit breaker
Q2 : NB Load circuit breaker
Q3 : NB Bypass circuit breaker

Operation modes:
Utility mode
Utility mode is the operation mode that is also named “power conditioning”. Circuit breakers Q1 and Q2 are closed and the diesel engine is not running. The NB load is fed by conditioned power of the utility, via the reactor. The UPS is improving power factor, filtering harmonics, correcting utility anomalies and keeping output voltage at a constant level.

Diesel mode
If utility is out of tolerance, the diesel engine is supplying the NB load. Only circuit breaker Q2 is closed and the diesel engine is running at constant speed.

Bypass mode
In bypass mode, Q3 is closed and Q2 is open, Q1 can be either open or closed. Utility is feeding the load.

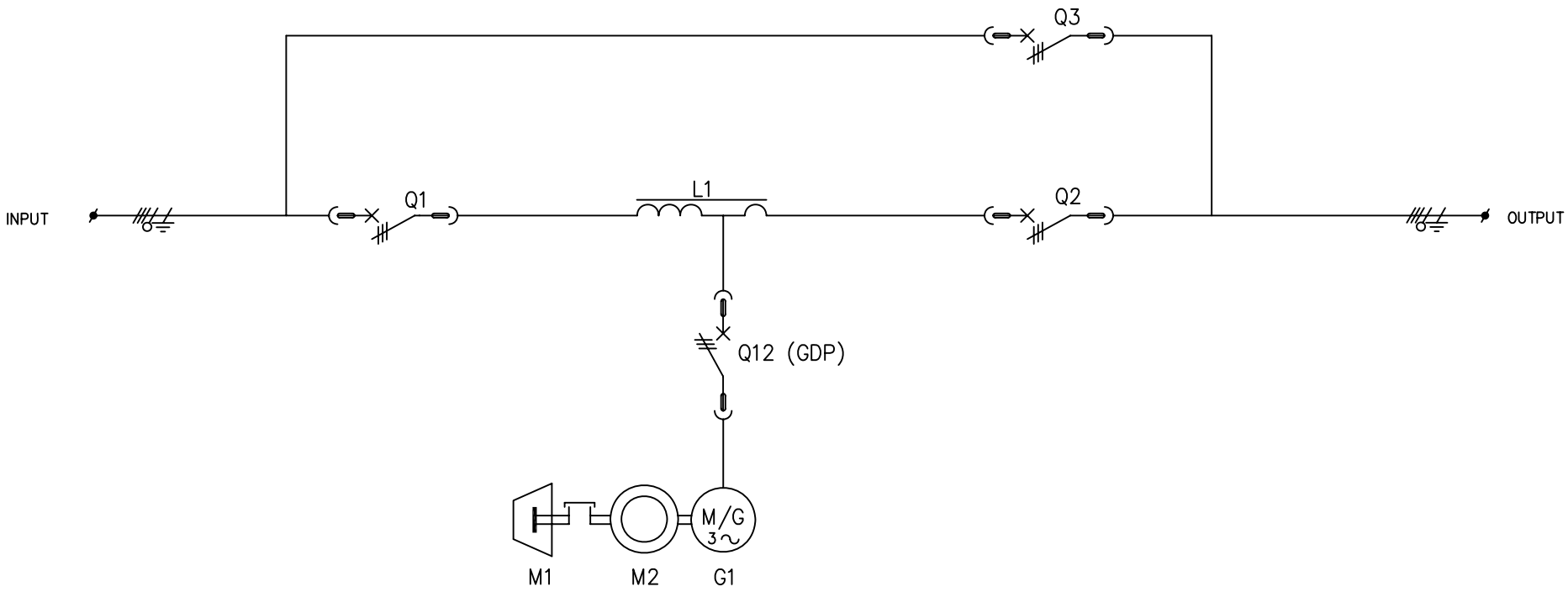
Utility failure / Diesel mode
With a utility outage the NB utility circuit breaker Q1 will open and the diesel engine will start. The UPS will continuously monitor the utility for voltage and frequency for return of these (parameters) within tolerances to retransfer to utility mode.

Retransfer, synchronizing and paralleling
If the utility returns within tolerances the generator will synchronise with the utility. It will run in synchronism with the utility during utility acceptance time and then parallel with the utility by closing NB utility circuit breaker Q1.

Bypass mode
The bypass circuit breaker is closed if the unit is taken out of operation. Switching over to bypass mode from utility mode (from Q2 to Q3) will be make-before-break.

Table

Mode	Q1	Q2	Q3	Diesel
Utility mode	Closed	Closed	Open	Stop
Bypass mode	Open or Closed	Open	Closed	Stop or Running
Diesel mode	Open	Closed	Open	Running



title	SINGLE LINE DIAGRAM UPS-SYSTEM SINGLE OPERATION	HITEC Power Protection	UEG97063
		drawn 97-07-31 W.HEMMER	sheet 1
		ch'd	
		app'd	of
revision 1 2 3 4 5 6 7 8 9	Hitec Power Protection bv – The Netherlands		

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AutoCAD version: 10.0 Menufile: SETUP.MNU DOS filename: UEG97063.DWG

HITEC STANDARD ENCLOSURES

All Hitec enclosures are NEMA 3R, walk-in type, designed to the following standards unless specified under a separate document. Other parameters are available upon request.

Sound Attenuation	85dBA @ 23 feet, clear field environment, 5 ft above ground level
Wind Load	Designed for 80 MPH
Rain	Designed for 4” per hour
Roof Load	Designed for 30PSF
Ambient Temp	PGM Operating: 32º to 104ºF PGM Non-Operating: -4º to 158ºF
Relative Humidity	PGM Operating: 0 to 95% for 32º to104ºF PGM Non-Operating: 0 to 95% including condensation
Barometric Pressure	Sea level to 3280ft.
Seismic Zone	None
Fire Proofing	None

Codes and Standards; applicable sections of

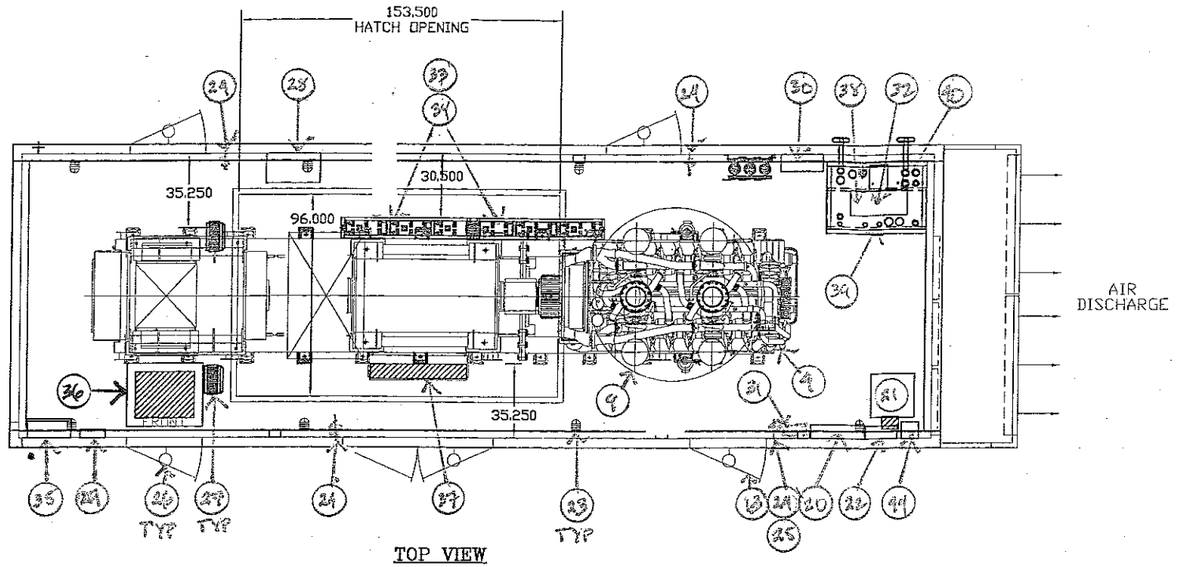
UBC	ASME B31
NEC	NFPA-30
ANSI	CSA

Construction

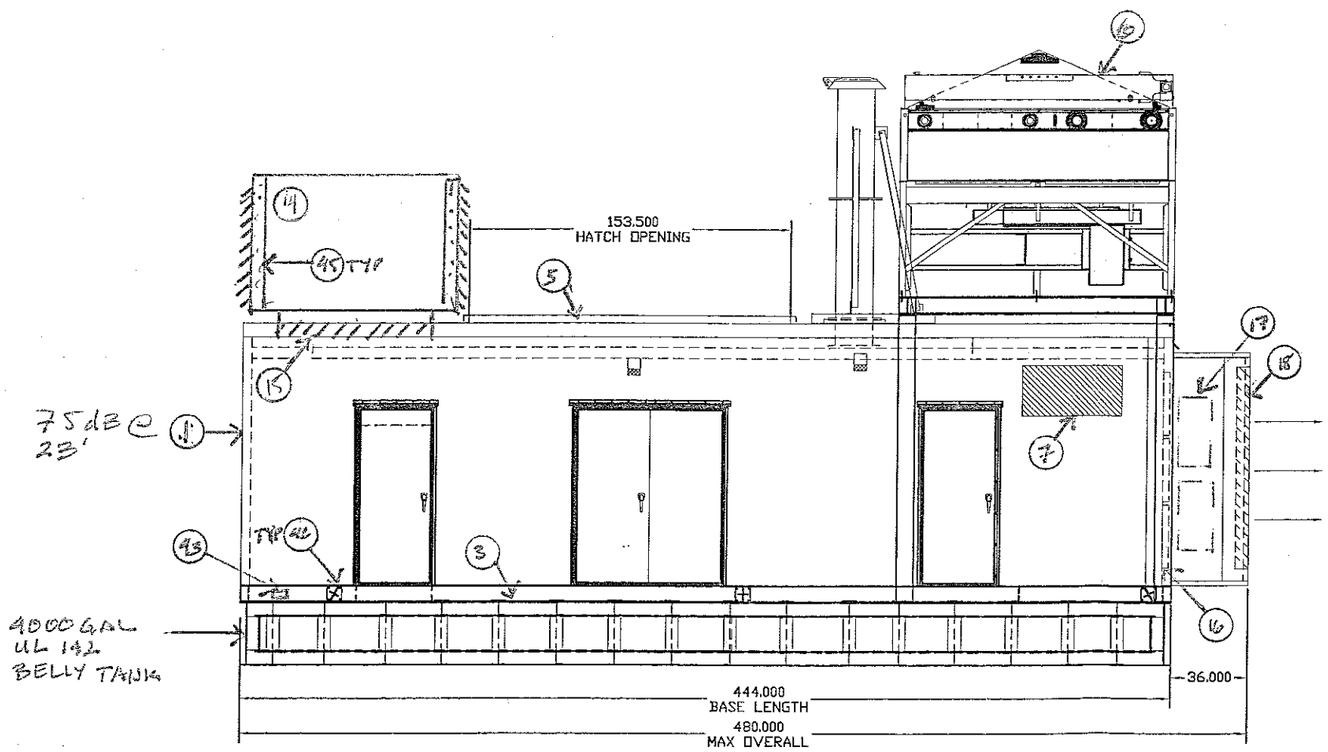
Base frame	Continuous ship channel base frame around entire perimeter
Corners	Vertical 4” x 4” square columns at each corner and in mid section
Exterior walls	14 gage galvanealed skin with 4” stiffeners on 24” centers.
Insulation	4” of 4lb/ft^3 of mineral wool insulation for sound attenuation and thermal insulation. Covered with 2mil polyethylene over insulation
Interior walls	Interior of enclosure lined with 22 gage galvanized perforated metal.
Roof	14 gage galvanealed material, 4” mineral wool, 16” centerline on stiffeners and a raised seam exterior to add additional roof support and rigidity.
Sound baffling	8” fully insulated sound deadening devices that have a step broke radius inlet and tapered discharge.
Painting	primed, polyurethane finish coat, ANSI 61, gray
Base Tank, if applicable	UL 142/UL 2085 Carbon steel, exterior primed and painted black

NOTE

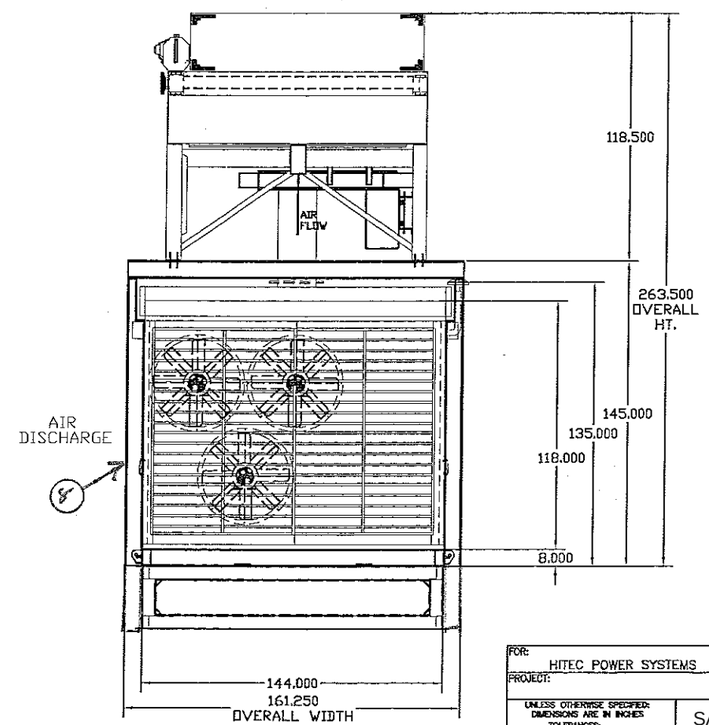
Any local codes/standards, state codes/standards, engineer’s stamps, certifications, tests or other requirements are not part of the quotation unless specifically mentioned in the quotation. If applicable, the customer should furnish the appropriate specifications and requirements to Hitec for re-quote.



TOP VIEW



SIDE VIEW



DISCHARGE END VIEW

ITEM	QTY:	DESCRIPTION
1	1	[redacted] PACKAGE– DROP OVER CONSTRUCTION
2	A/R	4.5"D WALL PANEL– INSULATED, MARINE GRADE ALUMINUM CONSTRUCTION
3	1	DROP–OVER ENCLOSURE FRAME
4	1	HITEC ROTARY UPS– 2000KW, [redacted]
5	1	ROOF HATCH– REMOVABLE, FOR INDUCTION COUPLING SERVICE
6	1	EXTERIOR MOUNTED RADIATOR– RDCORE HB88, HITEC PROVIDED, SHIPPED LOOSE
7	1	RADIATOR PIPING ACCESS AREA– 24" X 48", [redacted]
8	1	RADIATOR FRAME STRUCTURE– SHIPPED LOOSE, INSTALLED BY CONTRACTOR
9	1	EXHAUST SILENCER– INTERIOR MOUNT, W/ EXHAUST OUTLET ON TOP
10	2	EXHAUST FLEX PIPE– HITEC PROVIDED
11	3	EXHAUST EXTENSION SUPPORTS– SHIPPED LOOSE
12	2	EXHAUST EXTENSION SECTION– W/ RAIN CAP & SUPPORTS, SHIPPED LOOSE
13	4	PERSONNEL ENTRANCE DOORS– PAD LOCKABLE
14	1	AIR INTAKE HOOD W/ FIXED INTAKE LOUVER ASSEMBLY– FOR VENTILATION
15	1	MOTORIZED INTAKE DAMPER ASSEMBLY
16	1	GRAVITY DISCHARGE DAMPER ASSEMBLY
17	4	VENTILATION FAN– INSTALLED IN DISCHARGE HOOD
18	1	AIR DISCHARGE HOOD– W/ FANS
19	1	HAND PUMP – FOR FUEL SUPPLY TO DAY TANK, NOT SHOWN
20	1	DISTRIBUTION PANEL–~~480~~VAC, 100A MAIN
21	1	TRANSFORMER– 30kVA, ~~4W~~ 120/208V, CEILING MOUNTED
22	1	SERVICE PANEL– 120/208V, 100A MAIN, 3ø4W
23	8	LIGHT FIXTURE– VAPOR TIGHT, AC
24	4	LIGHT SWITCH
25	2	GFCI RECEPTACLE
26	4	EXTERIOR LIGHT FIXTURE– VAPOR TIGHT, W/ PHOTOCELL
27	2	ENCLOSURE HEATER– CEILING MOUNTED, W/ THERMOSTAT
28	1	BATTERY CHARGER– HITEC PROVIDED
29	1	AUXILIARY CONNECTION BOX
30	1	FUEL CONTROL PANEL
31	1	VENTILATION CONTROL PANEL
32	1	REDUNDANT START PANEL (RSP)– W/ DRIP PAN, HITEC PROVIDED
33	2	STARTING BATTERY SET– HITEC PROVIDED
34	2	BATTERY RACK
35	1	SAXON RADIATOR MOTOR CONTROL PANEL– HITEC PROVIDED
36	1	OUTPUT CIRCUIT BREAKER CUBICLE (GDP)– [redacted] BY CC
37	1	POWER GENERATING MODULE (PGM) CONNECTION BOX– HITEC PROVIDED
38	1	FUEL DAY TANK– ELEVATED, 150 GAL. PRIMARY W/ 225 GAL. RUPTURE, U.L. 142
39	1	DAY TANK FUEL FITTINGS & VENTS
40	1	FUEL OIL COOLER– FOR ENGINE FUEL RETURN TO DAY TANK, MOUNTED ABOVE TANK
41	1	FUEL/WATER SEPARATOR– RACOR 79/1000FGV, HITEC PROVIDED
42	6	REMOVABLE LIFT LUG
43	2	GROUND LUG– LOCATION: RIGHT REAR, FRONT LEFT
44	1	100A DISCONNECT
45	24	24X24X2 500FPM AIR FILTERS

FINISH COLOR:	UNDETERMINED
EST. ENCL. FRAME WEIGHT:	5,000 LBS
EST. ENCLOSURE WEIGHT:	9,000 LBS
EST. DAY TANK WT., DRY:	2,000 LBS
EST. RADIATOR WT., DRY:	12,000 LBS
EST. RAD. FRAME WEIGHT:	3,000 LBS
EST. DISCHARGE HOOD WT.:	1,500 LBS
EST. MISC. WEIGHT:	5,000 LBS
EST. DRY SHIPPING WT:	37,500 LBS
APPROXIMATE OVERALL DIMENSIONS	
LENGTH:	570"
WIDTH:	194.6"
HEIGHT:	263.5"
DAY TANK CAPACITY:	150 GAL.
RUPTURE BASIN CAPACITY:	150% 225 GAL.

NOTES:

AIR FLOW REQUIREMENTS:
COOLING– 55,500 CFM
COMBUSTION– 6,475 CFM
TOTAL– 61,975 CFM
MAXIMUM WALL PANEL WIDTH– 24"

DROP OVER ENCLOSURE FRAME TO INSTALL DIRECTLY ON CUSTOMER PROVIDED PAD.
GASKET MATERIAL, PROVIDED W/ SHIPMENT, TO BE INSTALLED BETWEEN FRAME & PAD.

ZONE	REV	DESCRIPTION	DATE	APPROVED
–	–	–	–	–

FOR: HITEC POWER SYSTEMS
PROJECT:

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/64"
DECIMAL ± .001"

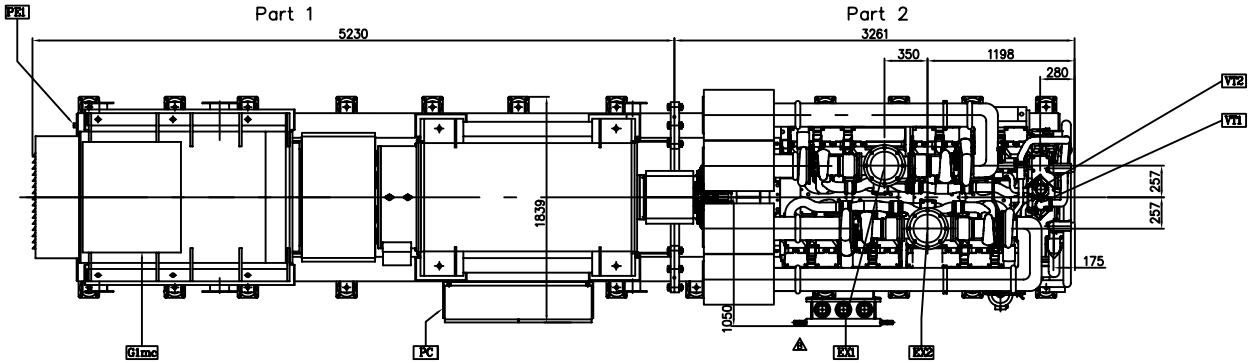
S.C.# [redacted]
DRAWN: X — DATE: X
CHECKED: – — –
DESIGN:

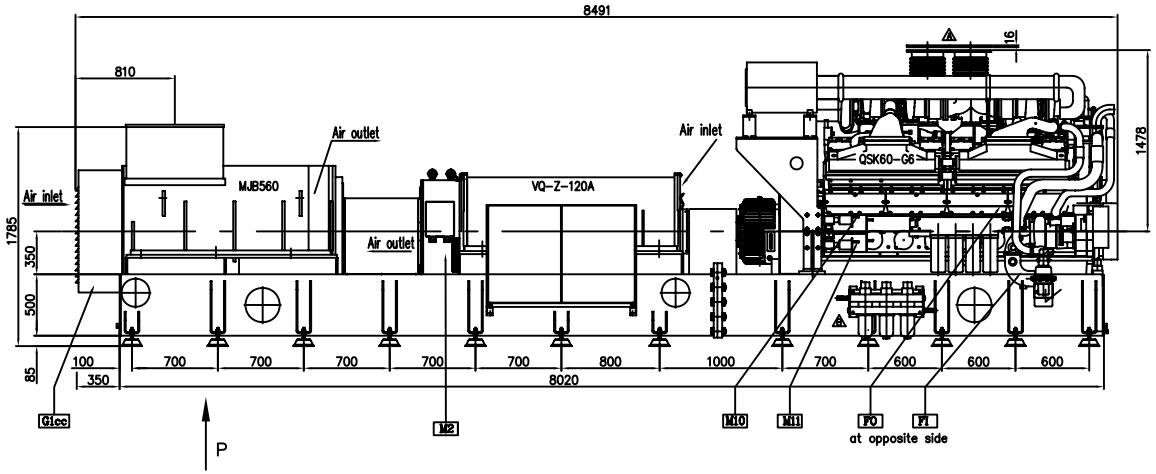
SAMPLE ENCLOSURE

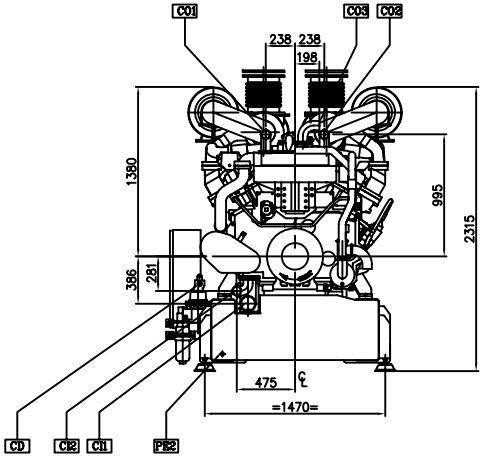
DROP–OVER THERMALLY INSULATED ENCLOSURE GENERAL ARRANGEMENT

DRAWING NO. X — REV. X
SCALE: 1" = 6' — SHEET 01

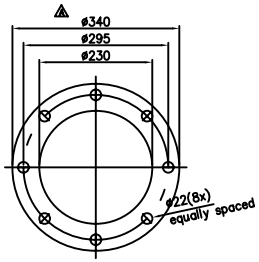
Customer electrical installation			Customer mechanical installation		
Item	Loc.	Remarks	Item	Loc.	Remarks
			CD	F6	Crankcase oil drain
G1mc	C2	Generator main connection	CI1	F6	Coolant inlet ø127
			CI2	F6	Aux/ coolant inlet ø76,2
M2	F3	Connection induction coupling	CO1	D6	Coolant outlet ø76,2
			CO2	D7	Coolant outlet ø76,2
M10	F4	Connection starting motor 1	CO3	D7	Coolant outlet ø76,2
M11	F4	Connection starting motor 2			
PE1	A1	Connection earthing M12			
PE2	F6	Connection earthing M12			
			EX1	C4	Flexible exhaust outlet (Detail D)
PC	C3	PGM box connection	EX2	C5	Flexible exhaust outlet (Detail D)
			FD	F6	Fluid drain 3/4"BSP
			FI	F5	Fuel inlet 1 1/16"-12-2A
			FO	F4	Fuel outlet 1 1/16-12-2A
			OS		Oil supply
			VT1	B6	Coolant vent. line 1.1/16"UNF
			VT2	B6	Intercooler coolant vent. line 1.1/16"UNF



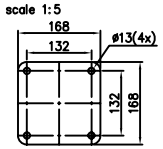




Flexible outlet
detail D
scale 1:5



View P
scale 1:5



Mass Part 1: ±14000 kg
Mass Part 2: ± 9300 kg
Total mass : ±23300 kg

rev.	revision	date	par.	ref. DRW-400142-301	replaces
A	Sheet Rubber added	09-01-2007	H.V.		
B	Fuel filters added	04-07-2007	S.D		

dim. without tolerance: ± 1
ISO 1302
scale 1:20
ISO 1101 ISO 128
Type: MJB560/VQ-Z/QSK60-G6
title: Dimension sketch
Power Module
Unit 4.2 & 4.3 (Left Construction)
drawn 16-05-2007 H.V.
chkd 04-07-2007 S.D.
seen
order
UPS
HITEC Power Protection
dwg.no. DRW-2200326-324
sheet 1 of 2 sh.
rev. B
Hitec Power Protection bv – the Netherlands
A1

Project: Solar Millennium Blythe
KPE #: 2008 - 045

January 26, 2009

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
	Specification Summary			
This specification covers the design, fabrication, testing and delivery of a Diesel UPS/CPS system in accordance with this specification and stated Standards.				
1	**Environmental Parameters**			
1.1	Application	**Indoor**	13.1	
1.2	Location	**Blythe, California U.S.**		
1.3	Altitude (Ft. above MSL)	**395**		
1.4	Ambient Temperature Range (Deg. F)	**33 to 110**		
1.5	Average Ambient Temperature (Deg. F)	**71**		
1.6	Average Relative Humidity (%)	**40%**		
1.7	Seismic Zone	**See Section 1B**		
1.8	Special Seismic Requirements	**Yes**		
1.9	Environment Contamination Level (IEEE Std C57.19.100-1995)	**Medium**		
1.10	Plant Access for Freight			
1.11	Rail	**See Section 1B**		
1.12	Truck	**See Section 1B**		
1.13	Barge	**See Section 1B**		
2	**Drawings Supplied as part of this Specification**			
2.1	General Arrangement	**N/A**		
2.2	Electrical One-Line	**N/A**		
2.3	Other	**N/A**		
3	**General Requirements**			
3.1	Quantity to be Quoted	**One (1)**		
3.2	Max. Output Rating (kVA)	**2200 kVA**		
3.3	Frequency (Hz)	**60 Hz**		
3.4	Input Voltage (kV)	**480 V**		
3.5	Output Voltage (kV)	**480 V**		
3.6	Voltage deviation	**+/- 1%**		
3.7	Voltage asymmetry	**<2%**		
3.8	Harmonic distortion	**<3.5%**		
3.9	Harmonic filtering	**>95%**		
3.10	Frequency deviation	**<0.5%**		
3.11	Short Circuit Current (kA)	**37 kA**		
3.12	Nominal P.F.	**0.8**		
3.13	Efficiency	**>95%**		
3.14	Color Scheme	**RAL 7032**		
3.15	Diesel Engine	**Manufacturer Standard**		
4	**Options**			
4.1	Modular Enclosure for Diesel UPS/CPS Equipment	**Included**		
4.2	Output Configuration	**Single Output**		
5	**Spare Parts**			
5.1	Manufacturer Recommended Start-Up Spare Parts	**Included**		
5.2	Manufacturer Recommended Two-Year Spare Parts	**N/A**		
6	**Commercial Requirements**			
6.1	Supply Bond, 100%, 12 months from date of order	**Included**		
6.2	Warranty, 18 months minimum from date of delivery	**Included**		
6.3	Extended Warranty (5 year)	**N/A**		

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
6.4	Freight to JOBSITE	**Included**		
6.5	Transfer of title at JOBSITE	**Included**		
7	**Required Testing**			
7.1	Manufacturer's Standard Testing:	**Included**		
7.2	Witness Test:	**Option**		
8	**Codes and Standards**			
8.1	Follow All the Latest Applicable Standards and Codes Including but Not Limited To:			
8.2	American National Standards Institute (ANSI)			
8.3	American Society of Testing and Materials (ASTM)			
8.4	Institute of Electrical and Electronic Engineers (IEEE)			
8.5	National Electric Code (NEC)			
8.6	National Electrical Manufacturers Association (NEMA)			
8.7	National Electric Safety Code (NESC)			
8.8	National Fire Protection Association (NFPA)			
8.9	Underwriters Laboratories (UL)			
8.10	Occupational Safety & Health Act (OSHA)			
9	**Data to be supplied by Vendor**			
9.1	Overall Dimensions of UPS/CPS (Length x Width x Height)	see drawing		
9.2	Enclosure Dimensions (Length x Width x Height)	see drawing		
9.3	Max. Output Rating (kVA)	2200		
9.4	Frequency (Hz)	60		
9.5	Input Voltage (kV)	480		
9.6	Output Voltage (kV)	480		
9.7	Voltage deviation	±1%		
9.8	Voltage asymmetry	<2%		
9.9	Harmonic distortion	<3.5% linear load		
9.10	Harmonic filtering	>95%		
9.11	Frequency deviation	typically set to go to diesel at ±0.5%		
9.12	Short Circuit Current (kA)	up to 14X		
9.13	Nominal P.F.	0.8		
9.14	Efficiency	>95% @ FL		
9.15	Color Scheme	RAL7032 & RAL 5012; engine std manufacturer color		
9.16	Diesel Engine	Cummins QSK60-G6		
9.17	Rear Access Required?	for swgr		
9.18	Additional Aux Power Requirements?	NA, power rating is net		
10	**Training and Start-up Supervision**			
10.1	Unit Rates ($/Man Hour)	NA		
10.2	Expenses, meals, lodging, auto, travel included	NA		
10.3	Recommended Erection Assistance (8hr Days)	included		
10.4	Recommended Training Period (8hr Days)	2 days, included		
11	**Commercial & Delivery**			
11.1	Site Delivery Time From Receipt of Order (Weeks)	30 weeks ARO		
11.2	Place of Manufacture (City, State, Country)	Almelo, NL for CPS; other matl USA		
11.3	Transfer of Title (Jobsite, Port of Entry, or Other)	**JOBSITE**		
11.4	Period of Quote Validity (days):	budgetary		
11.5	Date of Quotation	2/11/2009		
12	**Quotation Cost Breakdown Requirements**			

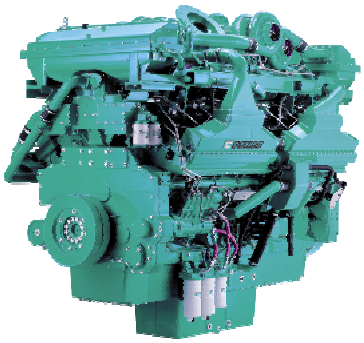
SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
	Manufacturer:	**Hitec Power Protection**		
	Show cost of each listed item:	**(rounded)**		
12.1	ELECTRICAL EQUIPMENT:	**$1,574,000**		
12.2	EQUIPMENT ENCLOSURE:	**$300,000**		
12.3	STARTUP/ERECTION ASSISTANCE: commissioning/site tests	**$160,000**		
12.4	TRAINING:	**$7,000**		
12.5	SPARE PARTS SPECIFIED:	**incl in equipment**		
12.6	START-UP SPARE PARTS:	**incl in equipment**		
12.7	TWO-YEAR SPARE PARTS:	**N/A**		
12.8	FREIGHT:	**$87,000**		
12.9	100% SUPPLY BOND:	**$12,000**		
12.10	CUSTOMS/DUTIES AND IMPORT FEES:	**$35,000**		
12.11	OTHER COSTS NOT LISTED (DESCRIBE):			
12.12	TOTAL, D.D.P. JOBSITE: Budgetary	**$2,175,000**		

13	**Additional Comments**
13.1	Quote shall include price for standalone modular building enclosure. Layout shall be typical and Manufacturer shall provide proposed layout drawing.
13.2	
13.3	
13.4	
13.5	

QSK60-G6

Emissions Compliance
EPA Tier 2 @ 60Hz



> Specification sheet

Our energy working for you.™

Description

The QSK60 is a V 16 cylinder engine with a 60 litre displacement. This Quantum series utilizes sophisticated electronics and premium engineering to provide outstanding performance levels, reliability and versatility for Standby, Prime and Continuous Power applications.

CE	This engine has been built to comply with CE certification.
ISO 9001	This engine has been designed in facilities certified to ISO9001 and manufactured in facilities certified to ISO9001 or ISO9002.

Features

High pressure fuel pump, Modular Common Rail fuel System (MCRS) and state of the art integrated electronic control system provide superior performance, efficiency and diagnostics. The electronic fuel pumps deliver up to 1600 bar injection pressure and eliminate mechanical linkage adjustments. The new MCRS utilizes an electric priming pump which is integrated with the off-engine stage-1 fuel filter head and is controlled and powered by the engine ECM. The stage-2 fuel filters are mounted on-engine

CTT (Cummins Turbo Technologies) HX82/HX83 turbo-charging utilizes exhaust energy with greater efficiency for improved emissions and fuel consumption.

Low Temperature After-cooling - Two-pump Two-loop (2P2L)

Ferrous Cast Ductile Iron (FCD) Pistons - High strength design delivers superior durability.

G-Drive Integrated Design - Each component has been specifically developed and rigorously tested for G-Drive products, ensuring high performance, durability and reliability.

Service and Support - G-Drive products are backed by an uncompromising level of technical support and after sales service, delivered through a world class service network.

1800 rpm (60 Hz Ratings)

Gross Engine Output			Net Engine Output			Typical Generator Set Output					
Standby	Prime	Base	Standby	Prime	Base	Standby (ESP)		Prime (PRP)		Base (COP)	
kWm/BHP			kWm/BHP			kWe	kVA	kWe	kVA	kWe	kVA
2180/2923	1975/2648	1740/2333	2120/2843	1937/2598	1702/2282	2000	2500	1825	2281	1633	2042

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www.cumminsgdrive.com

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(01/08) (GDSS169)

General Engine Data

Type	4 cycle, Turbocharged, After-cooled
Bore mm	159
Stroke mm	190
Displacement Litre	60.2
Cylinder Block	Cast iron, 16 cylinder
Battery Charging Alternator	55A
Starting Voltage	24V
Fuel System	Direct injection Cummins MCRS
Fuel Filter	Spin on fuel filters with water separator
Lube Oil Filter Type(s)	Spin on full flow filter
Lube Oil Capacity (l)	280
Flywheel Dimensions	SAE 0

Coolpac Performance Data

Cooling System Design	2 pump - 2 loop
Coolant Ratio	50% ethylene glycol; 50% water
Coolant Capacity (l)	Engine only – not applicable
Limiting Ambient Temp.**	
Fan Power	
Cooling System Air Flow (m^3/s)**	
Air Cleaner Type	Dry replaceable element with restriction indicator

** @ 13 mm H^2O

Ratings Definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN6271 and BS 5514.

Weight & Dimensions

Length mm	Width mm	Height mm	Weight (dry) kg
2781	1794	2155	7185

Fuel Consumption 1800 (60 Hz)

%	kWm	BHP	L/ph	US gal/ph
Standby Power				
100	2180	2922	536	141.4
Prime Power				
100	1975	2647	470	124.1
75	1481	1985	381	100.6
50	987	1324	285	75.1
25	494	662	165	43.5
Continuous Power				
100	1740	2332	423	111.6

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(01/08) (GDSS169)

California Environmental Protection Agency AIR RESOURCES BOARD	CUMMINS INC.	EXECUTIVE ORDER U-R-002-0523 New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engines and emission control systems produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2010	ACEXL060.AAD	60.0	Diesel	8000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Direct Diesel Injection, Turbocharger, Charge Air Cooler, Engine Control Module	Generator Set

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for hydrocarbon (HC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kw-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kw-hr)					OPACITY (%)		
			HC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
kW > 560	Tier 2	STD	N/A	N/A	6.4	3.5	0.20	N/A	N/A	N/A
		CERT	--	--	5.4	0.5	0.09	--	--	--

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 23 day of July 2009.

Annette Hebert, Chief
Mobile Source Operations Division

Engine Model Summary Template

U-12-002-0523
Attachment
7/8/2009

Engine Family	1.Engine Code	2.Engine Model	3.BHP@RPM (SAE Gross)	4.Fuel Rate: mm/stroke @ peak HP (for diesel only)	5.Fuel Rate: (lbs/hr) @ peak HP (for diesels only)	6.Torque @ RPM (SEA Gross)	7.Fuel Rate: mm/stroke@peak torque	8.Fuel Rate: (lbs/hr)@peak torque	9.Emission Control Device Per SAE J1930
ACEXL060.AAD	0930:FR6526	QSK60-G	2922@1800	629	1017.9	N/A	N/A	N/A	DDI,ECM,TC,CAC
ACEXL060.AAD	0930:FR6528	QSK60-G	3251@1800	702	1137	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2769:FR6602	QSK60-G	2922@1800	620	1003.3	NA	NA	NA	DDI,ECM,TC,
ACEXL060.AAD	2769:FR6671	QSK60-G	2922@1800	620	1003.3	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2769:FR6684	QSK60-G	2922@1800	620	1003.3	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6646	QSK60-G	2922@1800	634	1025.6	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6646	QSK60-G	2332@1500	586	790	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6682	QSK60-G	2785@1800	597	966.9	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6682	QSK60-G	2255@1500	554	747.2	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	3141:FR6644	QSK60-G	2922@1800	616	997	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	3143:FR6645	QSK60-G	3315@1800	702	1137	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	3178:FR6665	QSK60-G	2705@1500	676	911.6	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	8595:FR6525	QSK60-G	2922@1800	634	1026.1	NA	NA	NA	DDI,ECM,TC,
ACEXL060.AAD	8595:FR6525	QSK60-G	2334@1500	590	796.3	NA	NA	NA	DDI,ECM,TC,
ACEXL060.AAD	8595:FR6528	QSK60-G	3251@1800	702	1137	N/A	N/A	N/A	DDI,ECM,TC,

Appendix C

Ultra Low Sulfur Diesel MSDS

Material Safety Data Sheet

MSDS ID NO.: 0290MAR019
Revision date: 10/23/2009

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon No. 2 Ultra Low Sulfur Diesel 15 ppm Sulfur Max
Synonym: Ultra Low Sulfur Diesel No. 2 15 ppm Sulfur Max; Ultra Low Sulfur Diesel No. 2 15 ppm Sulfur Max with Polar Plus; No. 2 Diesel, Motor Vehicle Use, Undyed; No. 2 Diesel, Motor Vehicle Use, Undyed, with Polar Plus; ULSD No. 2 Diesel 15 ppm Sulfur Max; ULSD No. 2 Diesel 15 ppm Sulfur Max with Polar Plus; No. 2 MV 15 Diesel; No. 2 MV 15 Diesel with Polar Plus.
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

No. 2 Ultra Low Sulfur Diesel is a complex mixture of paraffins, cycloparaffins, olefins and aromatic hydrocarbon chain lengths predominantly in the range of C9-C16. Can contain small amounts of dye and other additives (<0.15%) which are not considered hazardous at the concentrations used.

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon No. 2 Ultra Low Sulfur Diesel	68476-30-2	100			

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Saturated Hydrocarbons	Mixture	70-80			
Aromatic Hydrocarbons	Mixture	17-25			
Unsaturated Hydrocarbons	Mixture	3-6			
Naphthalene	91-20-3	0.01-0.5	= 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m^3 TWA = 15 ppm STEL = 75 mg/m^3 STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

NO. 2 DIESEL IS A COLORLESS LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. PROLONGED OR REPEATED SKIN CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS.

OSHA WARNING LABEL:

WARNING.
COMBUSTIBLE LIQUID.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to high vapor concentrations may produce headache, giddiness, vertigo, and anesthetic stupor.

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Produces little or no irritation on direct contact with the eye.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon No. 2 Ultra Low Sulfur Diesel 68476-30-2	NE			

Notes: The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of diesel fuel/fuel oil in humans. IARC determined that there was limited evidence for the carcinogenicity of marine diesel fuel in animals. Distillate (light) diesel fuels were not classifiable as to their carcinogenicity to humans (Group 3A).

IARC has determined that there is sufficient evidence for the carcinogenicity in experimental animals of diesel engine exhaust and extracts of diesel engine exhaust particles. IARC determined that there is only limited evidence for the carcinogenicity in humans of diesel engine exhaust. However, IARC's overall evaluation has resulted in the IARC designation of diesel engine exhaust as probably carcinogenic to humans (Group 2A) because of the presence of certain engine exhaust components.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Naphthalene 91-20-3	Monograph 82 [2002]	Reasonably Anticipated To Be A Human Carcinogen male rat-clear evidence; female rat-clear evidence; male mice-no evidence; female mice-some evidence	A4 - Not Classifiable as a Human Carcinogen	Present

Notes: The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Keep surrounding area cool with water spray from a distance and prevent further ignition of combustible material. Keep run-off water out of sewers and water sources.

Flash point: 120-190 F
Autoignition temperature: 489 F
Flammable limits in air - lower (%): 0.7
Flammable limits in air - upper (%): 5.0

NFPA rating:
Health: 1
Flammability: 2
Instability: 0
Other: -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:
Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Avoid repeated and prolonged skin contact. Never siphon this product by mouth. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Respiratory protection: Use approved organic vapor chemical cartridge or supplied air respirators when material produces vapors that exceed permissible limits or excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride and polyurethane gloves to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Colorless

9. PHYSICAL AND CHEMICAL PROPERTIES:

Odor:	Not applicable.
Molecular weight:	180
pH:	Neutral
Boiling point/range (5-95%):	360-550 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	C.A. 0.8
Density:	6.76 lbs/gal
Bulk density:	No data available.
Vapor density:	4-5
Vapor pressure:	1-10 mm Hg @ 100 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	10%
Viscosity:	1.3-2.1 @ 50 C

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
Materials to avoid:	Strong oxidizers such as nitrates, perchlorates, chlorine, fluorine.
Conditions to avoid:	Excessive heat, sources of ignition and open flames.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon No. 2 Ultra Low Sulfur Diesel	68476-30-2	No data available	No data available	No data available

Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies. Some components of this product, have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the kidney damage develops via the formation of a alpha-2µ-globulin, a mechanism unique to the male rat. Humans do not form alpha-2µ-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in humans. Some components of this product were found to be positive in a few mutagenicity tests while negative in the majority of others. The exact relationship between these results and human health is not known.

Summary of health effect data on distillate fuel components:

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused an increased incidence in lung tumors in female mice. Exposure to 30-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and upper respiratory tract in male and female rats. Evidence of inflammation and tissue injury in target tissues (female mouse lung and rat nose) indicated that cytotoxicity played a significant role in the tumor response. Oral administration of 133-267 mg/kg/day of naphthalene in mice for up to 90 days did not produce mortality, systemic toxicity, adversely affect organ or body weight or produce changes in blood. Repeated oral administration of naphthalene produced an anemia in dogs. Repeated intraperitoneal doses of naphthalene produced lung damage in mice. Repeated high doses of naphthalene has caused the formation of cataracts and retinotoxicity in the eyes of rats and rabbits due to accumulation of 1,2-naphthoquinone, a toxic metabolite. Effects in human eyes is uncertain and not well documented. Pregnant rats administered intraperitoneal doses of naphthalene during gestation gave birth to offspring that had delayed heart and bone development. Pregnant mice given near lethal doses of naphthalene showed no significant maternal toxicity and a reduction in the number of pups per litter, but no gross abnormalities in offspring. Suppressed spermatogenesis and progeny development have been reported in mice, rats and guinea pigs after exposure to high concentrations of naphthalene in their drinking water. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Summary of health effect information on diesel engine exhaust:

Chronic inhalation studies of whole diesel engine exhaust in mice and rats produced a significant increase in lung tumors. Combustion of kerosine and/or diesel fuels produces gases and particulates which include carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur and hydrocarbons. Significant exposure to carbon monoxide vapors decreases the oxygen carrying capacity of the blood and may cause tissue hypoxia via formation of carboxyhemoglobin.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: Product can cause fouling of shoreline and may be harmful to aquatic life in low concentrations. The 96 hour LL50 values for an accomadated fraction (WAF) of fuel oil ranged from 3.2 to 65 mg/l in fish and 2-210 mg/l in invertebrates. EL50 values for inhibition of algal growth ranged from 1.8 to 2.9 mg/l for No. 2 fuel oil and from 10 to 78 mg/l for diesel fuel. This product does not concentrate or accumulate in the food chain. If released to soil and water, this product is expected to biodegrade under both aerobic and anaerobic conditions.

13. DISPOSAL CONSIDERATIONS

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "characteristic" hazardous waste. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Fuel Oil, No. 2
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
DOT reportable quantity (lbs): Not applicable.

TDG (Canada):

Proper shipping name: Fuel Oil, No. 2
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
Regulated substances: Not applicable.

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	= 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312 The following EPA hazard categories apply to this product:

Acute Health Hazard
Fire Hazard
Chronic Health Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Saturated Hydrocarbons	None
Aromatic Hydrocarbons	None
Unsaturated Hydrocarbons	None
Naphthalene	= 0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Saturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Aromatic Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed

Saturated Hydrocarbons

Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Unsaturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen, initial date 4/19/02
New Jersey Right-To-Know:	sn 1322
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 1322 TPQ 500 lb
Illinois - Toxic Air Contaminants	Present

Saturated Hydrocarbons

New York - Reporting of Releases Part 597 -	= 1 lb RQ	land/water
List of Hazardous Substances:	= 100 lb RQ	air

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Naphthalene	B4, D2A	1 %

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Mark S. Swanson, Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Appendix D

Emissions Calculations

Emergency Engine Criteria Pollutant Emission Calculations

Table D.1 Diesel ICE Emission Factors	
Pollutant	Emergency Generator
	EPA Tier 2[1]
	Emission Factors (g/bhp-hr)
NOx[2]	4.56
NMHC (VOC)[2]	0.24
CO	2.6
PM10	0.15

Table D.2 Reference Data		
Parameter	Value	Units
Horsepower	2922	hp
Daily Hours	1	hr/dy
Annual Hours	50	hr/year
Fuel Consumption	7,000	Btu/hp-hr
Fuel Use	141.4	gal/hr
Sulfur Content	15	ppmw
Heating Value Diesel	137,000	Btu/gal
Density Diesel	7.2	lb/gal
Conversion kg to lbs	0.454	kg/lb
Conversion g to lbs	454	g/lb
Conversion lb to tons	2,000	lb/ton
Conversion lb to metric tons	2,205	lb/metric ton
Molecular Weight S	32	lb/mol
Molecular Weight SO_2	64	lb/mol

Table D.3 Emissions for One Diesel Powered Emergency Generator				
Pollutant	Emission Factor (g/bhp-hr)	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (lb/yr)
NOx	4.56	29.35	29.35	0.73
VOC	0.24	1.54	1.54	0.039
CO	2.6	16.73	16.73	0.42
PM10	0.15	0.97	0.97	0.024
DPM	0.15	0.97	0.97	0.024
SOx	---	0.031	0.031	0.001

Notes:

[1]Subpart III of 40 CFR Part 60 - Certification Requirements for Stationary Fire Pump Engines and Non Fire Pump Engines for model year 2009 and later

[2]Emission limit for NMHC+NOx assuming 95% NOx

Preliminary Civil Construction Plans

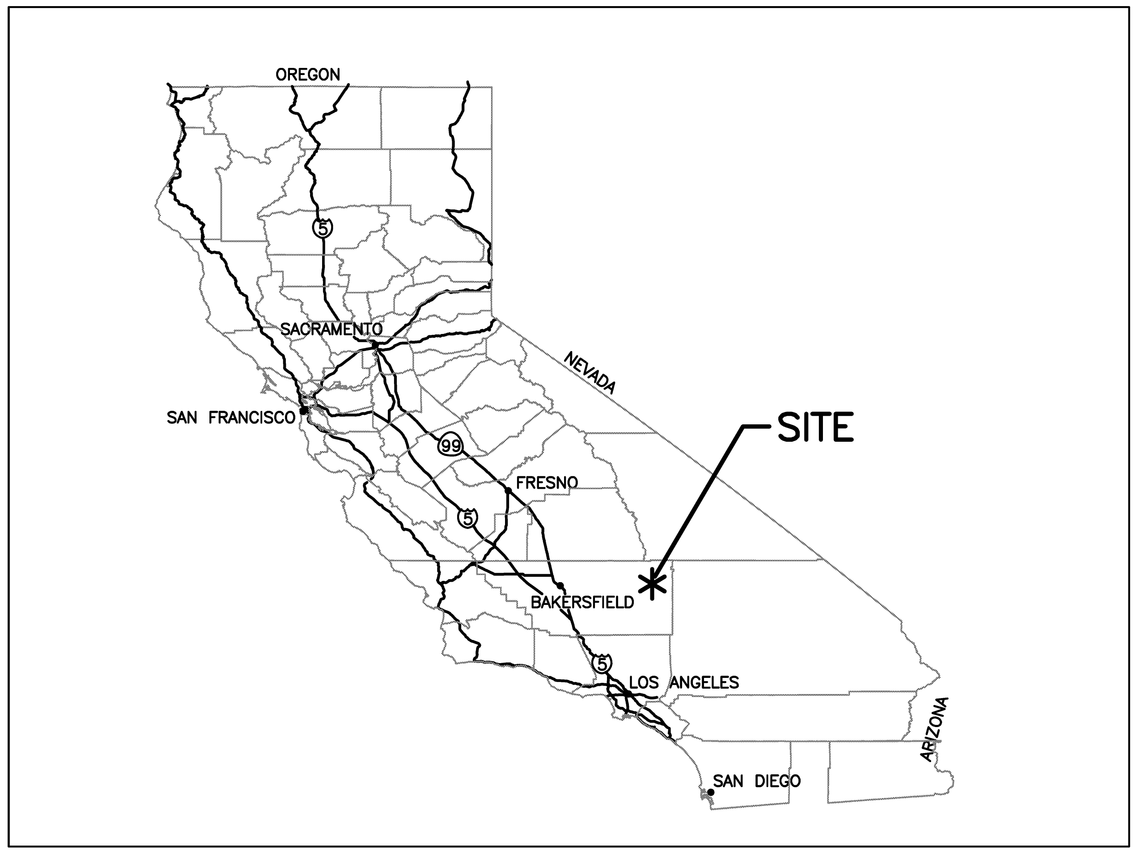
for

Bureau of Land Management Permitting Documents - Access Roads, Drainage and Erosion Control

for

Ridgecrest Solar Power Project

Kern County California
A Development of Solar Millennium LLC



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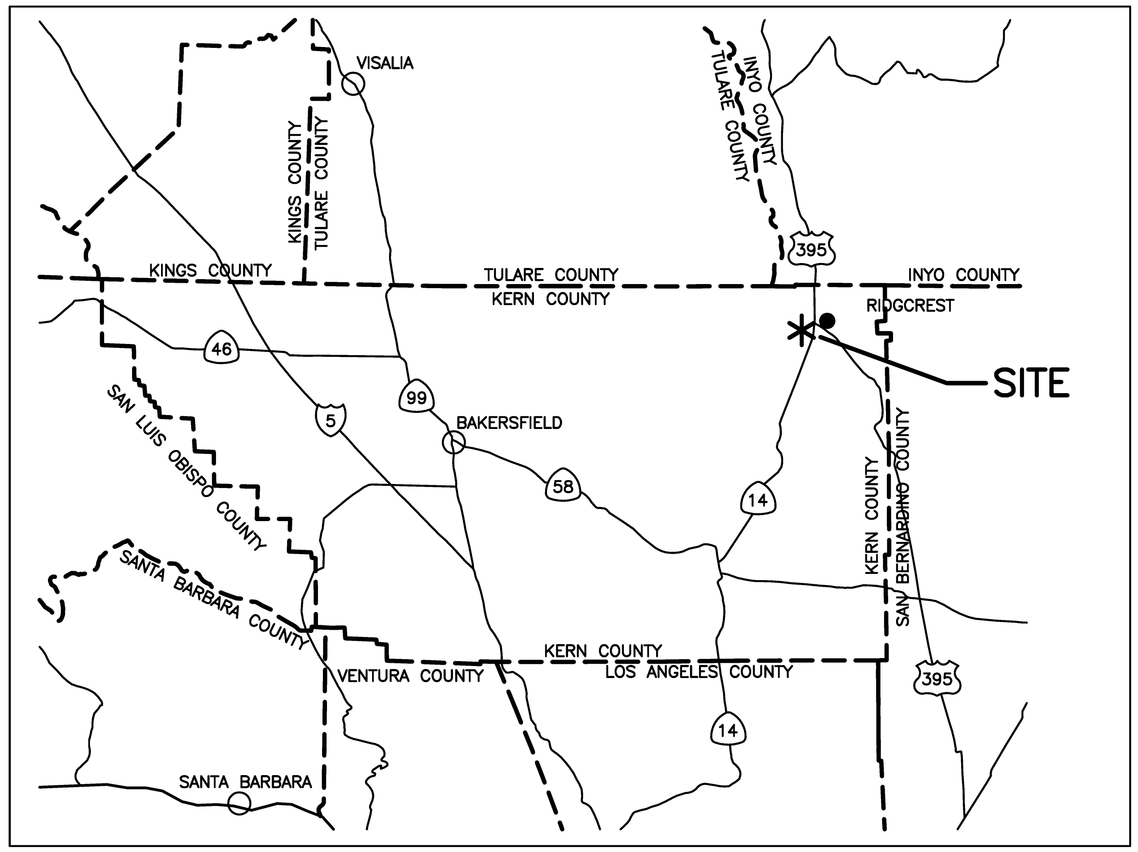

VICINITY MAP

SHEET INDEX	
SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	SITE BOUNDARY AND LEGEND
3	PRELIMINARY SITE PLAN
4	PRELIMINARY OVERALL GRADING PLAN
5	PRELIMINARY GRADING PLAN (FIELD 1)
6	PRELIMINARY GRADING PLAN (FIELD 1)
7	PRELIMINARY GRADING PLAN (FIELD 2)
8	TYPICAL DETAILS – SECTIONS
9	TYPICAL CROSS – SECTIONS
10	TYPICAL SECTIONS EAST – WEST (NORTH FIELD)
11	TYPICAL SECTIONS EAST – WEST (NORTH FIELD)
12	TYPICAL SECTIONS EAST – WEST (SOUTH FIELD)
13	TYPICAL SECTIONS EAST – WEST (SOUTH FIELD)
14	TYPICAL SECTIONS NORTH – SOUITH (NORTH AND SOUTH FIELD)
15	CHANNEL PROFILES – EAST CHANNEL, NORTH FIELD
16	CHANNEL PROFILES – EAST CHANNEL, NORTH FIELD
17	CHANNEL PROFILES – EAST CHANNEL, NORTH FIELD
18	CHANNEL PROFILES – EAST CHANNEL, NORTH FIELD
19	CHANNEL PROFILES – WEST CHANNEL, SOUTH FIELD
20	CHANNEL PROFILES – WEST CHANNEL, SOUTH FIELD
21	CHANNEL PROFILES – NORTH FIELD, 1 OF 2
22	CHANNEL PROFILES – NORTH FIELD, 2 OF 2
23	ONSITE ELECTRICAL POWER PLAN
24	ROAD PLAN
25	FENCING PLAN
26	WATER MAIN PLAN
27	ONSITE TELECOMMUNICATION PLAN
28	EROSION CONTROL PLAN
29	ERSOSION CONTROL DETAILS
30	INTERCEPTION CHANNELS AT EMBANKMENT
31	DROP STRUCTURE AND CHANNEL PROTECTION DETAIL
32	ACCESS INTERSECTION AT US 395
33	HTF PIPE CROSSING AT BROWN ROAD
34	HTF PIPE BRIDGE AT EL PASO WASH

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Drawn: K. S. BEDFORD
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Revisions:

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Kern County, California

Cover Sheet

Date: 02/10/10
Sheet: 01 of 34

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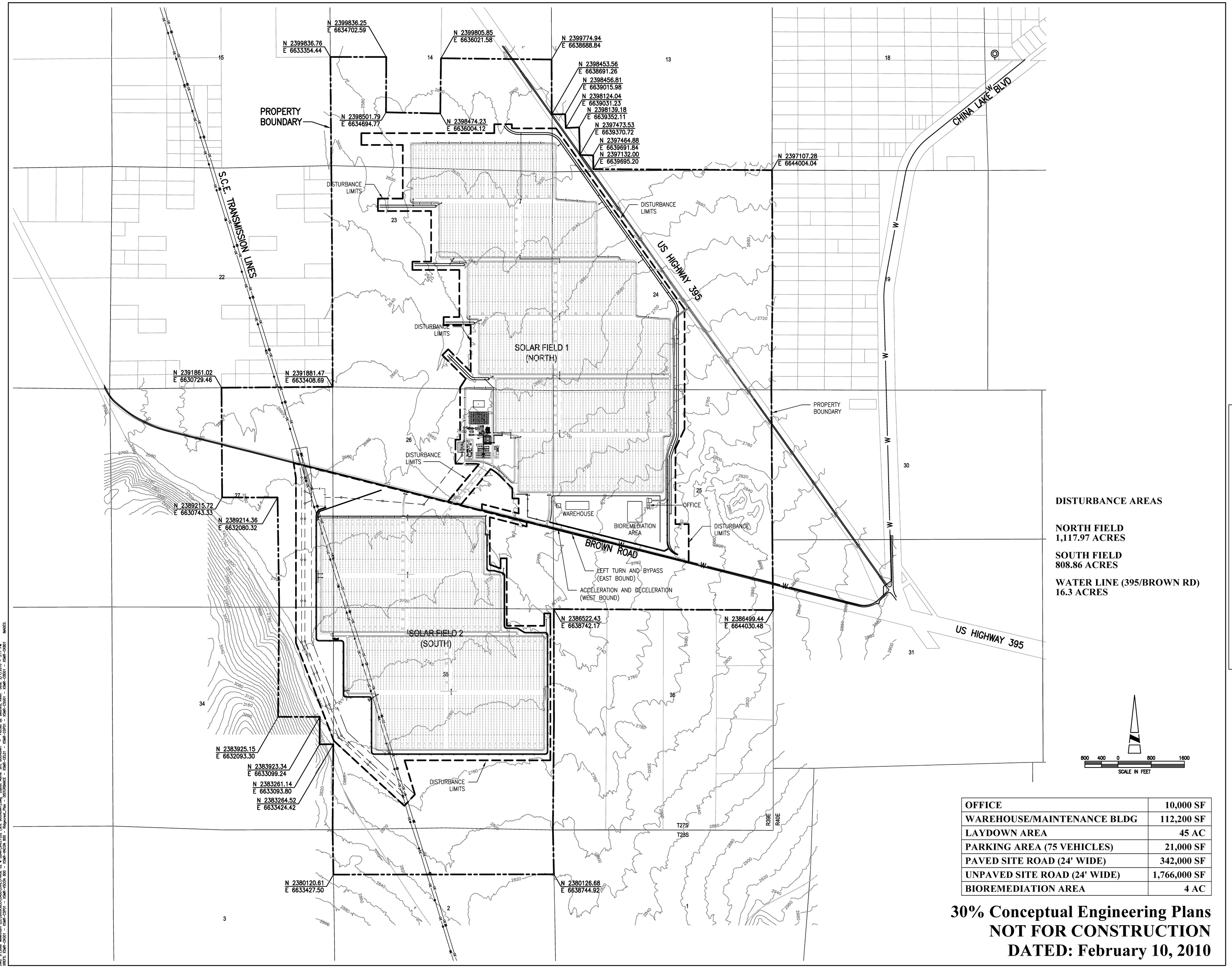

DISTURBANCE AREAS

NORTH FIELD
1,117.97 ACRES

SOUTH FIELD
808.86 ACRES

WATER LINE (395/BROWN RD)
16.3 ACRES

800 400 0 800 1600
SCALE IN FEET

OFFICE	10,000 SF
WAREHOUSE/MAINTENANCE BLDG	112,200 SF
LAYDOWN AREA	45 AC
PARKING AREA (75 VEHICLES)	21,000 SF
PAVED SITE ROAD (24' WIDE)	342,000 SF
UNPAVED SITE ROAD (24' WIDE)	1,766,000 SF
BIOREMEDIATION AREA	4 AC

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LEGEND:

- SOLAR FIELD PARABOLIC TROUGH
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- HEADER PIPING
- ACCELERATION LANE
- DECELERATION LANE
- DISTURBANCE LIMITS

Ridgecrest Solar Power Project

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Site Boundary and Legend

Date: 02/10/10
Sheet: 02 of 34

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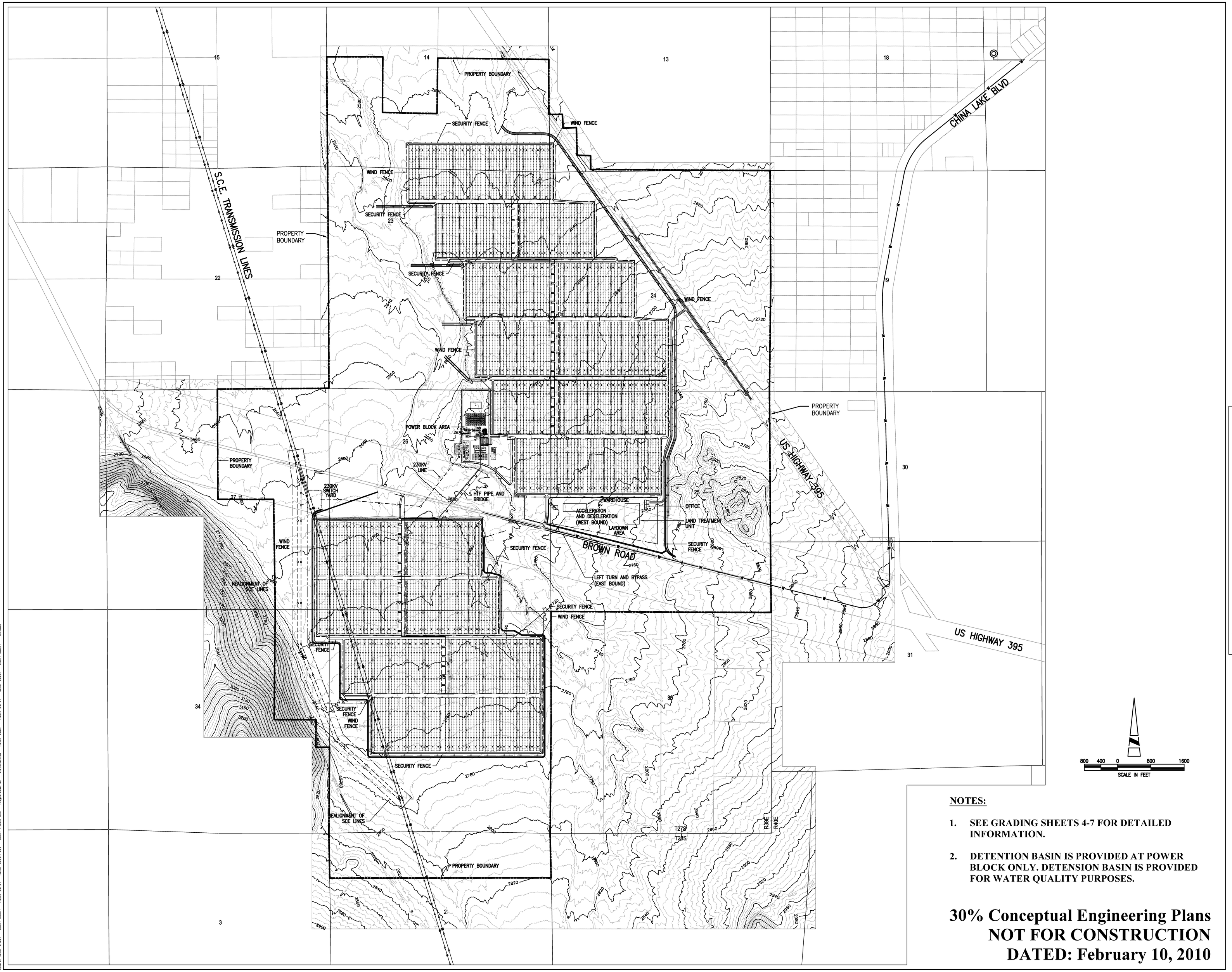

NOTES:

1. SEE GRADING SHEETS 4-7 FOR DETAILED INFORMATION.
2. DETENTION BASIN IS PROVIDED AT POWER BLOCK ONLY. DETENSION BASIN IS PROVIDED FOR WATER QUALITY PURPOSES.

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Preliminary Site Plan

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Sheet: 03 of 34

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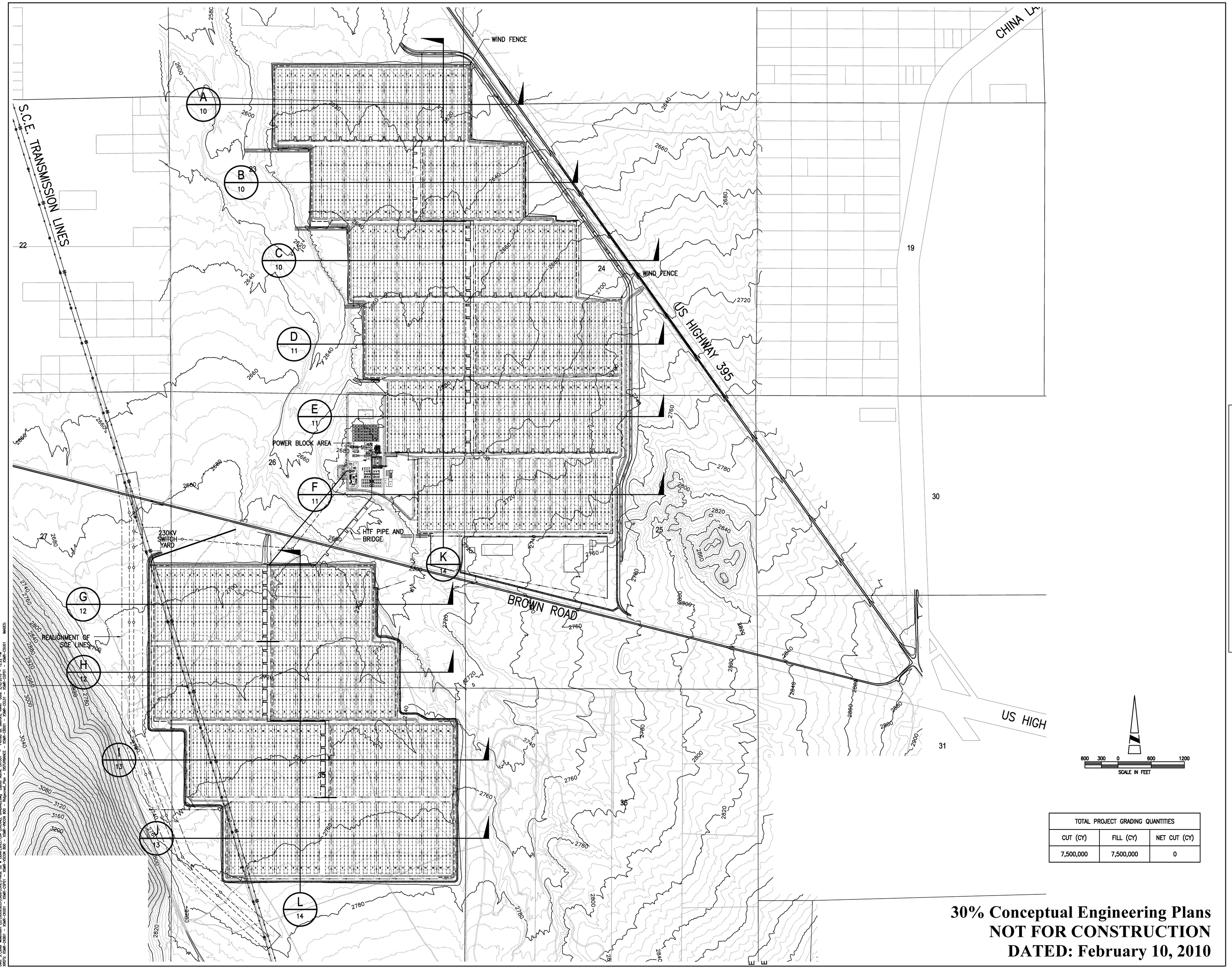

TOTAL PROJECT GRADING QUANTITIES		
CUT (CY)	FILL (CY)	NET CUT (CY)
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Ridgecrest Solar Power Project

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Preliminary Overall Grading Plan

Date: 02/10/10
Sheet: 04 of 34

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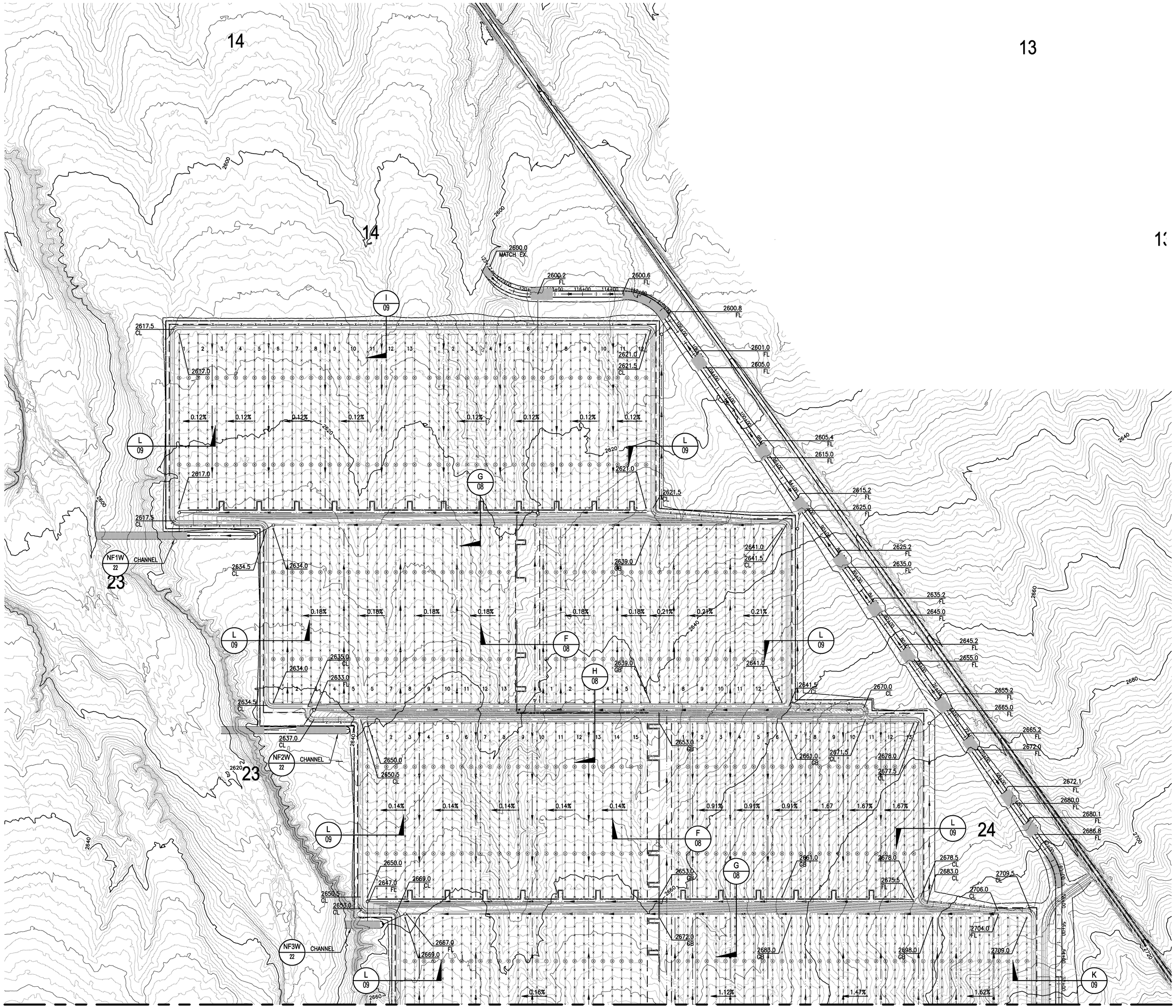

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Ridgecrest Solar Power Project

Kern County, California

Preliminary Grading Plan 01

Date: 02/10/10
Sheet: 05 of 34

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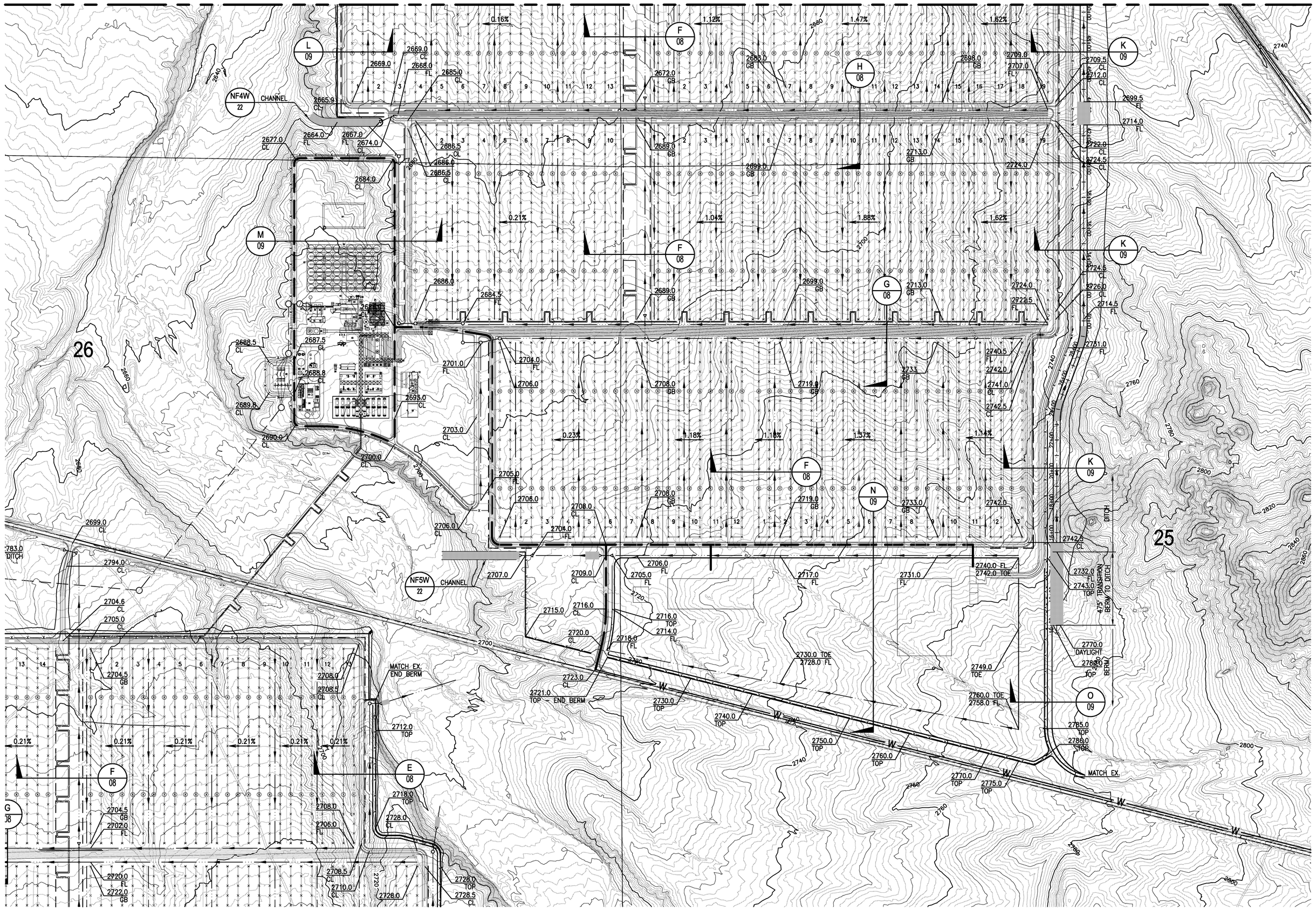

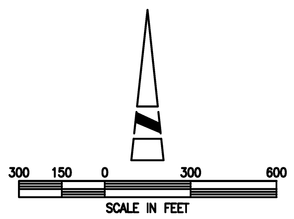

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Ridgecrest Solar Power Project

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Preliminary Grading Plan 02

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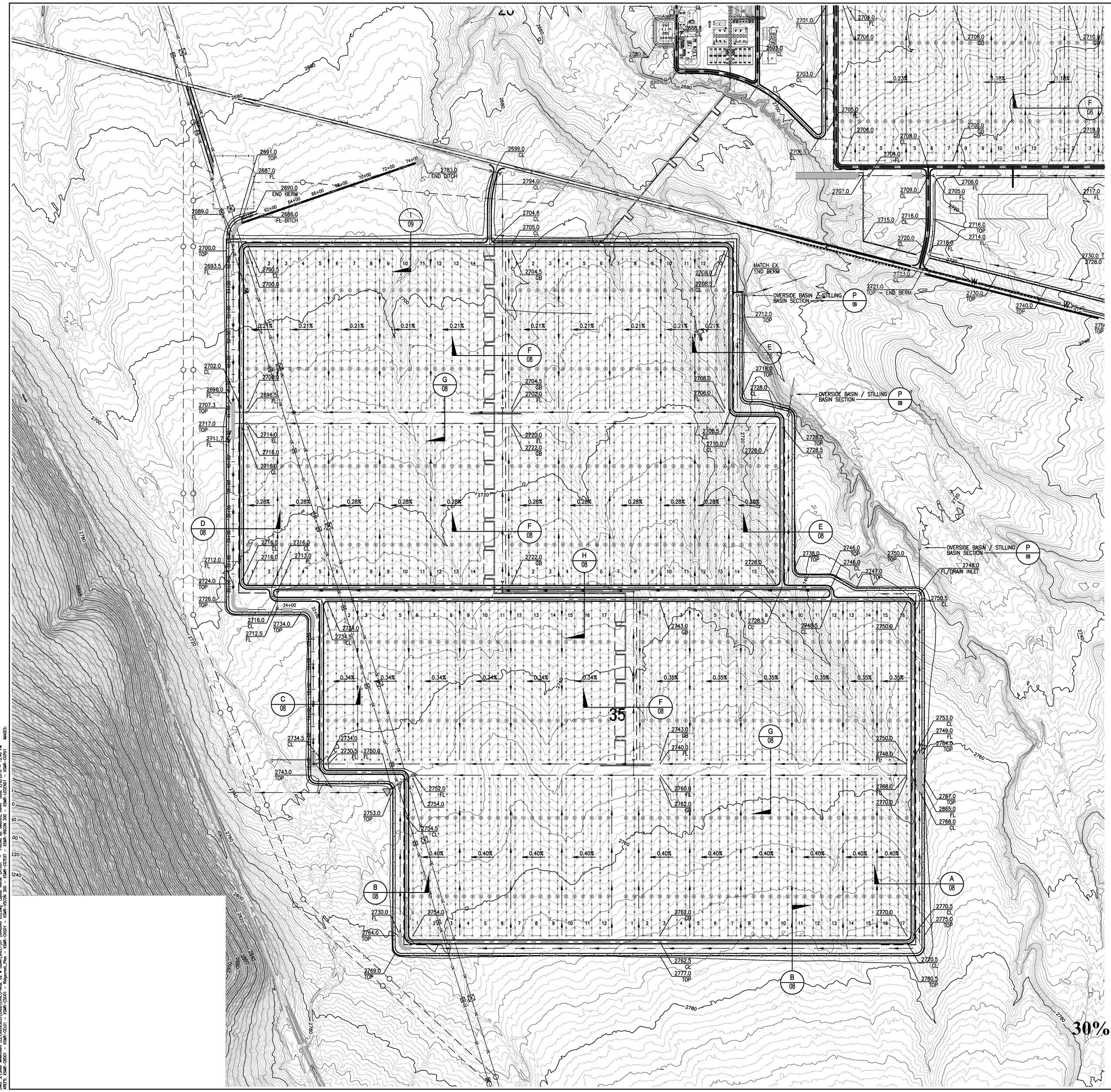

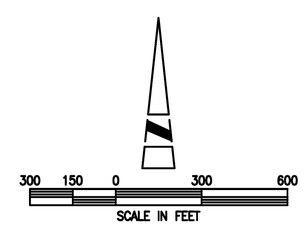

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Ridgecrest Solar Power Project

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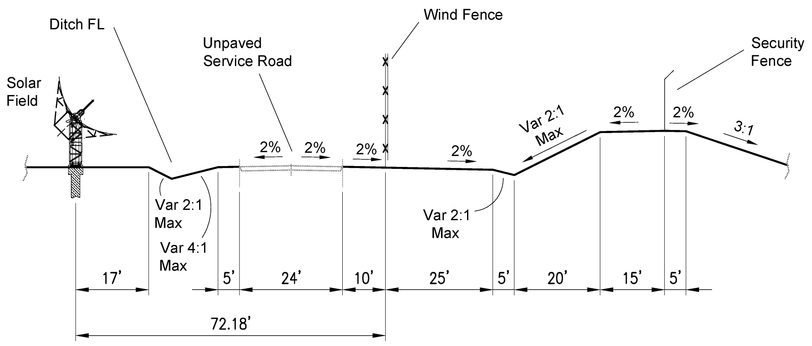
Preliminary Grading Plan 03

Date: 02/10/10
Sheet: 07 of 34



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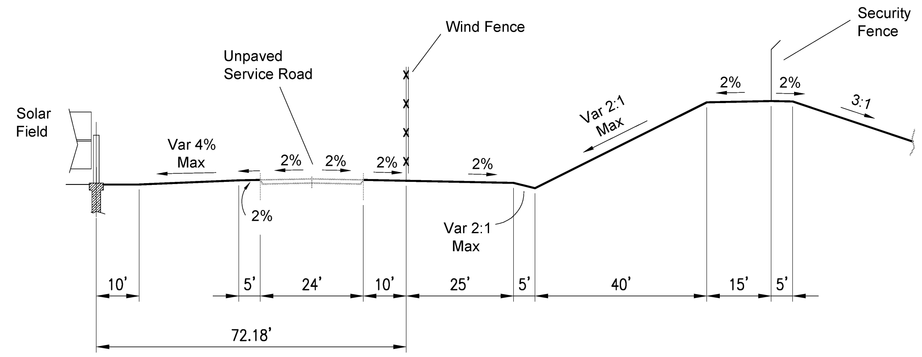

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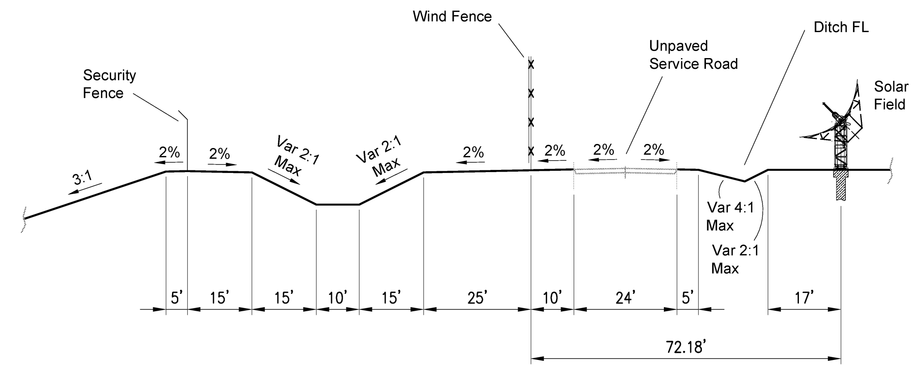

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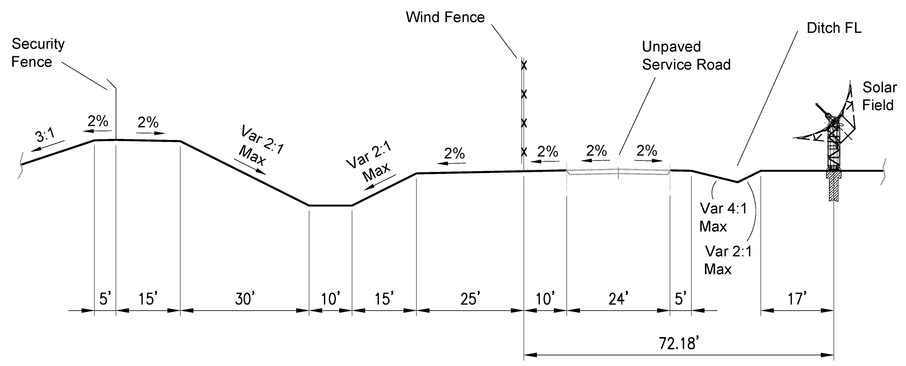

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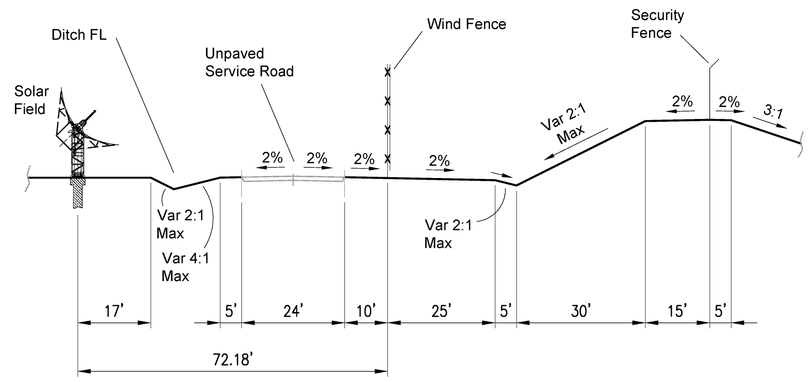

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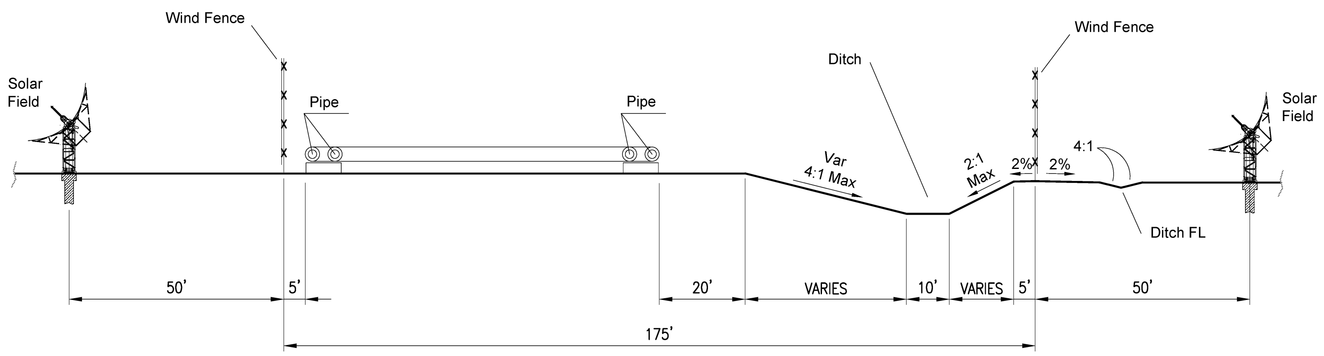

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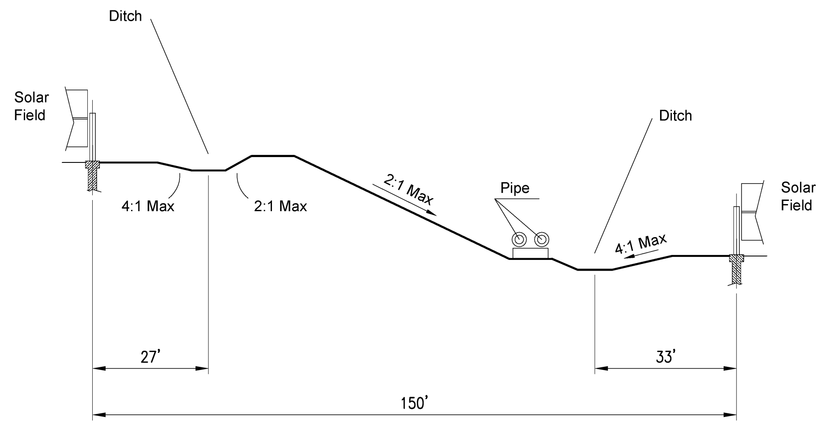

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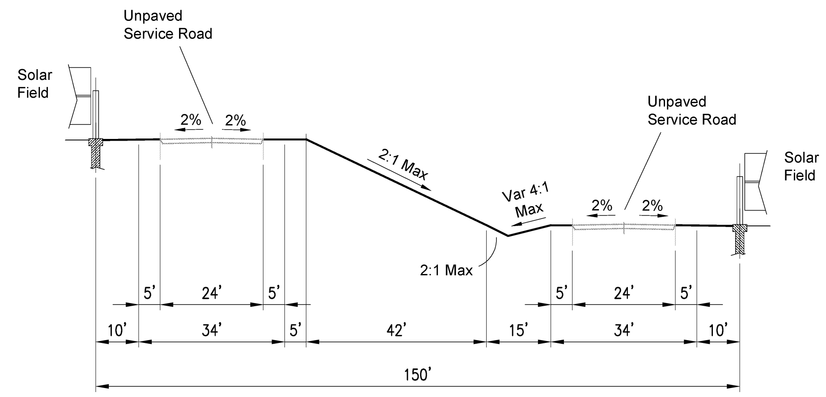

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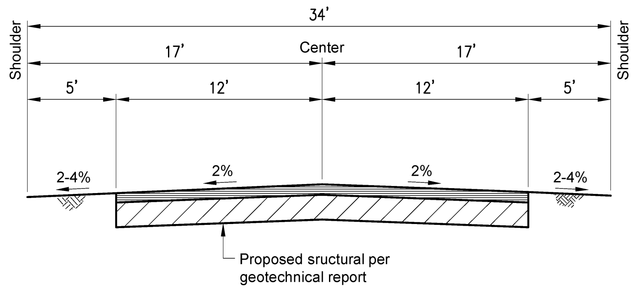
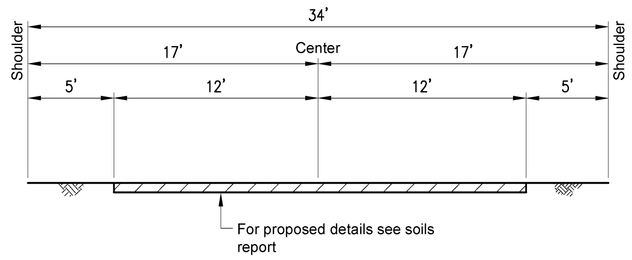


TYPICAL PAVED ROAD SECTION
SCALE: 1"=5'



TYPICAL GRADED ROAD SECTION
SCALE: 1"=5'

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DATED: February 10, 2010

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Drawn: K. S. BEDFORD
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Typical Details - Sections

Date: 02/10/10
Sheet: 08 of 34

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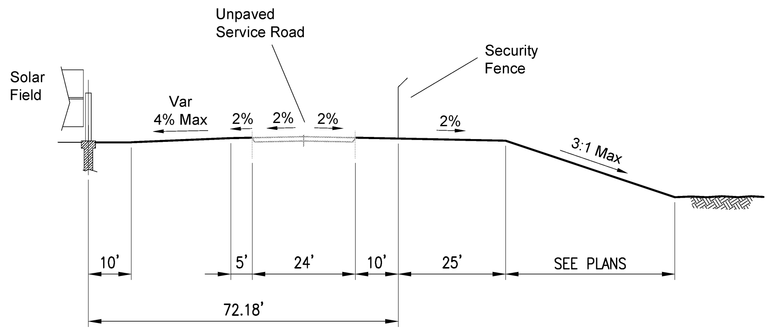

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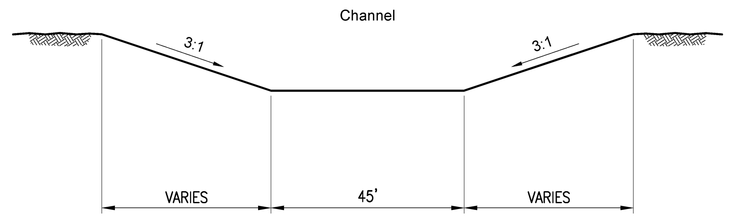

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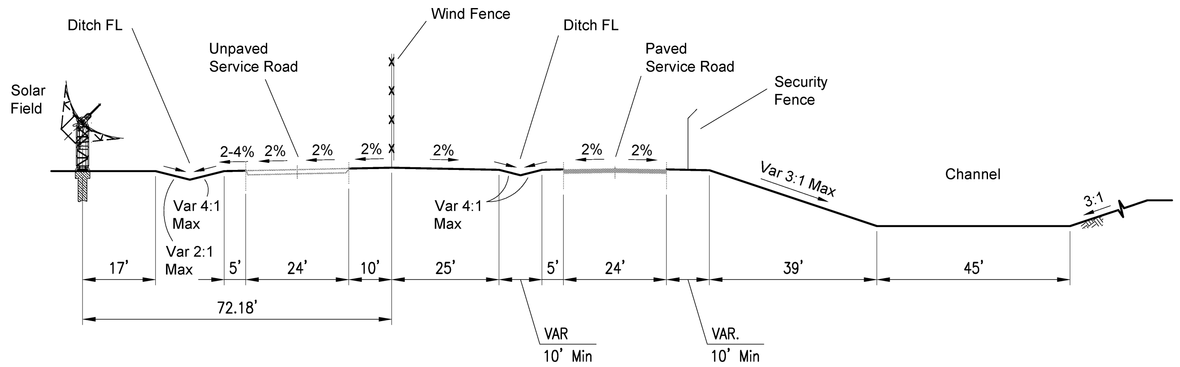

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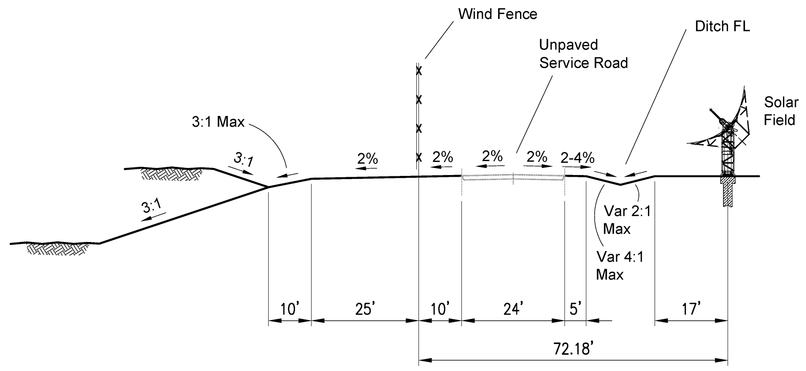

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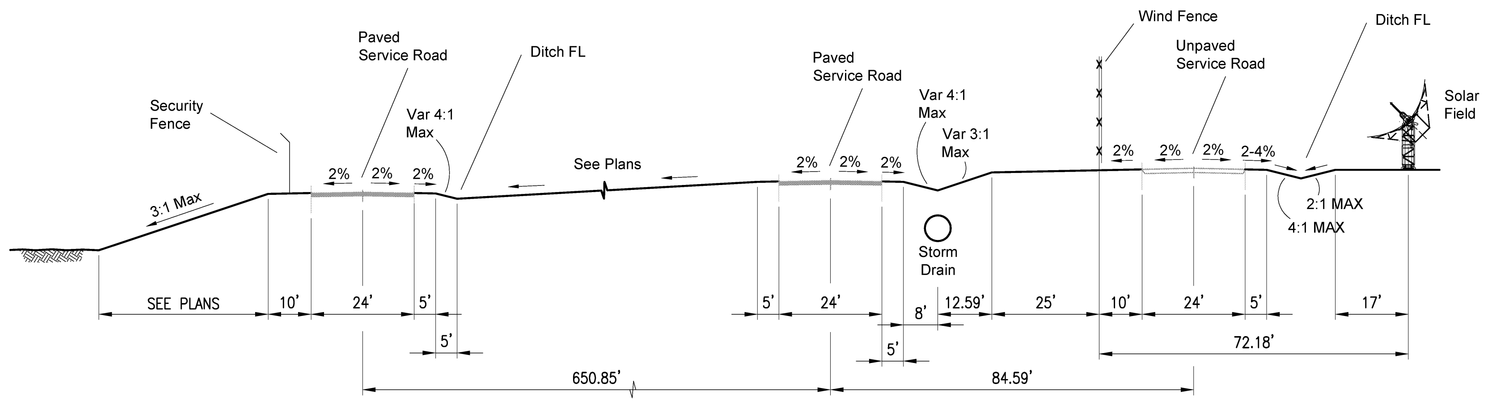

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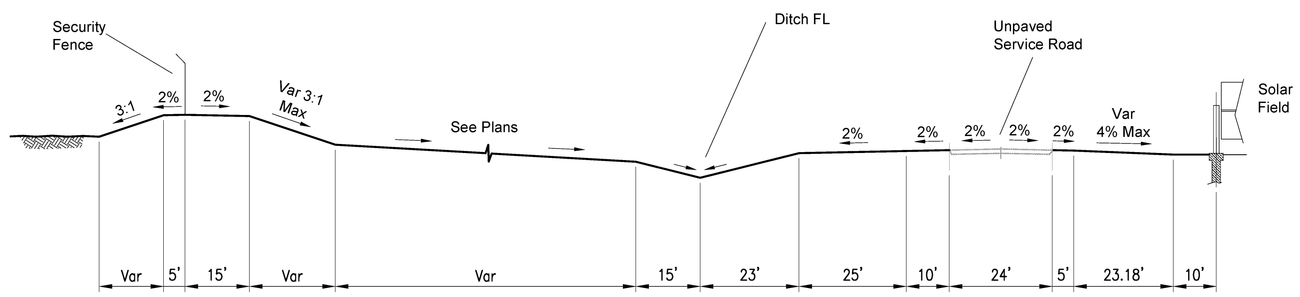

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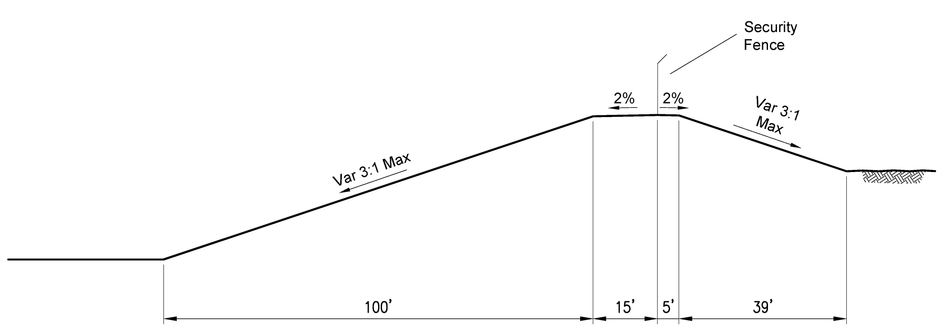
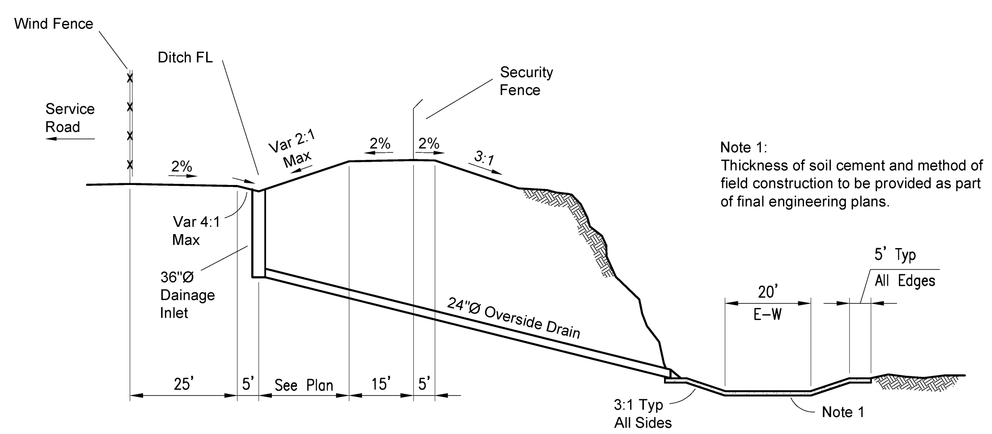


SECTION O
SCALE: 1"=20'



Note 1:
Thickness of soil cement and method of field construction to be provided as part of final engineering plans.

OVERSIDE DRAIN STILLING BASIN SECTION P
SCALE: 1"=20'

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#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Typical Details - Sections

Date: 02/10/10
Sheet: 09 of 34

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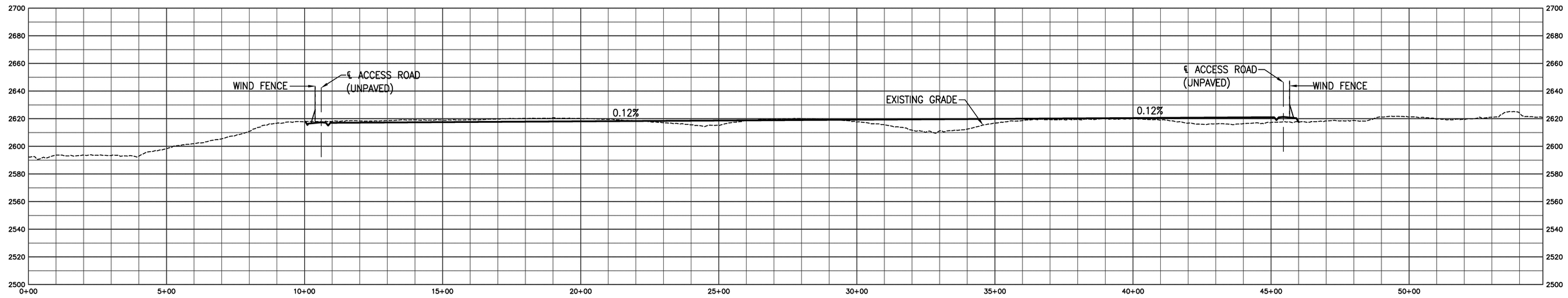
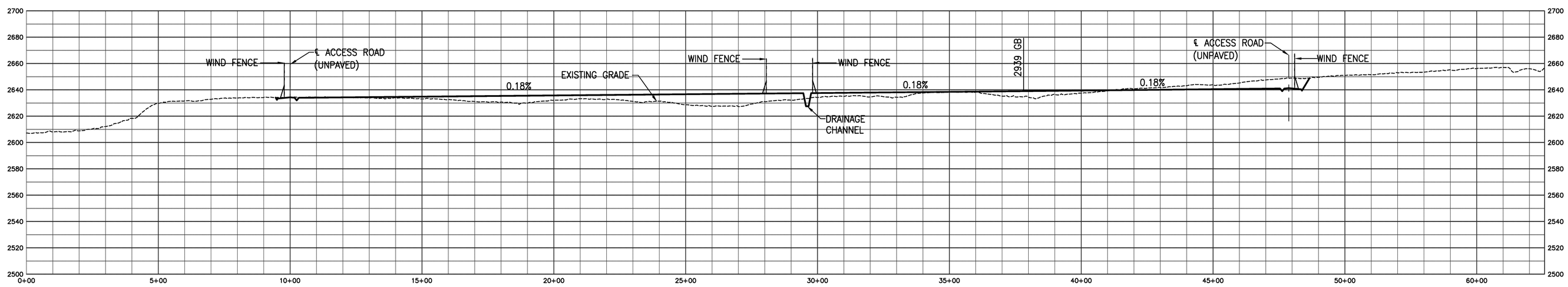


SECTION A-A

SCALE: HORIZ. 1" = 200'
VERT. 1" = 40'



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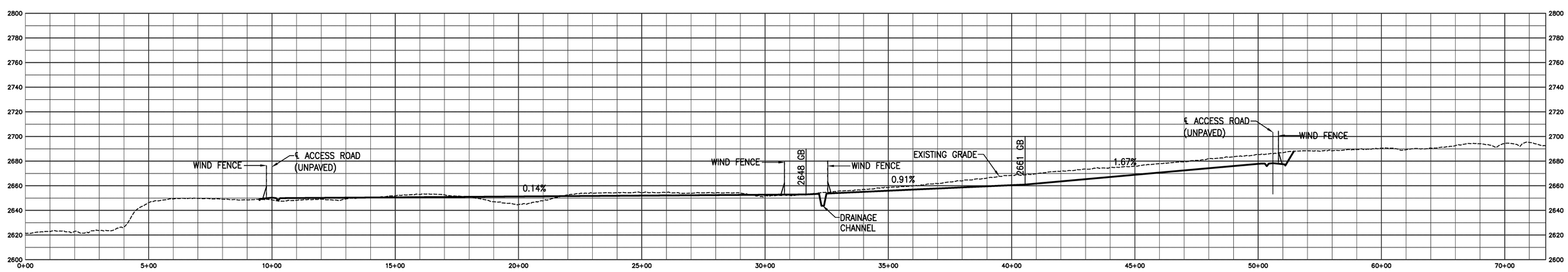

SECTION C-C

SCALE: HORIZ. 1" = 200'
VERT. 1" = 40'

VERT. 1" = 40'

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Cross Sections North Field

Date: 02/10/10
Sheet: 10 of 34

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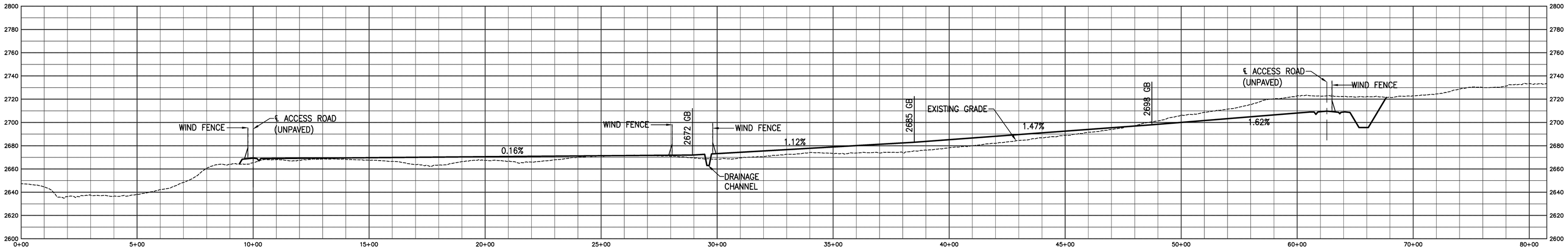
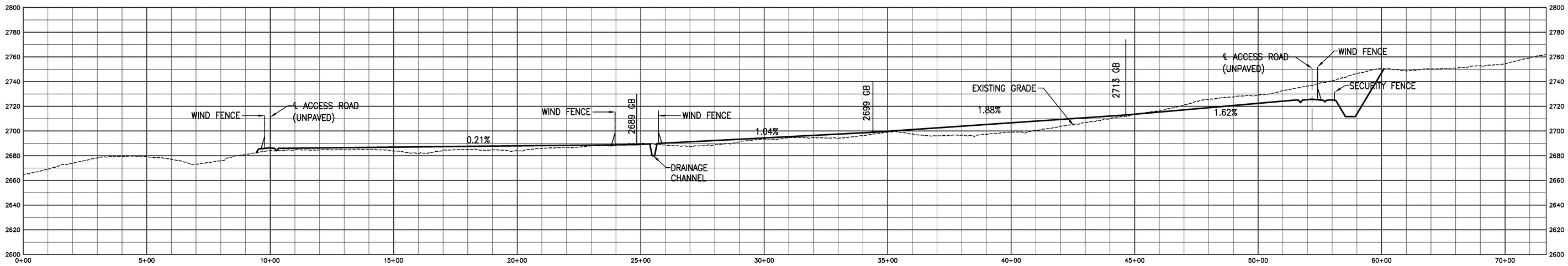


SECTION D-D

SCALE: HORIZ. 1" = 200'
VERT. 1" = 40'



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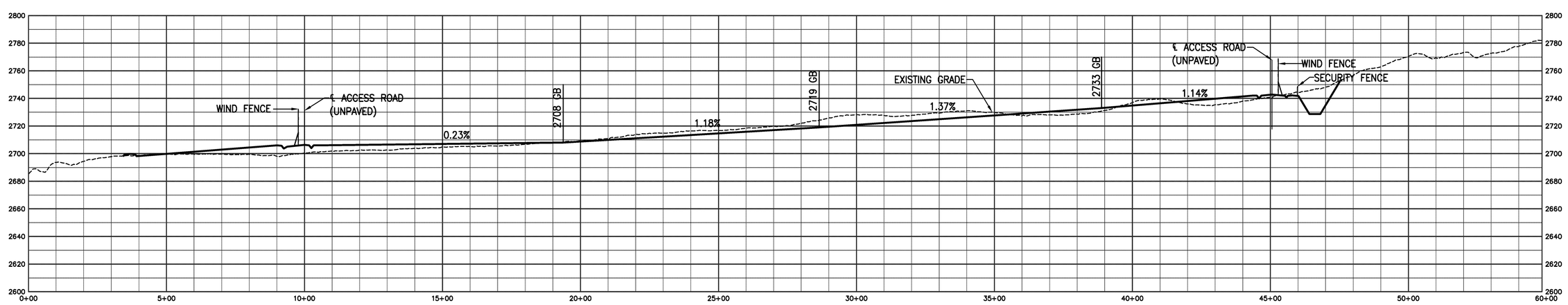
VERT. 1" = 40'



SECTION F-F

SCALE: HORIZ. 1" = 200'
VERT. 1" = 40'

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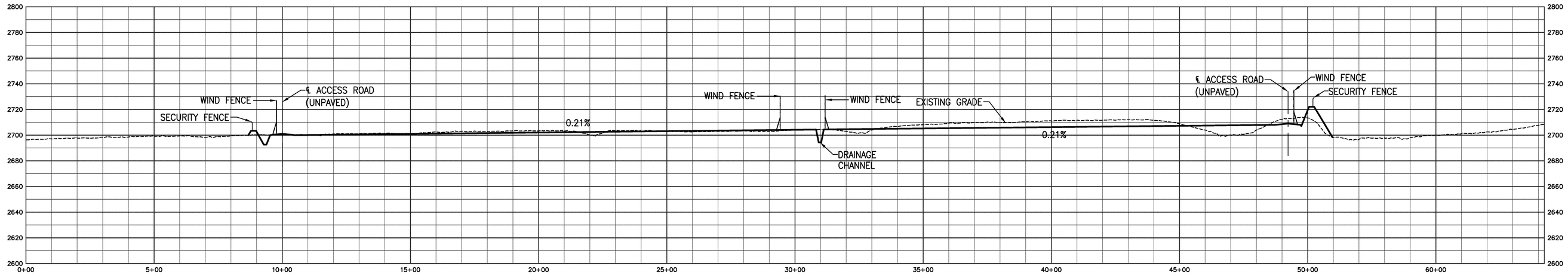
Cross Sections North Field

Date: 02/10/10
Sheet: 11 of 34



SECTION G-G

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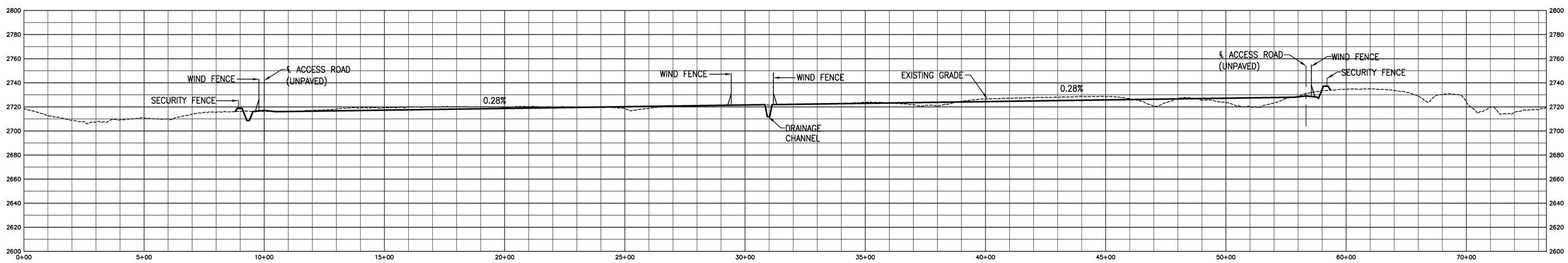

SECTION H-H

SCALE: HORIZ. 1" = 200'
VERT. 1" = 40'

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Kern County, California

Cross Sections South Field

Date: 02/10/10
Sheet: 12 of 34

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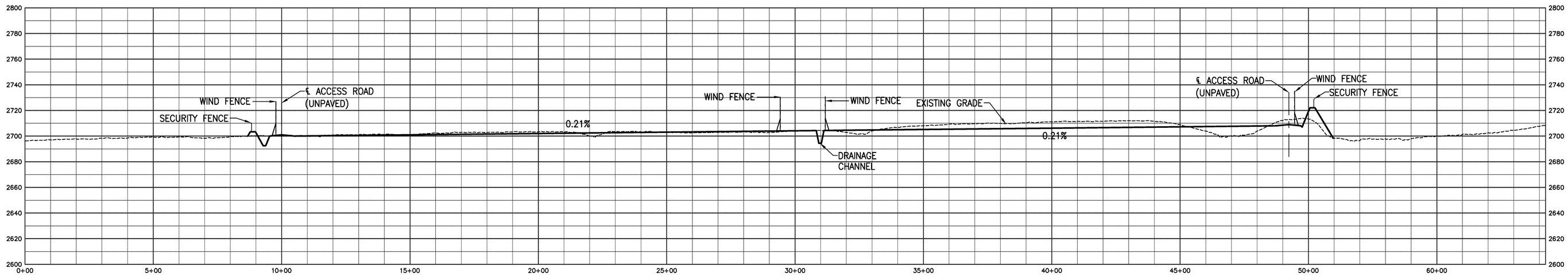

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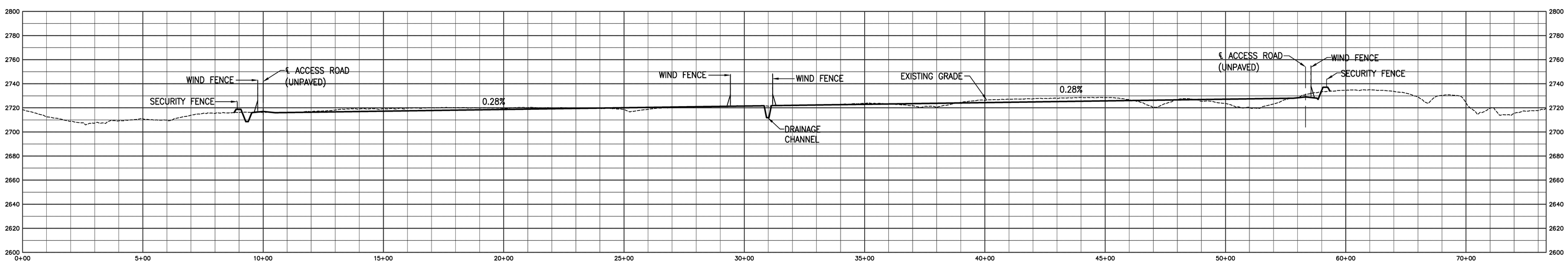

SECTION J-J

SCALE: HORIZ. 1" = 200'
VERT. 1" = 40'

VERT. 1" = 40'

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DATED: February 10, 2010

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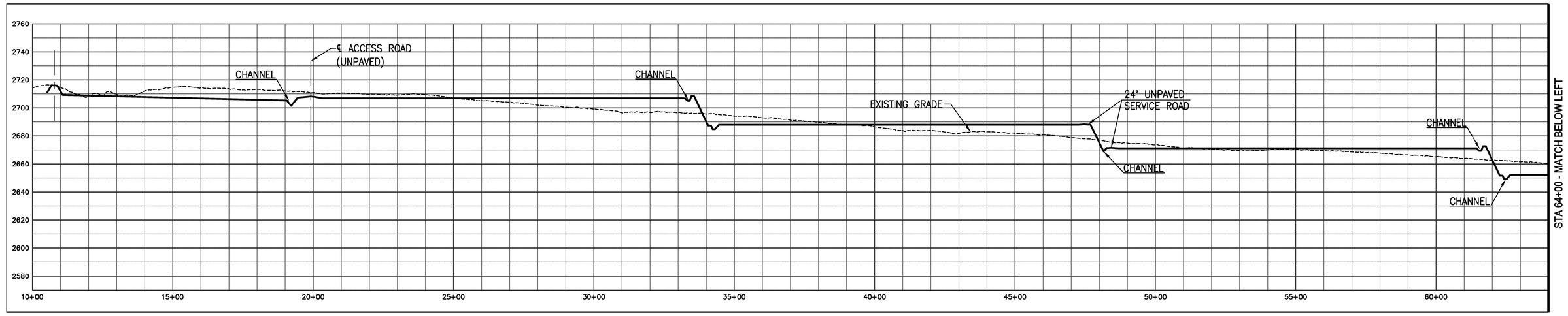
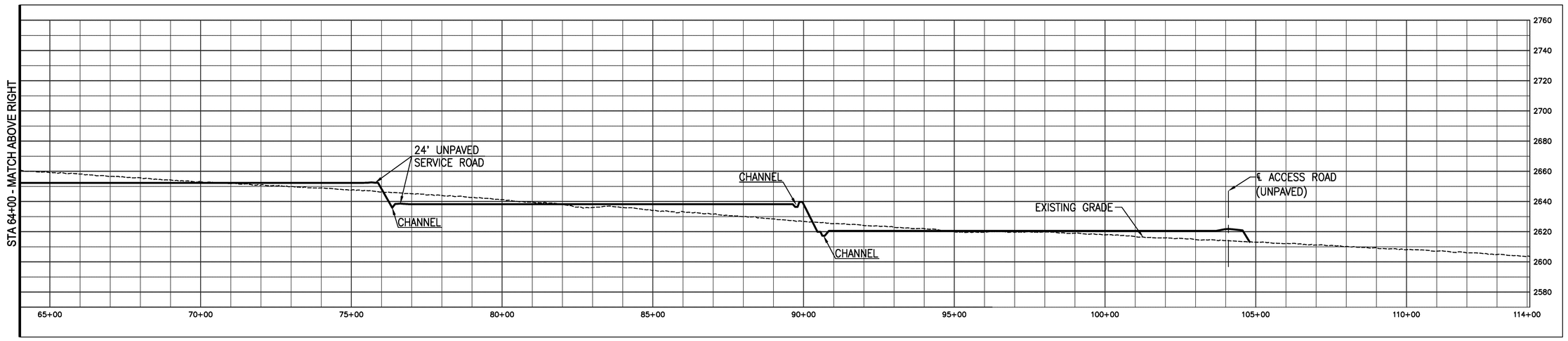
Kern County, California

Cross Sections South Field

Date: 02/10/10
Sheet: 13 of 34





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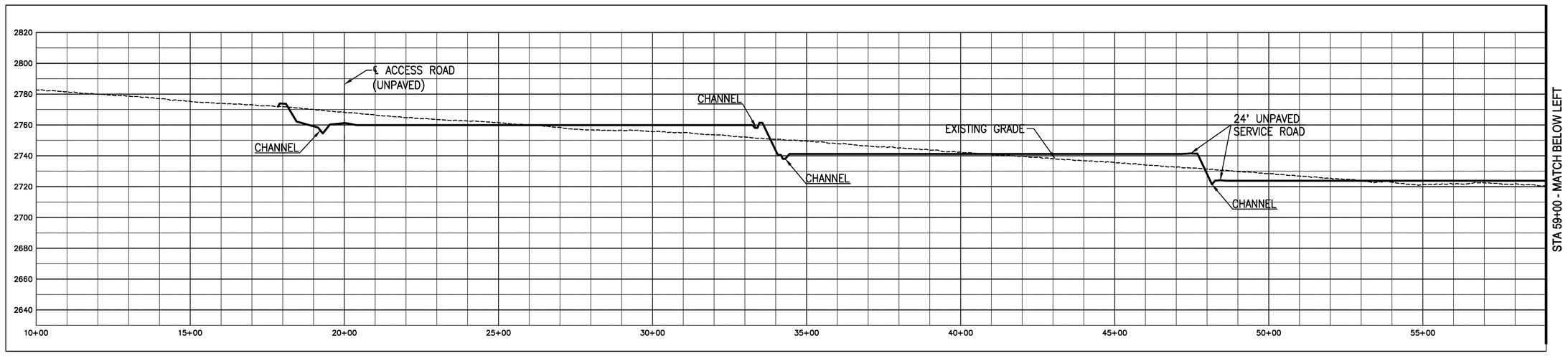

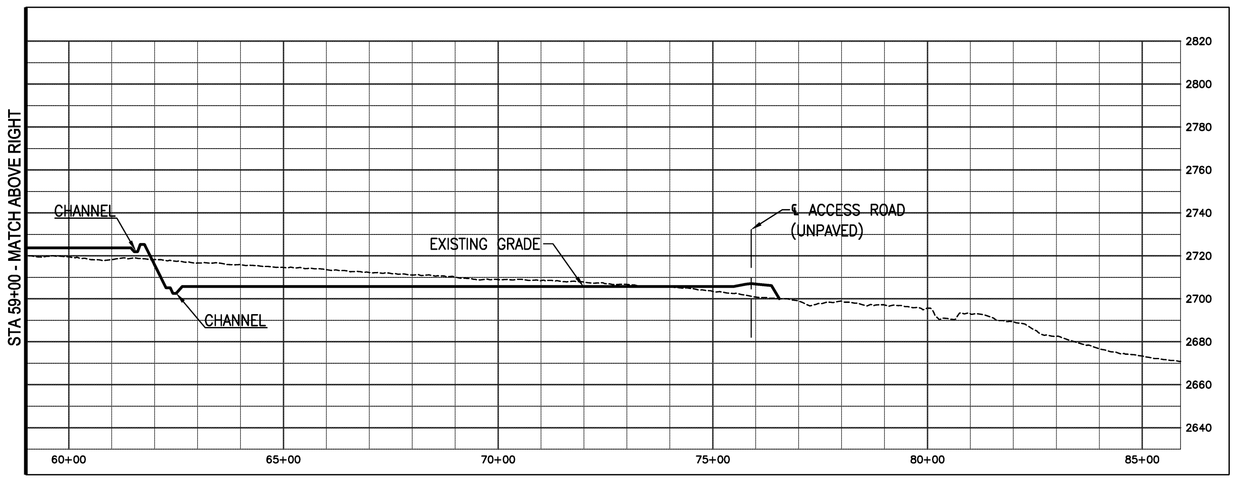

SECTION L-L

SCALE: HORIZ. 1" = 200'
VERT. 1" = 40'

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Kern County, California

Cross Sections North and South Field

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Sheet: 14 of 34

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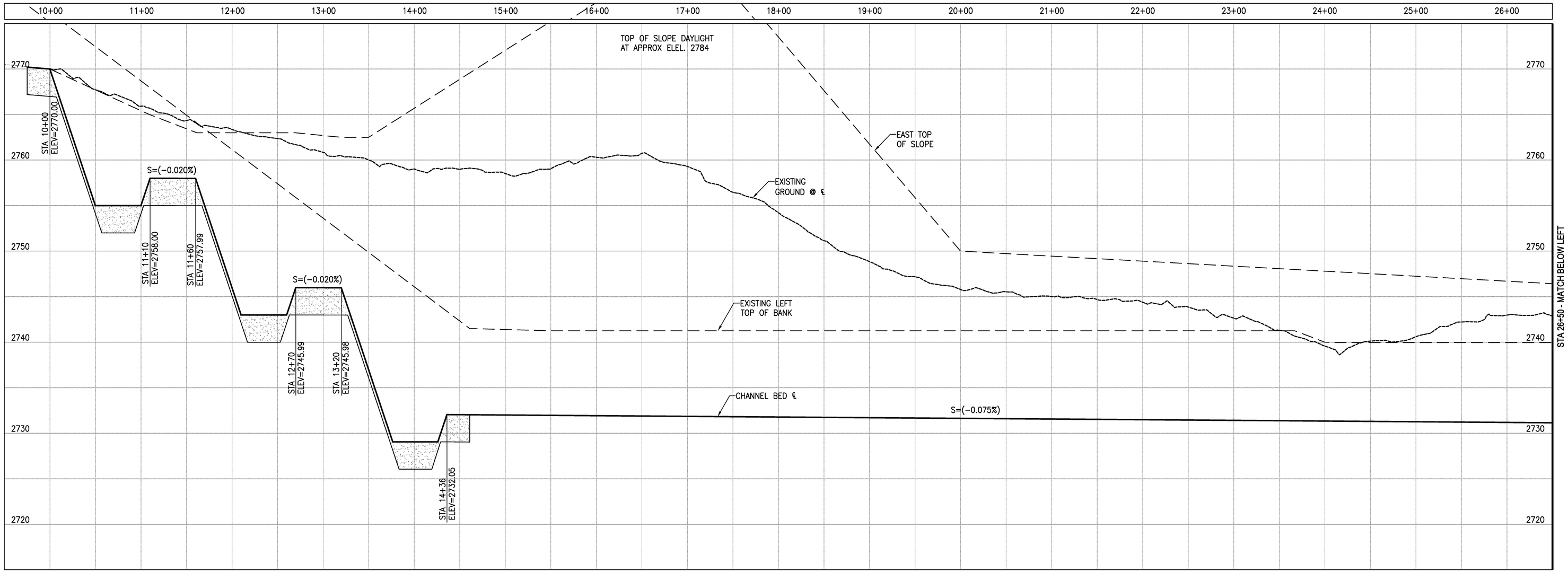

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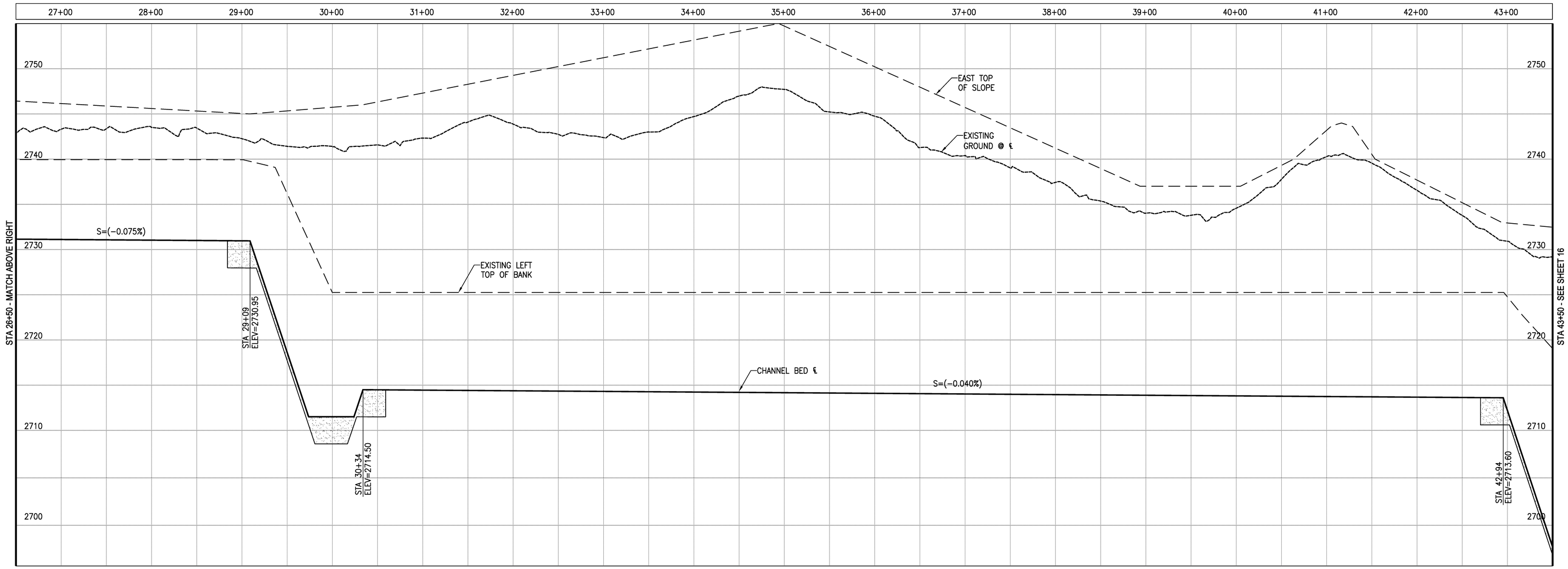

SCALE: HORIZ. 1"=50'
VERT. 1"=5'

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Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Channel Profiles
East Channel, North Field

Date: 02/10/10
Sheet: 15 of 34

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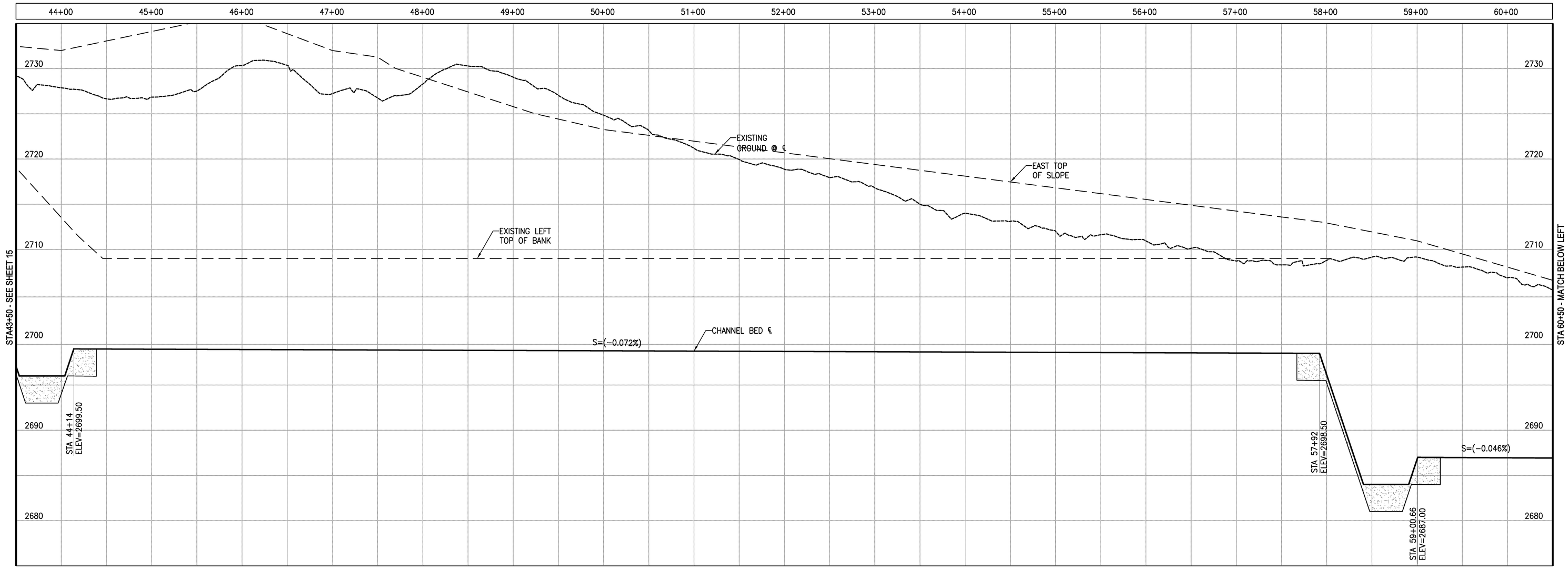

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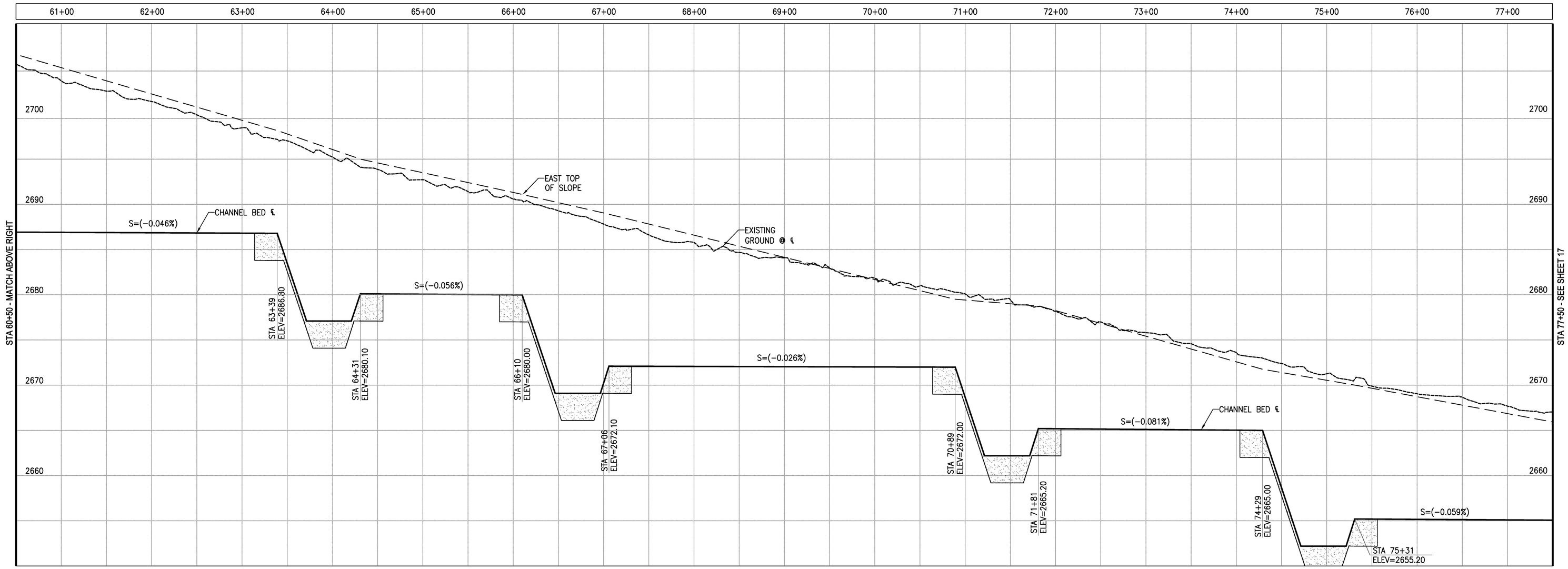

SCALE: HORIZ. 1"=50'
VERT. 1"=5'

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Ridgecrest Solar Power Project

Kern County, California

Channel Profiles
East Channel, North Field

Date: 02/10/10
Sheet: 16 of 34

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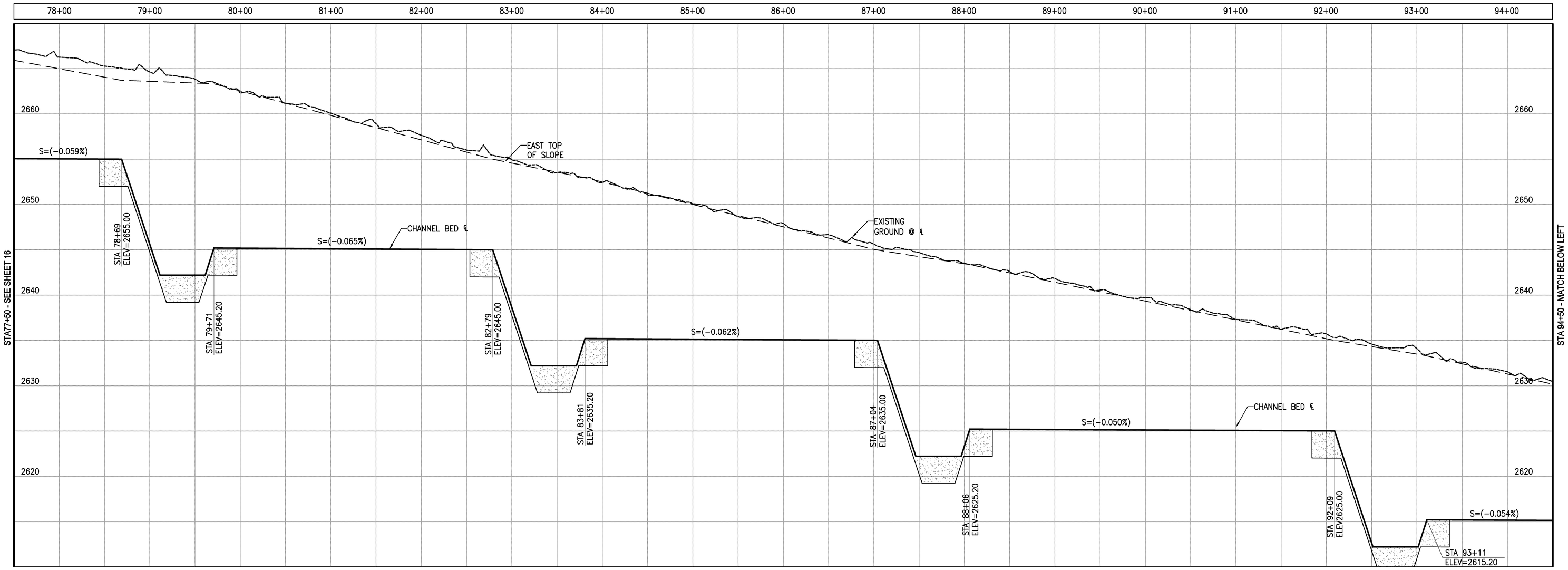

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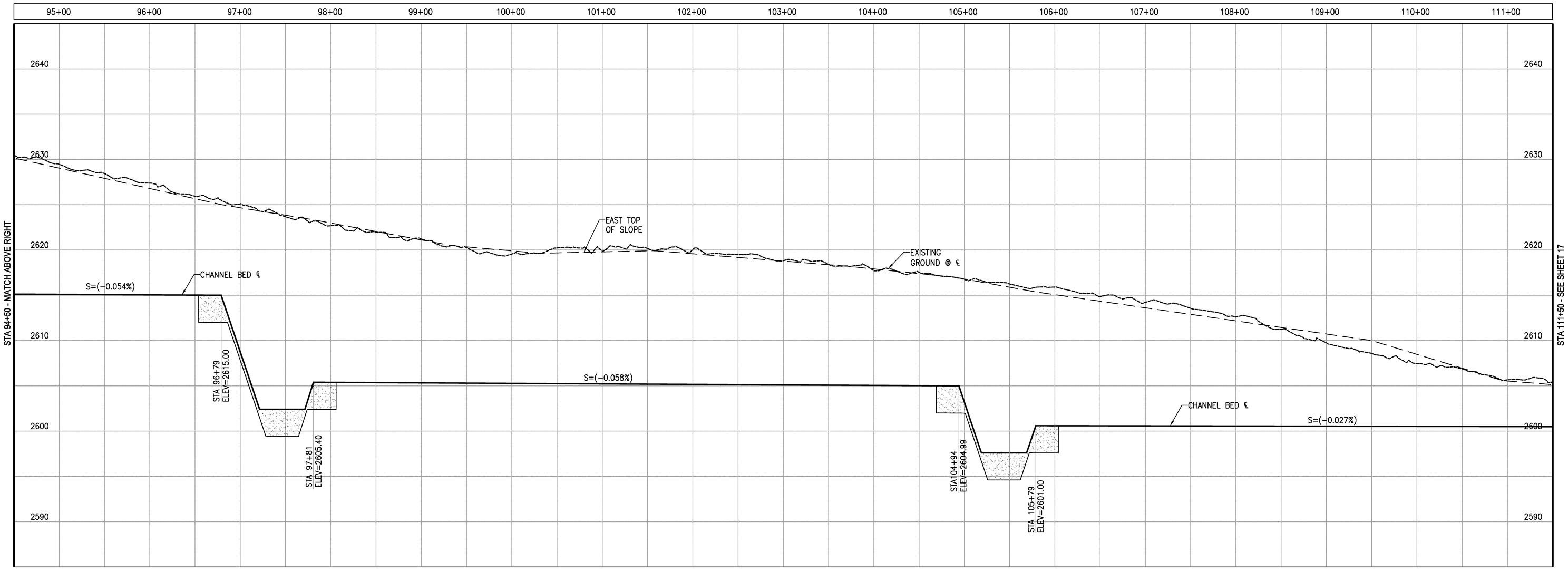

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Channel Profiles
East Channel, North Field

Date: 02/10/10
Sheet: 17 of 34

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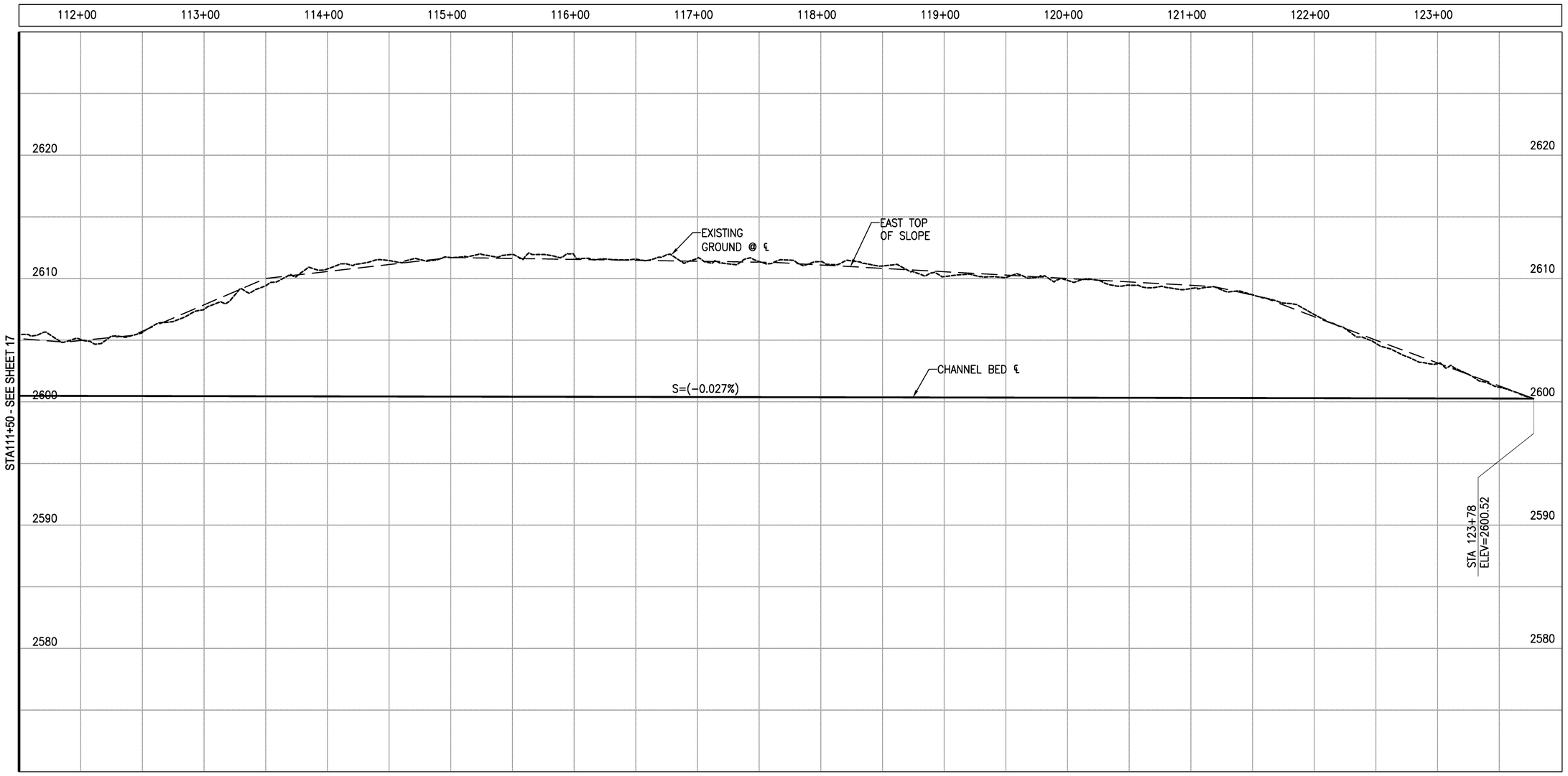

SCALE: HORIZ. 1"=50'
VERT. 1"=5'

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DATED: February 10, 2010

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Drawn: K. S. BEDFORD
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Channel Profiles
East Channel, North Field

Date: 02/10/10
Sheet: 18 of 34

DWG: S:\Solar Millennium LLC\60203537\CADD\CIVIL\PHASE 02 w LIDAR\SHEET\18 (CHANNEL).dwg Layout Name: LAYOUT - Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:33 PM
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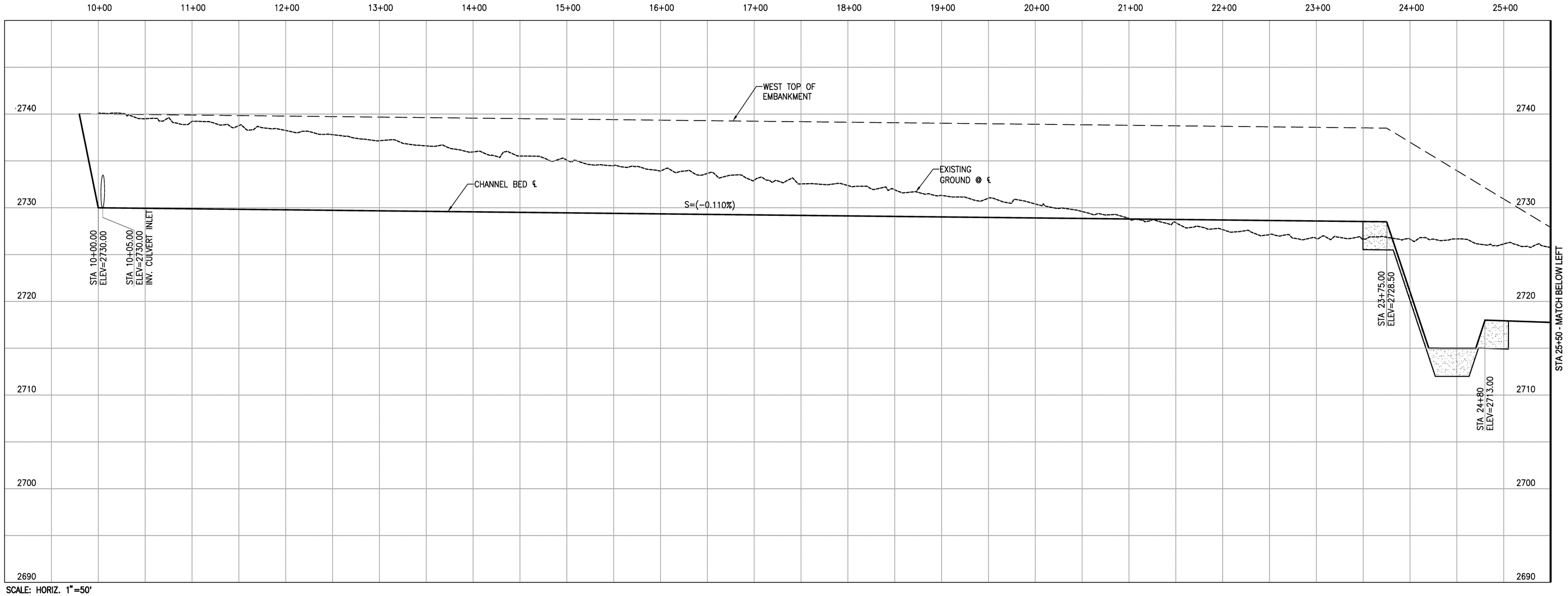

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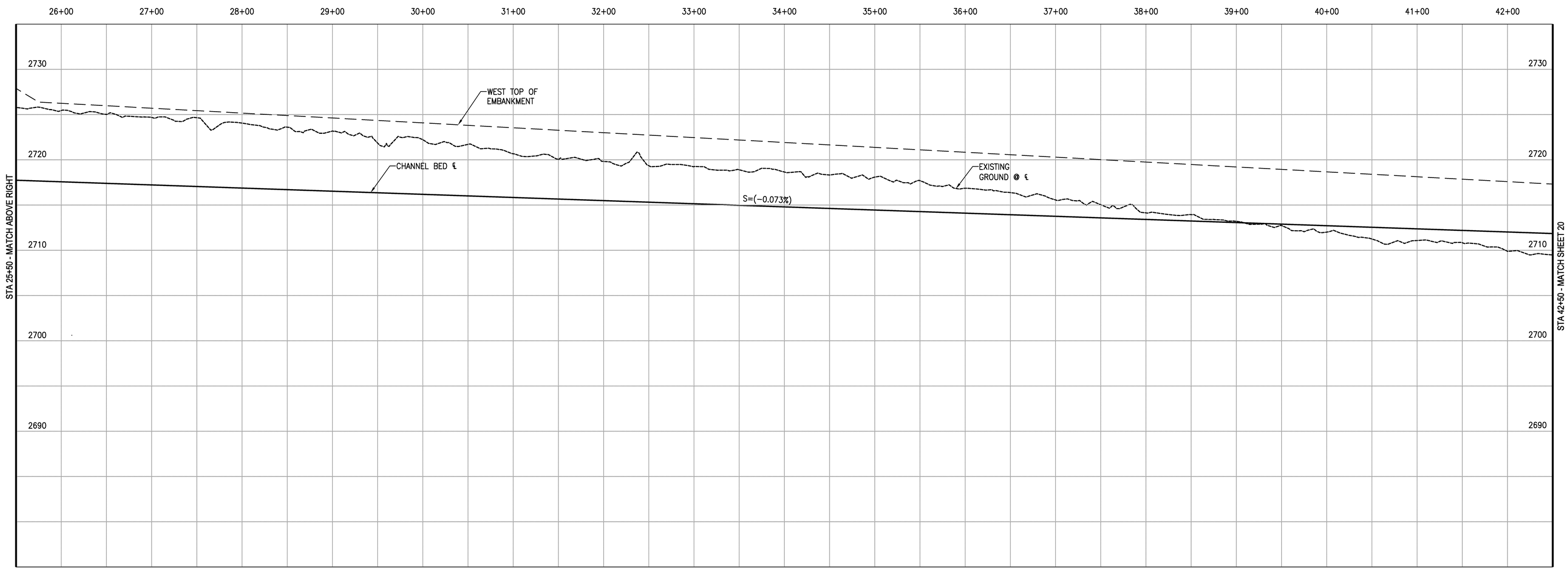

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VERT. 1"=5'

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Revisions:

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Kern County, California

Channel Profiles
West Channel, South Field

Date: 02/10/10
Sheet: 19 of 34

DWG: S:\Solar Millennium LLC\60093533\CADD\CIVIL\PHASE 02 + LIDAR\SHEET\19 (CHANNEL).dwg Layout Name: LAYOUT - Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:34 PM
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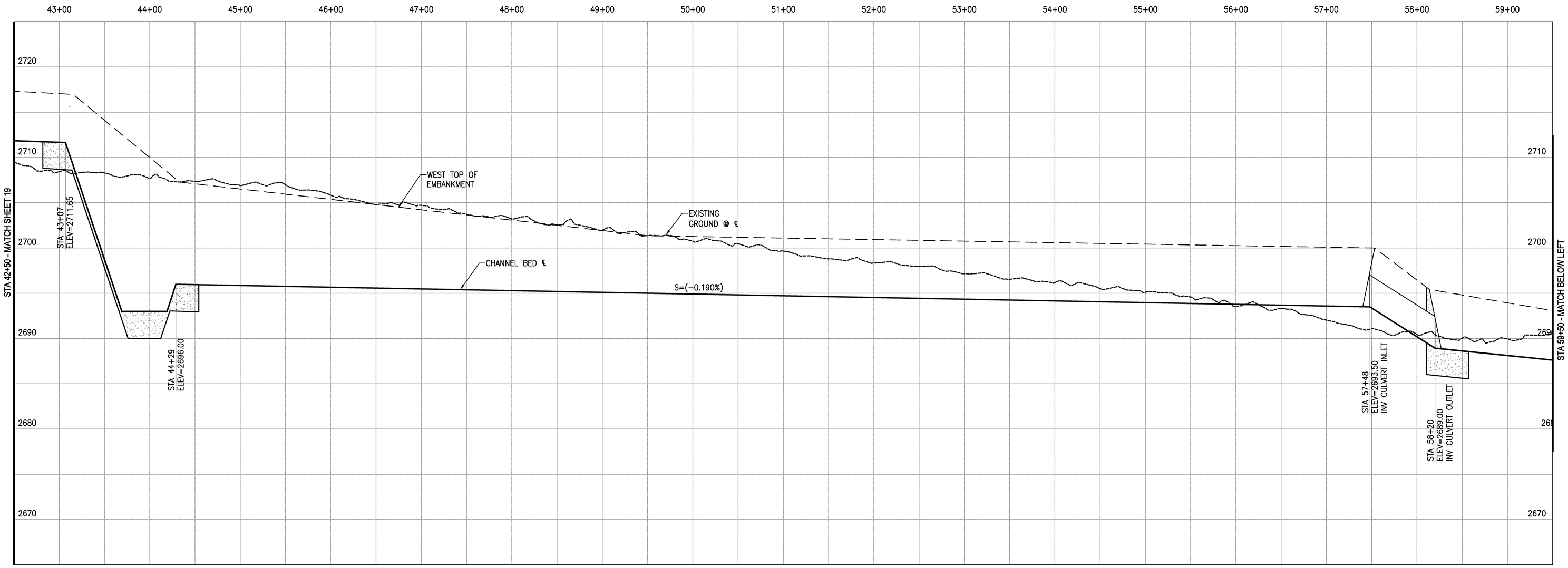

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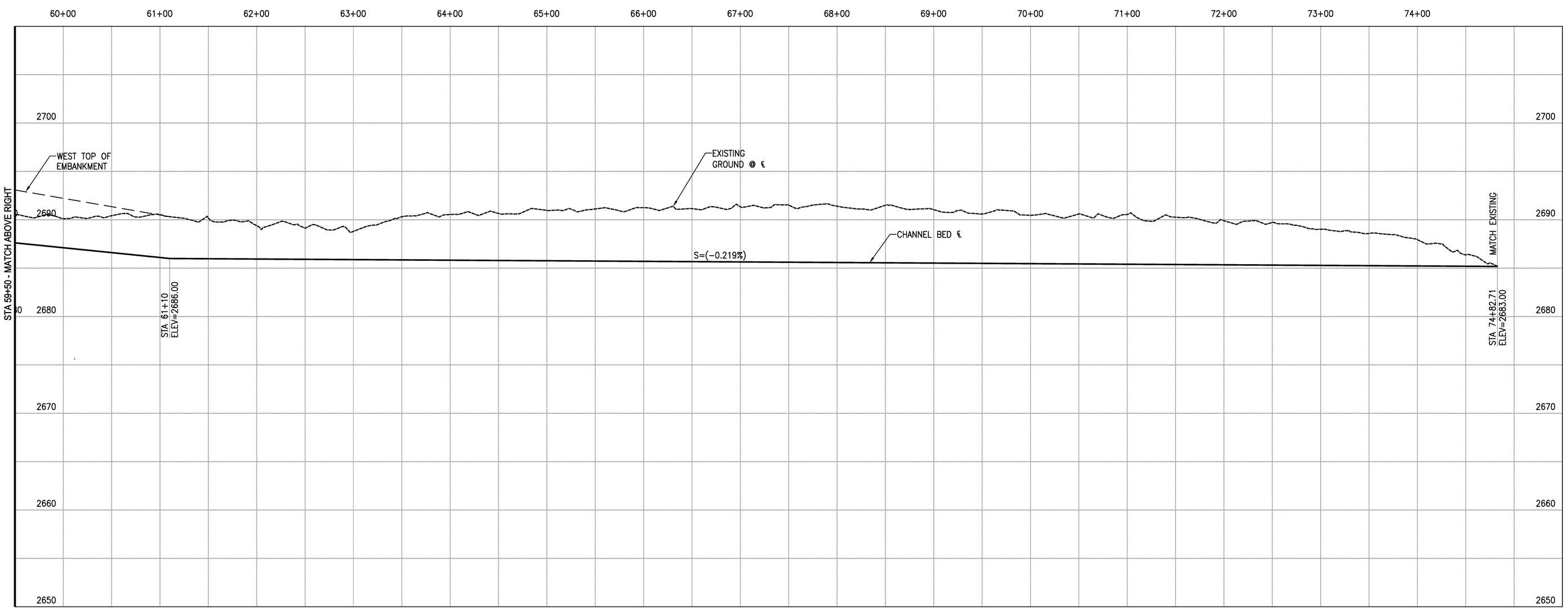

SCALE: HORIZ. 1"=50'
VERT. 1"=5'

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Ridgecrest Solar Power Project

Kern County, California

Channel Profiles
West Channel, South Field

Date: 02/10/10
Sheet: 20 of 34

DWG: S:\Solar Millennium LLC\60093833\CADD\CIVIL\PHASE 02 - LIDAR\SHEET\20 (CHANNEL).dwg Layout Name: LAYOUT - Plotted by: Bedford, Kevin Date: 3/7/2010 - 3:34 PM
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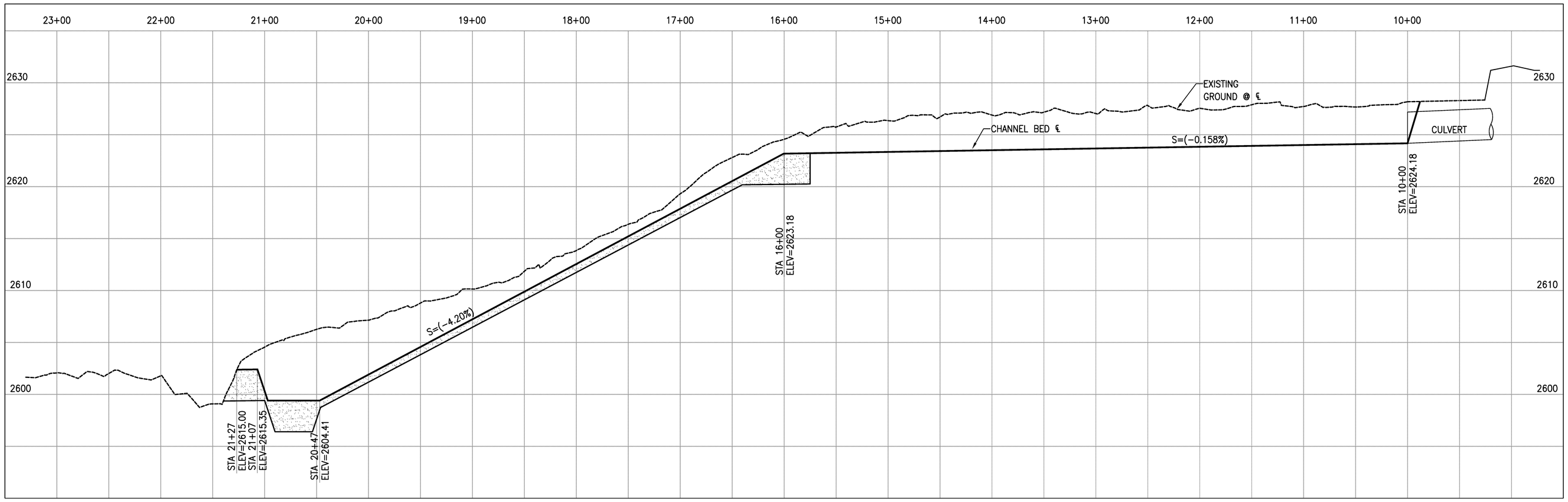

DRAINAGE CHANNEL NF1W

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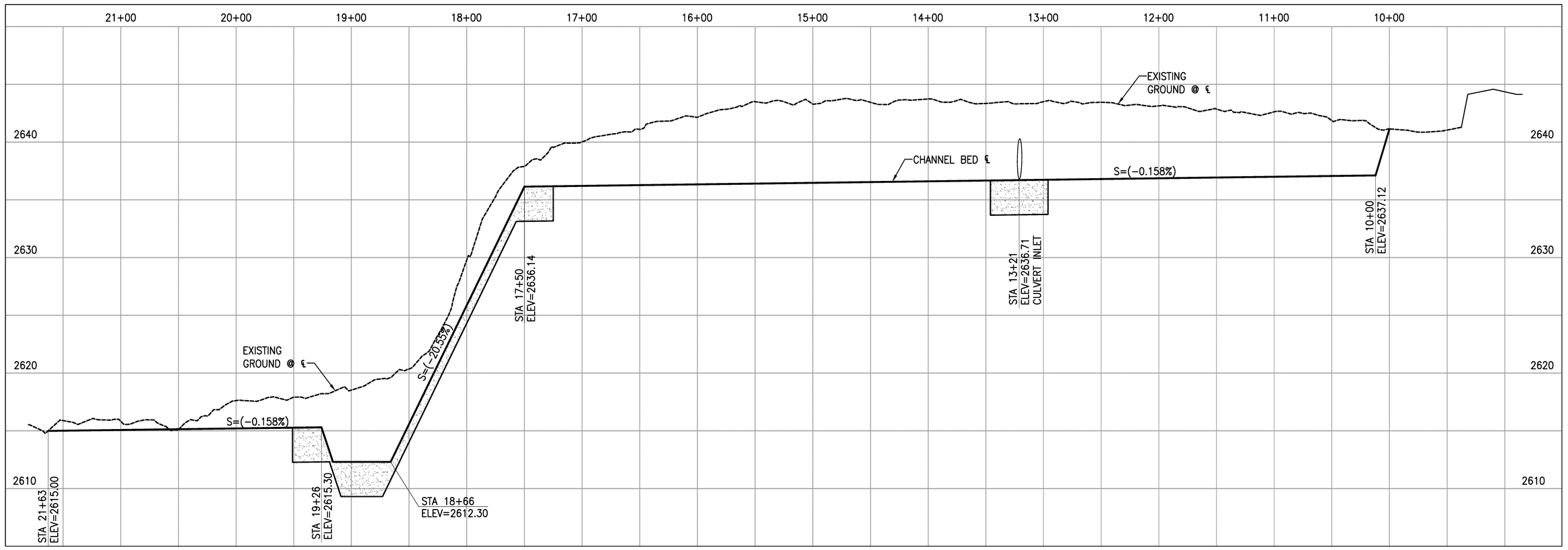

DRAINAGE CHANNEL NF2W

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Ridgecrest Solar Power Project

Kern County, California

Channel Profiles North Field 1 of 2

Date: 02/10/10
Sheet: 21 of 34

DWG: S:\Solar Millennium LLC\60193337\CADD\CIVIL\PHASE 02 ■ LIDAR\SHEET\21 (CHANNEL).dwg Layout Name: LAYOUT - Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:34 PM
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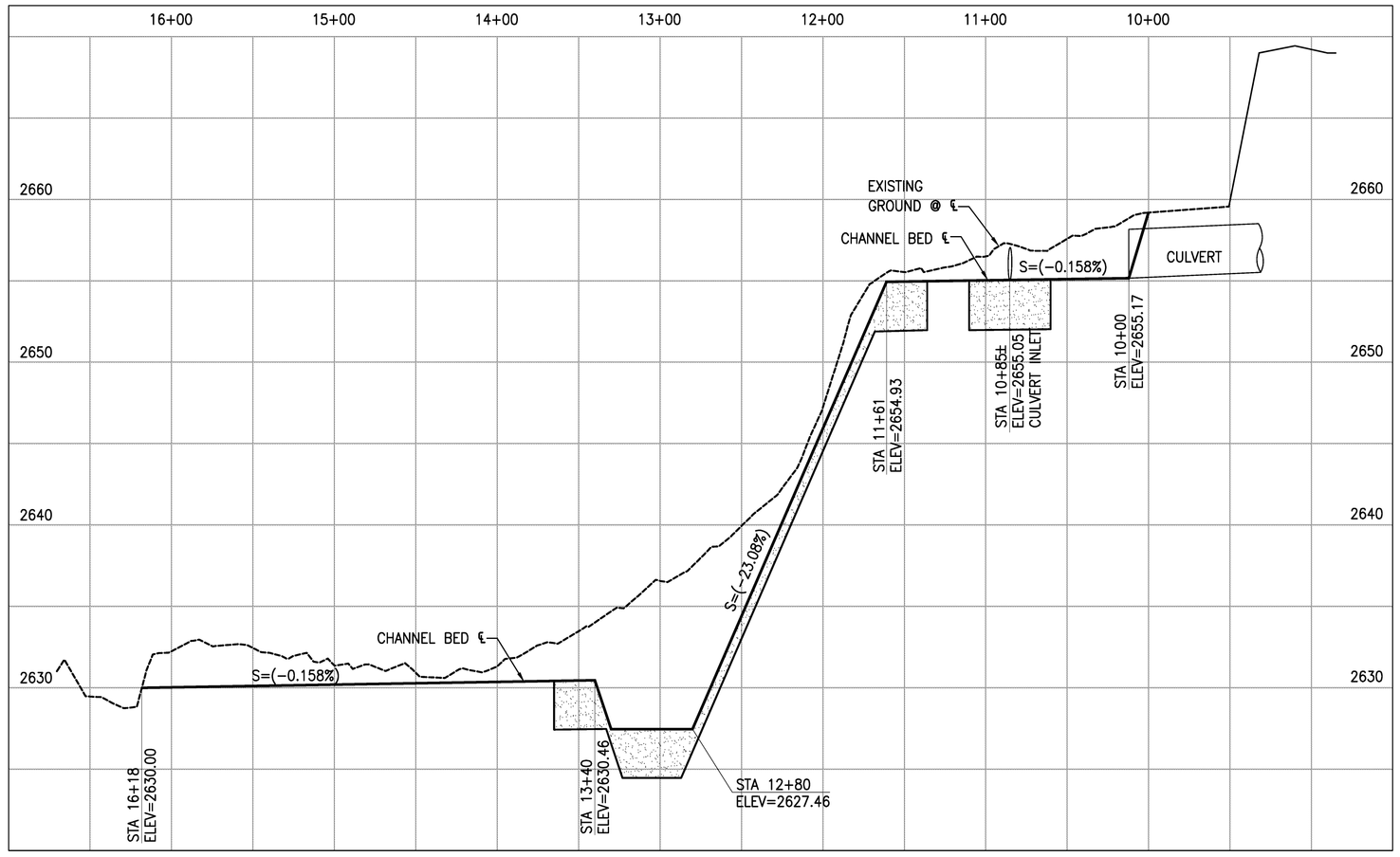

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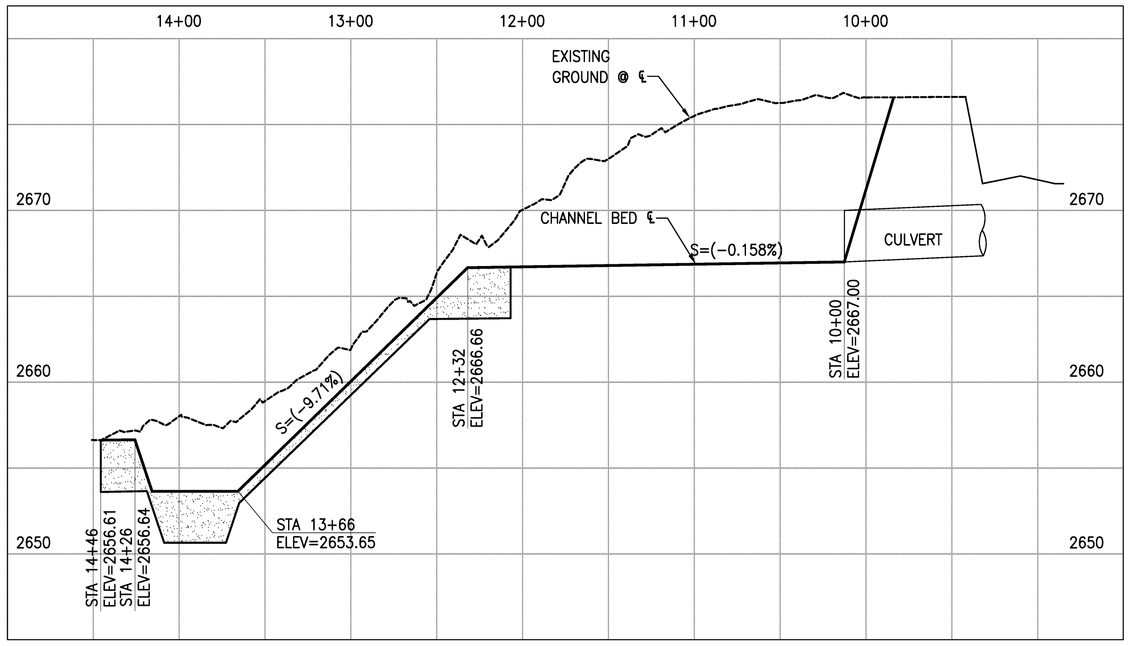

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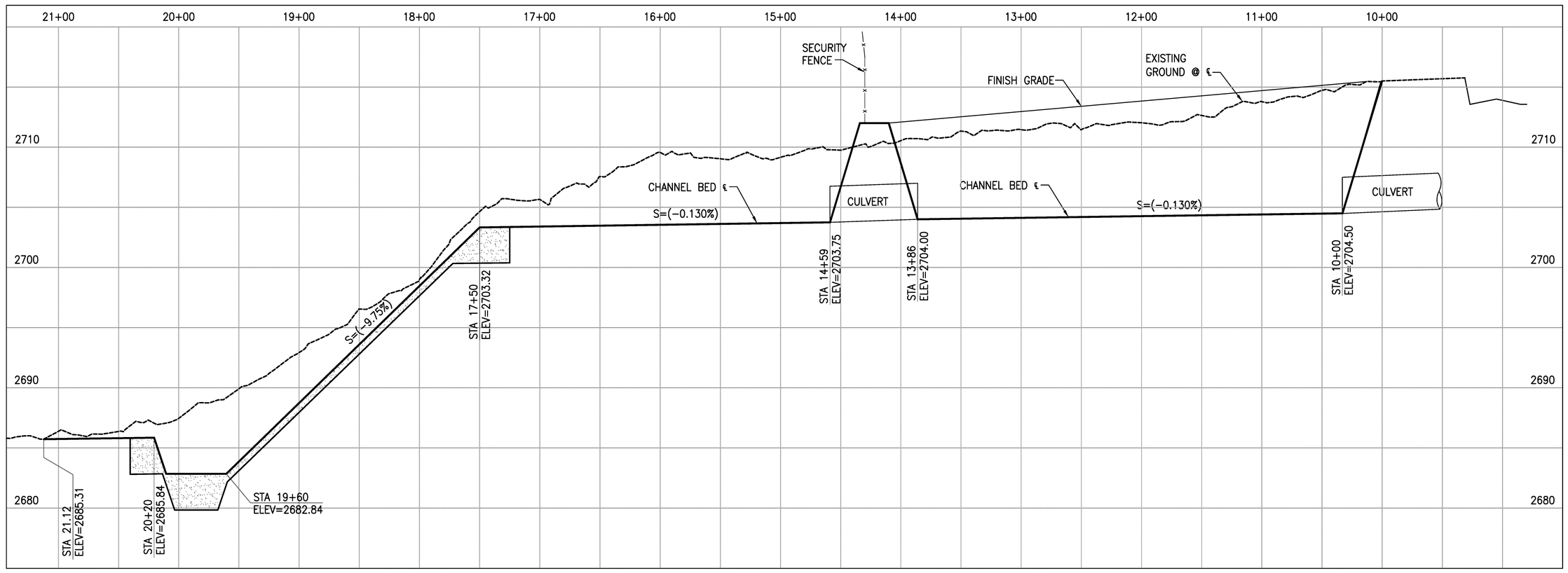

DRAINAGE CHANNEL NF5W

SCALE: HORIZ. 1"=50'
VERT. 1"=5'

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Ridgecrest Solar Power Project

Kern County, California

Channel Profiles North Field, 2 of 2

Date: 02/10/10
Sheet: 22 of 34

DWG: S:\Solar Millennium LLC\60093535\CADD\CIVIL\PHASE 02 - LIDAR\SHEET\22 (CHANNEL).dwg Layout Name: LAYOUT - Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:38 PM
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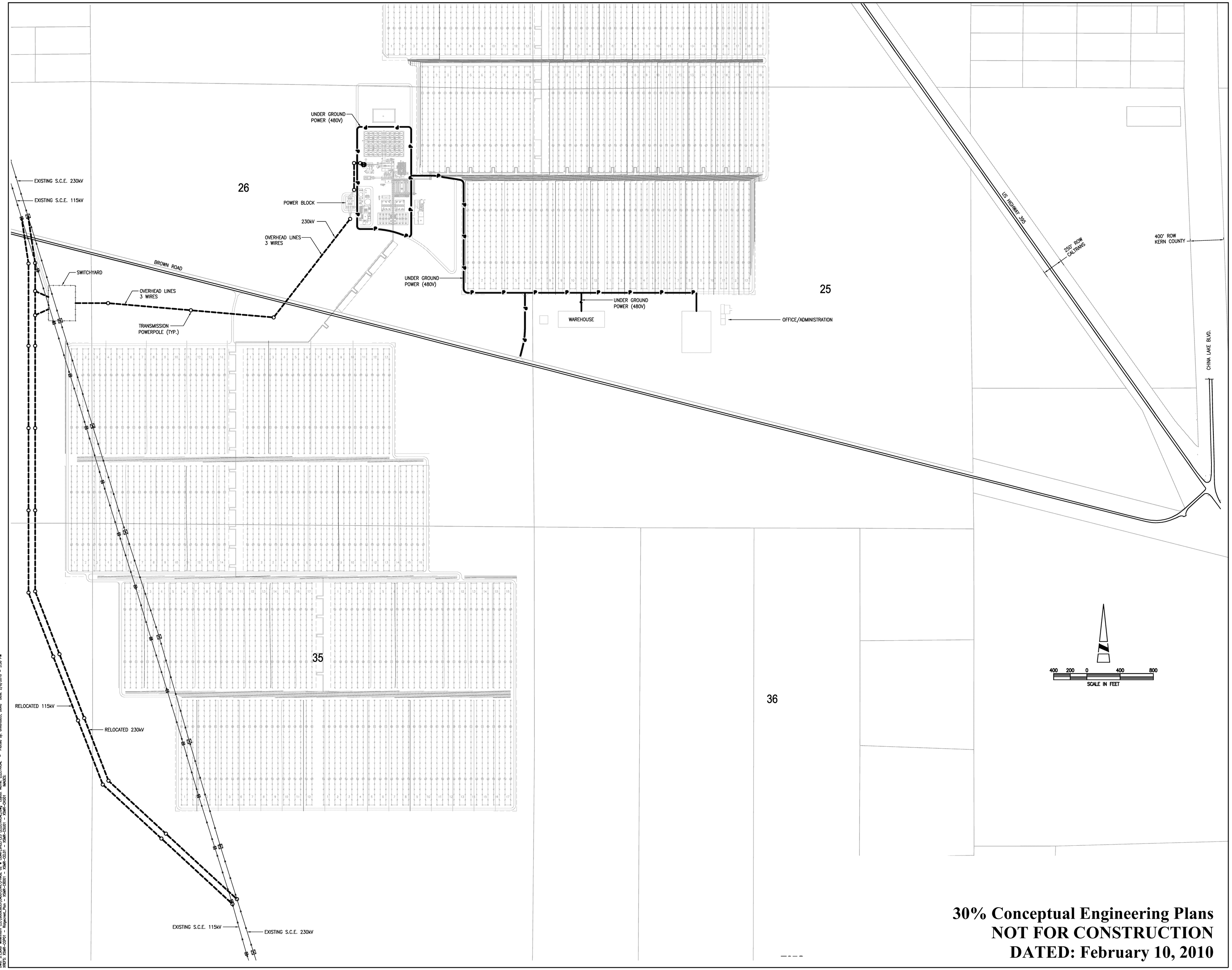

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#	DATE	DESCRIPTION

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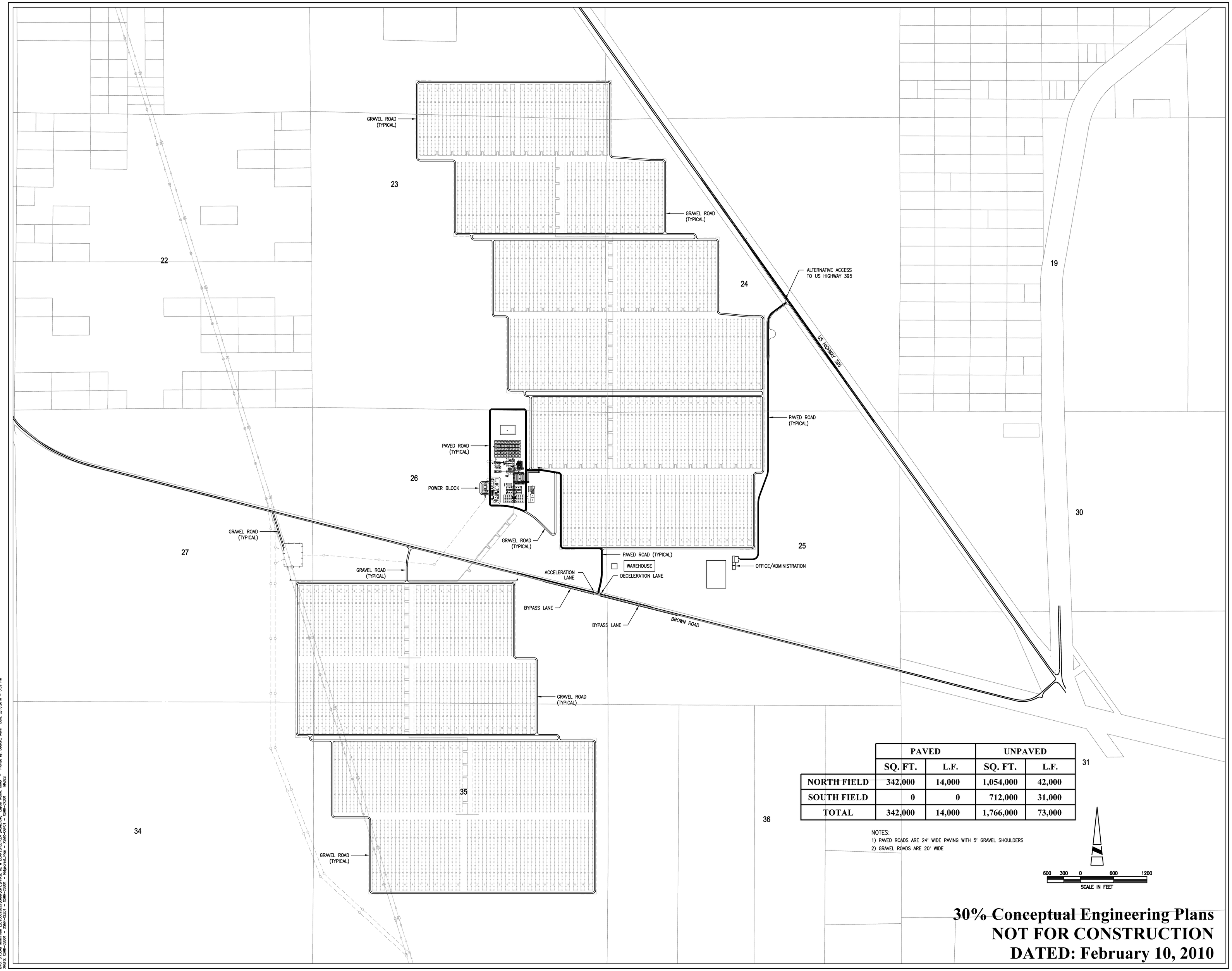
Ridgecrest Solar Power Project

Kern County, California

Onsite Electrical Power Plan

Date: 02/10/10
Sheet: 23 of 34



	PAVED		UNPAVED	
	SQ. FT.	L.F.	SQ. FT.	L.F.
NORTH FIELD	342,000	14,000	1,054,000	42,000
SOUTH FIELD	0	0	712,000	31,000
TOTAL	342,000	14,000	1,766,000	73,000

NOTES:
1) PAVED ROADS ARE 24' WIDE PAVING WITH 5' GRAVEL SHOULDERS
2) GRAVEL ROADS ARE 20' WIDE

600 300 0 600 1200
SCALE IN FEET

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Revisions:

#	DATE	DESCRIPTION

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Ridgecrest Solar Power Project

Kern County, California

Road Plan

Date: 02/10/10
Sheet: 24 of 34

DWG: S:\Solar Millennium LLC\60203833\CADD\CIVIL\PAGE 02 = LIDAR\SHEET\24 (ROAD).dwg Layout Name: ROAD -- Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:39 PM
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Revisions:

#	DATE	DESCRIPTION

Prepared for:

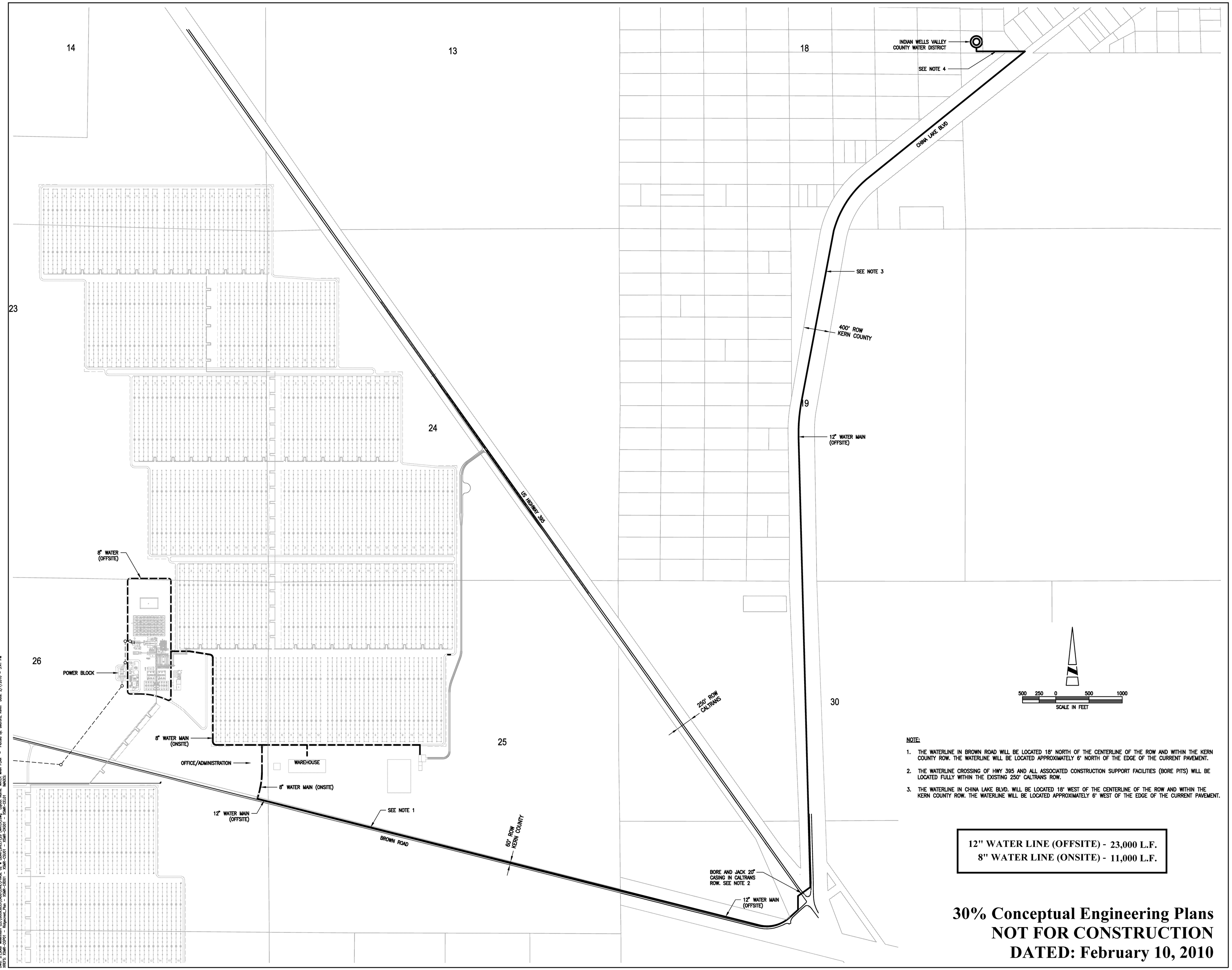
Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Fencing Plan

Date: 02/10/10
Sheet: 25 of 34



NOTE:

1. THE WATERLINE IN BROWN ROAD WILL BE LOCATED 18' NORTH OF THE CENTERLINE OF THE ROW AND WITHIN THE KERN COUNTY ROW. THE WATERLINE WILL BE LOCATED APPROXIMATELY 6' NORTH OF THE EDGE OF THE CURRENT PAVEMENT.
2. THE WATERLINE CROSSING OF HWY 395 AND ALL ASSOCIATED CONSTRUCTION SUPPORT FACILITIES (BORE PITS) WILL BE LOCATED FULLY WITHIN THE EXISTING 250' CALTRANS ROW.
3. THE WATERLINE IN CHINA LAKE BLVD. WILL BE LOCATED 18' WEST OF THE CENTERLINE OF THE ROW AND WITHIN THE KERN COUNTY ROW. THE WATERLINE WILL BE LOCATED APPROXIMATELY 6' WEST OF THE EDGE OF THE CURRENT PAVEMENT.

12" WATER LINE (OFFSITE) - 23,000 L.F.
8" WATER LINE (ONSITE) - 11,000 L.F.

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DATED: February 10, 2010

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Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Water Main Plan

Date: 02/10/10
Sheet: 26 of 34

DWG: S:\Solar Millennium LLC\60293533\CADD\CIVIL\PHASE 02 * LIDAR\SHEET\26 (WATER).dwg Layout Name: WATER MAIN PLAN - Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:41 PM
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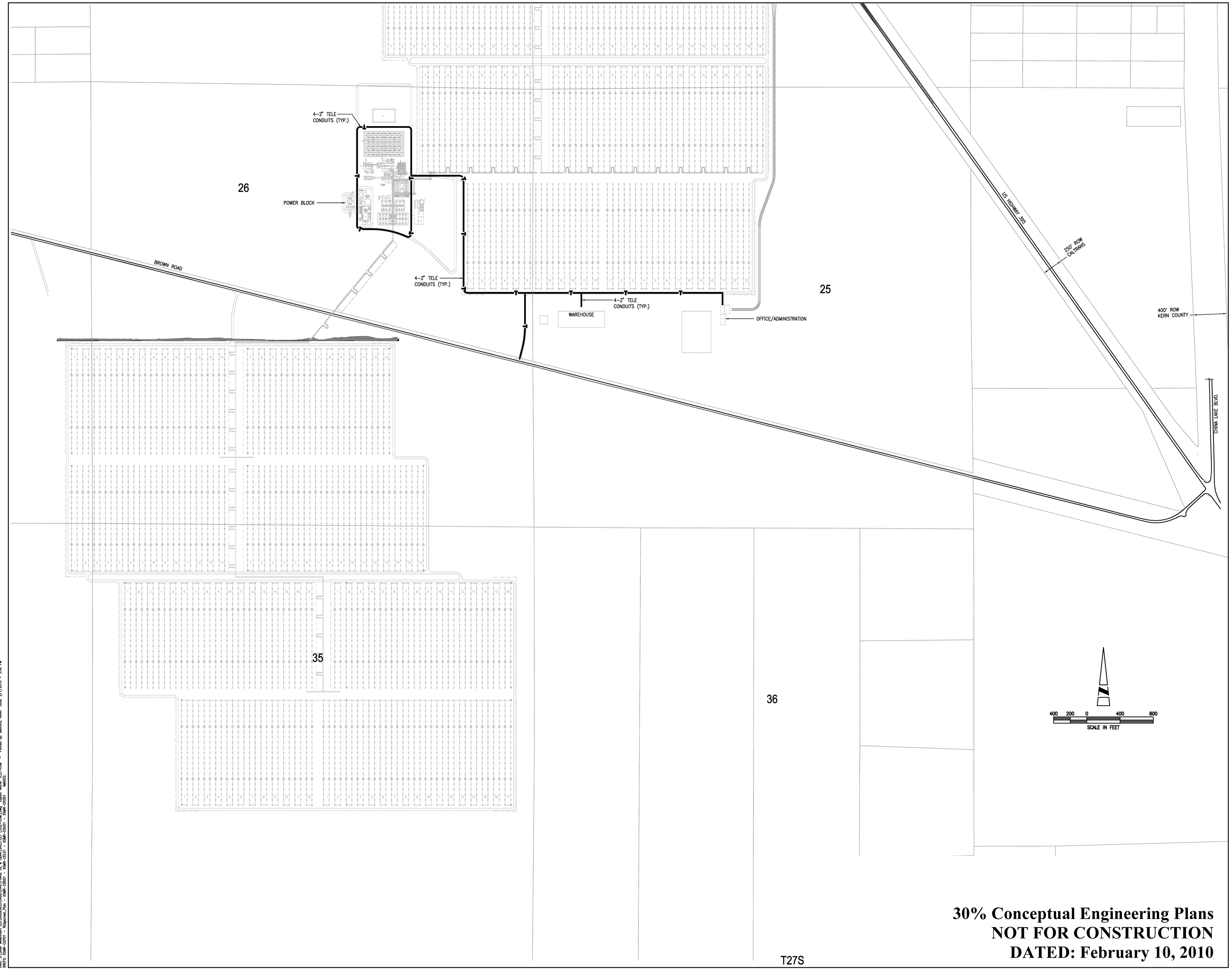

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Ridgecrest Solar Power Project

Kern County, California

Onsite Telecommunication Plan

Date: 02/10/10
Sheet: 27 of 34

DWG: S:\Solar Millennium LLC\0093837\CADD\CIVIL\PHASE 02 ■ LIDAR\SHEET\27 (TELE-CON).dwg Layout Name: TELE-CON - Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:42 PM
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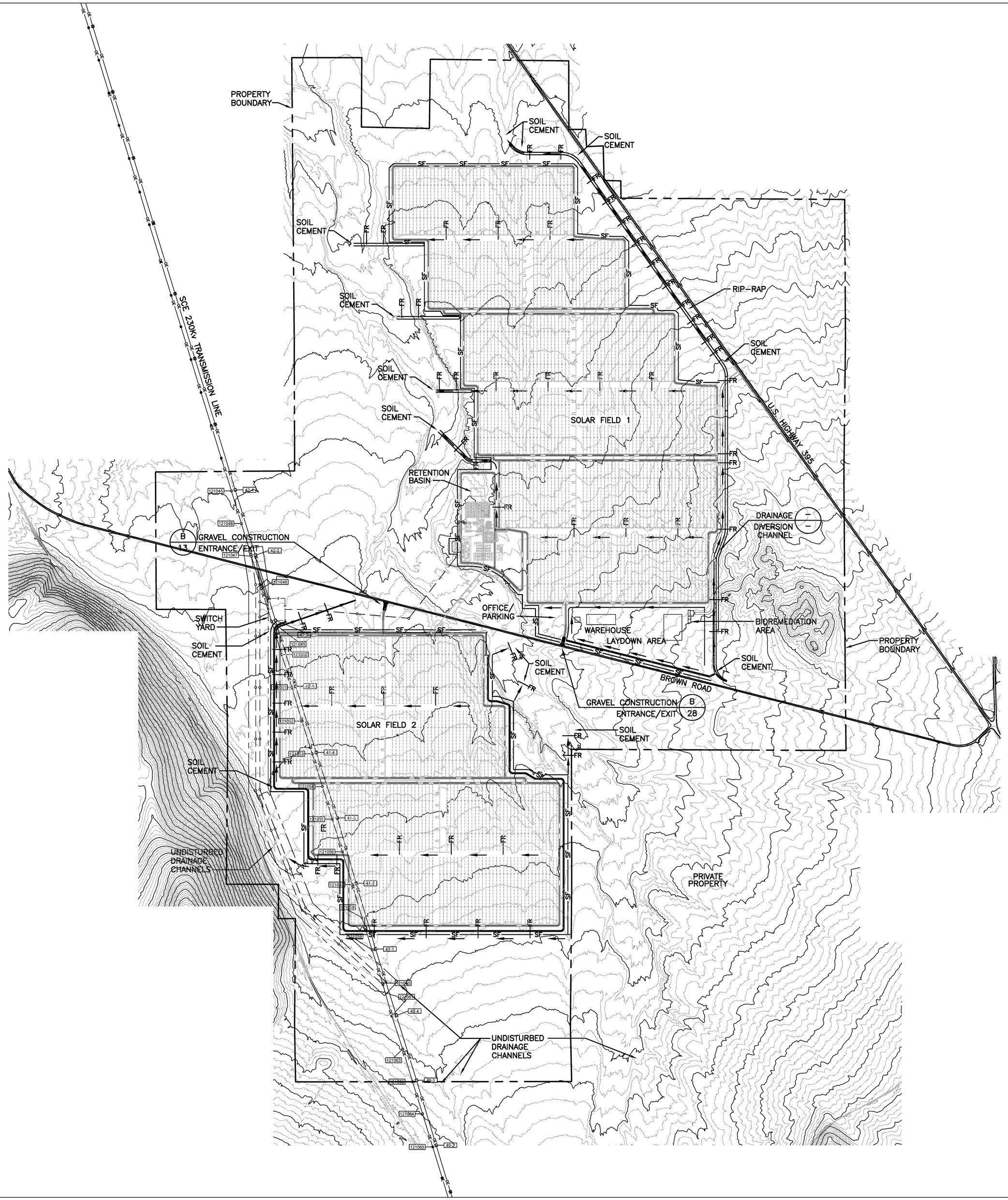

EROSION CONTROL NOTES:

1. CONTRACTOR SHALL BE CONTINUOUSLY RESPONSIBLE FOR ALL ASPECTS OF EROSION CONTROL AND STORMWATER POLLUTION PREVENTION INCLUDING CONFORMANCE WITH BEST MANAGEMENT PRACTICES (BMP'S) AND THE REQUIREMENTS OF THE STATE WATER RESOURCES CONTROL BOARD.

2. EROSION CONTROL PROVISIONS SHALL BE ESTABLISHED AND CONSTRUCTED PRIOR TO SITE GRADING OR CONSTRUCTION WORK.

3. PAVED AREAS SHALL BE KEPT CLEAN OF EARTH MATERIAL AND DEBRIS. THE SITE SHALL BE MAINTAINED SO THAT A MINIMUM OF SEDIMENT-LADEN RUNOFF ENTERS THE EXISTING DRYWASHES, CREEKS, OR ON-SITE STORM DRAINAGE SYSTEM.

4. FIBER ROLLS SHALL BE USED FOR CONCENTRATED DOWNSTREAM PERIMETER EROSION CONTROL.

5. EROSION CONTROL (RIP-RAP) SHALL BE PLACED DOWNSTREAM OF DETENTION BASIN OUTLETS TO DISSIPATE ENERGY AND SPREAD DRAINAGE WATER.

6. SILT FENCES SHALL BE PLACED AT PROJECT BOUNDARIES WHERE NON-CONCENTRATED (SHEET) FLOW IS ANTICIPATED TO FLOW OFF THE PROJECT SITE.

7. EROSION CONTROL BMP'S SHALL BE CONSTRUCTED WITHIN DITCHES TO CONTROL VELOCITY AND SCOUR.

8. ROCK CONSTRUCTION ENTRANCES SHALL BE LOCATED AT EACH POINT WHERE CONSTRUCTION TRAFFIC ENTERS OR EXITS THE SITE.

9. ADDITIONAL TEMPORARY EROSION CONTROL PROVISIONS WILL BE PROVIDED AS PART OF THE DEVELOPMENT PLANS.

DRAINAGE NOTES:

1. DRAINAGE DITCHES WILL BE SIZED BASED ON THE DESIGN LEVEL STORM EVENT REQUIRED BY THE COUNTY WITH PROVISIONS AND ANALYSIS OF FLOW VELOCITIES, SCOUR PROTECTION AND SEDIMENT CONTROL.

2. FLOW VELOCITIES IN THE CHANNEL AND AT THE CHANNEL EXITS WILL BE CONTROLLED WITH ADJUSTMENTS TO THE FLOW AREA, CHANNEL SLOPE WHERE APPROPRIATE AND USE OF APPROVED BMPS.

3. CHANNELS WILL BE DESIGNED TO WITHSTAND THE LOCALIZED FLOW VELOCITIES.

ON-SITE RETENSION BASINS ARE PROVIDED IN THE POWER BLOCK AREA TO CONTAIN RUNOFF FROM THE POWERBLOCK AREA.

5. DIVERTED DRAINAGE FLOWS CONCENTRATED TO THE SITE PERIMETER CHANNELS WILL BE DISCHARGED TO DEFINED DRAINAGE CHANNELS, WHERE AND WHEN AVAILABLE, WITH EROSION CONTROL PROVISIONS PROVIDED AT THE DISCHARGE POINT. FLOW VELOCITIES AT THE DISCHARGE POINTS WILL BE COORDINATED WITH THE JURISDICTIONAL AGENCIES.

6. DETENTION BASINS WILL BE SIZED SUCH THAT PROPOSED FLOWS IN EXCESS OF EXISTING FLOWS AT THE POINT OF DISCHARGE WILL BE DETAINED AND RELEASE FLOW VELOCITIES CONTROLLED TO MITIGATE EROSION.

800 400 0 800 1600
SCALE IN FEET

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DATED: February 10, 2010

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Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

GRAVEL CONSTRUCTION ENTERANCE
CONCRETE WASHOUT
PROPOSED FIBER ROLLS
PROPOSED SILT FENCE

Ridgecrest Solar Power Project

Kern County, California

Erosion Control Plan

Date: 02/10/10
Sheet: 28 of 34

DWG: S:\Solar Millennium LLC\60303833\CADD\CIVIL\PHASE 02 w LEAVE\SHEET\28 (EROSION).dwg Layout Name: EROSION - Plotted by: Bedford, Kevin Date: 2/7/2010 - 3:42 PM
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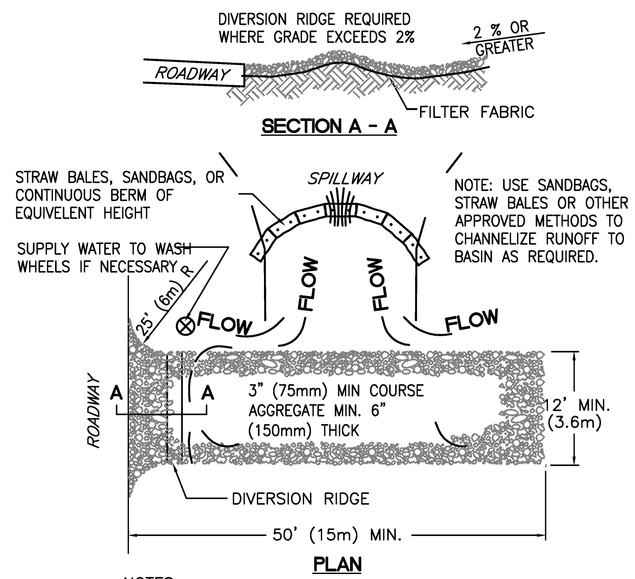


NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

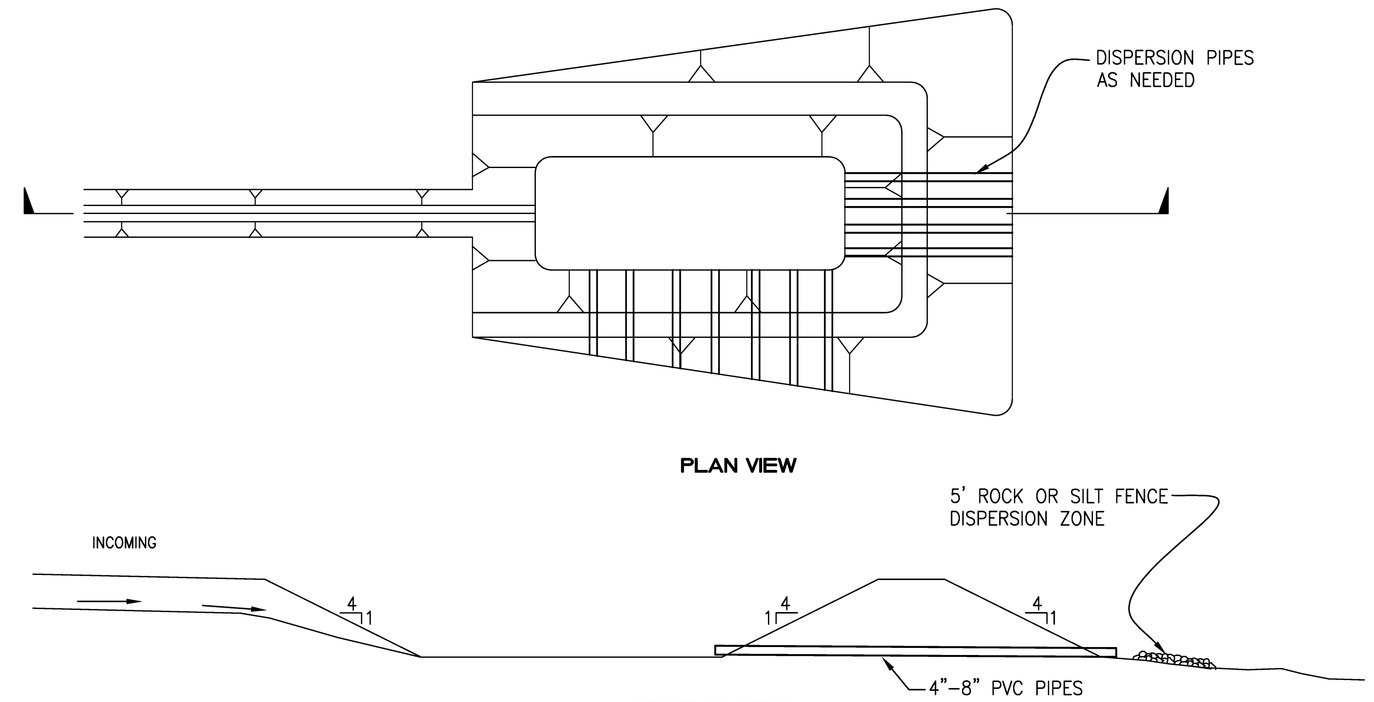
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.

3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABLIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

GRAVEL CONSTRUCTION ENTRANCE/EXIT

N.T.S.

F



NOTES:

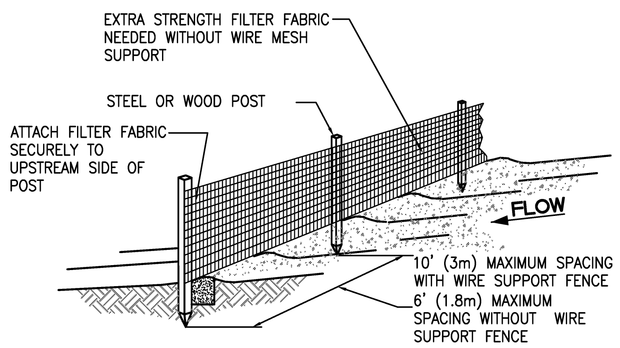
1. HEIGHT AND SIZE OF BASIN IS VARIABLE

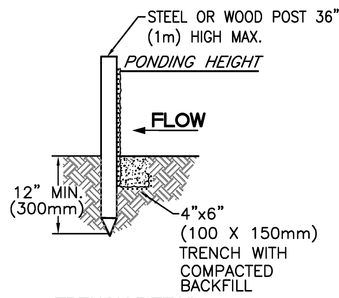
2. DISPERSION PIPES WILL BE PROVIDED IN ACCORDANCE WITH HYDROLOGY CALCULATIONS

DETENTION BASIN

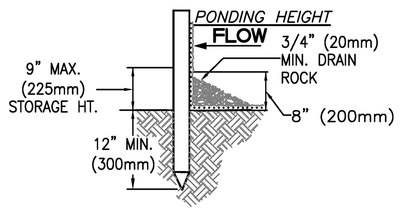
N.T.S.

C





TRENCH DETAIL



INSTALLATION WITHOUT TRENCHING

NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.

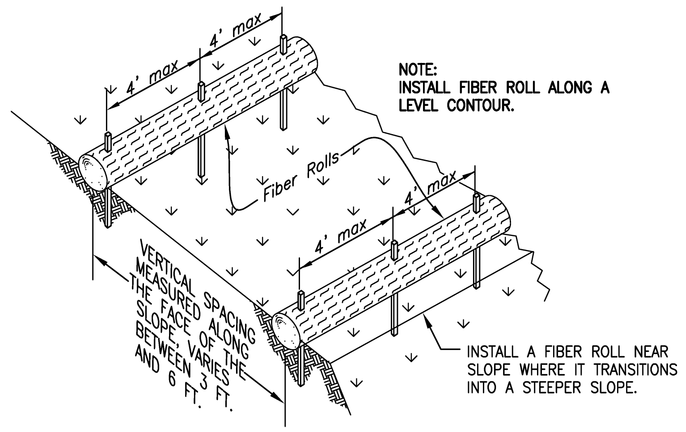
2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" (225mm) MAXIMUM RECOMMENDED STORAGE HEIGHT.

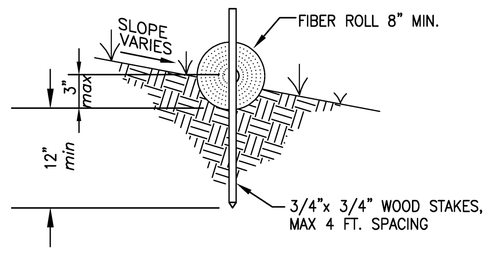
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE STABILIZED.

SILT FENCE

N.T.S.

D





TYPICAL FIBER ROLL INSTALLATION

N.T.S.

GENERAL NOTES

1. THIS PLAN MAY BE MODIFIED AND ALTERNATE MEASURES MAY BE USED TO INSURE BETTER EROSION AND SEDIMENT CONTROL RESULTS

2. CONTRACTOR SHALL USE THE APPROPRIATE EROSION CONTROL AND SEDIMENT MEASURES AS SHOWN AND DESCRIBED IN THE SWPPP APPENDICES.

3. CONTRACTOR SHALL PROTECT AND STABILIZED SLOPES PER DETAIL AS SHOWN IN THE SWPPP APPENDICES.

E

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Checked: W. BLACK
Drawn: K. S. BEDFORD
Record Drawing by/date:

Revisions:

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Prepared for:

Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Erosion Control Details

Date: 02/10/10
Sheet: 29 of 34

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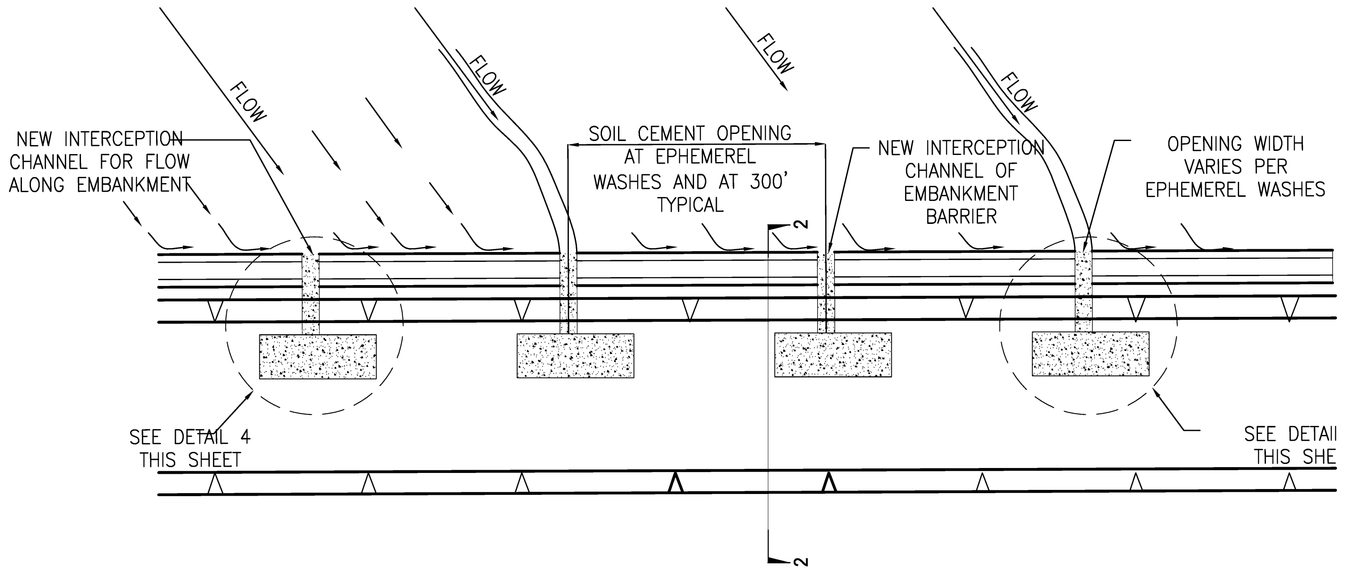
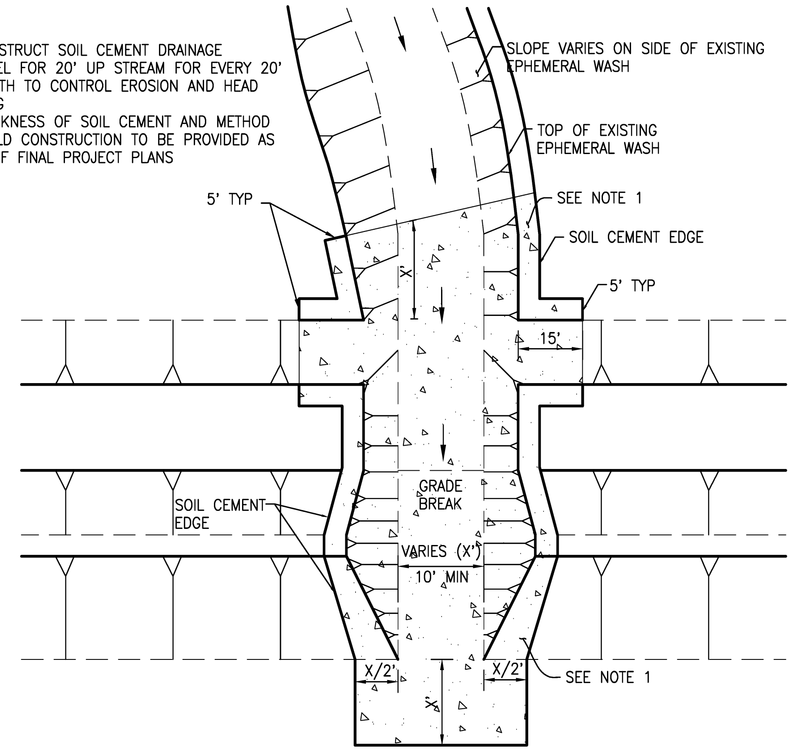


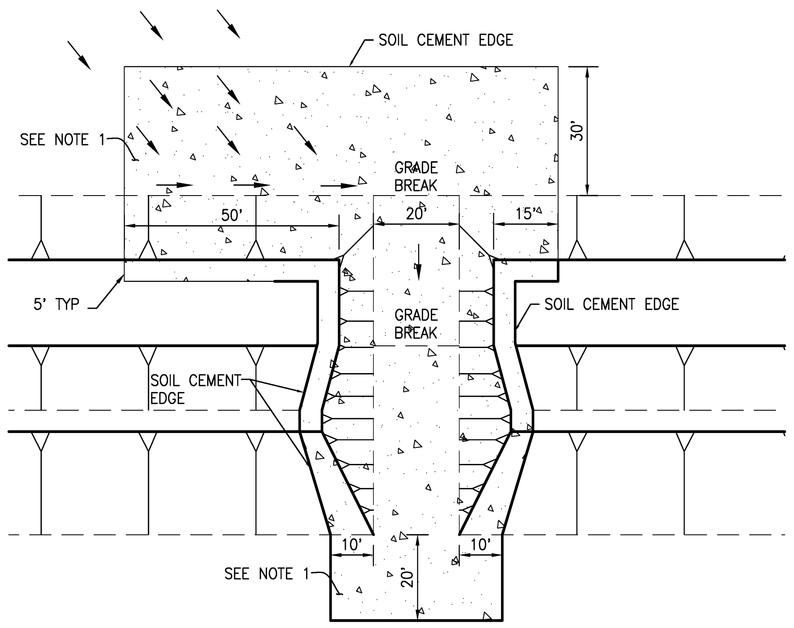
1 CHANNEL DETAIL
SCALE: 1"=100'

NOTES:
1. CONSTRUCT SOIL CEMENT DRAINAGE CHANNEL FOR 20' UP STREAM FOR EVERY 20' OF WIDTH TO CONTROL EROSION AND HEAD CUTTING
2. THICKNESS OF SOIL CEMENT AND METHOD OF FIELD CONSTRUCTION TO BE PROVIDED AS PART OF FINAL PROJECT PLANS

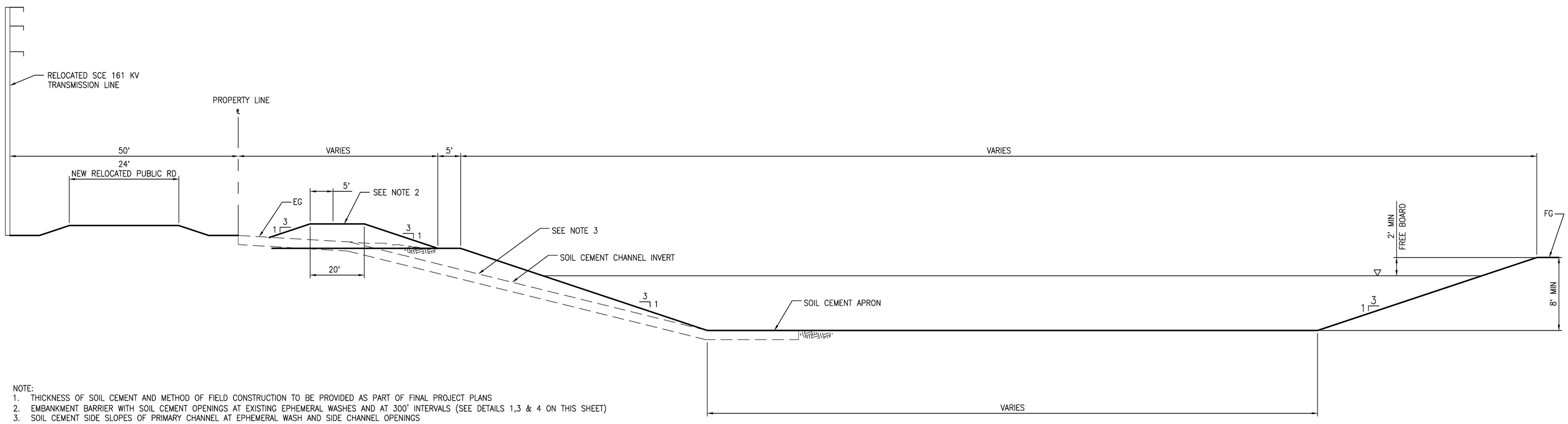


3 INTERCEPTION OF EPHEMERAL WASH AT PRIMARY CHANNEL
SCALE: 1"=20'

NOTE:
THICKNESS OF SOIL CEMENT AND METHOD OF FIELD CONSTRUCTION TO BE PROVIDED AS PART OF FINAL PROJECT PLANS



4 INTERCEPTION OF UN-CHANNELIZED LOCAL FLOWS AT PRIMARY CHANNEL
SCALE: 1"=20'



NOTE:
1. THICKNESS OF SOIL CEMENT AND METHOD OF FIELD CONSTRUCTION TO BE PROVIDED AS PART OF FINAL PROJECT PLANS
2. EMBANKMENT BARRIER WITH SOIL CEMENT OPENINGS AT EXISTING EPHEMERAL WASHES AND AT 300' INTERVALS (SEE DETAILS 1,3 & 4 ON THIS SHEET)
3. SOIL CEMENT SIDE SLOPES OF PRIMARY CHANNEL AT EPHEMERAL WASH AND SIDE CHANNEL OPENINGS

2 WESTERLY CHANNEL TYPICAL SECTION
SCALE: 1"=10'

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Kern County, California

Interception Channels at Embankment

Date: 02/10/10
Sheet: 30 of 34

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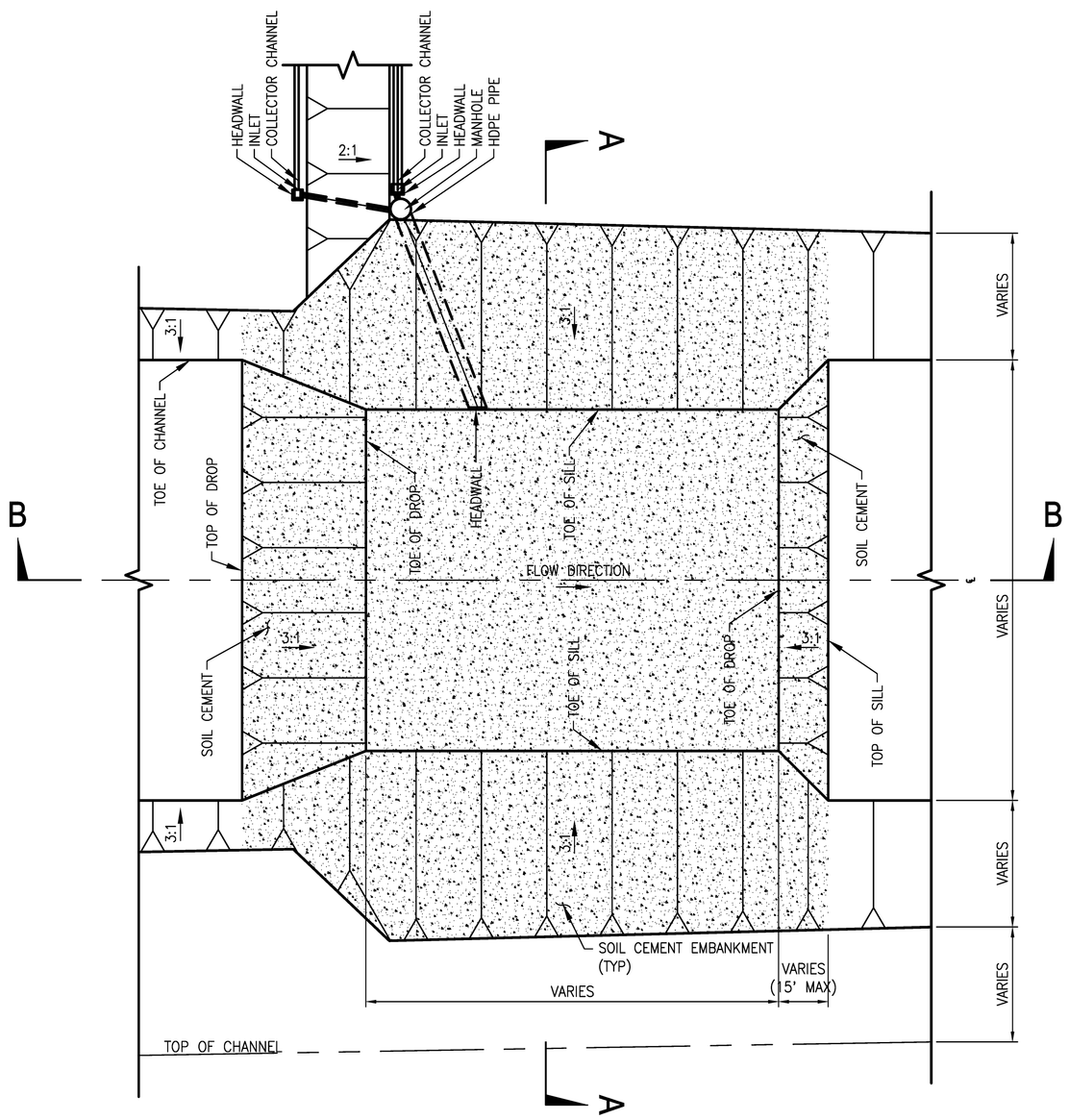
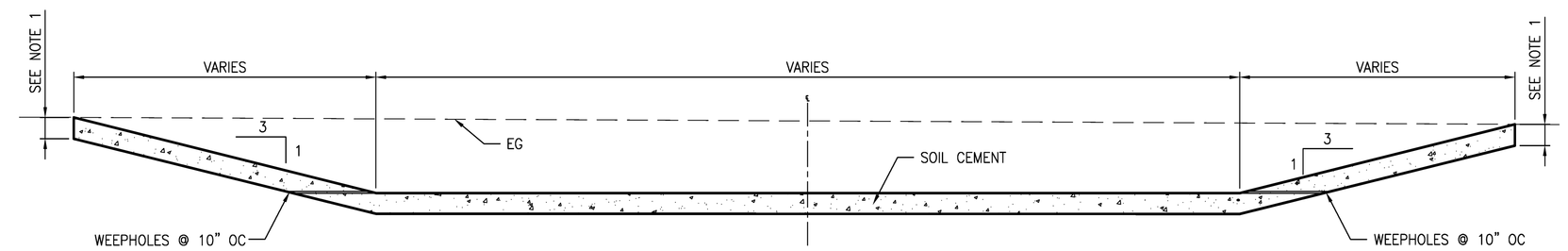
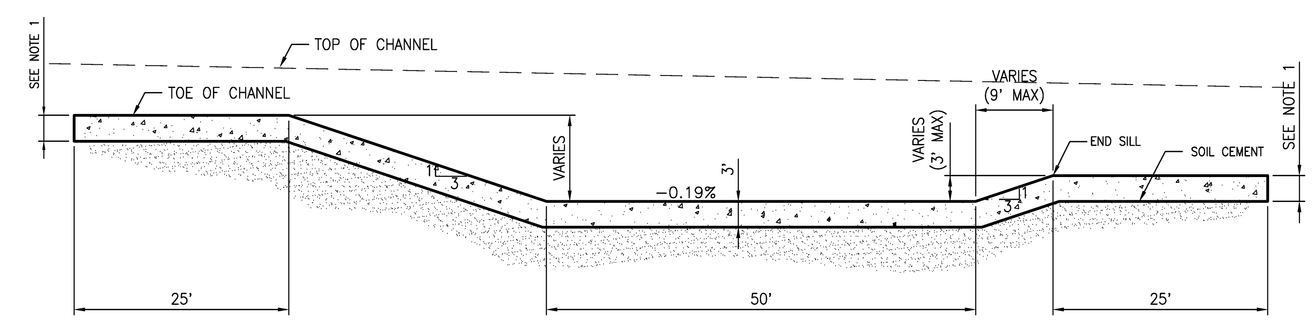


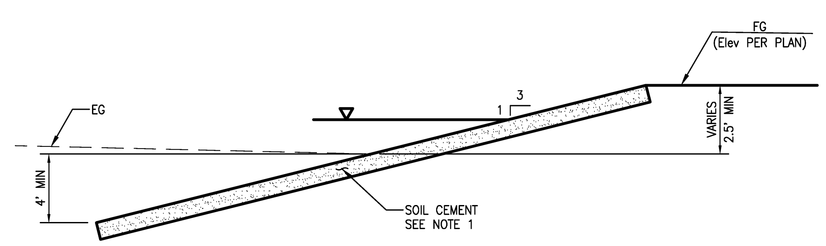
1 SOIL CEMENT DROP STRUCTURE AND STILLING BASIN
SCALE: 1"=20'



A-A CROSS SECTION
SCALE: 1"=10'



B-B CROSS SECTION
SCALE: 1"=10'



2 EMBANKMENT PROTECTION TYPICAL DETAIL
SCALE 1"=10'

NOTE:
1. THICKNESS OF SOIL CEMENT AND METHOD OF FIELD CONSTRUCTION TO BE PROVIDED AS PART OF FINAL PROJECT ENGINEERING PLANS

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Prepared for:

Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Drop Structure and Channel Protection Detail

Date: 02/10/10
Sheet: 31 of 34

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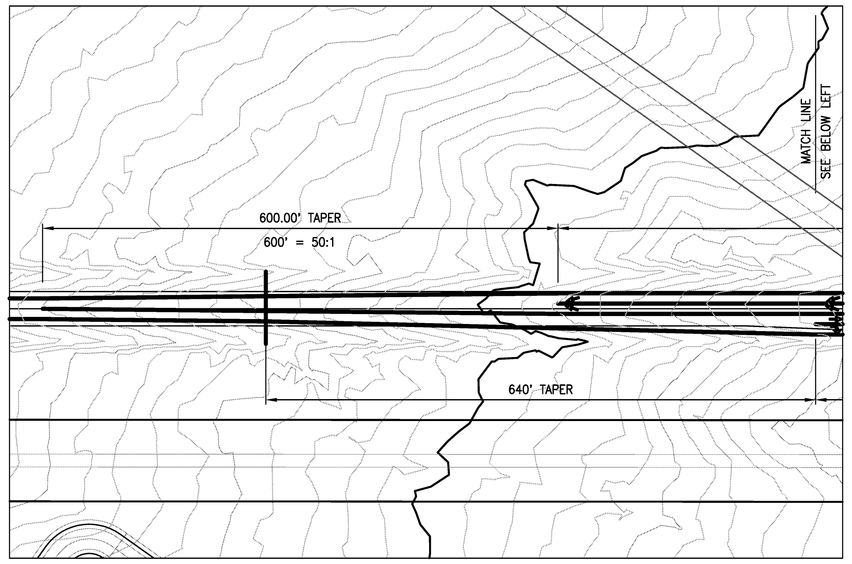


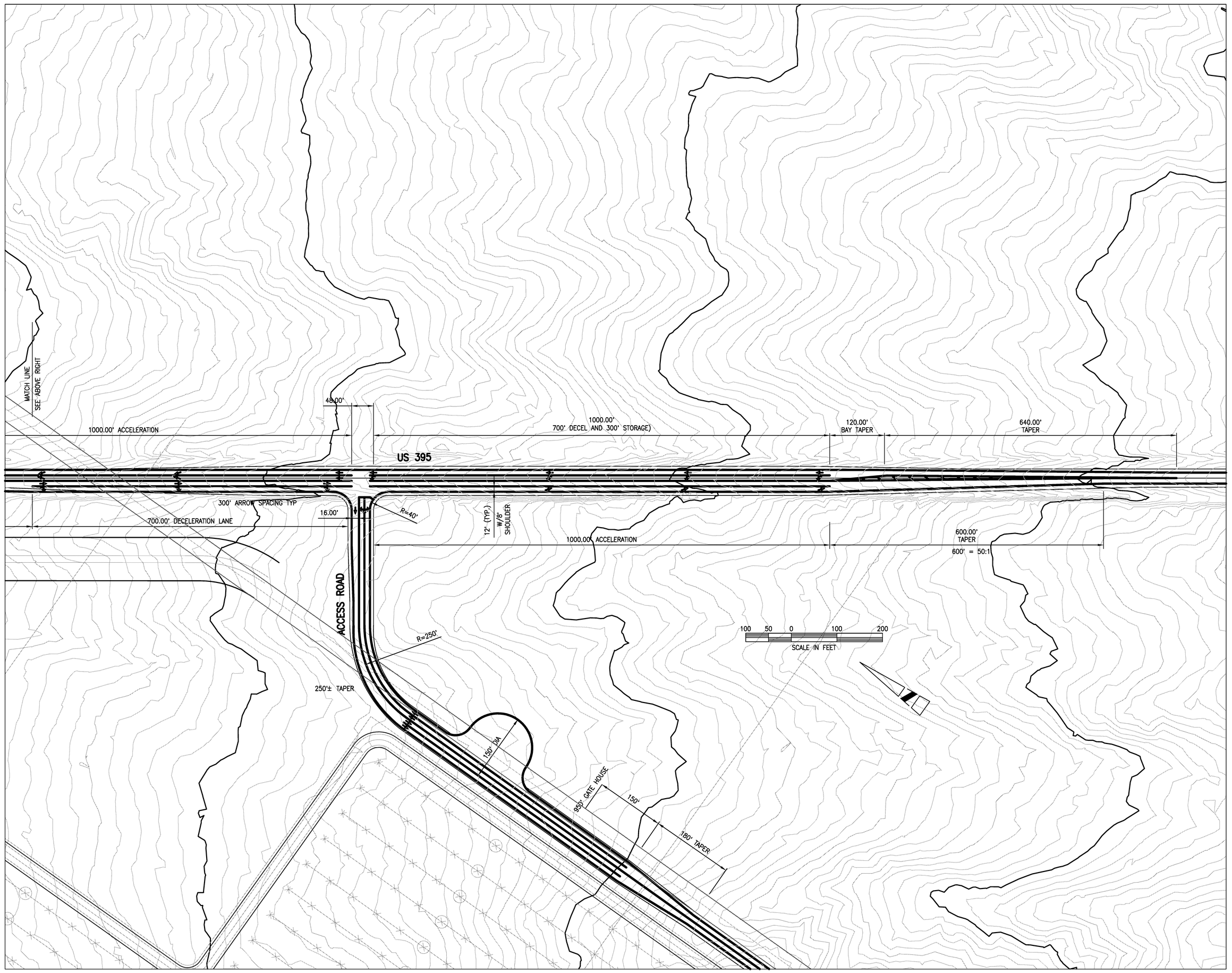
BASIS OF DESIGN
80 MPH DESIGN SPEED

DECELERATION LANE
ASSUMES 80 MPH DESIGN = 64 MPH AVERAGE RUN (BLUE BOOK)
TO STOP COMPLETION = 700'.

ACCELERATION LANE
70MPH DESIGN
0-53 MPH = 1590' = 1600'
(INCLUDES TAPER)

ASSUMES WIDENING OF HIGHWAY 6' ON EACH SIDE OF CENTERLINE.

BLUE BOOK
A POLICY OF GEOMETRIC DESIGN OF RURAL HIGHWAYS, 1965, AASHTO



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Kern County, California

Drop Structure and Channel Protection Detail

Date: 02/10/10
Sheet: 32 of 34

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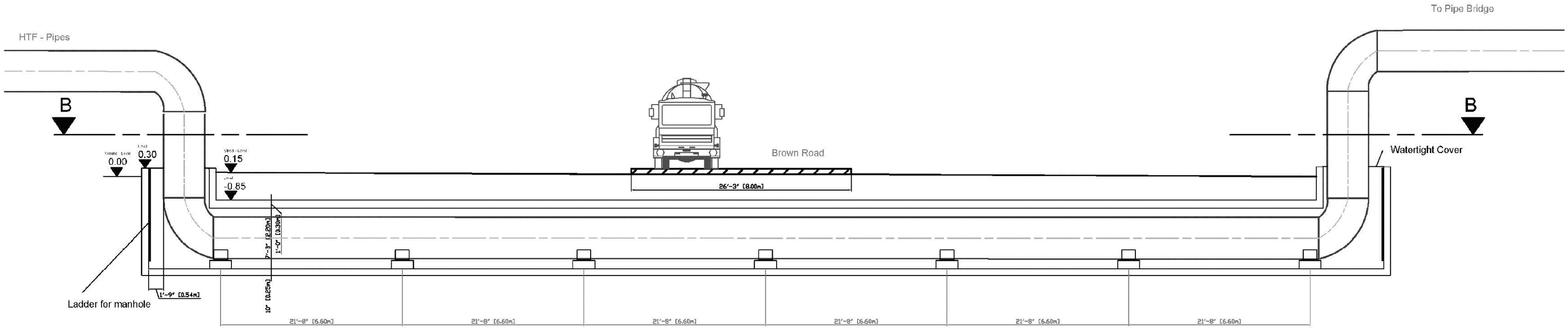
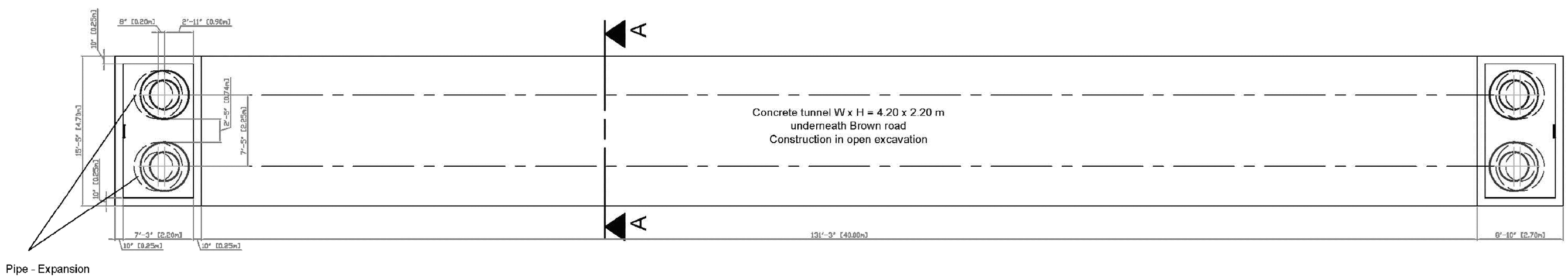


B - B



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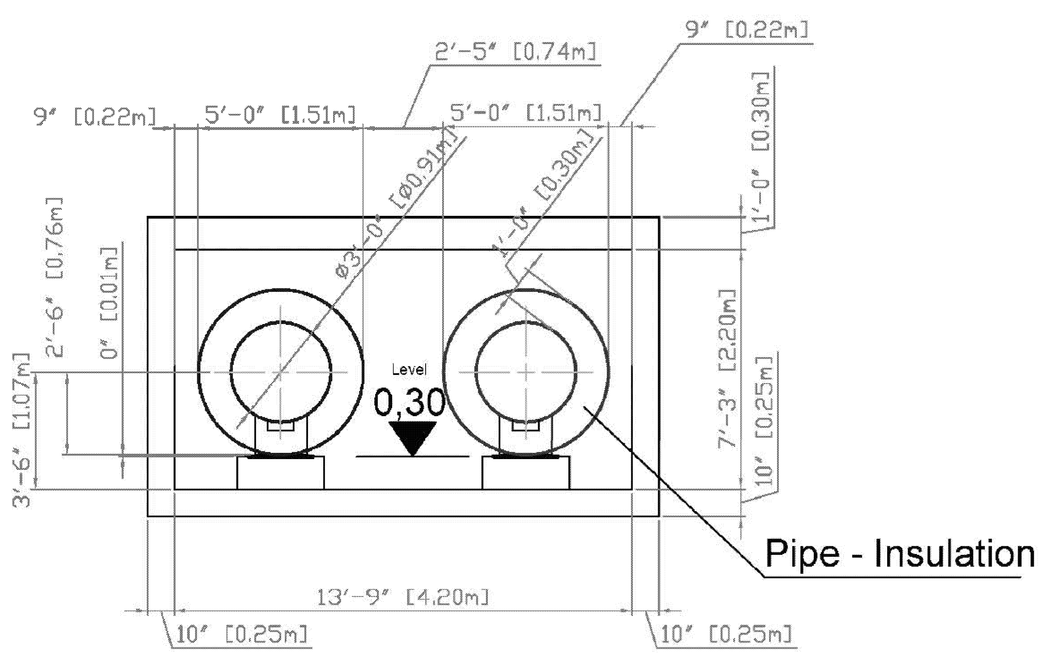

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Ridgecrest Solar Power Project

Kern County, California

HTF Pipe Crossing at Brown Road

Date: 02/10/10
Sheet: 33 of 34

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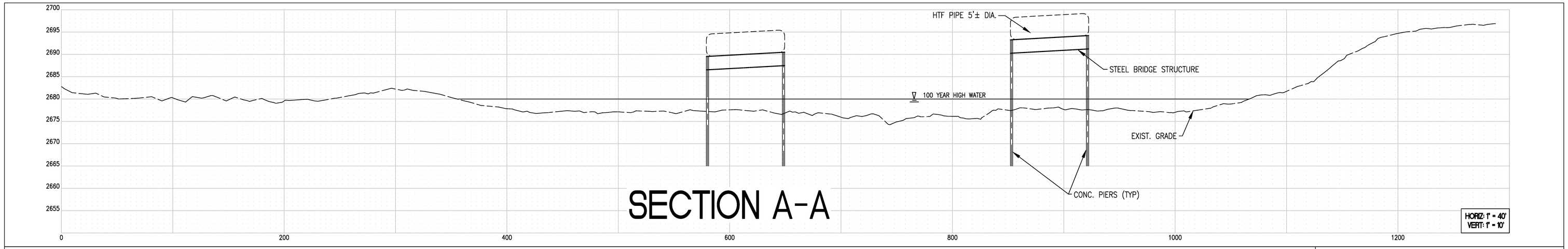

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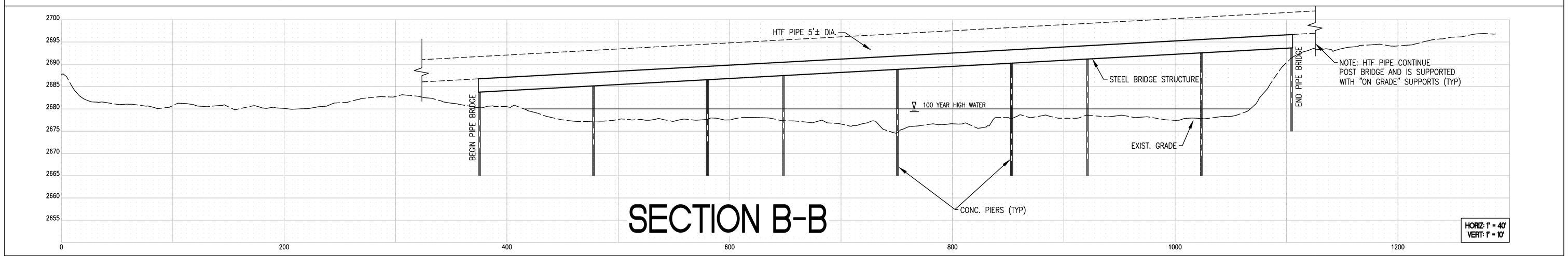

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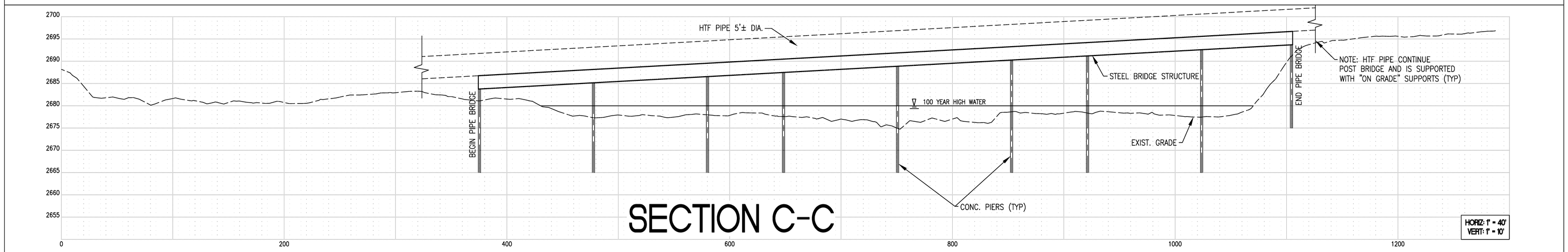

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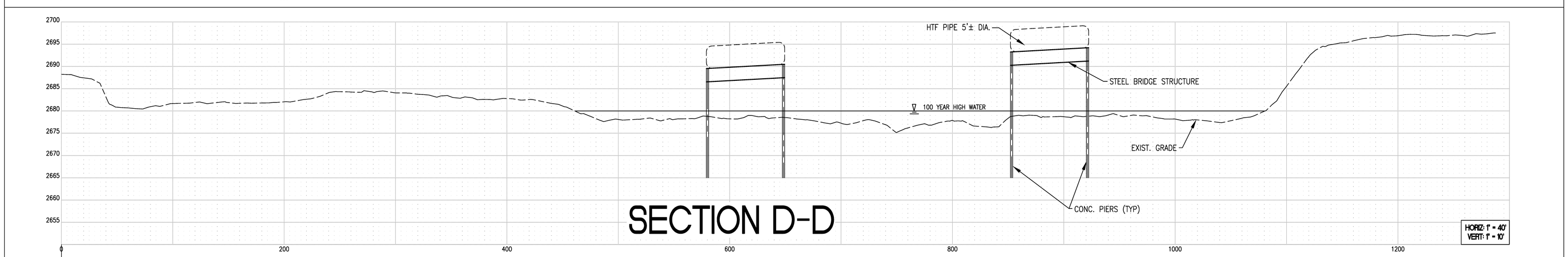

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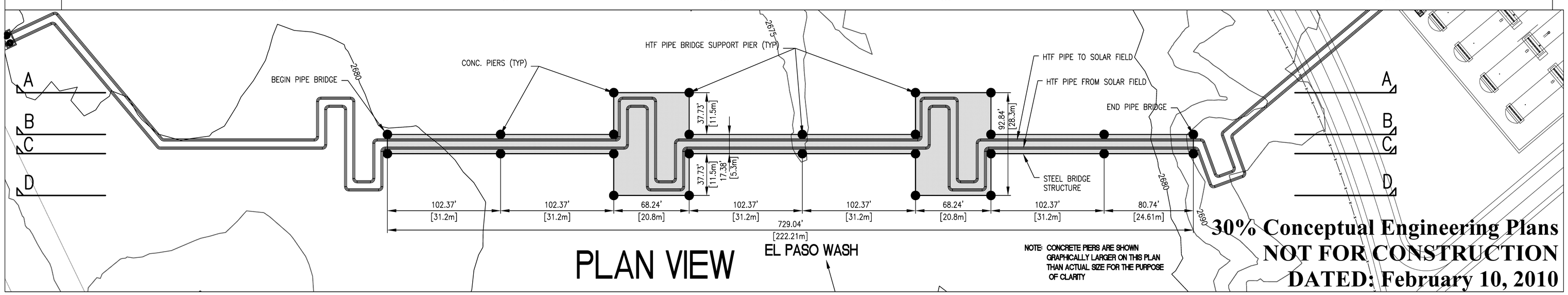

PLAN VIEW

NOTE: CONCRETE PIERS ARE SHOWN GRAPHICALLY LARGER ON THIS PLAN THAN ACTUAL SIZE FOR THE PURPOSE OF CLARITY

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Ridgecrest Solar Power Project

Kern County, California

HTF Pipe Bridge at El Paso Wash

Date: 02/10/10
Sheet: 34 of 34

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