DRAFT
ENVIRONMENTAL IMPACT REPORT
for the
CAMPO VERDE SOLAR PROJECT
APPENDICES

SCH. No. 2011111049
Conditional Use Permit (CUP) #11-0007
Variance #V12-0008

May 2012

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SCH. No. 2011111049
Conditional Use Permit (CUP) #11-0007
Variance #V12-0008

Prepared for

County of Imperial
801 Main Street
El Centro, CA 92243

Prepared by

ericsson-grant inc.

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Encinitas, CA 92024
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May 2012

DRAFT ENVIRONMENTAL IMPACT REPORT
CAMPO VERDE SOLAR PROJECT
APPENDICES

APPENDIX A

NOP, INITIAL STUDY AND COMMENT LETTERS

NOP

Form A

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P O Box 3044, Sacramento, CA 95812-3044 (916) 445-0613

See NOTE below

SCH# ________________

Project Title: Campo Verde Solar Energy Project

Lead Agency: Imperial County **Contact Person:** David Black

Street Address: 801 Main Street **Email:** DavidBlack@co.imperial.ca.us

City: El Centro **Zip** 92243 **County:** Imperial **Phone:** (760) 482-4240

Project Location

County: Imperial **City/Nearest Community:** El Centro

Cross Streets: South of I-8, west of Drew Road **Zip Code:** 92243 **Total Acres:** 1,990

Assessor's Parcel No. Various **Section:** Various **Twp.:** 16 South **Range:** 12 East **Base:** San Bernardino

Within 2 Miles: State Hwy #: N/A Waterways: Westside Main Canal

Airports: N/A Railways: N/A Schools: Westside School

Document Type

CEQA: [X] NOP [ ] Early Cons [ ] Neg Dec [ ] Draft EIR [ ] Supplement/Subsequent EIR (Prior SCH No.)________ [ ] Other: ________

NEPA: [ ] NOI [ ] EA [ ] Draft EIS [ ] FONSI

OTHER: [ ] Joint Document [ ] Final Document [ ] Other: ________

Local Action Type

[ ] General Plan Update
[ ] General Plan Amendment
[ ] General Plan Element
[ ] Community Planning_Dept.
[ ] Specific Plan
[ ] Master Plan
[ ] Planned Unit Development
[ ] Site Plan
[ ] Rezone
[ ] Prezone
[X] Use Permit
[ ] Land Division (Subdivision,
[ ] Annexation
[ ] Redevelopment
[ ] Coastal Permit
[ ] Other: ________

Development Type

[ ] Residential: *Units*______ *Acres*______
[ ] Office: *Sq. ft.*______ *Acres*______ *Employees*______
[ ] Commercial: *Sq. ft.*______ *Acres*______ *Employees*______
[ ] Industrial: *Sq. ft.*______ *Acres*______ *Employees*______
[ ] Educational: ______
[ ] Recreational: ______
[ ] Water Facilities: *Type*______ *MGD*______
[ ] Transportation: *Type*______
[ ] Mining: *Mineral*______
[X] Power: *Type* Solar *Watts* 150 MWAC
[ ] Waste Treatment: *Type*______
[ ] Hazardous Waste: *Type*______
[ ] Other: ______

Project Issues Discussed in Document

[X] Aesthetic/Visual
[X] Agricultural Land
[X] Air Quality
[X] Archeological/Historical
[ ] Coastal Zone
[X] Drainage/Absorption
[ ] Economic/Jobs
[ ] Fiscal
[X] Flood Plain/Flooding
[ ] Forest Land/Fire Hazard
[X] Geological/Seismic
[ ] Minerals
[X] Noise
[ ] Population/Housing Balance
[ ] Public Services/Facilities
[ ] Recreation/Parks
[ ] Schools/Universities
[ ] Septic Systems
[ ] Sewer Capacity
[X] Soil Erosion/Compaction/Grading
[ ] Solid Waste
[X] Toxic/Hazardous
[X] Traffic/Circulation
[X] Vegetation
[X] Water Quality
[ ] Water Supply/Groundwater
[ ] Wetland/Riparian
[X] Wildlife
[X] Growth Inducing
[X] Landuse
[X] Cumulative Effects
[ ] Other: ________

Present Land Use/Zoning/General Plan Use Agriculture, non-food crops. Zoned: A-2 - General Agriculture, A-2-R - General Agriculture, Rural Zone, and A-3 - Heavy Agriculture.

Project Description A solar project proposed on 1,990 acres of agricultural land. The project includes photovoltaic solar panels, transformers, inverters and supporting equipment arranged in rows.

SEE ATTACHED.

NOTE: Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. from a Notice of Preparation or previous draft document) please fill it in.

Reviewing Agencies Checklist

Form A, continued

KEY
S = Document sent by lead agency
X = Document sent by SCH
√ = Suggested distribution

____Resources Agency
____Boating & Waterways
____Coastal Commission
____Colorado River Board
____Conservation
_✓_Fish & Game
____Forestry
_✓_Office of Historic Preservation
_✓_Parks & Recreation
____Reclamation
____S.F. Bay Conservaion & Development Commission
_✓_Water Resources (DWR)

Business, Transportation & Housing

____Aeronautics
_✓_California Highway Patrol
_✓_CALTRANS District # 11
____Department of Transportation Planning (headquarters)
____Housing & Community Development
____**Food & Agriculture**

Health & Welfare

____Health Services____

State & Consumer Services

____General Services
____OLA (Schools)

Cal-EPA

_✓_Air Resources Board
_✓_APCD/AQMD
____California Waste Management Board
____SWRCB: Clean Water Grants
____SWRCB: Delta Unit
____SWRCB: Water Quality
____SWRCB: Water Rights
_✓_Regional WQBC # 7 (Palm Desert)

Youth & Adult Corrections

____Corrections

Independent Commissions & Offices

_✓_Energy Commission
_✓_Native American Heritage Commission
_✓_Public Utilities Commission
____Santa Monica Mountains Conservancy
____State Lands Commission
____Tahoe Regional Planning Agency

_✓_Other Department of Toxic Substance Control

Public Review Period (to be filled in by lead agency)

Starting Date November 15, 2011 Ending Date December 16, 2011

Signature ____ Date ____

Lead Agency: (Complete if applicable)

Consulting Firm: Ericsson-Grant, Inc.
Address: 418 Parkwood Lane
City/State/Zip: Encinitas
Contact : Kevin L. Grant, Principal
Email Address: kgrant@ericsson-grant.com
Phone: (858) 353-7073

For SCH Use Only:

Date Received at SCH ____
Date Review Starts ____
Date to Agencies ____
Date to SCH ____
Clearance Date ____
Notes:

Applicant: Campo Verde Solar, LLC
Address: 353 Sacramento St. - # 2100
City/State/Zip: San Francisco, CA 94111
Email Address: JCook@FIRSTSOLAR.COM
Phone: (510) 625-7455

INITIAL STUDY

1. Project Title: Campo Verde Solar Project Date: November 10, 2011

2. Lead Agency: Imperial County Planning & Development Services Department (ICPDS)

3. Contact Person: Dave Black, Planner IV

4. Address: 801 Main Street
El Centro, CA 92243

5. Phone Number: (760) 482-4320 Fax Number: (760) 353-8338

6. Project Location: The project site is located in Imperial County approximately 7 miles southwest of the community of El Centro, California generally south of I-8, west of Drew Road, and north and east of the Westside Main Canal.

7. Project Sponsor: Campo Verde Solar, LLC

8. Sponsor Address: 353 Sacramento St. - # 2100
San Francisco, CA 94111

9. General Plan Designation: Agriculture

10. Zoning: A-2 (General Agriculture), A-2-R (General Agricultural Rural Zone), A-3 (Heavy Agriculture)

11. Description of project: See attached project summary.

12. Surrounding Land Uses and Setting: See attached project summary.

13. Other Agencies whose approval is required (e.g., permits, financing approval, or participation agreement): Bureau of Land Management

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:
The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a potentially significant Impact as indicated by the checklist on the following pages.

☒ Aesthetics	☒ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology & Soils
☒ Greenhouse Gas Emissions	☒ Hazards & Hazardous Materials	☒ Hydrology & Water Quality
☒ Land Use & Planning	☐ Mineral Resources	☒ Noise
☐ Population & Housing	☐ Public Services	☐ Recreation
☒ Transportation / Traffic	☐ Utilities and Service and Systems	☒ Mandatory Findings of Significance

1) Found that the proposed project COULD NOT have significant effect on the environment, and a NEGATIVE DECLARATION will be prepared. ☐

2) Found that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent in the form of mitigation measures which are described on an attached sheet have been added to the project. A MITIGATED NEGATIVE DECLARATION will be prepared. ☐

3) Found that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required. ☒

4) Found that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one *effect* 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by

mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed. ☐

5) Found that although the proposed project could have a significant *effect* on the environment, because all potentially significant *effects* (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION, pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project nothing further is required. ☐

PROJECT SUMMARY

LOCATION:
The proposed project site is located in Imperial County approximately 7 miles southwest of the community of El Centro, California (Figure 1). The project site is located generally south of I-8, west of Drew Road, and north and east of the Westside Main Canal.

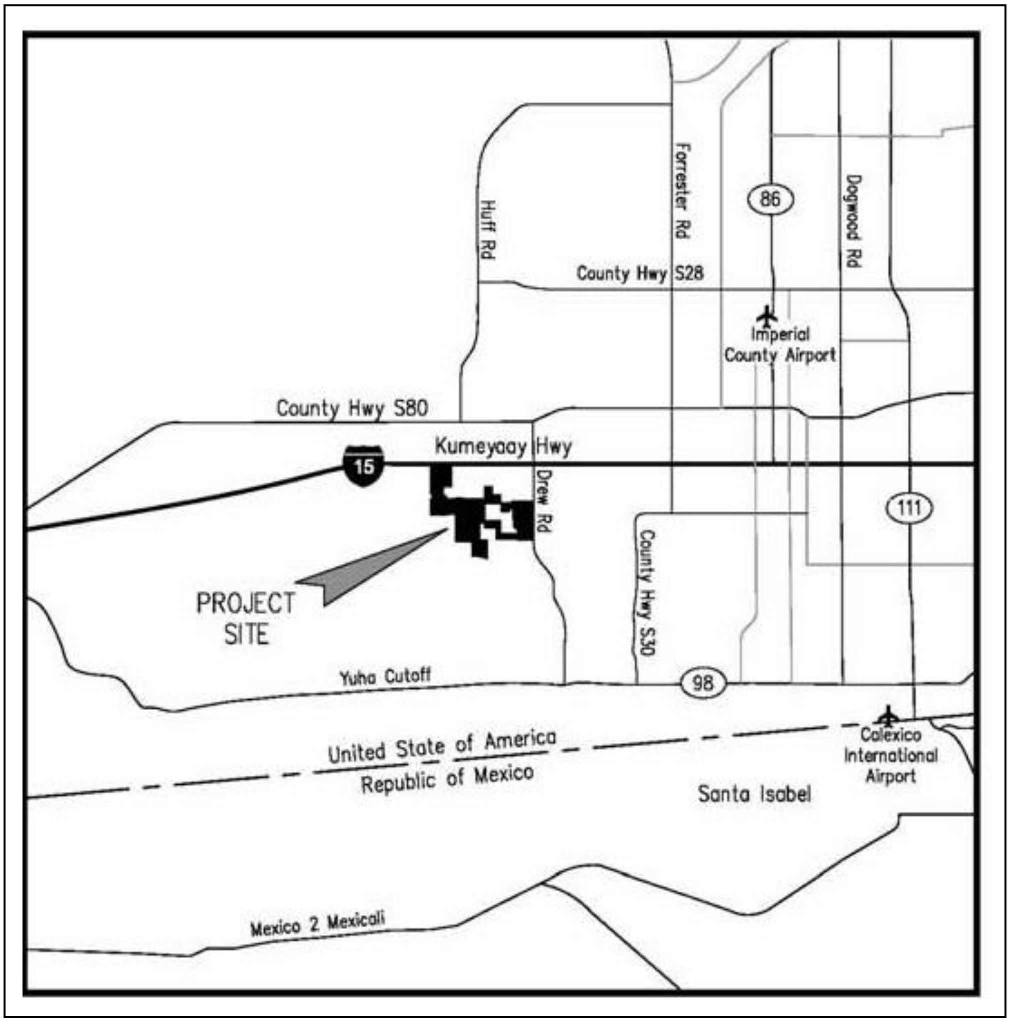

Figure 1 – Site Location Map

The solar facility site includes 27 parcels under private ownership by five separate owners (Figure 2). The project also includes a segment of transmission line that would extend south through land under the jurisdiction of the Bureau of Land Management (BLM) and connect with the Imperial Valley Substation.

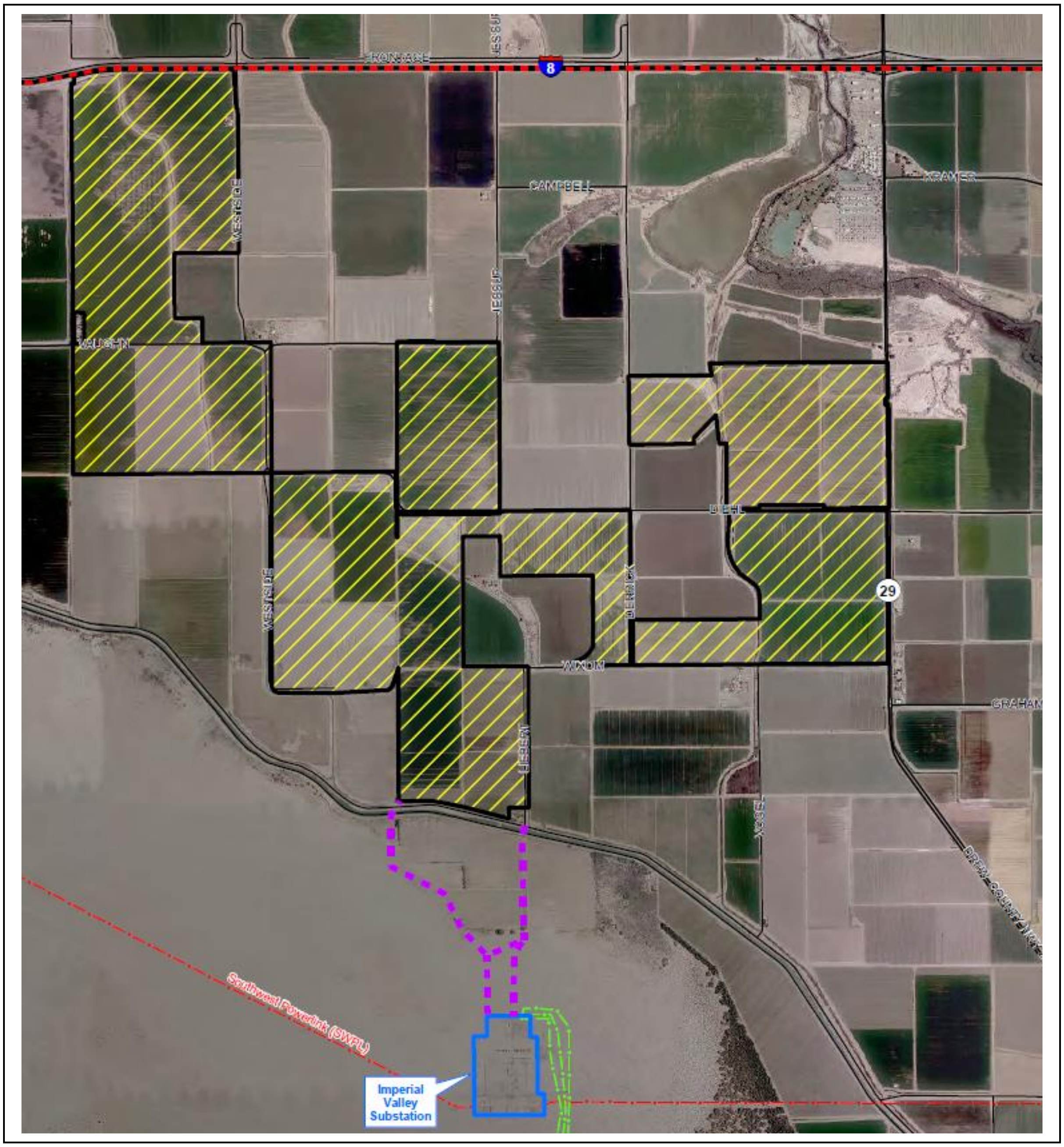

Figure 2 – Project Site Parcels

The proposed transmission line corridor would extend south from the project site through BLM land within BLM-designated Utility Corridor "N", connecting to the north side of the Imperial Valley Substation (Figure 3). The portion of the transmission line located through BLM land will undergo separate environmental review to fulfill the requirements of the National Environmental Policy Act (NEPA). The NEPA analysis will be prepared by the BLM.

Figure 3 - Gen-tie Line Route Options

THE PROJECT:

The proposed Campo Verde Solar project is located on approximately 1,990 acres of agricultural land. The project includes photovoltaic (PV) panels (either single-axis trackers or fixed-tilt supports) that would convert sunlight into direct current (DC) electricity. The PV modules would be grouped in blocks along with Power Conversion Station (PCS) with inverters, three-phase pad mounted transformers and circuit breakers to form 1 to 1.5 -megawatt alternating current (AC) blocks. The project also includes an on-site substation and a transmission line (Gen-tie Line) interconnection to the Imperial Valley Substation. The portion of the project on BLM land will undergo separate environmental review to fulfill the requirements of the National Environmental Policy Act (NEPA). The NEPA analysis will be prepared by the BLM.

The project will also include one or more small meteorological monitoring stations per block to track solar insulation, temperature, wind direction, and speed. The site will be fenced with a chain-link security fence approximately 8 feet high. Site security will be provided with a small guard station provided at gated access points. Security cameras may be deployed throughout the site and monitored at the guard station and remotely by a security service at night. Lights, triggered by motion sensors and powered by station power with backup battery power, will also be installed at each entry gate and at each PCS.

A site control center (SCC) will provide control, monitoring, alarm, and data storage functions for plant systems as well as communication with the solar field Supervisory Control and Data Acquisition (SCADA) system. The project's lighting system will provide operation and maintenance personnel with illumination for both normal and emergency conditions near the main entrance and the project substation. Underground metal structures will have cathodic protection as necessary based on soil conditions.

If the project were ever to be decommissioned, the panels, support structures, and electrical equipment would be removed and the site would be returned to agriculture.

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect is significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level.

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the follow:
   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures, which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to previously-prepared or outside documents should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:
   a) The significance criteria or threshold, if any, used to evaluate each question; and
   b) The mitigation measure identified, if any, to reduce the impact to less than significance.

OFFICIAL CHECKLIST:

AESTHETICS Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☒	☐	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

a) The project site is located in an unincorporated portion of Imperial County characterized by flat, agricultural land. No scenic vistas or areas with high visual quality would be disrupted. Impacts are anticipated to be less than significant.

b) The project site consists of agricultural parcels of land that have been cultivated and disturbed. As a result, development of the project site is not anticipated to substantially damage scenic resources, including, but limited to, trees, rock outcroppings, and historic buildings. Moreover, the project site is not located adjacent to a scenic highway. The initial segment for future Scenic Highway Designation status of SR 98 lies between the San Diego County line and its junction with State Route 98 which is over 16 miles southwest of the western boundary of the project site. Therefore, no impact is anticipated and impacts to resources within a state scenic highway will not be discussed in the EIR.

c) The proposed project is the construction of a solar facility, which would include low-lying solar panels, three-phase transformers and circuit breakers. The highest point on the fixed tilt supports (the uppermost solar panel) is up to approximately 7 feet above the ground surface. The highest point on the single axis-trackers would be approximately 9 to 11 feet occurring during the morning and evening hours when the panels are tilted to face the rising or setting sun. This is based on a 4-panel high mounting system. Using the fixed-tilt mounting system, panels will be mounted at an angle of approximately 25 degrees. The degree of tilt will change over the course of each day for the single-axis trackers. The PV units will be mounted on driven pile foundations to support the panel mounting system. The Power Conversion System (PCS) electrical equipment (inverters and transformers) will be located in a pre-fabricated protective enclosure about 10 to 12 feet high. In addition, an operation and maintenance (O&M) building would be developed on site and would have a maximum height of approximately 18 feet. The project will change the look and character of the site. Changes in the views of the site from Key Observation Points will be analyzed. Therefore, a potentially significant impact is identified for this issue area. Impacts to visual character and quality of the site will be addressed in the EIR.

d) The project's lighting system will provide operation and maintenance personnel with illumination for both normal and emergency conditions near the main entrance and the project substation. Lighting will be designed to provide the minimum illumination needed to achieve safety and security objectives and will be directed downward and shielded to focus illumination on the desired areas only. Lights, triggered by motion sensors and powered by station power with backup battery power, will also be installed at each entry gate and at each PCS. There will be no lighting in the solar field. Therefore, light trespass on surrounding properties will be minimal. If lighting at individual solar panels or other equipment is needed for night maintenance, portable lighting will be used. The solar panels are generally non-reflective. Therefore, a less than significant impact is identified for light and glare impacts. This will be acknowledged in the EIR.

II. AGRICULTURE AND FOREST RESOURCES -- In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☒	☐	☐	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g», timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 511 04(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☒	☐	☐	☐

a) Based on the farmland maps prepared by the *California Department* of *Conservation* (2006), the project site contains Prime Farmland and Farmland of Statewide importance. Therefore, a potentially significant impact would result from the conversion of Farmland of Statewide Importance to non-agricultural use, as proposed on the project site. A Land Evaluation Site Assessment (LESA) will be prepared for the proposed project and conversion of farmland will be addressed in the EIR. This issue is considered potentially significant.

b) The land encompassed by the project parcels is currently zoned A-2 (General Agriculture), A-2-R (General Agricultural Rural Zone) and A-3 (Heavy Agriculture) and designated by the General Plan as "Agriculture." Solar energy facilities are allowed uses within these zones subject to a Conditional Use Permit. The Applicant is not proposing a change in the Land Use Designation or zoning of the project parcels. Furthermore, the A-2 and A-3 zones allow for the development of solar energy farms and the Board of Supervisors has determined that solar projects are consistent with agriculture related zones. The Board of Supervisors has taken public comments on solar projects and approved previous solar farms as a temporary use on a case-by-case basis. Thus, the project does not conflict with existing zoning for agriculture. The original configuration of the project site contained four parcels encompassing approximately 276 acres which are subject to the Williamson Act. After discussions with the County and other stakeholders, these parcels have been removed from the project. Therefore, contract conversion of land under Williamson Act Contract is not an issue and will not need to be discussed in the EIR.

c) Based on the Imperial County General Plan, Conservation and Open Space Element, mixed chaparral, pinyon-juniper habitats, and the montane hardwood-conifer forest are located in restricted areas of the County. Mixed chaparral and pinyon-juniper habitats are located in the extreme southwestern corner of Imperial County; montane hardwood-conifer forest is in the extreme northwestern corner of Imperial County. Thus, there are no existing forest lands, timberlands, or timberland zoned Timberland Production either on-site or in the immediate vicinity that would conflict with existing zoning or cause rezoning. Therefore, no impact is identified for this issue area.

d) There are no existing forest lands either on-site or in the immediate vicinity of the project site. The proposed project would not result in the loss of forest land or conversion of forest land to non-forest use. Therefore, no impact is identified for this issue area.

e) The proposed project would introduce a solar facility into an area used for agriculture and would temporarily convert this farmland to non-agricultural uses. This action would not result in conversion of adjacent farmland to non-agricultural uses. This is a potentially significant impact that will be discussed in the EIR.

III. AIR QUALITY Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to the following determinations. Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☒	☐	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

a) The project site is located within the Salton Sea Air Basin (SSAB) and is subject to the Imperial County Air Pollution Control District (ICAPCD) Rules and Regulations. Construction of the proposed project would potentially create temporary emissions of dust, fumes, equipment exhaust, and other air contaminants that may conflict with the ICAPCD Rules and Regulations. Thus, a potentially significant impact is identified for this issue area.

b,c) Currently, the SSAB is either in attainment or unclassified for all federal and state air pollutant standards with the exception of O_3 (8-hour) and total suspended particulate matter less than 10 microns in diameter (PM_{10}). Air pollutants transported into the SSAB from the adjacent South Coast Air Basin (Los Angeles, San Bernardino County, Orange County, and Riverside County) and from Mexicali (Mexico) substantially contribute to the non-attainment conditions in the SSAB. Thus, a potentially significant impact is identified for this issue area. The proposed construction phase of the project may result in a cumulatively considerable net increase of one or more criteria pollutants as a result of point, and non-point source emissions, for which the project region is in nonattainment under applicable federal and state ambient air quality standards. Thus, a potentially significant impact is identified for this issue area. No sensitive receptors immediately surrounding the project site have been identified. No stationary source emissions are proposed from the project; however, temporary construction air quality emissions have the potential to result in a significant impact.

To address the above-identified issues, an analysis of air quality impacts is being prepared for the proposed project and these potential air quality impacts will be addressed in the EIR.

d) The project site and surrounding areas are currently agricultural land with the northernmost portion adjacent to Interstate 8. No sensitive receptors (housing, schools, churches) exist on the project site but one school and a few residences do occur within the immediate vicinity. These are not expected to be impacted by substantial pollutant concentrations from the construction activities. Impacts are anticipated to be less than significant, but will be acknowledged and/or analyzed in the EIR.

e) The proposed project is the installation of a solar facility. The project, by its nature, is not anticipated to generate objectionable odors. No impact is identified for this issue area.

IV. BIOLOGICAL RESOURCES Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐
d) Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances Protecting biological resource, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

a) Nearly all the project lands are disturbed agricultural lands with very little native vegetation / habitats. Biological surveys of these lands have been conducted with the focus of documenting the habitat, potential jurisdictional state / federal waters, and wetlands, and documenting suitable threatened, endangered, and sensitive wildlife species habitats. The CNDDB RareFind also indicated that two sensitive species are known to be in the general project vicinity: western burrowing owl (*Athene cunicularia*) and flat-tailed horned lizard (*Phrynosoma mcallii*). The potential range for the desert tortoise (*Gopherus agassizii*) is outside of, but close to, the project area.

The flat-tailed horned lizard is a Bureau of Land Management (BLM) sensitive species. According to the *Flat-tailed Homed Lizard Rangewide Management Strategy* (2003), the historical range of the flat-tailed horned lizard is located primarily in Imperial Valley. The project proposes to interconnect to the Imperial Valley Substation via one of two routes located on BLM land. The BLM land has the potential to provide habitat for the flat-tailed horned lizard. A flat-tailed horned lizard habitat assessment/survey shall be conducted to determine if potential/suitable habitat is present on the project site as part of BLM's analysis under NEPA.

The project area (non-BLM land) does not include any potential habitat for the flat-tailed horned lizard (no native habitats) but does include potential habitat for the burrowing owl. Thus, a potentially significant impact is identified for sensitive species. This issue will be addressed in the EIR.

b,c) The earthen drains and canals on the solar site were checked for indications of wetland vegetation and wildlife use. The remainder of the site is under active agriculture and did not require extensive surveys as native botanical resources are not present in these areas and wildlife habitats are limited. Because there is potential for riparian and wetlands on the project site, this issue is considered potentially significant and will be addressed in the EIR.

d) The proposed solar facility includes the installation of a chain link perimeter fence, which would inhibit medium- and large- sized mammals from moving through the site. Small- sized mammals would not be inhibited from moving through the solar facility.

e) The Imperial County General Plan Open Space Conservation Policy requires detailed investigations to be conducted to determine the significance, location, extent, and condition of natural resources in the County, and to notify any agency responsible for protecting plant and wildlife before approving a project which would impact a rare, sensitive, or unique plant or wildlife habitat. In accordance with this policy, biological studies have been prepared for the project site. The Imperial County General Plan Land Use Element Policy notes that the majority of the privately owned land in the County is designated "Agriculture," which is also the predominate area where burrowing owls create habitats, typically in the brims and banks of agricultural fields. Because the project site has the potential for burrowing owl, a potentially significant impact is identified. The results of the biological studies will be discussed in the EIR.

f) Imperial County does not have a Habitat Conservation Plan (HCP). Thus, no conflicts or impacts would occur between the portion of the project on private lands in Imperial County and an adopted HCP. The portion of the Gen-tie Line extending south from the solar facility site into BLM land is in an area designed as "Utility Corridor N" in the California Desert Conservation Area (CDCA). The transmission line is an allowable use under the CDCA. The transmission line will undergo a separate environmental review to fulfill the requirements of NEPA. Thus, a less than significant impact is anticipated with regard to the CDCA Plan. This will be discussed in the EIR.

V. CULTURAL RESOURCES Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☒	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

a) All of the parcels comprising the project site have been disturbed by past farming and/or other activities. Thus, the presence of significant or un-damaged cultural resources on the site is unlikely. Surveys on the site have verified the presence of historical canals in the area but none of these would be affected by the project. This is considered a less than significant impact, but will be discussed in the EIR.

b) A search of sacred lands on file at the Native American Heritage Commission shall be conducted to determine if any designated Sacred Lands are present in the immediate project vicinity. Thus, a potentially significant impact has been identified for this issue, and this issue will be addressed in the EIR.

c) Many paleontological fossil sites recorded in Imperial County have been discovered during construction activities. Paleontological resources are typically impacted when earthwork activities such as mass excavation cut into geological deposits (formations) with buried fossils. It is not known if any paleontological resources are located on the project site. Based on the San Diego-El Centro Sheet Geologic Map of California prepared by the Division of Mines and Geology, dated 1962, the project site is underlain by geologic units comprised of quaternary lake deposits of the ancient Lake Cahuilla. This type of deposit arrived during the late Pleistocene age (the last 10,000 years) and is suitable for discovery of paleontological resources. Thus, a potentially significant impact has been identified for this issue area, and this issue will be addressed in the EIR.

d) As described in item "a)" above, there it is unlikely that human remains would be found on the project site based on years of disturbance associated with agricultural activities. Nevertheless, potential for previously unknown human remains may be discovered. This issue is potentially significant unless mitigation is incorporated and will be discussed in the EIR.

VI. GEOLOGY AND SOILS Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?	☐	☐	☐	☒
ii) Strong Seismic ground shaking?	☒	☐	☐	☐
iii) Seismic-related ground failure, including liquefaction and seiche/tsunami?	☒	☐	☐	☐
iv) Landslides?	☒	☐	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, and potentially result in on- or off-site landslides, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐
d) Be located on expansive soil, as defined in the latest Uniform Building Code, creating substantial risk to life or property?	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☒	☐	☐	☐

a-i) The project site is not located within a State of California, Alquist-Priolo Earthquake Fault Zone. Thus, no impact is identified for this issue area.

a-ii) The project site is located in the seismically active Imperial Valley in Southern California and is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. The site could be affected by the occurrence of seismic activity to some degree, but no more than the surrounding properties. Additionally, Imperial County is classified as Seismic Zone 4 by the Uniform Building Code, (Sections 1626 through 1635), which requires developments to incorporate the most stringent earthquake resistant measures. A potentially significant impact has been identified for this issue, and it will be evaluated in the EIR.

a-iii) The project site may contain soils that are subject to liquefaction. A geotechnical study has been prepared for the project site and its findings will be discussed in the EIR. Thus, a potentially significant impact is identified for liquefaction and seismic-related ground failure.

The project site is not near a large body of water and is not along the coast. Therefore, no impact would occur with respect to a seiche or tsunami.

a-iv) The project site is not located within a State of California, Alquist-Priolo Earthquake Fault Zone. In addition, as identified in the Seismic and Public Safety Element of the County of Imperial General Plan, the hazard of landsliding is unlikely due to the regional planar topography. Thus, no impact is identified for these issue areas.

b) Soil erosion could result during construction of the proposed project in association with grading and earthmoving activities. Minimal grading would be done on the project site because the current topography is suitable for the placement of PV panels with little site preparation or improvements. Existing vegetation will be grubbed from the site and the soil surface will be smoothed and compacted to prepare the site for installation of the solar panels. However, impacts are considered less than significant because erosion would be controlled on-site in accordance with County standards including preparation, review and approval of a grading plan by the County Engineer.

Following construction, the solar field will be coated with a permeable dust suppressant and the roadways within and around the solar field will be covered with gravel. Thus, erosion impacts would be reduced to less than significant levels through County standards and design features. However, erosion will be discussed in the EIR.

c) According to the Soil Survey of Imperial County, the proposed project is underlain with Holtville silty clay wet; Imperial Silty Clay, wet; Imperial - Glenbar silty clay loams, wet, 0 to 2 percent slopes; Indio loam, wet; Vint loamy very fine sand, wet; and, Vint and Indio very fine sandy loams, wet; Meloland very fine sandy loam, wet; and Meloland and Holtville loams, wet (United States Department of Agriculture Soil Conservation Service, 1981). Some of these soils are considered potentially unstable. Therefore unstable soils have been identified as potentially significant that will be addressed in the EIR based on the findings of the geotechnical report prepared for the project site.

d) According to the Soil Survey of Imperial County, the proposed project is underlain with Holtville silty clay wet; Imperial Silty Clay, wet; Imperial - Glenbar silty clay loams, wet, 0 to 2 percent slopes; Indio loam, wet; Vint loamy very fine sand, wet; and, Vint and Indio very fine sandy loams, wet; Meloland very fine sany loam, wet; and Meloland and Holtville loams, wet (United States Department of Agriculture Soil Conservation Service, 1981). A majority of these soils have a low expansion potential. However, potential for expansive soils throughout the site are not known and are considered potentially significant. A geotechnical report is being prepared for the project site and will be used to formulate the analysis of expansive soils in the EIR.

e) Some of these soils on the project site are incapable of adequately supporting the use of septic tanks. The project would include an on-site operations and maintenance (O&M) building and there is a plan for a septic system. Therefore, soil ability to support septic tanks will be analyzed in the EIR.

VII. GREENHOUSE GAS EMISSIONS Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b) Conflict with an applicable plan or policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

a,b) The proposed project has the potential to generate greenhouse gas emissions during construction in association with travel required to and from the project site by construction workers and delivery of materials. During the up to 24 month construction period, the average number of construction workers on site would be expected to average up to approximately 150 each day with a peak of 500. In the long-term, the project is expected to provide a benefit with respect to reduction of greenhouse gas emissions. A Greenhouse Gas Emissions/Climate Change technical report is being completed for the proposed project. Thus, a potentially significant impact is identified for these issue areas.

VIII. HAZARDS AND HAZARDOUS MATERIALS – Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Create a Significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☒	☐	☐	☐
b) Create a Significant hazard to the public or the environment through reasonable foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☐
d) Be located on a site, which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

a,b) The operation of the solar facility will potentially handle hazardous materials. The hazardous materials handled onsite would be limited to small amounts of everyday use cleaners, common chemicals used for maintenance, and other common chemicals. The project will be required to comply with State laws and County Ordinance restrictions, which regulate and control the materials handled on-site. Such hazardous wastes would be transported off-site for disposal according to applicable State and County restrictions and laws governing the disposal of hazardous waste during construction and operation of the project. Disposal of hazardous wastes on the project site is not part of the proposed project. However, a potentially significant impact remains for this issue area, and this issue will be addressed in the EIR.

The project site is currently used as agricultural land. Therefore, there is a potential that the project may contain contaminated soils. A Phase I Environmental Site Assessment has been completed for the proposed project and no recognized or significant environmental conditions associated with contamination or hazardous materials were identified. A potentially significant, but mitigable impact is identified for this issue area with regard to use of hazardous materials during construction.

c) The project site is located within one-quarter mile of an existing school. However, the only hazardous materials that would be used by the Project within one-quarter mile of the school would be the fuels used by equipment during construction. This would be similar to the fuel used by the agricultural equipment currently conducting farming on the same lands. This will be evaluated in the EIR,

d) The project site is not listed as a hazardous materials site pursuant to Government Code, Section 65962.5. No impact is identified for this issue area.

e,f) The project site is not located within two miles of a public airport or a private airstrip. Thus, no impact is identified for these issue areas.

g) As identified in the Seismic and Public Safety Element of the County of Imperial General Plan, the "Imperial County Emergency Plan" addressed Imperial County's planned response to extraordinary emergency situations associated with natural disasters, technological incidents, and nuclear defense operations. The proposed circulation plan for the project site will be required to provide emergency access points and safe vehicular travel. In addition, local building codes would be followed to minimize flood, seismic, and fire hazard. Thus, the proposed project would not impair the implementation or physically interfere with any adopted emergency response plans or emergency evacuation plans. No impact is identified for this issue area.

h) The project site is not characterized as an area of urban/wildland interface. According to the Imperial County Natural Hazard Disclosure (Fire) Map prepared by the California Department of Forestry and Fire Protection (2000) the project site does not fall into an area characterized as either: (1) a wildland area that may contain substantial forest fire risk and hazard; or (2) very high fire hazard severity zone. Thus, the project site would not expose people or structures to significant risk of loss injury or death involvinq wildland fire. No impact is identified for this issue area.

IX. HYDROLOGY AND WATER QUALITY Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table *level* (e.q., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits *have* been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage patterns of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?	☐	☐	☒	☐
e) Create or contribute runoff water, which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect the flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss injury or death *involving* flooding, including flooding as a result of the failure of a *levee* or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

a) Compared to the existing irrigated agriculture on the site, the proposed project would not generate an increase in the amount of runoff water from the site. What little water could be used for panel washing will continue to percolate through the ground, as a majority of the surfaces on the project site will remain pervious. Thus, the proposed project will not substantially alter the existing drainage pattern of the site, substantially increase the rate of runoff, or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems. Therefore, a less than significant impact is identified for these issue areas.

b) The proposed project does not propose the use of groundwater. Water will continue to percolate through the ground, as a majority of the surfaces on the project site will remain pervious. No impact is identified for this issue area.

c,d,e) Most of the project site will be drained by sheet flow to on- and off-site drainages as it is currently configured. Thus the project would not substantially alter the existing drainage pattern of the site or area. Increased amounts of erosion or surface runoff are not anticipated, nor are increased amounts of polluted runoff. Local containment will be provided around the transformers within the project substation to prevent any associated hazardous materials from leaving the site. Furthermore, the project would be required to comply with the requirements of a stormwater permit. Impacts would be less than significant.

f) The project is not anticipated to degrade water quality based on the required stormwater permit as well as BMPs. This issue is considered less than significant.

g,h) According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, the majority of the project site is located in Zone X, which is an area determined to be outside of the 0.2% annual chance of a flood. A portion of the project site is located in Zone A, which is an area subject to 1% annual chance of a flood. However, the project does not propose the placement of housing or structures within a 100-year flood hazard area. Thus, no impact is identified for these issue areas.

i) No dams or levees are in the vicinity of the project site. Thus, no impact is identified relative to the failure of a levee or dam.

j) No bays or lakes are located within a two-mile radius of the project site. Furthermore, the project site is over 100-miles inland from the Pacific Ocean. In addition, the project site is relatively flat and level. Therefore, there is no potential for the project site to be inundated by seiches, tsunamis, or mudflows. Thus, no impact is identified for these issues.

X. *LAND USE AND PLANNING* Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (include, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☒	☐	☐	☐

a) The proposed project does not physically divide any established community. Thus, no impact is identified for this issue area.

b) The project site is currently designated by the General Plan as "Agriculture." No land use amendment would be required for the portion of the project located within the County's jurisdiction, as the facility is an allowed use within the existing zones subject to a Conditional Use Permit. The County identifies agricultural land as a form of open space. As such, there are activities such as hunting, bike riding, walking, and bird watching that can take place in agricultural areas. The project is anticipated to be compatible with these uses on adjacent lands. Thus, this impact is considered less than significant.

The impact to recreation use caused by the transmission line on BLM lands would be assessed by BLM as part of the environmental review carried out under NEPA.

c) Imperial County is not within the jurisdiction of any adopted habitat conservation plan (HCP) or natural community conservation plan (NCCP), or other approved local, regional or state habitat conservation plan. Therefore, no impact to an HCP or NCCP would occur and this issue will not be examined in the EIR.

XI. MINERAL RESOURCES Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

a, b)The project site is used for agriculture. According to the Conservation and Open Space Element of the County of Imperial General Plan, no known mineral resources occur within the project site nor does the project site contain mapped mineral resources. As such, the proposed project would not adversely affect the availability of any known mineral resources within the project site. Thus, no impact is identified for these issue areas.

XII. NOISE Would the project result in:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
e) For a project located within an airport land use plan or where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

a,c,d) The proposed project has the potential to exceed construction noise (temporary noise) standards on-site and off-site (e.g., sensitive habitat areas). A noise analysis is being prepared to identify any potential short-term construction and long-term operational impacts of the proposed project. Thus, potentially significant impacts have been identified for these issue areas. These issues will be addressed in the EIR.

e) The proposed project is a solar facility development. Operation of the facility would not create excessive groundborne vibration or noise levels. In addition, grading associated with project development is unlikely to generate groundborne vibration or noise levels through blasting or other construction related activity, as the project is characterized by flat topography. Therefore, no impact is identified for this issue area.

e,f) The project site is not located within two miles of a public airport or a private airstrip. Thus, the project site would not be exposed to excessive aircraft noise. No impacts have been identified for these issue areas.

XII. POPULATION AND HOUSING Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a) The project, as a solar facility, does not propose the development of housing on the project site. The project would require approximately 4 to 8 full-time personnel for operations and maintenance of the solar facility and one security guard. Thus, the proposed project would not result in substantial population growth as the number of employees required to operate and maintain the facility is minimal. The project would provide electricity to off-set a portion of current electricity generated by fossil-fuel sources. Thus the project would not induce substantial population growth. No impact would occur for this issue.

b-c) The proposed project site is currently used for agriculture and there are no farmhouses on the properties. As a result, development of the proposed solar facility would not displace substantial numbers of existing housing or people requiring construction of replacement housing elsewhere. No impact would occur for these issues.

XIII. PUBLIC SERVICES	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
1) Fire protection?	☐	☐	☒	☐
2) Police protection?	☐	☐	☒	☐
3) Schools?	☐	☐	☐	☒
4) Parks?	☐	☐	☐	☒
5) Other public facilities?	☐	☐	☐	☒

a-1) The project site is within the jurisdiction of the Imperial County Fire Department. The proposed project will pose a very small fire risk. All vegetation will be removed from the site and the solar field does not incorporate any flammable materials. The project would include an on-site O&M building and the electrical equipment (inverters and transformers) throughout the solar field would be located within pre-fabricated enclosed structures. The final site plan would be designed in accordance with Fire

Department requirements for access and would not impact the ability to provide emergency access to the site. The project also would not hinder the ability to access nearby properties. Thus, impacts to fire protection are considered less than significant.

a-2) Police protection to the project site would be under the jurisdiction of the Imperial County Sheriff Department. The project site incorporates a variety of security features to protect the site including a chain-link security fence approximately 8 feet high. Site security will be provided with a small guard station provided at the gated access points. Security cameras will be deployed throughout the site and monitored at the guard station and remotely by a security service at night. Lights, triggered by motion sensors and powered by station power with backup battery power, will also be installed at each entry gate and at each inverter. Thus, impacts to police protection are considered less than significant.

a-3, a-4, a-5) The proposed solar facility would not result in a substantial increase in population because it neither includes a residential component nor would it generate the need for new housing to accommodate workforce population. Based on the nature of the project as a solar facility, no increase in schools, parks, or other public facilities are anticipated. As such, the proposed project would not have an adverse physical effect on the environment because the project does not require new or significantly altered services or facilities to be constructed. Therefore, no impact is identified for this issue area.

XIV. RECREATION	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Would the project increase the use of the existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse effect on the environment?	☐	☐	☐	☒

a, b)The proposed project is a solar facility and would not create a demand for recreation or parks in the County. No impact is identified for these issue areas.

XVI. TRANSPORTATION/TRAFFIC	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☒	☐	☐	☐
b) Conflict with an applicable congestion management program, including but not limited to level of service standard and travel demand measures, or other standards established by the county congestion/management agency for designated roads or highways?	☒	☐	☐	☐

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☒	☐
f) Conflicts with adopted policies, plans, programs, regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance safety of such facilities?	☐	☐	☐	☒

a,b) The construction phases of the proposed project would result in an increase of traffic on area roadways and intersections, which may reduce levels of service below County thresholds and result in a potentially significant impact. A traffic impact study is being prepared. Thus a potentially significant impact is identified for this issue area. This issue will be addressed in the EIR.

c) The proposed project would not result in changes to existing air traffic patterns through an increase in traffic levels or change in location. Thus, no impact is identified for this issue area.

d) The proposed project would not change the existing surrounding circulation network. Thus, no impact with regard to an increase in hazards due to a design feature or incompatible uses is identified for this issue area.

e) The proposed circulation plan for the project site will be required to provide emergency access points and safe vehicular travel. The final site plan would be designed in accordance with Fire Department requirements for access and would not impact the ability to provide emergency access to the site. The project also would not hinder the ability to access nearby properties. Thus, no impact is identified for this issue area.

f) The proposed project would not conflict with any adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities. Thus, no impact is identified for this issue area.

XVII. UTILITIES AND SERVICE SYSTEMS Would the project:	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b) Require or result in the construction of new water or water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐

f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☒	☐

a,e) The project would include an on-site O&M building with a planned septic system. During construction, portable toilets will be used to provide needed sanitary facilities. Thus, a less than significant impact is identified for this issue area.

b,d)The proposed project is anticipated to result in a minimal increase in water demand/use during construction and operation. This water will be obtained under an agreement with IID. During construction, water will be used to facilitate soil compaction and to control fugitive dust on exposed soils. During operation, the project will use water only for periodic washing of the solar panels and reapplication of the soil binding agent if necessary. An agricultural farm currently uses more water than the proposed solar facility would need during construction and operation. Thus, a less than significant impact is identified for this issue.

c) The project site is relatively flat and will be drained by sheet flow to on- and off-site drainages as it is currently configured. No new drainage facilities are proposed. This impact is considered less than significant, but will be acknowledged in the EIR.

f-g) During operations of the proposed project, waste generation will be minor. Solid wastes will be disposed of using a locally-licensed waste hauling service. Thus, a less than significant impact is identified for this issue.

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE.	**Potentially Significant (PSI)**	**Potentially Significant Unless Mitigation Incorporated (PSUMI)**	**Less than Significant Impact (LTSI)**	**No Impact (NI)**
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)?	☒	☐	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

a) Implementation of the proposed project has the potential to impact agricultural resources, air quality, sensitive biological resources, cultural resources, and transportation/circulation. These issues will be further evaluated in the EIR.

b) The proposed project has the potential to result in a cumulatively considerable net increase or one or more criteria pollutants for which the project region is in non-attainment under applicable federal and state ambient air quality standards. Therefore a potentially significant cumulative impact may occur. An analysis of air quality impacts is being prepared for the proposed project and will be discussed in the EIR.

c) The proposed project has the potential to result in significant environmental effects, which could directly or indirectly cause adverse effects on human beings. As demonstrated in this Initial Study, the proposed project has the potential to result in significant impacts to air quality, geology/soils, hazards and hazardous materials, and noise. These impact areas could result in direct or indirect adverse effects on human beings. Thus, these issues will be discussed in the EIR.

REVIEWING AGENCIES (Copies and/or Notice Provided)

LOCAL AGENCIES
- ☒ AG. DEPT.
- ☒ APCD
- ☐ ASSESSOR
- ☐ C.E.O.
- ☐ COUNTY COUNSEL
- ☒ E.H.S. DIVISION
- ☒ FIRE /O.E.S.
- ☒ FISH & GAME (COUNTY)
- ☒ IMPERIAL IRRIGATION DISTRICT
- ☒ PUBLIC WORKS DEPT.
- ☒ SHERIFF
- ☐ OTHER

CITIES
- ☐ BRAWLEY
- ☐ CALEXICO
- ☐ CALIPATRIA
- ☐ EL CENTRO
- ☐ HOLTVILLE
- ☐ IMPERIAL
- ☐ WESTMORLAND

LIBRARIES
- ☐ CALEXICO
- ☐ COACHELLA VALLEY
- ☐ BRAWLEY
- ☐ EL CENTRO
- ☐ HOLTVILLE
- ☐ IMPERIAL
- ☐ IMPERIAL VALLEY COLLEGE
- ☐ INDIAN HILL
- ☐ MEYER MEMORIAL
- ☐ PALO VERDE
- ☐ SAN DIEGO STATE UNIVERSITY

STATE AGENCIES
- ☐ AIR RESOURCES BOARD
- ☒ CALTRANS District 11/San Diego
- ☒ CALIFORNIA HIGHWAY PATROL
- ☒ DEPT. OF FISH & GAME *TRUSTEE AGENCY*
- ☐ HISTORIC PRESERVATION
- ☐ HOUSING & COMMUNITY DEVELOPMENT
- ☐ CALIFORNIA INTEGRATED WASTE BOARD
- ☐ STATE LANDS COMMISSION *TRUSTEEAGENCY*
- ☐ MINE RECLAMATION (OMR)
- ☐ NATIVE AMERICAN HERITAGE
- ☒ OFFICE OF PLANNING & RESEARCH (OPR)
- ☐ PARKS & RECREATION DEPT. *TRUSTEE AGENCY*
- ☒ REGIONAL WATER QUALITY BOARD
- ☐ RESOURCE AGENCY
- ☐ SCAG
- ☐ STATE GEOLOGIST
- ☐ WATER RESOURCE BOARD
- ☐ OTHER: DEPARTMENT OF CONSERVATION

FEDERAL AGENCIES
- ☒ BUREAU OF LAND MANAGEMENT (BLM)
- ☐ BUREAU OF MINES
- ☐ BUREAU OF RECLAMATION
- ☒ BORDER PATROL
- ☐ MARINE CORPS. AIR STATION, YUMA
- ☒ NAVAL AIR FACILITY, EL CENTRO
- ☐ SOIL CONSERVATION SERVICE
- ☒ U.S. FISH & WILDLIFE SERVICE
- ☐ OTHER

FOR ADDITIONAL & GENERAL NOTICING SEE DISTRIBUTION LIST IN PROJECT FILE

NOP COMMENT LETTERS

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

Notice of Preparation

November 15, 2011

To: Reviewing Agencies

Re: Campo Verde Solar Energy Project
SCH# 2011111049

Attached for your review and comment is the Notice of Preparation (NOP) for the Campo Verde Solar Energy Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

David Black
Imperial County
801 Main Street
El Centro, CA 92243

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH# **2011111049**
Project Title Campo Verde Solar Energy Project
Lead Agency Imperial County

Type NOP Notice of Preparation

Description A solar project proposed on 1,990 acres of agricultural land. The project includes photovoltaic solar panels, transformers, inverters and supporting equipment arranged in rows.

Lead Agency Contact

Name David Black
Agency Imperial County
Phone (760) 482-4240 *Fax*
email DavidBlack@co.imperial.ca.us
Address 801 Main Street
City El Centro *State* CA *Zip* 92243

Project Location

County Imperial
City El Centro
Region
Cross Streets So. of I-8, W. of Drew Rd.
Lat / Long
Parcel No. Various
Township 16S *Range* 12E *Section* Variou *Base* SBB&M

Proximity to:

Highways
Airports
Railways
Waterways Westside Main Canal
Schools Westside School
Land Use Agriculture, non-food crops.
Z: A-2- General Agriculture, A-2-R-General Agriculture, Rural Zone, and A-3 Heavy Agriculture.

Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Drainage/Absorption; Flood Plain/Flooding; Noise; Soil Erosion/Compaction/Grading; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Wildlife; Growth Inducing; Landuse; Cumulative Effects; Geologic/Seismic

Reviewing Agencies Caltrans, Division of Aeronautics; Department of Conservation; California Energy Commission; Office of Historic Preservation; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Game, Region 6; Native American Heritage Commission; Public Utilities Commission; California Highway Patrol; Caltrans, District 11; Air Resources Board; Regional Water Quality Control Board, Region 7

Date Received 11/15/2011 *Start of Review* 11/15/2011 *End of Review* 12/14/2011

NOP Distribution List

County: Imperial

SCH# 2011111049

Resources Agency

- ■ **Resources Agency** Nadell Gayou
- ☐ **Dept. of Boating & Waterways** Nicole Wong
- ☐ **California Coastal Commission** Elizabeth A. Fuchs
- ☐ **Colorado River Board** Gerald R. Zimmerman
- ☒ **Dept. of Conservation** Elizabeth Carpenter
- ☒ **California Energy Commission** Eric Knight
- ☐ **Cal Fire** Allen Robertson
- ☐ **Central Valley Flood Protection Board** James Herota
- ☒ **Office of Historic Preservation** Ron Parsons
- ■ **Dept of Parks & Recreation** Environmental Stewardship Section
- ☐ **California Department of Resources, Recycling & Recovery** Sue O'Leary
- ☐ **S.F. Bay Conservation & Dev't. Comm.** Steve McAdam
- ☒ **Dept. of Water Resources** Resources Agency Nadell Gayou

Fish and Game

- ☐ **Depart. of Fish & Game** Scott Flint Environmental Services Division
- ☐ **Fish & Game Region 1** Donald Koch
- ☐ **Fish & Game Region 1E** Laurie Harnsberger
- ☐ **Fish & Game Region 2** Jeff Drongesen
- ☐ **Fish & Game Region 3** Charles Armor
- ☐ **Fish & Game Region 4** Julie Vance
- ☐ **Fish & Game Region 5** Leslie Newton-Reed Habitat Conservation Program
- ☒ **Fish & Game Region 6** Gabrina Gatchel Habitat Conservation Program
- ☐ **Fish & Game Region 6 I/M** Brad Henderson Inyo/Mono, Habitat Conservation Program
- ☐ **Dept. of Fish & Game M** George Isaac Marine Region

Other Departments

- ☐ **Food & Agriculture** Sandra Schubert Dept. of Food and Agriculture
- ☐ **Depart. of General Services** Public School Construction
- ☐ **Dept. of General Services** Anna Garbeff Environmental Services Section
- ☐ **Dept. of Public Health** Bridgette Binning Dept. of Health/Drinking Water
- ☐ **Delta Stewardship Council Terry Macaulay**

Independent Commissions,Boards

- ☐ **Delta Protection Commission** Linda Flack
- ☐ **Cal EMA (Emergency Management Agency)** Dennis Castrillo
- ■ **Native American Heritage Comm.** Debbie Treadway
- ☒ **Public Utilities Commission** Leo Wong
- ☐ **Santa Monica Bay Restoration** Guangyu Wang
- ☐ **State Lands Commission** Jennifer Deleong
- ☐ **Tahoe Regional Planning Agency (TRPA)** Cherry Jacques

Business, Trans & Housing

- ☐ **Caltrans - Division of Aeronautics** Philip Crimmins
- ☐ **Caltrans - Planning** Terri Pencovic
- ☒ **California Highway Patrol** Suzann Ikeuchi Office of Special Projects
- ☐ **Housing & Community Development** CEQA Coordinator Housing Policy Division

Dept. of Transportation

- ☐ **Caltrans, District 1** Rex Jackman
- ☐ **Caltrans, District 2** Marcelino Gonzalez
- ☐ **Caltrans, District 3** Bruce de Terra
- ☐ **Caltrans, District 4** Lisa Carboni
- ☐ **Caltrans, District 5** David Murray
- ☐ **Caltrans, District 6** Michael Navarro
- ☐ **Caltrans, District 7** Elmer Alvarez
- ☐ **Caltrans, District 8** Dan Kopulsky
- ☐ **Caltrans, District 9** Gayle Rosander
- ☐ **Caltrans, District 10** Tom Dumas
- ☒ **Caltrans, District 11** Jacob Armstrong
- ☐ **Caltrans, District 12** Marlon Regisford

Cal EPA

Air Resources Board

- ☒ Airport/Energy Projects Jim Lerner
- ☐ Transportation Projects Douglas Ito
- ☐ Industrial Projects Mike Tollstrup
- ☐ **State Water Resources Control Board** Regional Programs Unit Division of Financial Assistance
- ☐ **State Water Resources Control Board** Student Intern, 401 Water Quality Certification Unit Division of Water Quality
- ☐ **State Water Resouces Control Board** Phil Crader Division of Water Rights
- ☐ **Dept. of Toxic Substances Control** CEQA Tracking Center
- ☐ **Department of Pesticide Regulation** CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- ☐ **RWQCB 1** Cathleen Hudson North Coast Region (1)
- ☐ **RWQCB 2** Environmental Document Coordinator San Francisco Bay Region (2)
- ☐ **RWQCB 3** Central Coast Region (3)
- ☐ **RWQCB 4** Teresa Rodgers Los Angeles Region (4)
- ☐ **RWQCB 5S** Central Valley Region (5)
- ☐ **RWQCB 5F** Central Valley Region (5) Fresno Branch Office
- ☐ **RWQCB 5R** Central Valley Region (5) Redding Branch Office
- ☐ **RWQCB 6** Lahontan Region (6)
- ☐ **RWQCB 6V** Lahontan Region (6) Victorville Branch Office
- ☒ **RWQCB 7** Colorado River Basin Region (7)
- ☐ **RWQCB 8** Santa Ana Region (8)
- ☐ **RWQCB 9** San Diego Region (9)

- ☐ **Other** ____________
- ☐ ____________ Conservancy

Last Updated 9/29/11

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

November 18, 2011

Mr. David Black
Imperial County Department of Planning & Development Services
801 Main Street
El Centro, CA 92243

Re: SCH#2011111049 CEQA Notice of Preparation (NOP); draft Environmental Impact Report (DEIR) for the **"Campo Verde Energy Project;"** located in Imperial County, California

Dear Mr. Black:

The Native American Heritage Commission (NAHC), the State of California 'Trustee Agency' for the protection and preservation of Native American cultural resources pursuant to California Public Resources Code §21070 and affirmed by the Third Appellate Court in the case of EPIC v. Johnson (1985: 170 Cal App. 3rd 604). The court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources, impacted by proposed projects including archaeological, places of religious significance to Native Americans and burial sites. The NAHC wishes to comment on the proposed project.

This letter includes state and federal statutes relating to Native American historic properties of religious and cultural significance to American Indian tribes and interested Native American individuals as 'consulting parties' under both state and federal law. State law also addresses the freedom of Native American Religious Expression in Public Resources Code §5097.9.

The California Environmental Quality Act (CEQA – CA Public Resources Code 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ...objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE), and if so, to mitigate that effect.

The NAHC Sacred Lands File (SLF) search resulted as follows: **Native American cultural resources** **were not identified** within the project area identified. Also, the absence of archaeological resources does not preclude their existence. . California Public Resources Code §§5097.94 (a) and 5097.96 authorize the NAHC to establish a Sacred Land Inventory to record Native American sacred sites and burial sites. These records are exempt from the provisions of the California Public Records Act pursuant to. California Government Code §6254 (r). The purpose of this code is to protect such sites from vandalism, theft and destruction. The NAHC followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery'.

To be effective, consultation on specific projects must be the result of an ongoing relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. Regarding tribal consultation, a relationship built around regular meetings and informal involvement with local tribes will lead to more qualitative consultation tribal input on specific projects.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton
Program Analyst

Cc: State Clearinghouse

Attachment: Native American Contact List

California Native American Contacts
Imperial County
November 18, 2011

La Posta Band of Mission Indians
Gwendolyn Parada, Chairperson
PO Box 1120 Diegueno/Kumeyaay
Boulevard , CA 91905
gparada@lapostacasino.
(619) 478-2113
619-478-2125

Cabazon Band of Mission Indians
Judy Stapp, Director of Cultural Affairs
84-245 Indio Springs Cahuilla
Indio , CA 92203-3499
markwardt@cabazonindia
(760) 342-2593
(760) 347-7880 Fax

Manzanita Band of Kumeyaay Nation
Leroy J. Elliott, Chairperson
PO Box 1302 Kumeyaay
Boulevard , CA 91905
ljbirdsinger@aol.com
(619) 766-4930
(619) 766-4957 Fax

Ewiiaapaayp Tribal Office
Will Micklin, Executive Director
4054 Willows Road Diegueno/Kumeyaay
Alpine , CA 91901
wmicklin@leaningrock.net
(619) 445-6315 - voice
(619) 445-9126 - fax

Campo Band of Mission Indians
Monique LaChappa, Chairwoman
36190 Church Road, Suite 1 Diegueno/Kumeyaay
Campo , CA 91906
miachappa@campo-nsn.gov
(619) 478-9046
(619) 478-5818 Fax

Ewiiaapaayp Tribal Office
Michael Garcia, Vice Chairperson
4054 Willows Road Diegueno/Kumeyaay
Alpine , CA 91901
michaelg@leaningrock.net
(619) 445-6315 - voice
(619) 445-9126 - fax

Kwaaymii Laguna Band of Mission Indians
Carmen Lucas
P.O. Box 775 Diegueno -
Pine Valley , CA 91962
(619) 709-4207

Cocopah Museum/Cultural Resources Dept.
Jill McCormick, Tribal Archaeologist
County 15th & Ave. G Cocopah
Sommerton , AZ 85350
culturalres@cocopah.com
(928) 530-2291 - cell
(928) 627-2280 - fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH#2011111049; CEQA Notice of Preparation (NOP); draft Environmental Impact Report for the Campo Verde Solar Energy Project; located in Imperial County, California for which a Sacred Lands File search and Native American Contacts list were requested.

California Native American Contacts
Imperial County
November 18, 2011

Quenchan Indian Nation
THPO
P.O. Box 1899 Quechan
Yuma , AZ 85366
b.nash@quechantribe.com
(928) 920-6068 - CELL
(760) 572-2423

Campo Band of Mission Indians
Andrea Najera, Cultural Resources Manager
36190 Church Road, Suite 1 Diegueno/Kumeyaay
Campo , CA
(619) 478-9046
(619) 478-5818 - FAX

Ah-Mut-Pipa Foundation
Preston J. Arrow-weed
P.O. Box 160 Quechan
Bard , CA 92222 Kumeyaay
ahmut@earthlink.net
(928) 388-9456

Inter-Tribal Cultural Resource Protection Council
Frank Brown, Coordinator
240 Brown Road Diegueno/Kumeyaay
Alpine , CA 91901
FIREFIGHTER69TFF@AOL.
COM
((619) 884-8437

Kumeyaay Cultural Repatriation Committee
Bernice Paipa, Vice Spokesperson
P.O. Box 1120 Diegueno/Kumeyaay
Boulevard , CA 91905
(619) 478-2113

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH#2011111049; CEQA Notice of Preparation (NOP); draft Environmental Impact Report for the Campo Verde Solar Energy Project; located in Imperial County, California for which a Sacred Lands File search and Native American Contacts list were requested.

DEPARTMENT OF TRANSPORTATION
DISTRICT 11, DIVISION OF PLANNING
4050 TAYLOR ST, M.S. 240
SAN DIEGO, CA 92110
PHONE (619) 688-6960
FAX (619) 688-4299
TTY 711

Flex your power!
Be energy efficient!

November 30, 2011

11-IMP-8
PM 29.93
Campo Verde Solar Energy Project
SCH # 2011111049

David Black
Planning & Development Services
Imperial County
801 Main Street
El Centro, CA 92243

Dear Mr. Black:

The California Department of Transportation (Caltrans) received a copy of the Notice of Preparation (NOP) for the proposed Campo Verde Solar Energy project located in proximity to Interstate 8 (I-8). Caltrans has the following comments:

Visual aspects of the project including glint and glare should be documented not to have any potential impacts to motorists driving on I-8.

It is understood by our agency that no new utility crossings on state facilities will occur as a result of this project.

If you have any questions, please contact Marisa Hampton of the Development Review Branch at (619) 688-6954.

Sincerely,

JACOB M. ARMSTRONG, Chief
Development Review Branch

RECEIVED
DEC 05 2011
IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

GS-EREP December 12, 2011

Mr. Armando G. Villa
Director
Planning & Development Services Department
County of Imperial
801 Main Street
El Centro, CA 92243

SUBJECT: Campo Verde Solar Energy Project NOP of a DEIR

Dear Mr. Villa:

On November 22, 2011 we received from the Imperial County Planning and Development Services Dept., the Notice of Preparation (NOP) for a Draft Environmental Report (DEIR) for the Campo Verde Solar Energy (CVSE) Project. The proposed 1,990-acre solar photovoltaic energy-generating facility is located in Imperial County approximately 7 miles southwest of the community of El Centro, California, south of I-8 and west of Drew Road and northeast of Westside Main Canal.

The Imperial Irrigation District (IID) submits the following comments to the NOP:

1. Just as the California Department of Transportation objects to unnecessary crossing of the state's highways for safety reasons, IID is equally concerned about numerous crossing of the major IID irrigation canals. A case in point is the potential impacts to the Westside Main Canal (WSM) due to the Project's electrical transmission line (gen-tie) crossings for interconnection to the Imperial Valley Substation. While IID is not predicting the outcome of a study of the effects of a gen-tie tower being knocked over into the WSM, it is worth analyzing to develop a proposed mitigation strategy. Given that this project is one of many seeking approval by the County of Imperial (County) and Bureau of Land Management (BLM) and planning to cross the WSM, the safety of the IID irrigation system must be taken into consideration. Thus, the Project proponent is strongly advised to contact IID's Chief Civil Engineer at (760) 339-9559.

2. The Project could potentially involve using the banks of the WSM as an access road. Project proponent may not use IID's canal or drain banks to access the project site. For further information on this matter, contact IID's Chief Civil Engineer.

3. Additionally, IID has become aware that several of the solar energy generation projects being reviewed by the County and the BLM as stand-alone projects, are part of a larger proposal submitted by San Diego Gas & Electric (SDG&E) to the California Independent System Operator (CALISO), to develop a Locational Constrained Resource Interconnection Facility (LCRIF) named the "Imperial Valley Solar Collector Project." The proposed LCRIF has not been studied either operationally, as to its effect on the IID

balancing authority, or environmentally as to its effect on the resources within the Imperial County. SDG&E is suggesting that there are not sufficient facilities in Imperial County to transmit new renewable resources and that the gen-ties approved or in the process of being approved, for the various solar projects in the vicinity of the Imperial Valley Substation, should become part of a larger interconnected facility to transfer energy to the CALISO.

4. The apparent piecemealing being done regarding the effects of the various solar projects that together will form the framework for the LCRIF facilities is a cause of concern for IID given the potential impacts to our electrical balancing authority and our irrigation system integrity. A concern that is exacerbated by the fact that the County and BLM are being asked to approve projects that are part of a bigger whole without completing the full analysis of the entirety of the projects' impacts.

5. If SDG&E seeks approval from the County and the BLM for its LCRIF proposal and required facilities, IID will be able to review the many impacts and participate in the environmental and operational review. Until that time, any approval for the CVSE Project or any other renewable generation development in the same vicinity as the proposed LCRIF should be limited to the generation project as described and analyzed in the environmental documents for the project. The above mentioned LCRIF proposal is not part of the CVSE project description. Any Conditional Use Permit or BLM Right-of-Way Grant should specifically limit the use of the permitted facilities for the purposes studied and until such time as a new permit application is received that addresses any required mitigation for an expanded use.

6. Temporary interconnection to the IID S-Line that traverses the site is subject to IID's non-discriminatory Open Access Transmission Tariff provisions including availability of electrical energy facilities, capacity and deliverability on and from the IID's transmission system. For further information on this matter Project proponent should contact IID's Interconnection Transmission Contracts Administrator at (750) 482-3639 or access the IID website at: http://www.oatioasis.com/iid/index.html.

7. Project proponent assumes that permanent electrical service for the O&M building and for substation backfeed power will be provided by IID. Power to O&M building would be served from the "L-67" circuit out of Dixieland Substation. However, power is limited around proposed CVSE Project and a Distribution Circuit Analysis needs to be performed by IID Distribution Planning Engineering in order to identify what kinds of Distribution System improvements are necessary to provide such service. At this time, the IID has not received an electrical service request from the CVSE Project proponent. Thus, Project proponent is urged to contact IID Energy - Customer Operations & Planning Section at (760) 482-3402 for additional information and guidance regarding electrical service for the Project. It is important to note that all costs associated with the relocation and/or upgrade of IID electrical infrastructure to service the Project will be the responsibility of the Project proponent.

8. All new non-agricultural water project supply requests are processed in accordance with the IID's Interim Water Supply Policy for Non-Agricultural Projects (IWSP) (see http://www.iid.com/index.aspx?page=152 for a link to the IWSP). In order to obtain a water supply from IID for the project, the Project proponent will be required to comply with all applicable IID policies and regulations and may be required to enter into a water supply agreement with IID. Such policies and regulations require, among other things,

that all potential environmental and water supply impacts of the Project have been adequately assessed, appropriate mitigation has been developed and appropriate conditions have been adopted by the relevant land use permitting/approving agencies. Furthermore, the Project proponent will be required to meet standards for water use efficiency and best management practices, including but not limited to those established by the County, as well as other water use efficiency standards, adopted by IID or local government agencies. For additional information regarding the Interim Water Supply Policy, the IID Water Supply Planning/Colorado River Manager may be contacted at (760) 339-9038.

9. The DEIR/EA should address impacts to IID's drains. 33.3% of water delivered to agricultural users is discharged into the IID's drainage system. Reduction in field drainage due to land use conversion has an incremental effect on both drain water quality and volume of impacted drain and subsequent drainage path to the Salton Sea. This affects drainage habitat (flora and fauna) and the elevation of the Salton Sea (shoreline habitat and exposed acreage that may have air quality issues). Additionally certain direct-to-Sea drains have been identified as pupfish drains which require additional protections under state and federal Endangered Species Acts.

10. Furthermore, the DEIR/EA should also contain an assessment or analysis of cumulative impacts considering other non-agricultural facilities whose water use (or potential water use) would reduce the inflow conveyed to IID drains and subsequently, the Salton Sea.

11. The CVSE Project will impact numerous IID Water Department facilities in addition to the WSM, such as the Wormwood Lateral 7, Fig Canal, Fern Canal, Fern Sidemain Canal, Fern Lateral 7, Westside Drain, Dixie Drain No. 3, Dixie Drain No. 3-A, Wixom Drain, Diehl Drain, and Fig Drain.

12. The agricultural water delivery gates and small parcel water service pipes that exist in the project area, shall not to be used for the solar project, except those designated in the water supply agreement. CVSE shall plug the outlets of delivery gate and service pipes prior to commencing construction at each parcel and shall be abandoned with an Abandonment Request Form (ARF). The ARF is available at the following IID web site link: http://www.iid.com/Modules/ShowDocument.aspx?documentid=2587. The ARF shall be submitted prior to commencing construction at each parcel. Abandoned delivery gates and small parcel service pipes can be re-established in the future, upon written request. CVSE shall continue to pay Water Availability Charges after the gates are abandoned.

13. Any existing canal and drain facilities within the project site are to be abandoned and quitclaimed by IID. CVSE shall execute an Abandonment Agreement with IID for these facilities. The Abandonment Agreement will include provisions for the canal and drain facilities to remain in service with IID for the parcels they serve until agricultural activities are suspended. The Agreement will also address IID requirements for returning the project site to a condition to support agricultural production in the event the facility is decommissioned and deconstructed. The IID Real Estate Section should be contacted at (760) 339-9239 for further details.

14. All existing underground tile drain pipe outlets into IID drains that serve the CVSE Project area are to be plugged prior to construction at each parcel. IID is to be notified 48 hours in advance of plugging, for on-site inspection and verification.

15. The CVSE project description states that the CVSE site's soil surface will be smoothed and compacted and that some drains may be removed. This will cause a greater volume of runoff to discharge and concentrate into the remaining drains, which is not an insignificant impact to drains, site runoff flows, or proposed storm water detention facilities, as stated in the NOP, and must be mitigated. IID drains are designed for farm drainage not storm water runoff. On site storm water runoff must be contained in retention ponds for release per IID requirements to make sure drain capacities are not exceeded. Consequently, a comprehensive IID hydraulic drainage system analysis is required to properly design system modifications to mitigate project impacts. The detailed drainage analysis will review the project's drainage hydraulics relative to IID system's hydraulics. Completion of the analysis may indicate the need for additional capital improvements, the cost of which would be borne by CVSE. IID's hydraulic drainage system analysis includes an associated drain impact fee.

16. IID is working on development of a program to address operation and maintenance of the drainage system for non-agricultural connections. The program will provide a mechanism to ensure the drainage system is properly operated and maintained for non-agricultural connections. Non-agricultural connections such as CVSE will be required to execute an agreement with IID regarding drain operation and maintenance costs.

17. In addition to IID's recorded easements, IID claims, at a minimum, a prescriptive right of way to the toe of slope of all existing canals and drains. Where space is limited and depending upon the specifics of adjacent modifications, the IID may claim additional secondary easements/prescriptive rights of ways to ensure operation and maintenance of IID's facilities can be maintained and are not impacted and if impacted mitigated. Thus, IID should be consulted prior to the installation of any facilities adjacent to IID's facilities. Certain conditions may be placed on adjacent facilities to mitigate or avoid impacts to IID's facilities.

18. Any construction or operation on IID property or within its existing and proposed right of way or easements will require an encroachment permit, including but not limited to: surface improvements such as proposed new streets, driveways, parking lots, landscape; and all water, sewer, storm water, or any other above ground or underground utilities. A copy of the encroachment permit application is included in the IID's *Developer Project Guide 2008*, and can be accessed at: http://www.iid.com/Modules/ShowDocument.aspx?documentid=2328. Also, instructions for the completion of encroachment applications can be found at http://www.iid.com/Modules/ShowDocument.aspx?documentid=2335. The IID Real Estate Section should be contacted at (760) 339-9239 for additional information regarding encroachment permits.

19. An IID encroachment permit is required in order to utilize existing surface water drain pipe connections to drains, and receive drainage service from IID. Surface water drain pipe connections are to be modified in accordance with IID standards.

    a. Construction Storm Water Permit: A construction storm water permit from the California Regional Water Quality Control Board (CRWQCB) is required before commencing construction. Copies of this permit and the Storm Water Pollution Prevention Plan for the CVSE Project are to be submitted to IID.

b. An industrial storm water permit from CRWQCB is required for operation of the proposed solar facility. A copy of this permit is to be submitted to IID.

20. Any new, relocated, modified or reconstructed IID facilities required for and by the project (which can include but is not limited to electrical utility substations, electrical transmission and distribution lines, canals, drains, etc.) need to be included as part of the project's CEQA and/or NEPA documentation, environmental impact analysis and mitigation. Failure to do so will result in postponement of any construction and/or modification of IID facilities until such time as the environmental documentation is amended and environmental impacts are fully mitigated. **Any and all mitigation necessary as a result of the construction, relocation and/or upgrade of IID facilities is the responsibility of the project proponent**.

21. IID remains supportive of the CVSE Project and all renewable generation projects in the Imperial County in general and offers its assistance in the review of how to avoid unnecessary impacts to vital IID facilities or undermine IID's electrical balancing authority, as well as requirements for constructing around all IID facilities and interconnecting to IID's electrical grid.

Should you have any questions, please do not hesitate to contact me by phone at 760-482-3609 or by e-mail at dvargas@iid.com. Thank you for the opportunity to comment on this matter.

Respectfully,

Donald Vargas
Environmental Specialist

Kevin Kelley. – General Manager
Michael Campbell. - Chief Admin. Officer
Jesse Silva. – Manager, Water Dept.
Joel Ivy. – Interim Manager, Energy Dept.
Jeff M. Garber. – General Counsel
Paul G. Peschel.- Executive Program Manager
Carlos Villalon. – Asst. Mgr., Water Dept. System Control & Monitoring
Juan Carlos Sandoval. – Asst. Mgr. Energy Dept.
Carlton L. King. – Asst. Mgr., Energy Dept. Customer Service Operations
Mike L. King. – Manager, Water Dept. Colorado River Water Issues
Tina Shields. – Asst. Mgr., Water Dept. Resources Planning & Management
David L. Barajas. – General Supt., Energy Dept. System Planning & Engineering
Michael S. Trump. – General Supt., Energy Dept. Customer Operations & Planning
Ismael Gomez. – Chief Engineer, Water Dept. Engineering Services
Bruce Wilcox. – Environ. Proj. Mgr., Water Dept. QSA Water Transfer
Randy Gray. – Interim Supervisor, Real Estate & Right-of-Way
Vikki Dee Bradshaw. – Interim Supervisor, Environmental Services

1280 Drew Road
El Centro, CA 92243

December 15, 2011

RECEIVED

DEC 15 2011

IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

In regards to: Campo Verde Solar Project

HAND DELIVERED

David Black
Imperial County Planning & Development
801 Main Street
El Centro, CA 92243

Dear Mr. Black and County Officials:

We are writing this letter to you to address our concerns with the Campo Verde Solar Project. We are homeowner's presently residing at 1280 Drew Road, which is directly across the road from this project. We are worried about how this will affect the livelihood of our family.

The land we currently built our home on has been in our family since the 1930's. Our grandfather, Woodrow Preece purchased this land, and the land just to the south of us, to make a home for his family. He loved this land and thought it was the most beautiful and peaceful place to raise his family. In following our grandfather's tradition, we too, had the same idea and decided to build a home for our family. We couldn't think of a better way to raise our children and show them the beauty of the Imperial Valley at the same time.

Now, to our astonishment, we are being told that our beautiful views will now be a sea of black solar panels. Not to mention the many other environmental changes/impacts that will come with this project. We have the following concerns that we will further elaborate on in this letter:

- Aesthetics
- Air Quality/Soil Erosion
- Temperature increase
- Noise
- Wildlife
- Traffic
- Property value
- Employment
- Safety

<u>Aesthetics</u> - In your initial study, you indicate that no scenic vistas or areas with high visual quality would be disrupted and the impacts are to be less than significant. This is not true for my family and neighbors in the surrounding area. This will have a huge impact on our scenic views of the area. Imagine going from beautiful views of green farm ground and mountain ranges to this: 11 foot solar panels bordered by an eight foot chain link fence topped with barbed wire for as far as the eye can see.

In speaking with James Cook from First Solar on December 6, 2011, he informed us that the project on the east side running down Drew Road from Diehl to Wixom, would be pushed back 800 feet from the road for our benefit. What benefit will another 800 feet of dirt give us? First Solar should be made to landscape this area to create a barrier between our home and the solar panels. Some ideas might be to farm this 800 foot strip or plant large trees, such as Eucalyptus or Oleanders that will block the panels and make a better view for all of us in this area.

Air Quality/Soil Erosion - Soil erosion will occur as a result of taking this land out of farm ground. We quite often have very high winds in our area. The system of leaves and roots in grass plants allow them to trap millions of tons of dust and dirt from the air annually. Up to 90% of the weight of a grass plant is in the root system. This makes grass very efficient at preventing erosion. Many other solar projects in other parts of the Country and in foreign countries have grass planted in and around the solar panels. Why is the County not requiring some kind of landscaping/grass to be put down in the subject ground area? After 20-25 years of the land being fallowed, it is very unlikely this land can be put back into production.

In speaking with the representatives from First Solar, we were told the subject ground would eventually return to its natural state and be similar to the ground surrounding the Imperial Valley Substation. Please refer to Exhibit A attached to this letter. This picture was taken on Thanksgiving Day, 2011, from our front yard and shows the enormous amount of blowing dirt in the air. Imagine having 1900 acres of dirt blowing into your home and into the Seeley and El Centro area. According to your initial report, the solar field will be coated with a permeable dust suppressant. How often will this need to be done and what type of suppressant will be used?

How will the chemicals for weed control affect us? We called Imperial County Environmental Health to ask about this and were told that we would likely be asked to leave our home when this is done. If we have to leave our home, how safe could this be? How often will this need to be applied and what type of impact will this have on my land, my animals and most importantly, my family?

Where will the runoff water go from the rains we get in the Imperial Valley? During flashfloods and heavy rains, what will happen to our roads? At this time, the corner of Diehl and Drew Roads flood whenever we have a heavy downpour and it washes out our drain ditch. Diehl Road east of Drew Road floods quite often when we have heavy rains. Please see Exhibit B attached to show the condition of the roads in this area on December 13, 2011, after we had a two day rain.

Temperature Increase – Grasses provide a cooling effect that reduces surface temperature 30 to 40 degrees as compared to bare soil. One acre of grass has the cooling effect of a 70-ton air conditioner. We are losing 1900 acres of grass farm ground, not to mention the temperature of the solar panels themselves. The solar panels can reach extremely high temperatures. How is this going to affect us and our neighbors when we have high winds in the area? The wind will be blowing the heat right into our homes. We will not only have higher power bills, but the heat could become unbearable. We have two small children and animals, how will this affect them?

Noise – We are concerned with the noise levels of the inverters. As you know, living in the country has many advantages, one being the sounds of nature and not much else. Landscaping and/or vegetation, including grass, help to muffle objectionable noises. With the removal of all grass and vegetation, we are concerned the noise levels of the inverters will very be noticeable.

What are the hours of construction? Will the construction crews be working through the night or just during normal business hours?

Wildlife – How will this project impact the burrowing owl? We have at least 6 burrowing owls that make their home on our property. A project of this size could have a significant impact on the existence of the burrowing owl causing hundreds of them to be displaced from their homes.

Traffic – There will be a significant increase in traffic due to construction crews and vehicles. This will not only create more greenhouse emissions, but will do further damage to already damaged country roads. Many of our country roads in this area are already in need of major repair. Is the County going to create a plan to repair the roads, once the construction process is complete?

Property value – The value of our property and neighboring properties will be affected. The placement of a solar project across from our home could reduce our property value by 20 to 30%. In today's real estate market, we need to be increasing property values, not dragging them down even further.

Employment - The representatives from First Solar are trying to make us believe this and all other solar projects will be creating jobs for the Imperial Valley. At best, it will only create temporary employment, which will eventually turn into 3 or 4 permanent jobs when all is said and done. What about the hundreds, if not thousands, of farm workers that will be displaced from their jobs? This solar project will end up eliminating more jobs than it will create.

Safety - What type of hazard will the solar panels pose to us? At such high temperatures, the solar panels can overheat and catch fire. The panels can also catch fire from faulty wiring. If too much power is pumped through inadequate wiring, the insulation can melt away and expose the wire, which can cause a fire. Is the Imperial County Fire Department equipped to handle fires such as these? If the panels catch fire, will toxic fumes from the cadmium telluride affect us? What about the thousands of lightning strikes we get each year?

As we all know in the Imperial Valley, earthquakes are a part of life for us. Will these solar panels be engineered to withstand a large earthquake? The Easter 2010 earthquake destroyed parts of Drew Road, Brockman Road, and Lyons Road, which left us with only one route to access our home. If another large earthquake were to strike, what kind of emergency plan does the County have in mind? How will the County ensure these solar projects are not endangering the residents living amongst them?

Our family is not against solar energy, but we do feel that it should not be placed near families that will be forced to live with them everyday. Solar energy and the ever changing solar panels in production may cause serious health issues for us and our neighbors.

We hope that you will take our concerns into consideration. Thank you in advance for taking the time to address all of these pertinent issues.

Sincerely,

Douglas Wayne Skains, Jr. and Heather Skains


Exhibit A

Exhibit B

RECEIVED

DEC 16 2011

IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

December 16, 2011
1210 Drew Road
El Centro, California 92243

ATTENTION: David Black
Imperial County Planning & Development
801 Main Street
El Centro, CA 92243

Dear Mr. Black and County Officials:

We are writing this letter in order to voice our opinions about the proposed CAMPO VERDE SOLAR PROJECT. This project is virtually across the street from our family home. Also it is my understanding that SILVERLEAF is also proposing another project directly in front of our home. My father, Atta Mohammed Khan purchased 120 acres of land and built a home where he happily raised his family. I also built my home and raised my family here. I had hopes that my son would also someday have a family and remain here at the 'ranch' so that his kids would also have the wonderful opportunities that 'ranch' life has to offer. This dream now may never take place because of all of the known and unknown concerns that this project will bring.

We attended the 'snow job' meeting on December 6, 2011 with the First Solar Company. Their claim, of course, is that it is a win-win situation. But how is this a win-win situation for the families that live in this area. Here are a few of my family's most urgent concerns.

* We will have lost our beautiful views of green crops, glorious mountains, and stunning sunsets. Instead, we get black solar panels, an eight foot chain link fence and rolls of barbed wire on top of the fence. It's going to appear that we live next to a prison instead of the area in which my dad decided farm and live.

* We were told that there are no health issues with the solar panels. I don't think that concern has been studied enough. This is a fairly new technology therefore, more time and more experience is needed in order to answer the question about health hazards. Only time will tell what will be the affects of solar panels for the families living near them.

* There are lots of other safety issues: the heat from the panels, the extreme heat that winds will push towards our homes, the traffic during the building phase and the maintenance of the panels. First Solar representatives said I should feel safer because they will have security guards roaming the area. But my response to them was that I have never felt unsafe in this farmland that my dad decided to buy. The mere fact that they need security guards makes me feel unsafe.

* Also at the meeting on December 6, I ask a question that First Solar could not answer. I was asked to write it down and they would get back to me. As of today, no response has been received. The question was: When those 2000 acres no longer need water for irrigation, will the water that we use for our homes (from the canal across the street) be affected? My feeling is that of course it will. The fields will no longer need water so less water will flow in the canals, therefore, less water for our household use. Our families can not survive without daily water coming to us.

* Where is this solar energy going? Is it going to benefit the people of the Imperial Valley? It is going directly to San Diego Gas and Electric. It is not going to lower our electricity bill. Our families in the area already pay outrages amounts during the summer, now we'll pay more because of the environmental heat which will be a bi-product of the solar panels.

So in closing, first of all, thank you for understanding our concerns about solar panels (First Solar Project) being so close to our living environment. We sincerely hope that you consider these issues in your decision making process.

Sincerely,

Salvador Garcia and Sarah Khan Garcia
Email address: skgarcia2004@yahoo.com

APPENDIX B

DRAFT TRAFFIC IMPACT ANALYSIS

Campo Verde Solar
County of Imperial (South of I-8 and East of Drew Road)
February 6, 2012

Draft Traffic Impact Analysis

Prepared for:

ENValue LLC
3225 Country Club Pkwy
Castle Rock, CO 80108

Prepared by Justin Rasas (RCE 60690), a principal with:

LOS Engineering, Inc.
11622 El Camino Real, Suite 100, San Diego, CA 92130
Phone 619-890-1253, Fax 619-374-7247

Job #1111

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Appendices

1.0 Introduction

The purpose of this study is to determine and analyze traffic impacts for the proposed Campo Verde Solar Project. The project is a solar photovoltaic (PV) facility on approximately 1,990 acres of private lands that have been used for agriculture. The project is generally located south of I-8 and west of Drew Road in the vicinity of Diehl Road. The general location of the project is shown in **Figure 1**. A site plan is included in **Figure 2**.

This report describes the existing roadway network in the vicinity of the project site. It includes a review of the existing and proposed traffic activities for weekday peak AM and PM periods and daily traffic conditions. The format of this study includes the following chapters:

- 1.0 Introduction
- 2.0 Study Methodology
- 3.0 Existing (Year 2011) Conditions
- 4.0 Project Description
- 5.0 Existing (Year 2011) + Project Conditions
- 6.0 Year 2013 Conditions
- 7.0 Year 2013 + Project Conditions
- 8.0 Cumulative Projects (New Development)
- 9.0 Year 2013 + Project + Cumulative Conditions
- 10.0 Horizon Year 2050 + Project Operations
- 11.0 ITE Turn Lane Warrants
- 12.0 Calculated Impact and Recommended Mitigation
- 13.0 Conclusions and Recommendations
- 14.0 References

Figure 1: Project Location

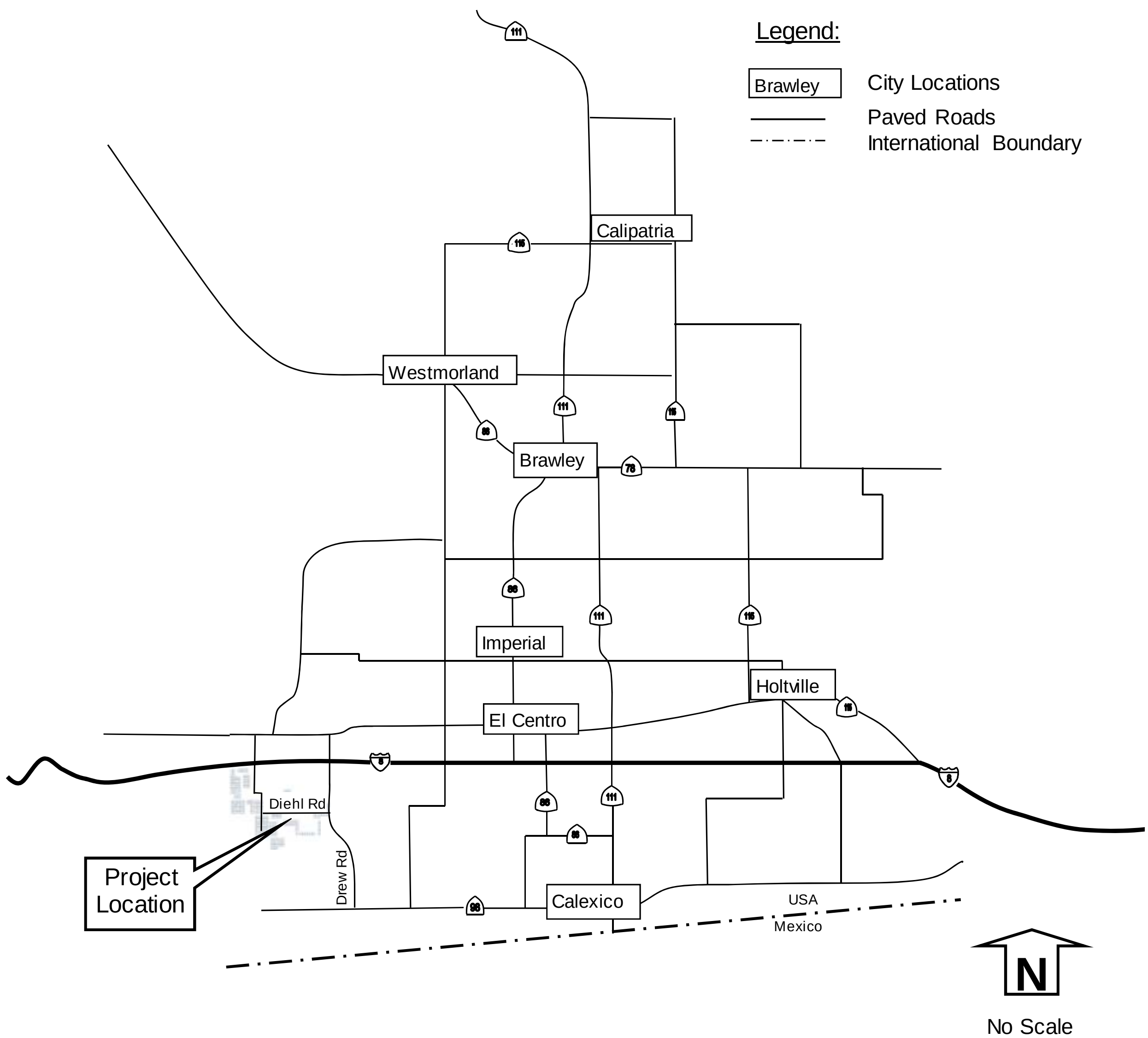
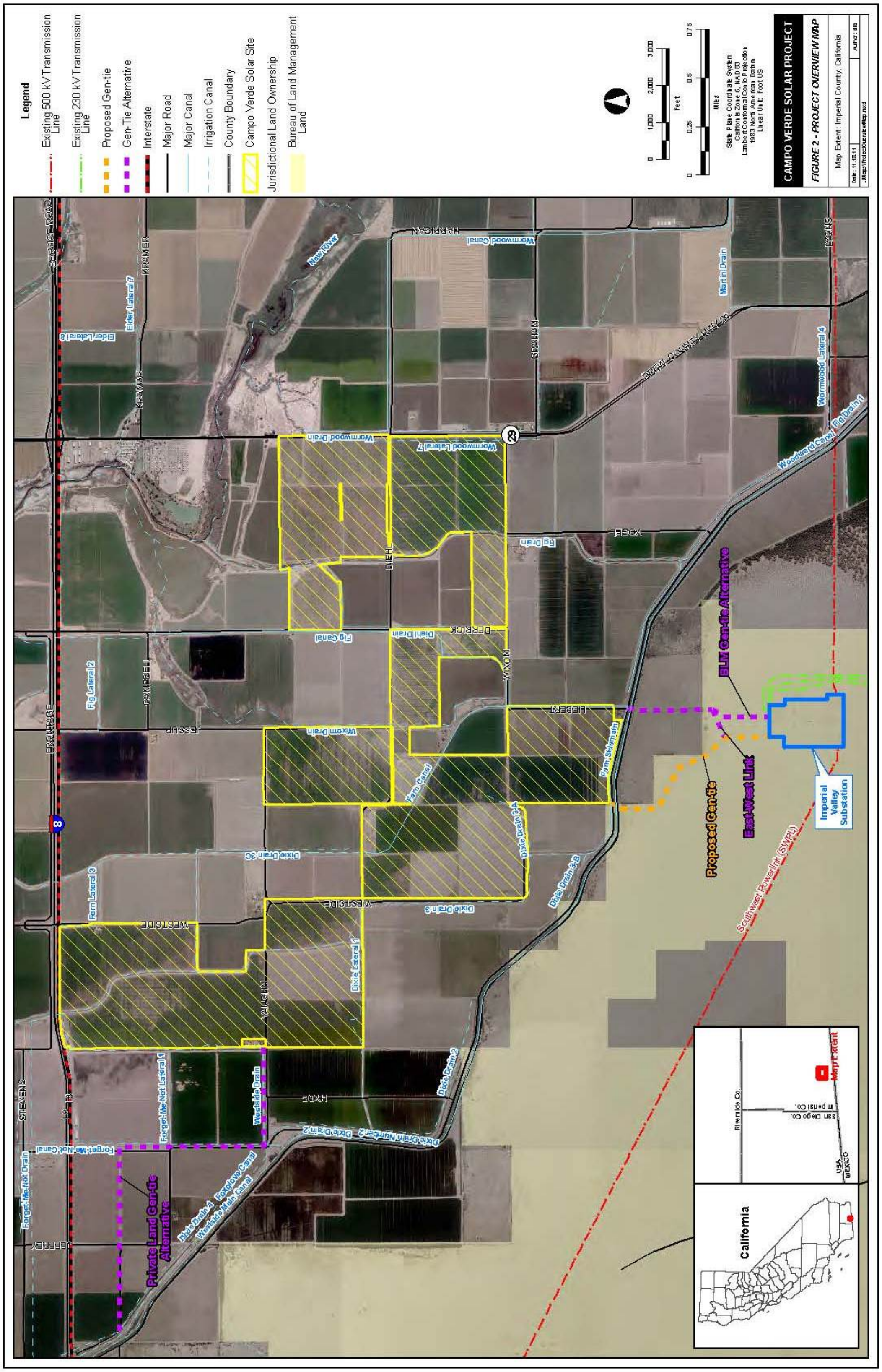


Figure 2: Site Plan



Source: ENValue LLC

2.0 Traffic Analysis Methodology and Significance Criteria

The parameters by which this traffic study was prepared included the determination of what intersections and roadways are to be analyzed, the scenarios to be analyzed and the methods required for analysis. The criteria for each of these parameters are included herein.

2.1 Study Area Criteria

The County of Imperial Department of Public Works *Traffic Study and Report Policy* dated March 12, 2007, revised June 29, 2007 and approved by the Board of Supervisors of the County of Imperial on August 7, 2007 states on page 14 "The study area for the project will be expected to encompass an adequate surrounding area to ensure that all impacts are identified to a sufficient extent that any mitigation measures, regardless of importance are shown, e.g. stop signs, yield signs, etc." The project study area based on the extent of where in general 50 peak hour directional project trips will travel was confirmed by County staff as the current practice for determining the study area, which requires the analysis of following intersections:

1) Drew Road/Evan Hewes Hwy (un-signalized)
2) Drew Road/I-8 WB Ramps (un-signalized)
3) Drew Road/I-8 EB Ramps (un-signalized)
4) Drew Road/Diehl Road (un-signalized)
5) Drew Road/SR-98 (un-signalized)
6) Forrester Road/Evan Hewes Hwy (signalized)
7) Forrester Road/I-8 WB Ramps (un-signalized)
8) Forrester Road/I-8 EB Ramps (un-signalized)
9) Derrick Road/Diehl Road (un-signalized)
10) Westside Road/Evan Hewes Hwy (un-signalized)
11) Derrick Road/Evan Hewes Hwy (un-signalized)

The following existing roadway/highway segments were analyzed as part of this study:

1) Diehl Road from Derrick Road to Drew Road
2) Drew Road from Evan Hewes Hwy to I-8
3) Drew Road from I-8 to Diehl Road
4) Drew Road from Diehl Road to SR-98
5) Evan Hewes Hwy from Derrick Road to Drew Road
6) Evan Hewes Hwy from Drew Road to Forrester Road
7) Forrester Road from Evan Hewes Hwy to I-8

The following freeway segments were analyzed as part of this study:

1) I-8 from Dunaway Road to Drew Road
2) I-8 from Drew Road to Forrester Road

2.2 Scenario Criteria

The number of scenarios to be analyzed is based on the methodology outlined in the County of Imperial Department of Public Works *Traffic Study and Report Policy* dated March 12, 2007, revised June 29, 2007 and approved by the Board of Supervisors of the County of Imperial on August 7, 2007. Excerpts from the *Traffic Study and Report Policy* showing the scenario criteria are included in **Appendix A**. Based on the aforementioned methodology source, the following scenarios were analyzed:

1) Existing (Year 2011) Conditions
2) Existing (Year 2011) + Project Conditions
3) Year 2013 Conditions
4) Year 2013 + Project Conditions
5) Year 2013 + Project + Cumulative Conditions
6) Horizon Year 2050 + Project Conditions

2.3 Traffic Analysis Criteria

In the traffic analyses prepared for this study, the *2000 Highway Capacity Manual* (HCM) operations analysis using Level of Service (LOS) evaluation criteria were employed. The operating conditions of the study intersections are measured using the HCM LOS designations ranging from A through F. LOS A represents the best operating condition and LOS F denotes the worst operating condition. The individual LOS criteria for each roadway component are described below.

2.3.1 Intersections

The study intersections were analyzed using the **operational analysis** method outlined in the 2000 HCM. This process defines LOS in terms of **average control delay** (measured in seconds) per vehicle. Intersection LOS was calculated using the Synchro 7.0 (Trafficware Ltd., 2003-2007) computer software program. The HCM LOS for the range of delay by seconds for un-signalized and signalized intersections is described in **Table 1**.

TABLE 1: UN-SIGNALIZED AND SIGNALIZED INTERSECTION LEVEL OF SERVICE (HCM 2000)

Level of Service	Un-Signalized Average Control Delay (seconds/vehicle)	Signalized Average Control Delay (seconds/vehicle)
A	0-10	0-10
B	> 10-15	> 10-20
C	> 15-25	> 20-35
D	> 25-35	> 35-55
E	> 35-50	> 55-80
F	> 50	> 80

Source: Highway Capacity Manual 2000.

As noted on page 5 of Caltrans' *Guide for the Preparation of Traffic Impact Studies,* December 2002, the accepted methodology by Caltrans for un-signalized intersections is the most current edition of the HCM (excerpt included in **Appendix B)**. Therefore, all of the study interchanges with un-signalized intersections were analyzed using the most current edition of the HCM.

2.3.2 Roadway Segments

The roadway segments were analyzed based on the functional classification of the roadway using the Imperial County Standard Street Classification capacity lookup table (copy included in **Appendix C**). The roadway segment capacity and LOS standards used to analyze roadway segments are summarized in **Table 2**.

TABLE 2: ROADWAY SEGMENT DAILY CAPACITY AND LOS (IMPERIAL COUNTY)

Circulation Element Road Classification	CROSS SECTION	LOS A	LOS B	LOS C	LOS D	LOS E
Expressway	154/210	<30,000	<42,000	<60,000	<70,000	<80,000
Prime Arterial	106/136	<22,200	<37,000	<44,600	<50,000	<57,000
Minor Arterial	82/102	<14,800	<24,700	<29,600	<33,400	<37,000
Major Collector (Collector)	64/84	<13,700	<22,800	<27,400	<30,800	<34,200
Minor Collector (Local Collector)	40/70	<1,900	<4,100	<7,100	<10,900	<16,200
Local County (Residential)	40/60	*	*	<1,500	*	*
Local County (Residential Cul-de-Sac or Loop Street)	40/60	*	*	<200	*	*
Major Industrial Collector – (Industrial)	76/96	<5,000	<10,000	<14,000	<17,000	<20,000
Industrial Local	44/64	<2,500	<5,000	<7,000	<8,500	<10,000

Source: Imperial County Department of Planning & Development Services *Circulation and Scenic Highways Element* January 29, 2008. Notes: *Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

2.3.3 Freeway Segments

The freeway segments were analyzed based on a multilane highway LOS criteria using a Volume to Capacity (V/C) ratio as outlined in the 2000 HCM. The V/C ratio is the ratio of traffic over the roadway capacity that provides a measure of how much roadway capacity is being used. The accepted methodology by Caltrans for the analysis of freeway sections is to use the most current edition of the HCM as noted on page 5 of Caltrans' *Guide for the Preparation of Traffic Impact Studies,* December 2002. The freeway LOS operations are based on Caltrans' *Guide for the Preparation of Traffic Impact Studies* V/C ratios as summarized below in **Table 3**. Excerpts from Caltrans' *Guide for the Preparation of Traffic Impact Studies* are included in **Appendix D**.

TABLE 3: FREEWAY LEVEL OF SERVICE

Measure of Effectiveness	LOS A	LOS B	LOS C	LOS D	LOS E
Max Volume/Capacity Ratio	0.30	0.50	0.71	0.89	1.00

Source: Caltrans' *Guide for the Preparation of Traffic Impact Studies,* December 2002.

2.4 Significance Criteria

The significance criteria for traffic impacts are based on the Imperial County Planning & Development Services Department level of service standard as outlined on page 55 of the *Circulation and Scenic Highways Element* dated January 29, 2008, which states "The County's goal for an acceptable traffic service standard on an ADT basis and during AM and PM peak periods for all County-Maintained Roads shall be LOS C for all street segment links and intersections." An excerpt from the *Circulation and Scenic Highways Element* is included in **Appendix E**. The current practice of determining direct or cumulative impacts is defined by the significance criteria outlined in **Table 4**, which was obtained from several EIRs for projects located in Imperial County. The criteria outlined in Table 4 were confirmed with County of Imperial Department of Public Works in April 2011. Copies of traffic significance criteria from other EIRs are included in **Appendix F**.

TABLE 4: SIGNIFICANCE CRITERIA

Existing	Existing + Project	Existing + Project + Cumulative Projects	Impact Type
Intersections			
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS D or worse	NA	Direct
LOS D	LOS D and adds 2.0 seconds or more of delay	LOS D or worse	Cumulative
LOS D	LOS E or F	NA	Direct
LOS E	LOS F	NA	Direct
LOS F	LOS F and delay increases by ≥ 10.0 seconds	LOS F	Direct
Any LOS	Project does not degrade LOS and adds < 2.0 seconds of delay	Any LOS	None
Any LOS	Project does not degrade LOS but adds 2.0 to 9.9 seconds of delay	LOS E or worse	Cumulative
Segments			
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS C or better and v/c > 0.02	LOS D or worse	Cumulative
LOS C or better	LOS D or worse	NA	Direct (1)
LOS D	LOS D and v/c > 0.02	LOS D or worse	Cumulative
LOS D	LOS E or F	NA	Direct
LOS E	LOS F	NA	Direct
LOS F	LOS F and v/c increases by >0.09	LOS F	Direct
Any LOS	LOS E or worse & v/c 0.02 to 0.09	LOS E or worse	Cumulative
Any LOS	LOS E or worse and v/c < 0.02	Any LOS	None

Notes: LOS: Level of Service. (1) Exception: post-project segment operation is LOS D and intersections along segment are LOS D or better resulting in no significant impact. NA: Not Applicable.

2.5 Study Limitations

The findings and recommendations of this report were prepared in accordance with generally accepted professional traffic and transportation engineering principles and practice. No other warranty, express or implied is made.

3.0 Existing (Year 2011) Conditions

This section describes the study area street system, peak hour intersection volumes, daily roadway volumes, and existing LOS.

3.1 Existing Street System

The existing roadway system and classifications are described below. These are based on the Imperial County Planning & Development Services Department *Circulation and Scenic Highways Element*, January 29, 2008 – excerpts included in **Appendix G**.

Interstate 8 (I-8) between Dunaway Road and Imperial Avenue is constructed as a 4 lane divided freeway with 2 lanes in each direction.

Diehl Road between Westside Road and Drew Road has a year 2003 classification of MINOR COLLETOR in the Imperial County *Circulation and Scenic Highways Element*. This roadway is currently constructed as a 2 lane un-divided roadway within approximately 20 feet of pavement. A posted speed limit was not observed on this segment.

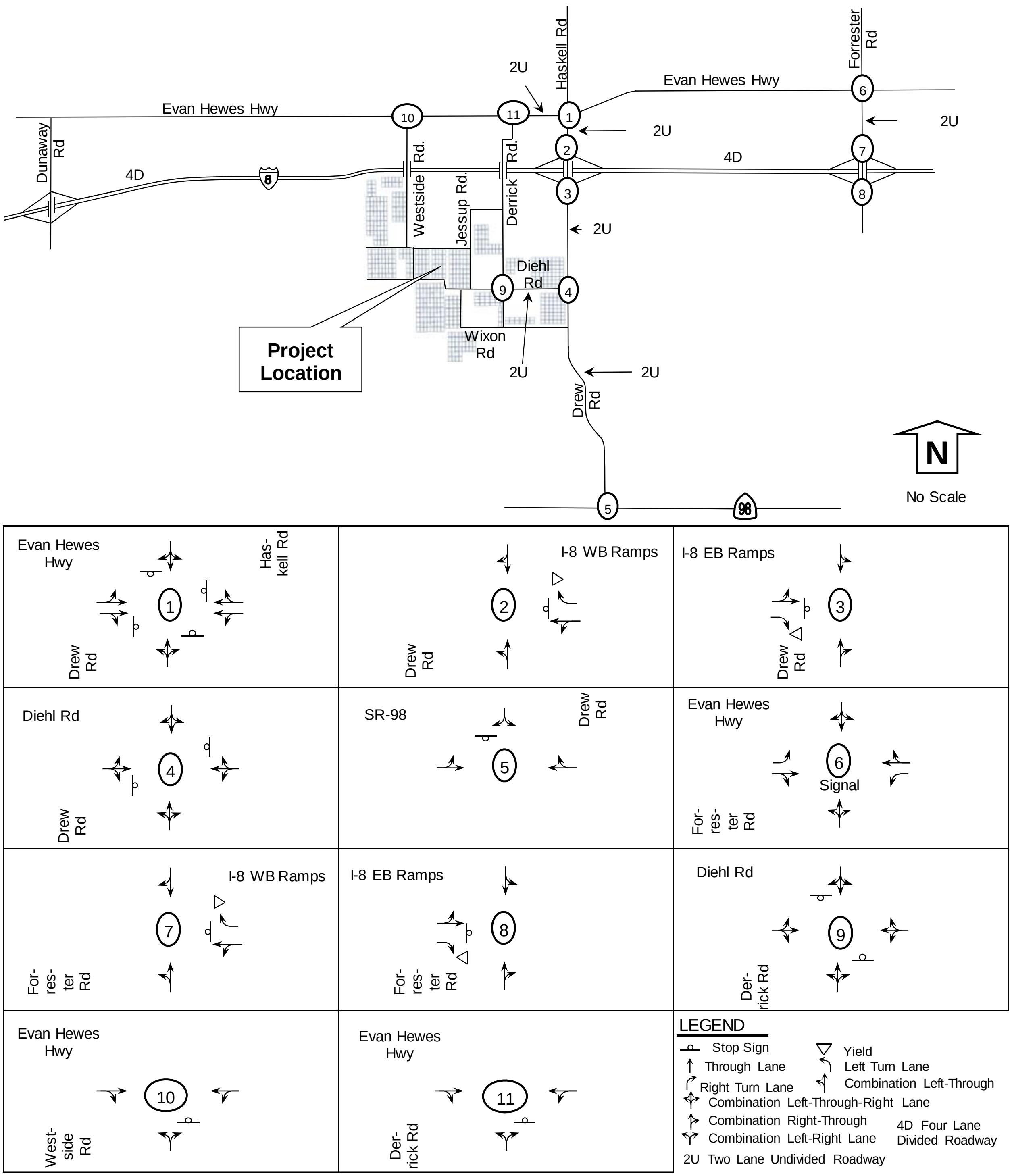
Drew Road (S29) between I-8 and SR-98 has a year 2003 classification of PRIME ARTERIAL in the Imperial County *Circulation and Scenic Highways Element*. This paved roadway is currently constructed as a 2 lane un-divided roadway.

Evan Hewes Highway between Westside Road and Forrester Road has a 2003 classification of PRIME ARTERIAL on the Imperial County *Circulation and Scenic Highways Element*. This roadway is currently constructed as a 2 lane un-divided roadway within approximately 24 feet of pavement. The posted speed limit is 40 MPH within the built-up areas of Seeley. A posted speed limit was not observed on Evan Hewes Highway outside of urbanized areas.

Forrester Road (S30) between I-8 and McCabe Road has a year 2003 classification of PRIME ARTERIAL in the Imperial County *Circulation and Scenic Highways Element*. This paved roadway is currently constructed as a 2 lane un-divided roadway.

The existing roadway conditions are shown in **Figure 3**.

Figure 3: Existing (Year 2011) Roadway Conditions



3.2 Existing (Year 2011) Traffic Volumes and LOS Analyses

Existing AM and PM peak hour intersection volumes (with count dates) were collected for this study:

1) Drew Road/Evan Hewes Hwy (Wednesday 6/22/2011)
2) Drew Road/I-8 WB Ramps (Wednesday 6/22/2011)
3) Drew Road/I-8 EB Ramps (Wednesday 6/22/2011)
4) Drew Road/Diehl Road (Wednesday 6/22/2011)
5) Drew Road/SR-98 (Thursday 3/24/2011)
6) Forrester Road/Evan Hewes Hwy (Wednesday 6/22/2011)
7) Forrester Road/I-8 WB Ramps (Thursday 3/24/2011)
8) Forrester Road/I-8 EB Ramps (Thursday 3/24/2011)
9) Derrick Road/Diehl Road (Wednesday 6/22/2011)
10) Westside Road/Evan Hewes Hwy (5/22/2008 with a 2.8% annual growth factor applied to reach a year 2011 volume)
11) Derrick Road/Evan Hewes Hwy (Wednesday 6/22/2011)

Daily traffic volumes (with count dates) were obtained or collected for the following segments:

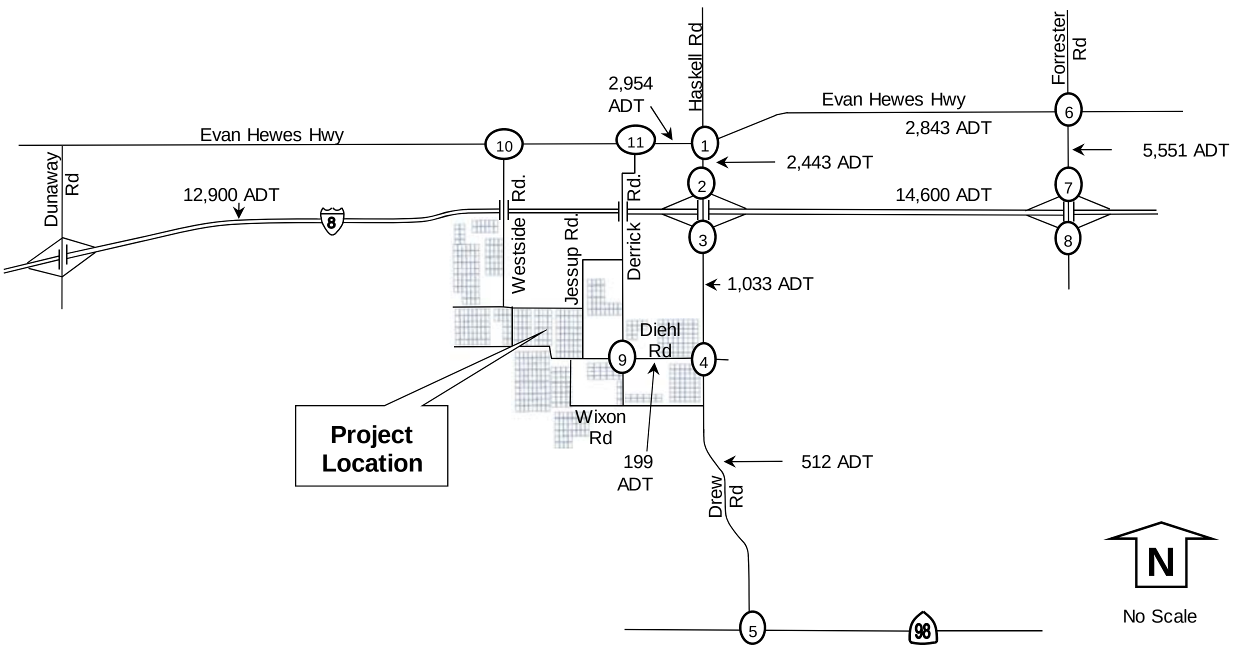
1) Diehl Road from Derrick Road to Drew Road (Wednesday 6/22/2011)
2) Drew Road from Evan Hewes Hwy to I-8 (Wednesday 6/22/2011)
3) Drew Road from I-8 to Diehl Road (Wednesday 6/22/2011)
4) Drew Road from Diehl Road to SR-98 (Wednesday 6/22/2011)
5) Evan Hewes Hwy from Derrick Road to Drew Road (Wednesday 6/22/2011)
6) Evan Hewes Hwy from Drew Road to Forrester Road (Wednesday 6/22/2011)
7) Forrester Road from Evan Hewes Hwy to I-8 (Wednesday 6/22/2011)

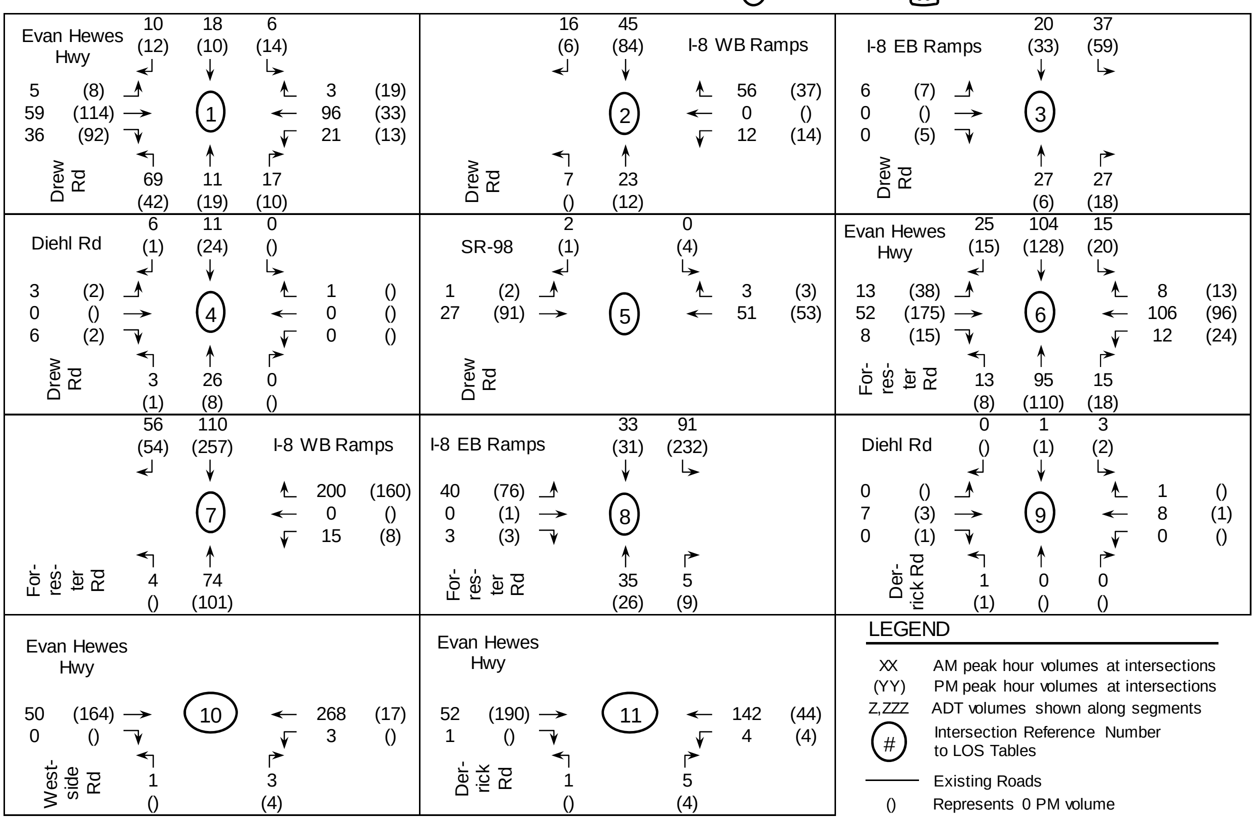
Daily freeway volumes (with count dates) were obtained for the following segments:

1) I-8 from Dunaway Road to Drew Road (Caltrans 2010 with a 2.8% annual growth factor applied to reach a year 2011 volume)
2) I-8 from Drew Road to Forrester Road (Caltrans 2010 with a 2.8% annual growth factor applied to reach a year 2011 volume)

Existing AM, PM, and daily volumes are shown on **Figures 4** with count data included in **Appendix H**. The weekday intersection, segment, and freeway LOS are shown in **Tables 5, 6, and 7** respectively. Intersections LOS calculations are included in **Appendix I**.

Figure 4: Existing (Year 2011) Volumes





LEGEND

XX	AM peak hour volumes at intersections
(YY)	PM peak hour volumes at intersections
Z,ZZZ	ADT volumes shown along segments
# (circled)	Intersection Reference Number to LOS Tables
——	Existing Roads
()	Represents 0 PM volume

TABLE 5: EXISTING (YEAR 2011) INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	Existing Delay[2]	Existing LOS[3]
1) Drew Road at	All	AM	7.5	A
Evan Hewes Hwy (U)	All	PM	7.5	A
2) Drew Road at	WB LT	AM	8.7	A
I-8 WB Ramp (U)	WB LT	PM	8.7	A
3) Drew Road at	EB LT	AM	10.0	B
I-8 EB Ramp (U)	EB LT	PM	9.3	A
4) Drew Road at	EB LTR	AM	8.6	A
Diehl Road (U)	EB LTR	PM	8.6	A
5) Drew Road at	SB LR	AM	8.6	A
SR-98 (U)	SB LR	PM	9.2	A
6) Forrester Road at	All	AM	16.8	B
Evan Hewes Hwy (S)	All	PM	22.9	C
7) Forrester Road at	WB LT	AM	9.8	A
I-8 WB Ramp (U)	WB LT	PM	9.8	A
8) Forrester Road at	EB LT	AM	10.8	B
I-8 EB Ramp (U)	EB LT	PM	16.9	C
9) Derrick Road at	SB LTR	AM	8.7	A
Diehl Road (U)	SB LTR	PM	8.7	A
10) Westside Road at	NB LR	AM	9.1	A
Evan Hewes Hwy (U)	NB LR	PM	9.2	A
11) Derrick Road at	NB LR	AM	8.8	A
Evan Hewes Hwy (U)	NB LR	PM	9.3	A

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds.
3) LOS: Level of Service

TABLE 6: EXISTING (YEAR 2011) SEGMENT LOS

Segment	Classification (as built)	Existing Daily Volume	# of lanes	LOS C Capacity	V/C	LOS
Diehl Road						
Derrick Road to Drew Road	Minor Collector (2U)	199	2	7,100	0.03	A
Drew Road						
Evan Hewes Highway to I-8	Prime Arterial (2U)	2,443	2	7,100	0.34	B
I-8 to Diehl Road	Prime Arterial (2U)	1,033	2	7,100	0.15	A
Diehl Road to SR-98	Prime Arterial (2U)	512	2	7,100	0.07	A
Evan Hewes Highway						
Derrick Road to Drew Road	Prime Arterial (2U)	2,954	2	7,100	0.42	B
Drew Road to Forrester Road	Prime Arterial (2U)	2,843	2	7,100	0.40	B
Forrester Road						
Evan Hewes Highway to I-8	Prime Arterial (2U)	5,551	2	7,100	0.78	C

Notes: Classification based on 1/29/08 CIrculation and Scenic Highways Element. 2U= 2 lane undivided roadway.Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio.

TABLE 7: EXISTING (YEAR 2011) FREEWAY LOS

Freeway Segment	I-8 Dunaway Rd to Drew Rd				I-8 Drew Rd to Forrester Rd			
Year 2011 (Forecasted from 2010)								
ADT	12,900				14,600			
Peak Hour	A M		P M		A M		P M	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity (1)	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor (2)	0.1076	0.0963	0.0917	0.1517	0.1076	0.0963	0.0917	0.1517
D Factor (3)	0.2616	0.7384	0.4419	0.5581	0.2616	0.7384	0.4419	0.5581
Truck Factor (4)	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	434	1,095	624	1,304	491	1,239	706	1,476
Volume to Capacity	0.092	0.233	0.133	0.277	0.104	0.264	0.150	0.314
LOS	A	A	A	A	A	A	A	B

Notes: (1) Capacity of 2,350 passenger cars per hour per lane (pcphpl) from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002. (2) Latest K factor (percentage of the AADT in both directions during the peak hour) from Caltrans (based on 2007 report). (3) Latest D factor (percentage of traffic in the peak direction during the peak hour) from Caltrans (based on 2007 report), which when multiplied by K and ADT will provide peak hour volume. (4) Latest truck factor from Caltrans (based on 2007 report).

Under existing year 2011 conditions, the study intersections and roadways were calculated to operate at LOS C or better.

4.0 Project Description

The project is a solar photovoltaic facility on approximately 1,990 acres of private lands that have been used for agriculture. The construction schedule is estimated between 12 and 24 months. The applicant anticipates construction to start in the second quarter of 2012 following a Conditional Use Permit (CUP) approval. A detailed project construction schedule is included in **Appendix J**.

4.1 Project Trip Generation

The project trip generation consists of a construction phase and operations phase. The construction phase will have the highest traffic intensity followed by an operations phase with significantly fewer vehicle trips. This section describes the construction and operations trip generation.

4.1.1 Construction Trip Generation

Construction of the project includes site preparation, foundation construction, erection of major equipment and structures, installation of electrical systems, control systems, and start-up/testing. These construction activities are expected to require approximately 12 to 24 months. According to the applicant, the construction workforce is expected to reach a peak during month number seven (7) anticipated to occur during the 1st quarter of 2013 with a peak of up to 325 daily vehicles for construction workers and 50 daily truck deliveries (details in Appendix J). The number of workers before and after the peak month will be less. Work is anticipated to start at 6am and conclude at 6 pm Monday through Friday. The peak construction traffic (during month number 7) is calculated at 950 ADT with 349 AM peak hour trips (337 inbound and 12 outbound) and 349 PM peak hour trips (12 inbound and 337 outbound) as shown in **Table 8**.

TABLE 8: PROJECT TRIP GENERATION SUMMARY

Proposed Construction Related Traffic	Daily Vehicles	ADT with PCE[2]	AM (6AM)		PM (6PM)	
			IN	OUT	IN	OUT
Peak Construction Workers[1]	325	650	325	0	0	325
Equipment Deliveries and Construction Trucks (with PCE)[2]	50	300	12	12	12	12
Total Traffic During Peak Construction Period	**375**	**950**	**337**	**12**	**12**	**337**

ADT: Average Daily Trips. 1) Number of construction workers and construction trucks provided by applicant. 2) Passenger Car Equivalent (PCE) factor of 3 applied to each truck, thus 50 daily trucks equals 300 ADT in one 1 day while peak hour has about 4 trucks x 3 PCE to equal 12 PCE peak hour trips.

4.1.2 Project Operations and Maintenance Trip Generation

During operations and maintenance, the project will primarily operate during daylight hours and will require (on average) less than 10 fulltime personnel for operations and maintenance. Operations personnel include employees running the facility, security, and any other work associated with the operations. Maintenance personnel include employees addressing maintenance on a daily basis. On average, the operations and maintenance trip generation is estimated at about 20 ADT with approximately 10 AM and 10 PM peak hour trips.

During a typical year, the project will require up to 10 daily water trucks for panel washing over approximately 15 business days; however, the washing frequency is estimated from one to four times a year. During the washing period, the total project daily traffic may increase to 40 or 50 ADT over a 15 business day period.

Since the operations and maintenance traffic generation is significantly less than the construction, the higher and more conservative construction trip generation is used to determine potential project impacts. In other words, the construction phase was used for the traffic analysis because it is calculated to generate significantly higher traffic than the project operations and maintenance phase when the project is operational.

4.2 Construction Trip Distribution and Assignment

The applicant has indicated that the labor pool for the construction workforce is anticipated at approximately 60% from within Imperial County from a combination of existing residents and workers that will temporarily reside in the County, and approximately 40% from outside Imperial County. Local cities/residential communities within Imperial County are considered to include but are not limited to Calipatria, Westmorland, Brawley, Imperial, El Centro, Holtville, and Calexico. The distribution of the construction workforce by cities/communities was based on the concentration of populations per the Census 2010 from the U.S. Census Bureau. The percentage of local construction workforce by city/community and county is shown in **Table 9**.

TABLE 9: CONSTRUCTION WORKFORCE SOURCES BASED ON CENSUS 2010 POPULATIONS (60% LOCAL)

LOCAL (60%) City/Community	2010 Census Population	Percentage of Total	Percentage of Local Workforce (60% from within Imperial County)
Calipatria	7,705	6%	3%
Westmorland	2,225	2%	1%
Brawley	24,953	18%	11%
Imperial	14,758	11%	6%
El Centro	42,598	31%	19%
Holtville	5,939	4%	3%
Calexico	38,572	28%	17%
Local Total	**136,750**	**100%**	**60%**

Source: Population data from U.S. Census Bureau.

The percentage of non-local construction workforce by city/community and county were based on the population concentrations per the Census 2010 from the U.S. Census Bureau and proximity to population centers such as San Diego. The non-local workforce numbers are shown in **Table 10**.

TABLE 10: CONSTRUCTION WORKFORCE SOURCES BASED ON CENSUS 2010 POPULATIONS (40% NON-LOCAL)

NON-LOCAL (40%) County	2010 Census Population	Percentage of Census Total	Percentage of Non-Local Workforce (With emphasis on proximity to San Diego)
San Diego County	3,095,313	56%	30%
Riverside County	2,189,641	40%	9%
Yuma County (Arizona)	195,751	4%	1%
Non-Local Total	**5,480,705**	**100%**	**40%**

Source: Population data from U.S. Census Bureau.

Based on the aforementioned Census information, the regional construction workforce distribution is shown in **Figure 5** with the study area distribution shown in **Figure 6.** The construction workforce trip assignment is shown in **Figure 7**.

The delivery of equipment is anticipated to arrive from outside of Imperial Valley with a majority arriving from Los Angeles and Riverside Counties, followed by San Diego County, and the possibility of some truck traffic from other locations. The project truck delivery distribution is shown in **Figure 8** with the truck delivery trip assignment shown in **Figure 9**.

The total project traffic that consists of the construction workforce and delivery of equipment is shown in **Figure 10**.

4.3 Alternative Access Routes

On April 5, 2010 an earthquake struck Imperial County and caused the closure of Drew Road south of I-8. In the event an alternative route is required to reach the project site, several route options exist. These alternative access routes are shown in **Figure 11**; however, this analysis is based on primary access from Drew Road.

Figure 5: Regional Construction Workforce Distribution

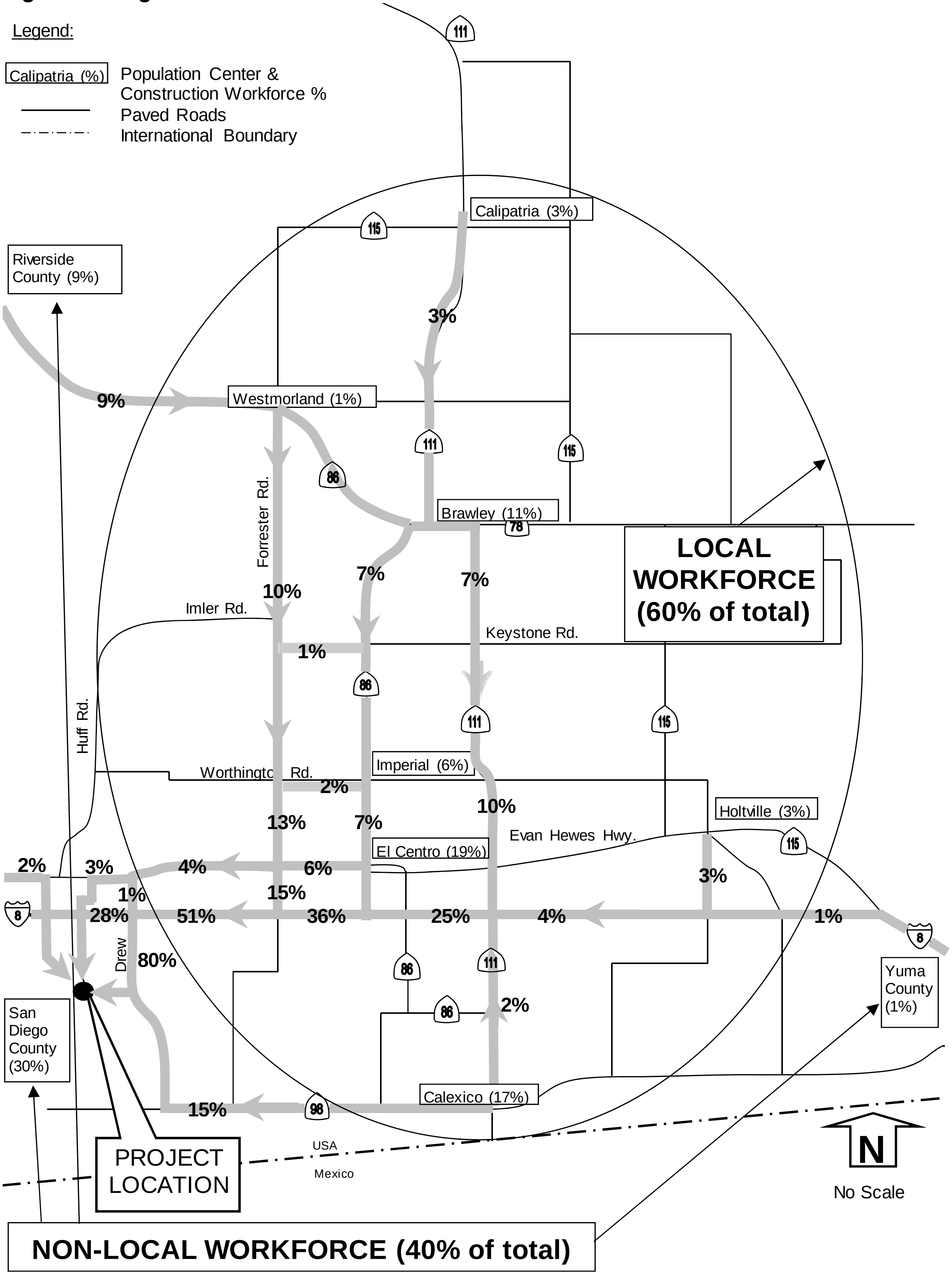


Figure 6: Local Construction Workforce Distribution

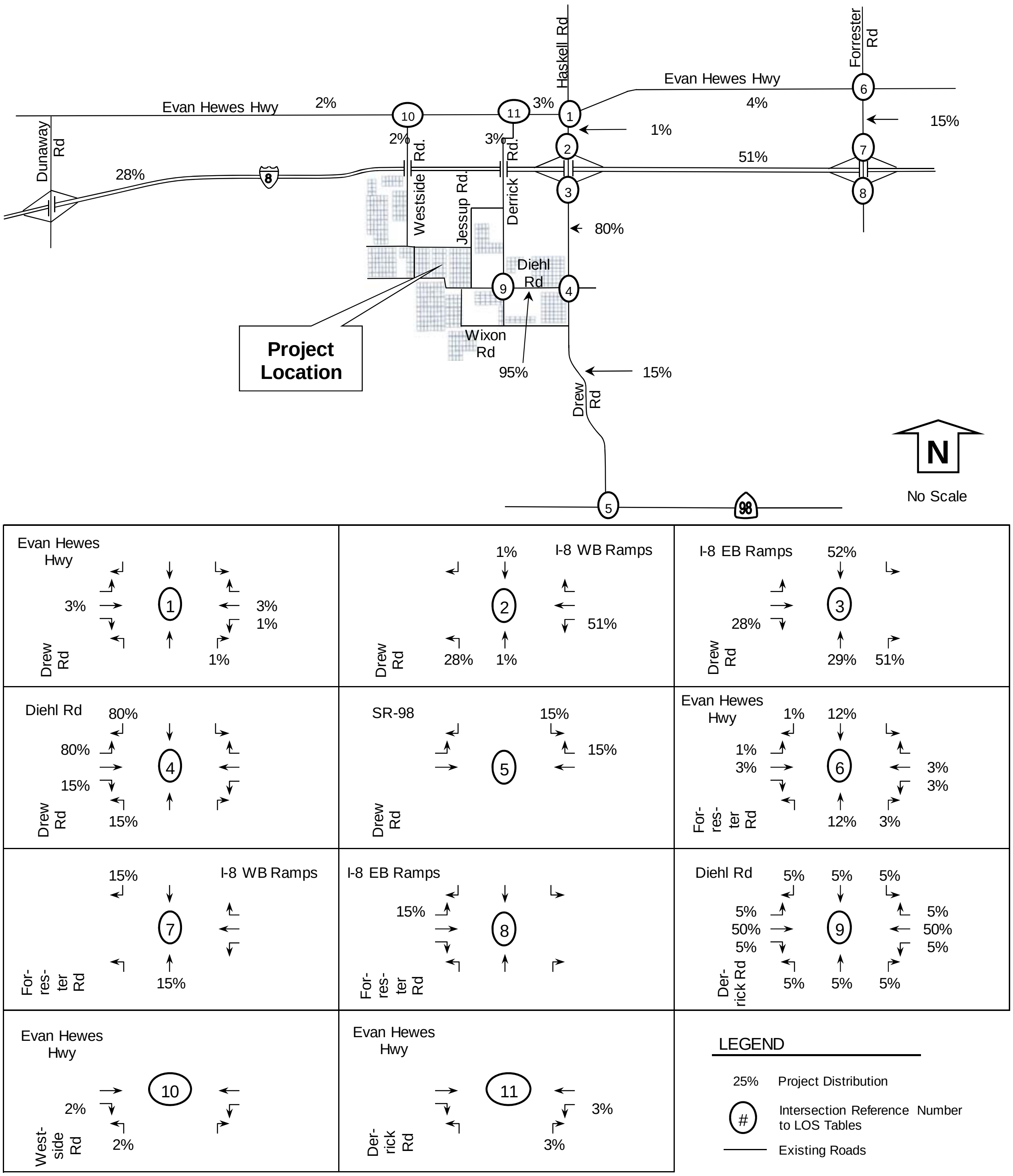


Figure 7: Construction Workforce Traffic

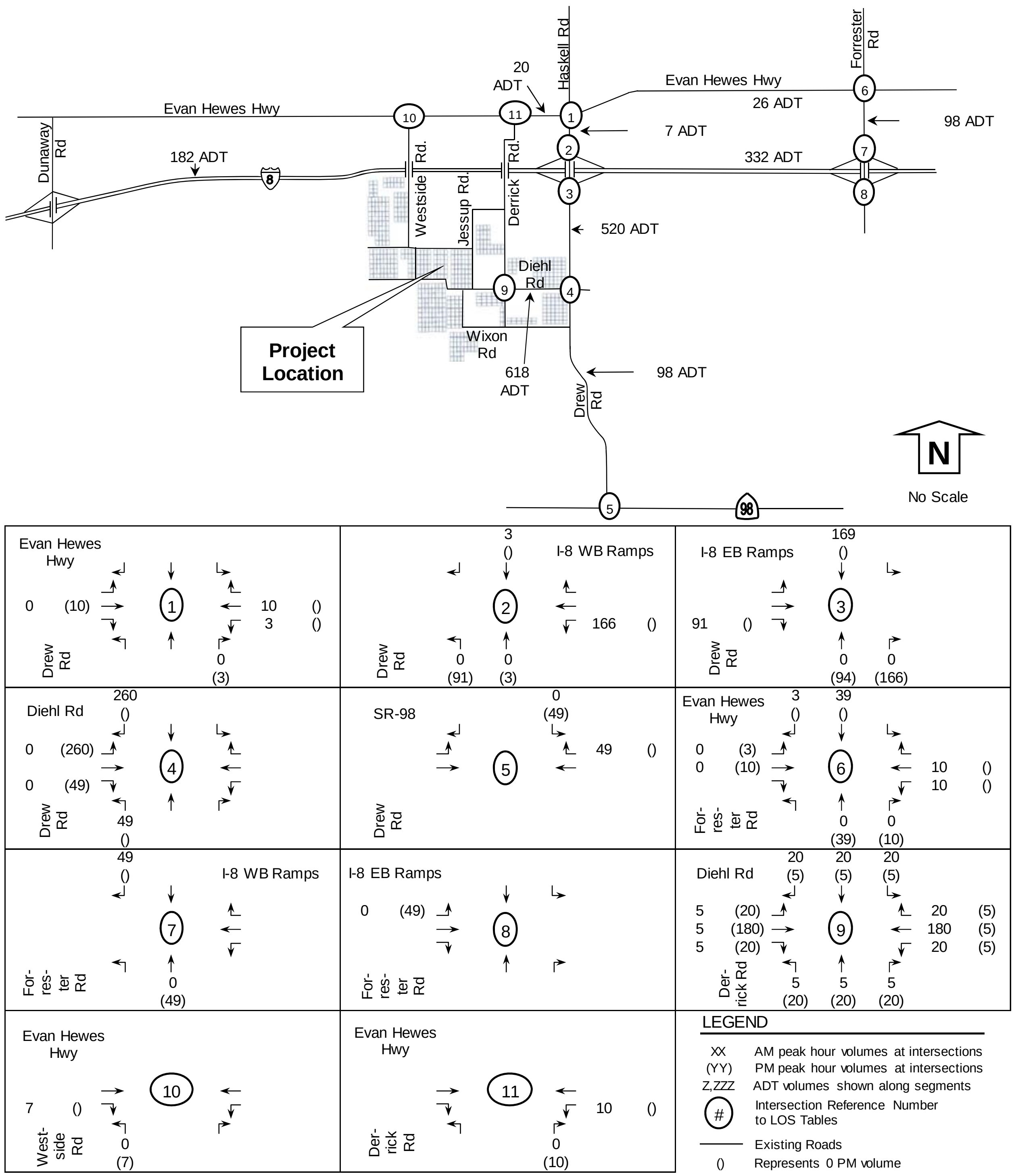


Figure 8: Truck Delivery Distribution

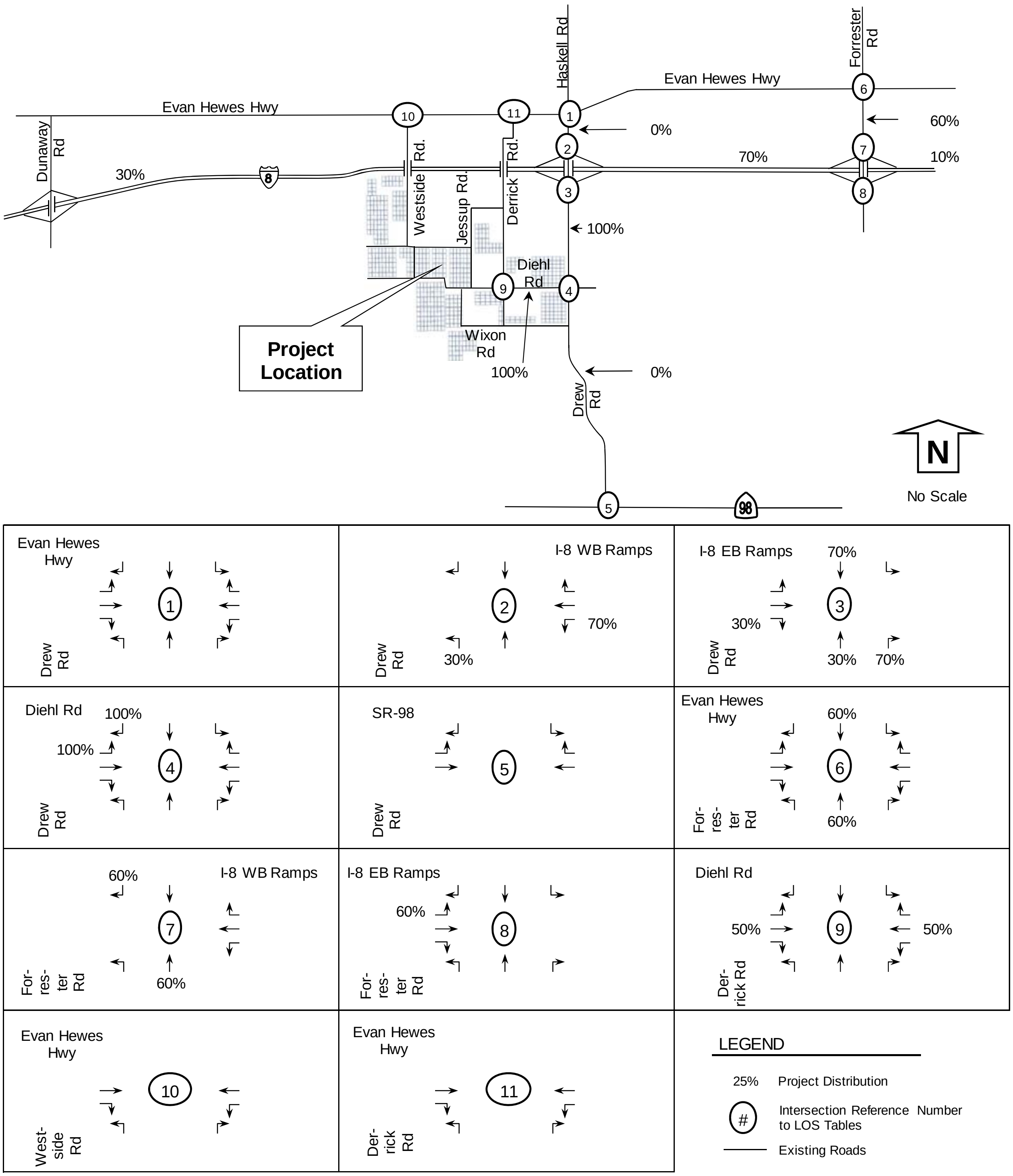


Figure 9: Truck Delivery Traffic

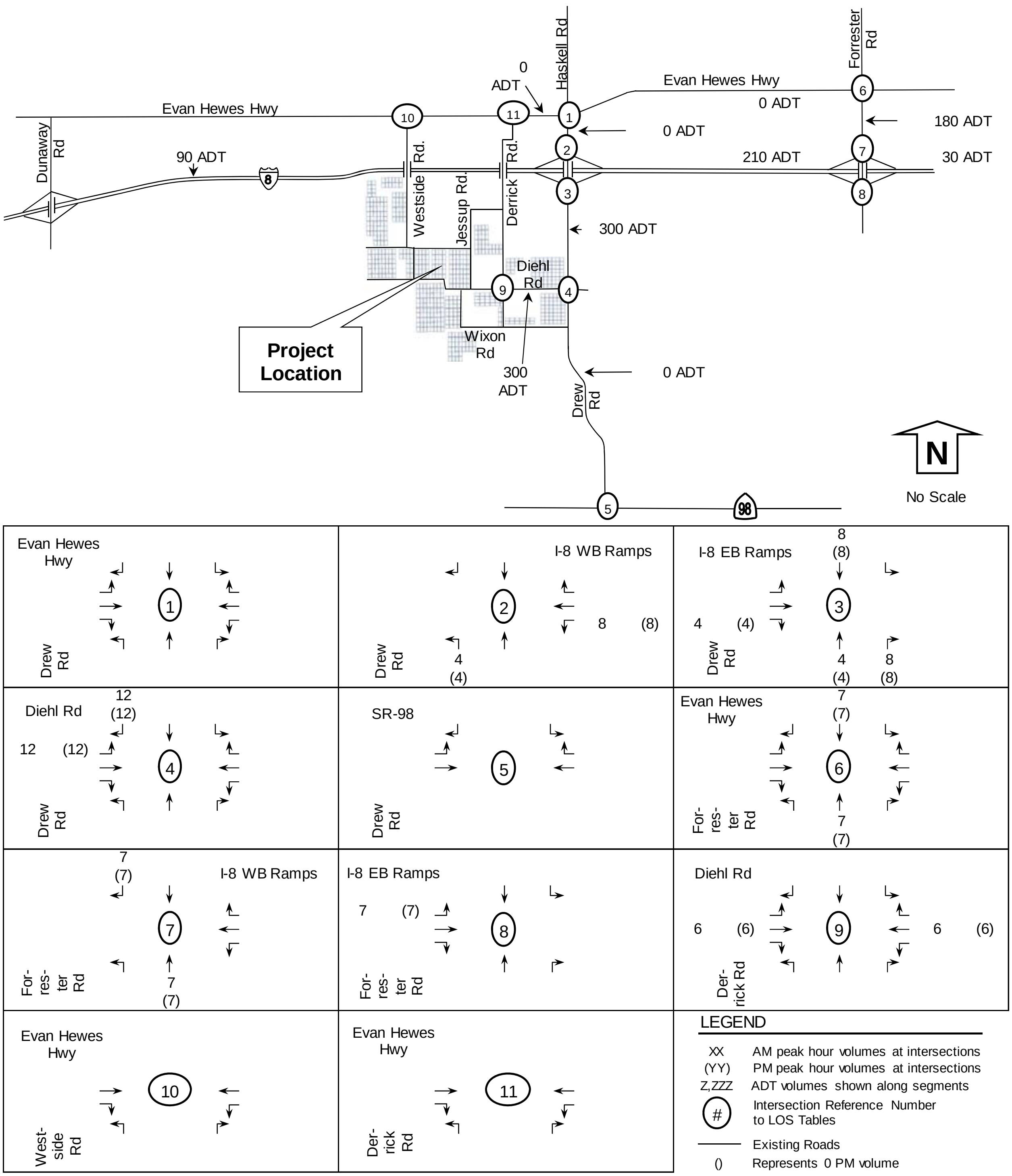


Figure 10: Total Project Traffic

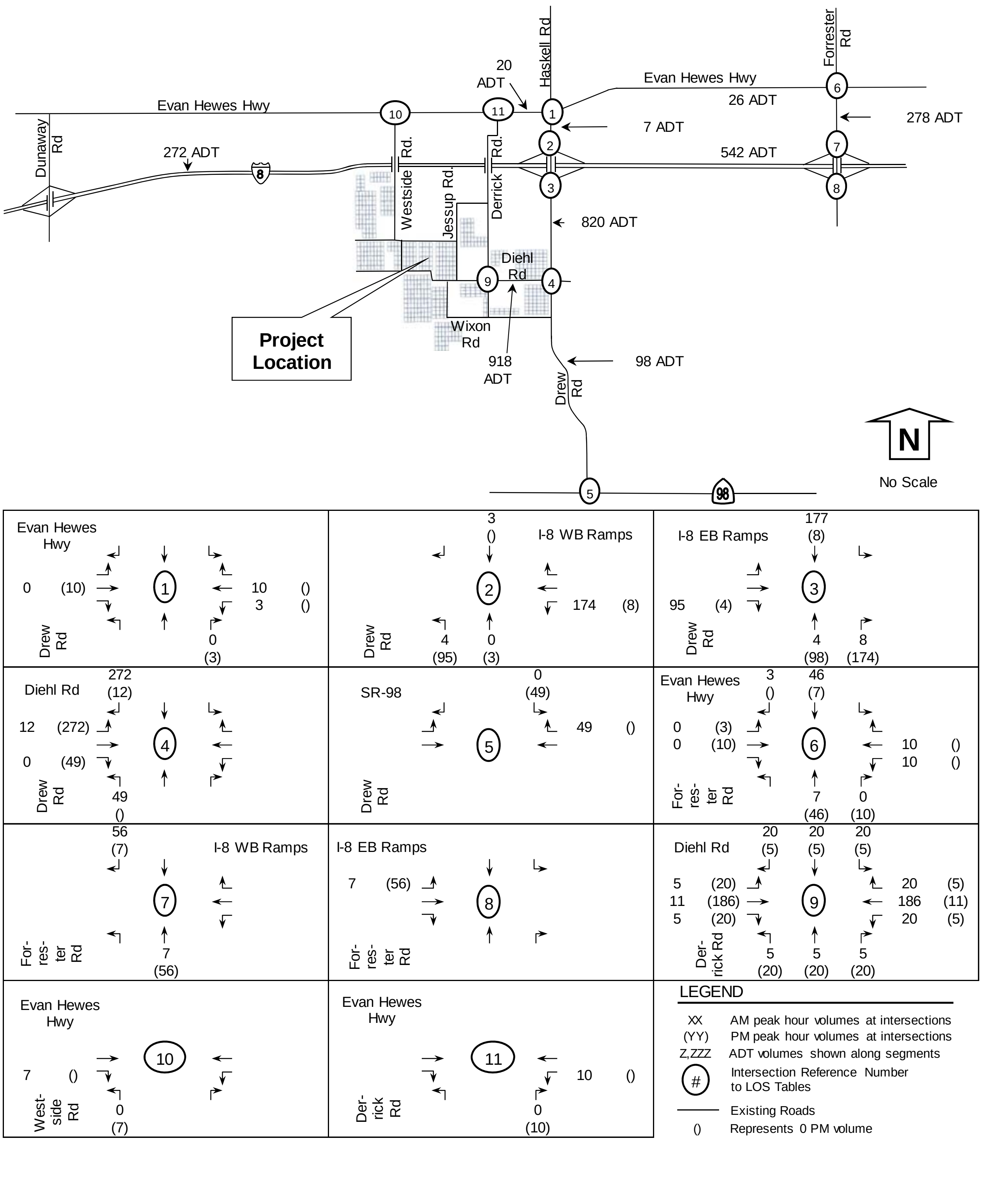
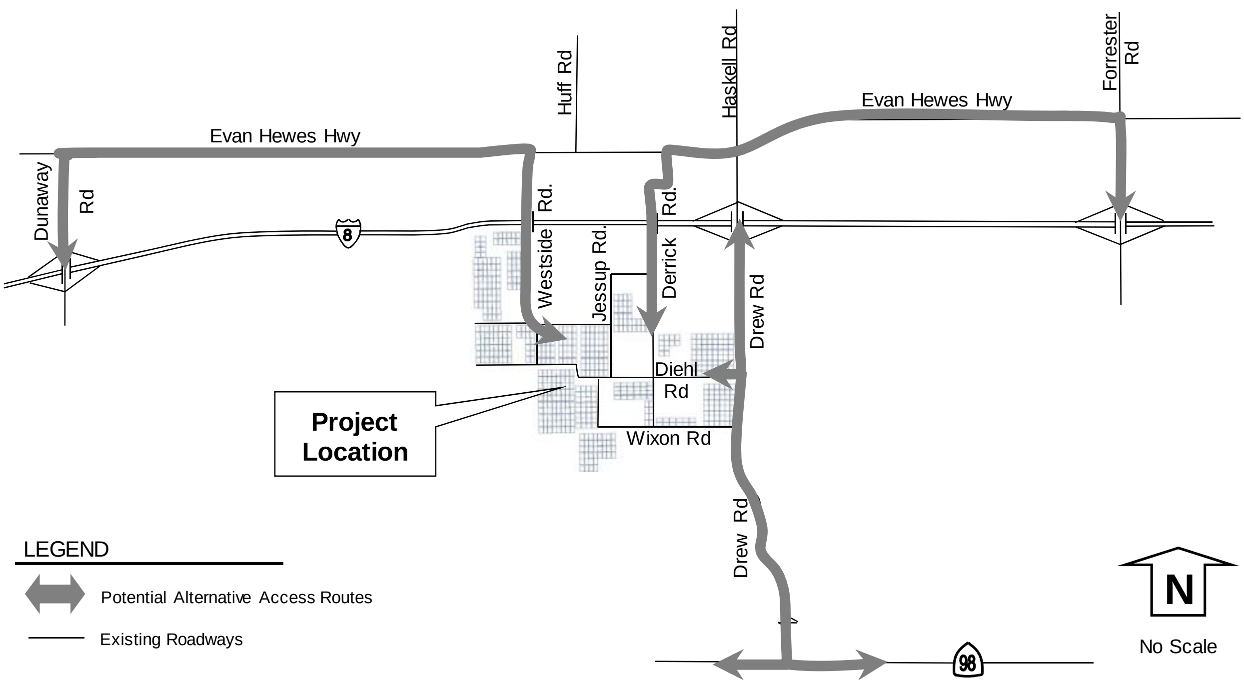


Figure 11: Possible Alternative Access Routes



5.0 Existing (Year 2011) + Project Conditions

This section documents the addition of total project traffic onto existing conditions. Existing plus total project volumes are shown in **Figure 12**. Intersection, segment, and freeway LOS are shown in **Tables 11, 12 and 13**. Intersection LOS calculations are included in **Appendix K**.

TABLE 11: EXISTING (YEAR 2011) + PROJECT INTERSECTION LOS

Intersection &	Movement	Peak	Existing		Existing + Project			
(Control)[1]		Hour	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Sig[5]
1) Drew Road at	All	AM	7.5	A	7.6	A	0.1	No
Evan Hewes Hwy (U)	All	PM	7.5	A	7.5	A	0.0	No
2) Drew Road at	WB LT	AM	8.7	A	10.0	B	1.3	No
I-8 WB Ramp (U)	WB LT	PM	8.7	A	9.5	A	0.8	No
3) Drew Road at	EB LT	AM	10.0	B	10.0	B	0.0	No
I-8 EB Ramp (U)	EB LT	PM	9.3	A	9.9	A	0.6	No
4) Drew Road at	EB LTR	AM	8.6	A	10.5	B	1.9	No
Diehl Road (U)	EB LTR	PM	8.6	A	10.8	B	2.2	No
5) Drew Road at	SB LR	AM	8.6	A	8.7	A	0.1	No
SR-98 (U)	SB LR	PM	9.2	A	9.7	A	0.5	No
6) Forrester Road at	All	AM	16.8	B	17.5	B	0.7	No
Evan Hewes Hwy (S)	All	PM	22.9	C	23.0	C	0.1	No
7) Forrester Road at	WB LT	AM	9.8	A	9.8	A	0.0	No
I-8 WB Ramp (U)	WB LT	PM	9.8	A	10.2	B	0.4	No
8) Forrester Road at	EB LT	AM	10.8	B	10.9	B	0.1	No
I-8 EB Ramp (U)	EB LT	PM	16.9	C	20.0	C	3.1	No
9) Derrick Road at	SB LTR	AM	8.7	A	11.0	B	2.3	No
Diehl Road (U)	SB LTR	PM	8.7	A	10.9	B	2.2	No
10) Westside Road at	NB LR	AM	9.1	A	9.1	A	0.0	No
Evan Hewes Hwy (U)	NB LR	PM	9.2	A	9.5	A	0.3	No
11) Derrick Road at	NB LR	AM	8.8	A	8.8	A	0.0	No
Evan Hewes Hwy (U)	NB LR	PM	9.3	A	9.4	A	0.1	No

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds.
3) LOS: Level of Service. 4) Delta is the increase in delay from project. 5) Significant Impact? (yes or no).

Figure 12: Existing (Year 2011) + Project Volumes

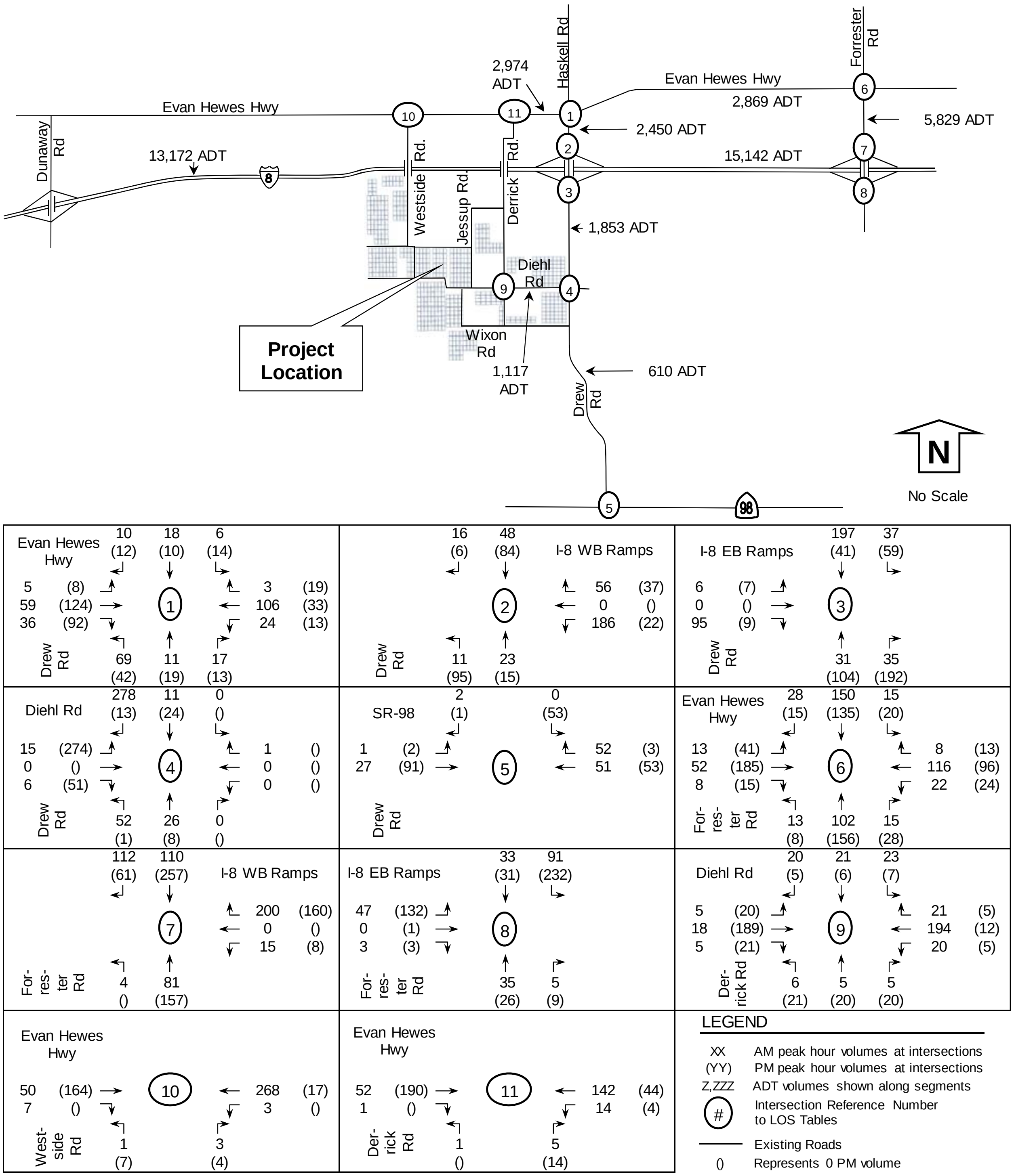


TABLE 12: EXISTING (YEAR 2011) + PROJECT SEGMENT LOS

Segment	Classification (as built)	Existing Daily Volume	Existing LOS C Capacity	Existing V/C	Existing LOS	Project Daily Volume	Existing + Project Daily Volume	Existing + Project LOS C Capacity	Existing + Project V/C	Existing + Project LOS	Change in V/C	Direct Impact?
Diehl Road												
Derrick Road to Drew Road	Minor Collector (2U)	199	7,100	0.028	A	918	1,117	7,100	0.157	A	0.129	No
Drew Road												
Evan Hewes Highway to I-8	Prime Arterial (2U)	2,443	7,100	0.344	B	7	2,450	7,100	0.345	B	0.001	No
I-8 to Diehl Road	Prime Arterial (2U)	1,033	7,100	0.145	A	820	1,853	7,100	0.261	A	0.115	No
Diehl Road to SR-98	Prime Arterial (2U)	512	7,100	0.072	A	98	610	7,100	0.086	A	0.014	No
Evan Hewes Highway												
Derrick Road to Drew Road	Prime Arterial (2U)	2,954	7,100	0.416	B	20	2,974	7,100	0.419	B	0.003	No
Drew Road to Forrester Road	Prime Arterial (2U)	2,843	7,100	0.400	B	26	2,869	7,100	0.404	B	0.004	No
Forrester Road												
Evan Hewes Highway to I-8	Prime Arterial (2U)	5,551	7,100	0.782	C	278	5,829	7,100	0.821	C	0.039	No

Notes: Classification based on 1/29/08 CIrculation and Scenic Highways Element. 2U= 2 lane undivided roadway.Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Direct Impact? = identifies if a project impact is calculated (yes or no).

TABLE 13: EXISTING (YEAR 2011) + PROJECT FREEWAY LOS

Freeway Segment	I-8 Dunaway Rd to Drew Rd				I-8 Drew Rd to Forrester Rd			
Year 2011 (Forecasted from 2010)								
ADT	12,900				14,600			
Peak Hour	A M		P M		A M		P M	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity (1)	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor (2)	0.1076	0.0963	0.0917	0.1517	0.1076	0.0963	0.0917	0.1517
D Factor (3)	0.2616	0.7384	0.4419	0.5581	0.2616	0.7384	0.4419	0.5581
Truck Factor (4)	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	434	1,095	624	1,304	491	1,239	706	1,476
Volume to Capacity	0.092	0.233	0.133	0.277	0.104	0.264	0.150	0.314
LOS	A	A	A	A	A	A	A	B
Project Pk Hr Vol	95	4	4	95	8	174	174	8
Existing (2011) + Project								
Peak Hour Volume	529	1,099	628	1,399	499	1,413	880	1,484
Volume to Capacity	0.112	0.234	0.134	0.298	0.106	0.301	0.187	0.316
LOS	A	A	A	A	A	B	A	B
Increase in V/C	0.020	0.001	0.001	0.020	0.002	0.037	0.037	0.002
Impact?	None	None	None	None	None	None	None	None

Notes: (1) Capacity of 2,350 passenger cars per hour per lane (pcphpl) from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002. (2) Latest K factor (percentage of the AADT in both directions during the peak hour) from Caltrans (based on 2007 report). (3) Latest D factor (percentage of traffic in the peak direction during the peak hour) from Caltrans (based on 2007 report), which when multiplied by K and ADT will provide peak hour volume. (4) Latest truck factor from Caltrans (based on 2007 report).

Under existing year 2011 + project conditions, the study intersections and roadways were calculated to operate at LOS C or better. No direct project impacts were calculated with the addition of project traffic on top of existing traffic.

6.0 Year 2013 Conditions

This section documents year 2013 conditions when the project is anticipated to be at the peak month of construction activities. The year 2013 background volumes are based on increasing the existing year 2011 volumes by an annual growth rate. Determination of the annual growth rate was based on guidelines defined in the County of Imperial Department of Public Works *Traffic Study and Report Policy* dated March 12, 2007, revised June 29, 2007 and approved by the Board of Supervisors of the County of Imperial on August 7, 2007. This document indicates that traffic projections should be based on demonstrated growth as detailed in the general plan. Four growth rate options were reviewed:

1) The Land Use Element of the general plan indicates that the Population Research Unit of the California Department of Finance (DOF) estimates the annual change in population. Using the DOF revised July 1, 2006 population estimate of 168,979 and the projected population of Imperial County in 2030 of 283,693, an annual growth rate of 2.2 percent is calculated.
2) The Housing Element section of the general plan has a 1980 population of 92,500. The 2000 Southern California Association of Governments [SCAG] population estimate of 148,980 for the year 2000. Based on this information, an annual growth rate of 2.4 percent is calculated.
3) The Southern California Association of Governments Community Development Division's 2004 *Regional Transportation Plan Socio-Economic Forecast Report*, dated June 2004, states that the population of Imperial County is projected to grow at an annual rate of 2.8 percent.
4) The U.S. Census Bureau population data from year 2000 to year 2010 for the local cities/residential communities within Imperial County as outlined previously in Table 9. The U.S. Census Bureau reported a population growth of 27,162 people over a 10 year period (population of 109,588 per the 2000 census and population of 136,750 per the 2010 census). Over this 10 year period, the annual growth rate was about 2.0%.

For the purpose of this traffic study, the more conservative growth rate of **2.8 percent** was selected for the annual population growth rate. The growth factor support data are included in **Appendix L**. Year 2013 volumes data was factored up from year 2011 data through the application of a 2.8% annual growth rate.

The construction peak background year 2013 volumes were calculated by increasing year 2011 volumes by 2.8% annually as shown in **Figure 13**. Intersection, segment, and freeway LOS are shown in **Tables 14, 15 and 16**. Intersection LOS calculations are included in **Appendix M**.

Figure 13: Year 2013 Volumes

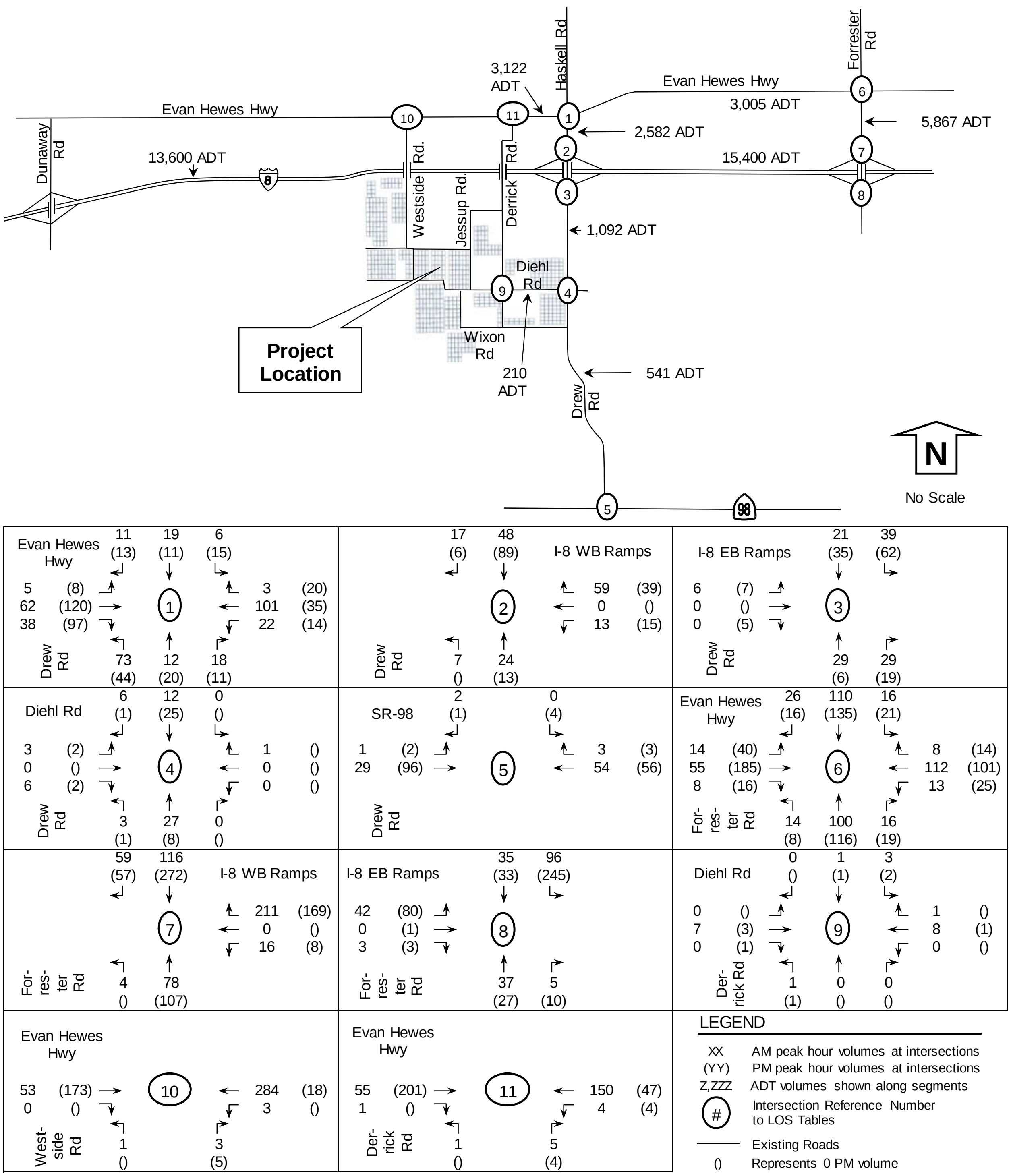


TABLE 14: YEAR 2013 INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	Year 2013 Delay[2]	Year 2013 LOS[3]
1) Drew Road at	All	AM	7.6	A
Evan Hewes Hwy (U)	All	PM	7.6	A
2) Drew Road at	WB LT	AM	8.7	A
I-8 WB Ramp (U)	WB LT	PM	8.7	A
3) Drew Road at	EB LT	AM	10.1	B
I-8 EB Ramp (U)	EB LT	PM	9.3	A
4) Drew Road at	EB LTR	AM	8.6	A
Diehl Road (U)	EB LTR	PM	8.6	A
5) Drew Road at	SB LR	AM	8.6	A
SR-98 (U)	SB LR	PM	9.3	A
6) Forrester Road at	All	AM	17.7	B
Evan Hewes Hwy (S)	All	PM	23.8	C
7) Forrester Road at	WB LT	AM	9.9	A
I-8 WB Ramp (U)	WB LT	PM	9.9	A
8) Forrester Road at	EB LT	AM	11.0	B
I-8 EB Ramp (U)	EB LT	PM	18.0	C
9) Derrick Road at	SB LTR	AM	8.7	A
Diehl Road (U)	SB LTR	PM	8.7	A
10) Westside Road at	NB LR	AM	9.1	A
Evan Hewes Hwy (U)	NB LR	PM	9.2	A
11) Derrick Road at	NB LR	AM	8.8	A
Evan Hewes Hwy (U)	NB LR	PM	9.4	A

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds.
3) LOS: Level of Service

TABLE 15: YEAR 2013 SEGMENT LOS

Segment	Classification (as built)	Year 2013 Daily Volume	# of lanes	LOS C Capacity	V/C	LOS
Diehl Road						
Derrick Road to Drew Road	Minor Collector (2U)	210	2	7,100	0.03	A
Drew Road						
Evan Hewes Highway to I-8	Prime Arterial (2U)	2,582	2	7,100	0.36	B
I-8 to Diehl Road	Prime Arterial (2U)	1,092	2	7,100	0.15	A
Diehl Road to SR-98	Prime Arterial (2U)	541	2	7,100	0.08	A
Evan Hewes Highway						
Derrick Road to Drew Road	Prime Arterial (2U)	3,122	2	7,100	0.44	B
Drew Road to Forrester Road	Prime Arterial (2U)	3,005	2	7,100	0.42	B
Forrester Road						
Evan Hewes Highway to I-8	Prime Arterial (2U)	5,867	2	7,100	0.83	C

Notes: Classification based on 1/29/08 CIrculation and Scenic Highways Element. 2U= 2 lane undivided roadway.Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio.

TABLE 16: YEAR 2013 FREEWAY LOS

Freeway	I-8				I-8			
Segment	Dunaway Rd to Drew Rd				Drew Rd to Forrester Rd			
Year 2013 (Forecasted from 2010)								
ADT	13,600				15,400			
Peak Hour	A M		P M		A M		P M	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity (1)	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor (2)	0.1076	0.0963	0.0917	0.1517	0.1076	0.0963	0.0917	0.1517
D Factor (3)	0.2616	0.7384	0.4419	0.5581	0.2616	0.7384	0.4419	0.5581
Truck Factor (4)	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	457	1,155	658	1,375	518	1,307	745	1,557
Volume to Capacity	0.097	0.246	0.140	0.292	0.110	0.278	0.159	0.331
LOS	A	A	A	A	A	A	A	B

Notes: (1) Capacity of 2,350 passenger cars per hour per lane (pcphpl) from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002. (2) Latest K factor (percentage of the AADT in both directions during the peak hour) from Caltrans (based on 2007 report). (3) Latest D factor (percentage of traffic in the peak direction during the peak hour) from Caltrans (based on 2007 report), which when multiplied by K and ADT will provide peak hour volume. (4) Latest truck factor from Caltrans (based on 2007 report).

Under year 2013 conditions, the study intersections and roadways were calculated to operate at LOS C or better.

7.0 Year 2013 + Project Conditions

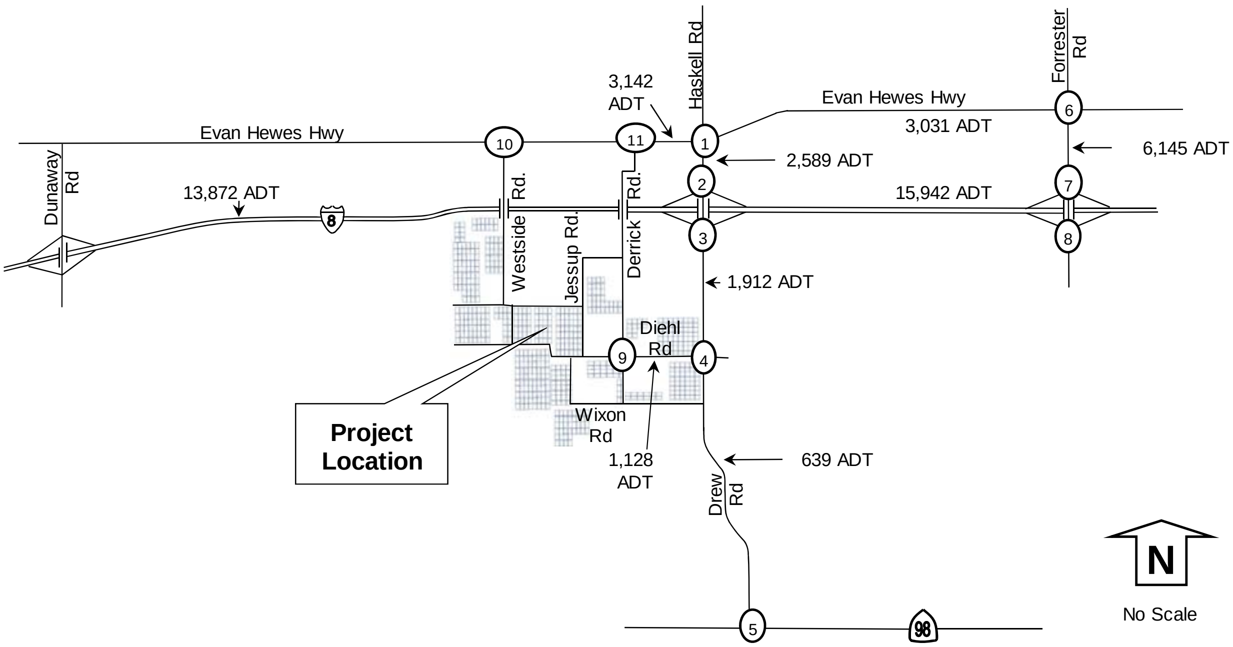
This section documents the addition of construction traffic onto year 2013 conditions for the anticipated construction peak (month 7). Year 2013 plus project traffic volumes are shown in **Figure 14**. Intersection, segment, and freeway LOS are shown in **Tables 17, 18 and 19**. Intersection LOS calculations are included in **Appendix N**.

TABLE 17: YEAR 2013 WITHOUT AND WITH PROJECT INTERSECTION LOS

Intersection &	Movement	Peak	Year 2013		Year 2013 + Project			
(Control)[1]		Hour	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Sig[5]
1) Drew Road at	All	AM	7.6	A	7.7	A	0.1	No
Evan Hewes Hwy (U)	All	PM	7.6	A	7.6	A	0.0	No
2) Drew Road at	WB LT	AM	8.7	A	10.1	B	1.4	No
I-8 WB Ramp (U)	WB LT	PM	8.7	A	9.6	A	0.9	No
3) Drew Road at	EB LT	AM	10.1	B	10.1	B	0.0	No
I-8 EB Ramp (U)	EB LT	PM	9.3	A	10.0	A	0.7	No
4) Drew Road at	EB LTR	AM	8.6	A	10.5	B	1.9	No
Diehl Road (U)	EB LTR	PM	8.6	A	10.8	B	2.2	No
5) Drew Road at	SB LR	AM	8.6	A	8.7	A	0.1	No
SR-98 (U)	SB LR	PM	9.3	A	9.7	A	0.4	No
6) Forrester Road at	All	AM	17.7	B	17.9	B	0.2	No
Evan Hewes Hwy (S)	All	PM	23.8	C	23.9	C	0.1	No
7) Forrester Road at	WB LT	AM	9.9	A	9.9	A	0.0	No
I-8 WB Ramp (U)	WB LT	PM	9.9	A	10.4	B	0.5	No
8) Forrester Road at	EB LT	AM	11.0	B	11.1	B	0.1	No
I-8 EB Ramp (U)	EB LT	PM	18.0	C	21.8	C	3.8	No
9) Derrick Road at	SB LTR	AM	8.7	A	11.0	B	2.3	No
Diehl Road (U)	SB LTR	PM	8.7	A	10.9	B	2.2	No
10) Westside Road at	NB LR	AM	9.1	A	9.2	A	0.1	No
Evan Hewes Hwy (U)	NB LR	PM	9.2	A	9.5	A	0.3	No
11) Derrick Road at	NB LR	AM	8.8	A	8.8	A	0.0	No
Evan Hewes Hwy (U)	NB LR	PM	9.4	A	9.5	A	0.1	No

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds.
3) LOS: Level of Service. 4) Delta is the increase in delay from project. 5) Significant Impact? (yes or no).

Figure 14: Year 2013 + Project Volumes



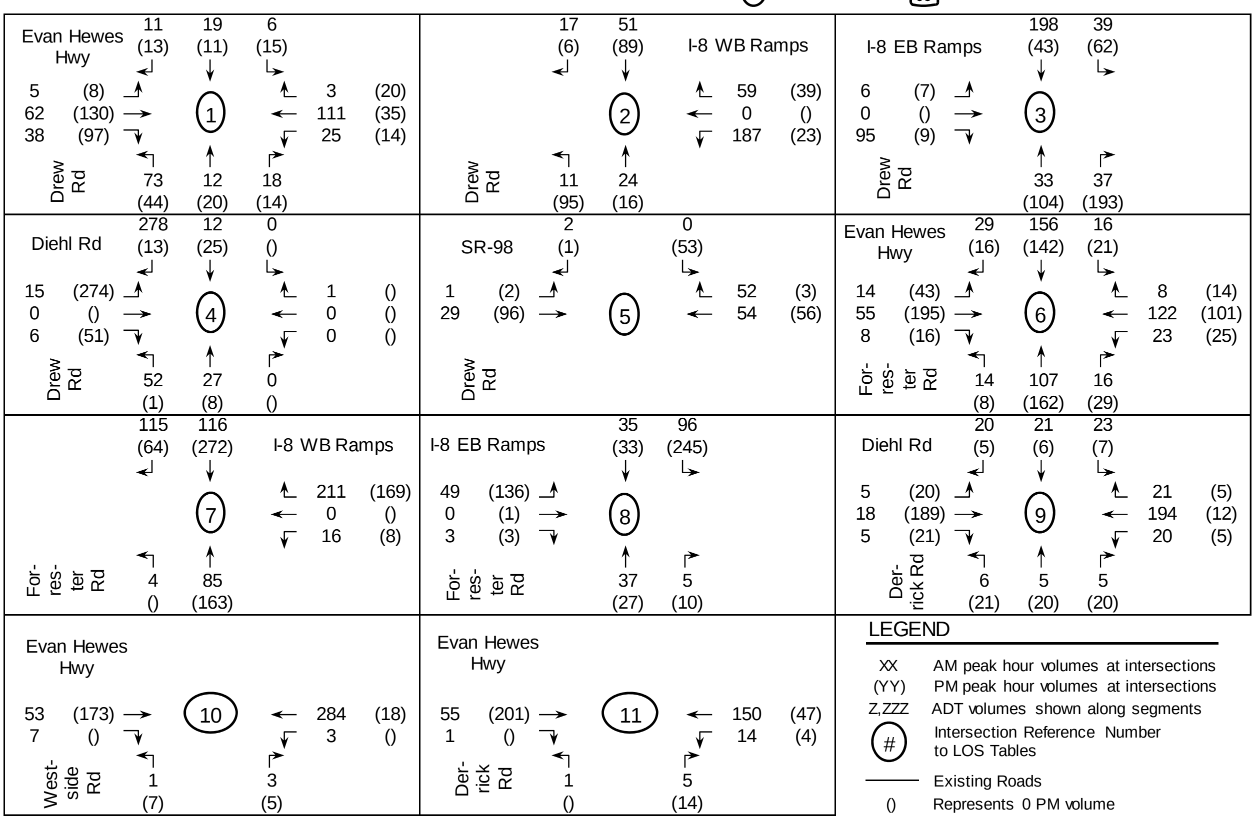


TABLE 18: YEAR 2013 WITHOUT AND WITH PROJECT SEGMENT LOS

Segment	Classification (as built)	Year 2013 Daily Volume	Year 2013 LOS C Capacity	Year 2013 V/C	Year 2013 LOS	Project Daily Volume	Year 2013 + Project Daily Volume	Year 2013 + Project LOS C Capacity	Year 2013 + Project V/C	Year 2013 + Project LOS	Change in V/C	Direct Impact?
Diehl Road												
Derrick Road to Drew Road	Minor Collector (2U)	210	7,100	0.030	A	918	1,128	7,100	0.159	A	0.129	No
Drew Road												
Evan Hewes Highway to I-8	Prime Arterial (2U)	2,582	7,100	0.364	B	7	2,589	7,100	0.365	B	0.001	No
I-8 to Diehl Road	Prime Arterial (2U)	1,092	7,100	0.154	A	820	1,912	7,100	0.269	B	0.115	No
Diehl Road to SR-98	Prime Arterial (2U)	541	7,100	0.076	A	98	639	7,100	0.090	A	0.014	No
Evan Hewes Highway												
Derrick Road to Drew Road	Prime Arterial (2U)	3,122	7,100	0.440	B	20	3,142	7,100	0.443	B	0.003	No
Drew Road to Forrester Road	Prime Arterial (2U)	3,005	7,100	0.423	B	26	3,031	7,100	0.427	B	0.004	No
Forrester Road												
Evan Hewes Highway to I-8	Prime Arterial (2U)	5,867	7,100	0.826	C	278	6,145	7,100	0.866	C	0.039	No

Notes: Classification based on 1/29/08 CIrculation and Scenic Highways Element. 2U= 2 lane undivided roadway.Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Direct Impact? = identifies if a project impact is calculated (yes or no).

TABLE 19: YEAR 2013 WITHOUT AND WITH PROJECT FREEWAY LOS

Freeway Segment	I-8 Dunaway Rd to Drew Rd				I-8 Drew Rd to Forrester Rd			
Year 2013 (Forecasted from 2010)								
ADT	13,600				15,400			
Peak Hour	A M		P M		A M		P M	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity (1)	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor (2)	0.1076	0.0963	0.0917	0.1517	0.1076	0.0963	0.0917	0.1517
D Factor (3)	0.2616	0.7384	0.4419	0.5581	0.2616	0.7384	0.4419	0.5581
Truck Factor (4)	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	457	1,155	658	1,375	518	1,307	745	1,557
Volume to Capacity	0.097	0.246	0.140	0.292	0.110	0.278	0.159	0.331
LOS	A	A	A	A	A	A	A	B
Project Pk Hr Vol	95	4	4	95	8	174	174	8
Year 2013 + Project								
Peak Hour Volume	552	1,159	662	1,470	526	1,481	919	1,565
Volume to Capacity	0.117	0.247	0.141	0.313	0.112	0.315	0.196	0.333
LOS	A	A	A	B	A	B	A	B
Increase in V/C	0.020	0.001	0.001	0.020	0.002	0.037	0.037	0.002
Impact?	None	None	None	None	None	None	None	None

Notes: (1) Capacity of 2,350 passenger cars per hour per lane (pcphpl) from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002. (2) Latest K factor (percentage of the AADT in both directions during the peak hour) from Caltrans (based on 2007 report). (3) Latest D factor (percentage of traffic in the peak direction during the peak hour) from Caltrans (based on 2007 report), which when multiplied by K and ADT will provide peak hour volume. (4) Latest truck factor from Caltrans (based on 2007 report).

Under year 2013 + project conditions, the study intersections and roadways were calculated to operate at LOS C or better. No impacts were calculated.

8.0 Cumulative Projects (New Development)

Information on cumulative projects (new development) was obtained from the County of Imperial and confirmed with County of Imperial planning staff to be current as of November 2011. The cumulative list also includes projects within the jurisdiction of the Bureau of Land Management (BLM). Most of the cumulative projects have completed technical studies including traffic generation information; however, several do not because they are in their initial stages. For the projects that do not have detailed traffic generation information, an estimate was calculated based on traffic generation information for similar projects. Traffic generation calculations and copies of the individual cumulative project descriptions, locations, traffic generation, and assignments are included in **Appendix O**. The combined Imperial County and BLM cumulative projects (new development) are included below:

1) *"S" Line Upgrade 230-kV Transmission Line Project* – a power line project of approximately 18 miles extending from approximately 10 miles southwest of the City of El Centro near Libert Road and Wixom Road along I-8 and SR-86. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction.

2) *Imperial Valley Solar Project (Formerly SES Solar Two)* – an electric generating facility capable of producing approximately 750 megawatts of electricity on approximately 6,500 acres generally located west of Dunaway Road and north of I-8. The construction phase of the project is calculated to generate 1,736 ADT with 772 AM peak hour trips and 772 PM peak hour trips.

3) *Sunrise 500-kV Line IV West Solar Farm Interconnection to Imperial Valley Substation* – a power line project extending from Imperial Valley to Penasquitos in the City of San Diego. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction.

4) *SDG&E Photovoltaic Solar Field* – a photovoltaic solar facility capable of producing approximately 14 megawatts of electricity on approximately 100 acres located adjacent to the SDG&E Imperial Valley Substation. The construction phase of the project is calculated to generate approximately 40 ADT with 15 AM peak hour trips and 15 PM peak hour trips.

5) *SDG&E Geotechnical Investigation* – an exploratory analysis to determine the quality and compaction of the soil around the SDG&E Imperial Valley substation. Limited construction traffic is anticipated to last no longer than one week in September 2011; therefore, this specific cumulative traffic was not added to the cumulative aggregate. This project is listed to be consistent with the list of projects identified when the cumulative list was confirmed with County of Imperial planning staff to be current as of November 2011.

6) *North Gila to Imperial Valley #2* - a power line project of approximately 75 miles extending from the SDG&E Imperial Valley substation to Yuma County, Arizona. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction.

7) *Dixieland Connection to Imperial Irrigation District Transmission System* – a power line project connecting the Imperial Irrigation District's "S" line from the Imperial Irrigation District substation to the Imperial Valley substation. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction.

8) *Solar Reserve Imperial Valley* – a 100 megawatt solar power tower generally located approximately 35 miles east of the Imperial Valley substation. The construction phase of the project is calculated to generate approximately 283 ADT with 110 AM peak hour trips and 112 PM peak hour trips.

9) *Linda Vista* – A mixed use project of 182 single family homes and a 6 acre commercial lot generally located on the west side of Clark Road between I-8 and McCabe Road. The traffic generation for this cumulative project is calculated at 7,175 ADT with 252 AM and 676 PM peak hour trips.

10) *County Center II Expansion* – a mixed use project of a commercial center, expansion of the Imperial County Office of Education, a Joint-Use Teacher Training and Conference Center, Judicial Center, County Park, Jail expansion, County Administrative Complex, Public Works Administration, and a County Administrative Complex located on the southwest corner of McCabe Road and Clark Road. The total project is calculated to generate 24,069 ADT with 2,581 AM peak hour trips and 2,242 PM peak hour trips.

11) *Imperial Solar Energy Center West* – a photovoltaic solar facility capable of producing approximately 250 megawatts of electricity on approximately 1,130 acres generally located east of Dunaway Road and located both north and south of I-8. The construction phase of the project is calculated to generate 750 ADT with 306 AM peak hour trips and 315 PM peak hour trips.

12) *Imperial Solar Energy Center South* – a photovoltaic solar facility capable of producing approximately 200 megawatts of electricity on approximately 950 acres generally located south of SR-98 and east of Drew Road. The construction phase of the project is calculated to generate 680 ADT with 271 AM peak hour trips and 280 PM peak hour trips.

13) *Mount Signal Solar Farm I* – a photovoltaic solar facility capable of producing approximately 200 megawatts of electricity on approximately 1,375 acres generally located south of SR-98 between Pulliam Road and Ferrell Road. The construction phase of the project is calculated to generate 522 ADT with 162 AM peak hour trips and 162 PM peak hour trips.

14) *Centinela* - a photovoltaic solar facility capable of producing approximately 275 megawatts of electricity generally located in the vicinity of SR-98 and Drew Road. The construction phase is calculated to generate 1,260 daily trips with 414 AM peak hour trips and 414 PM peak hour trips.

15) *Mayflower Solar Farm Project* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 482 acres generally located 5.5 miles southeast of the town of Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

16) *Arkansas* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 481 acres generally located 2.5 miles east of the town of

Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

17) *Sonora* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 488 acres generally located 4.5 miles northeast of the town of Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

18) *Alhambra* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 482 acres generally located 3.5 miles south of the town of Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

19) *Acorn Greenworks* - a photovoltaic solar facility capable of producing approximately 150 megawatts of electricity on approximately 693 acres generally located 10 miles southwest of the City of El Centro. The construction phase is calculated to generate 425 daily trips with 166 AM peak hour trips and 169 PM peak hour trips.

20) *Calexico I-A* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 666 acres generally located 6 miles west of the City of Calexico. The construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

21) *Calexico I-B* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 666 acres generally located 6 miles west of the City of Calexico. The construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

22) *Calexico II-A* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 733 acres generally located 6 miles west of the City of Calexico. The construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

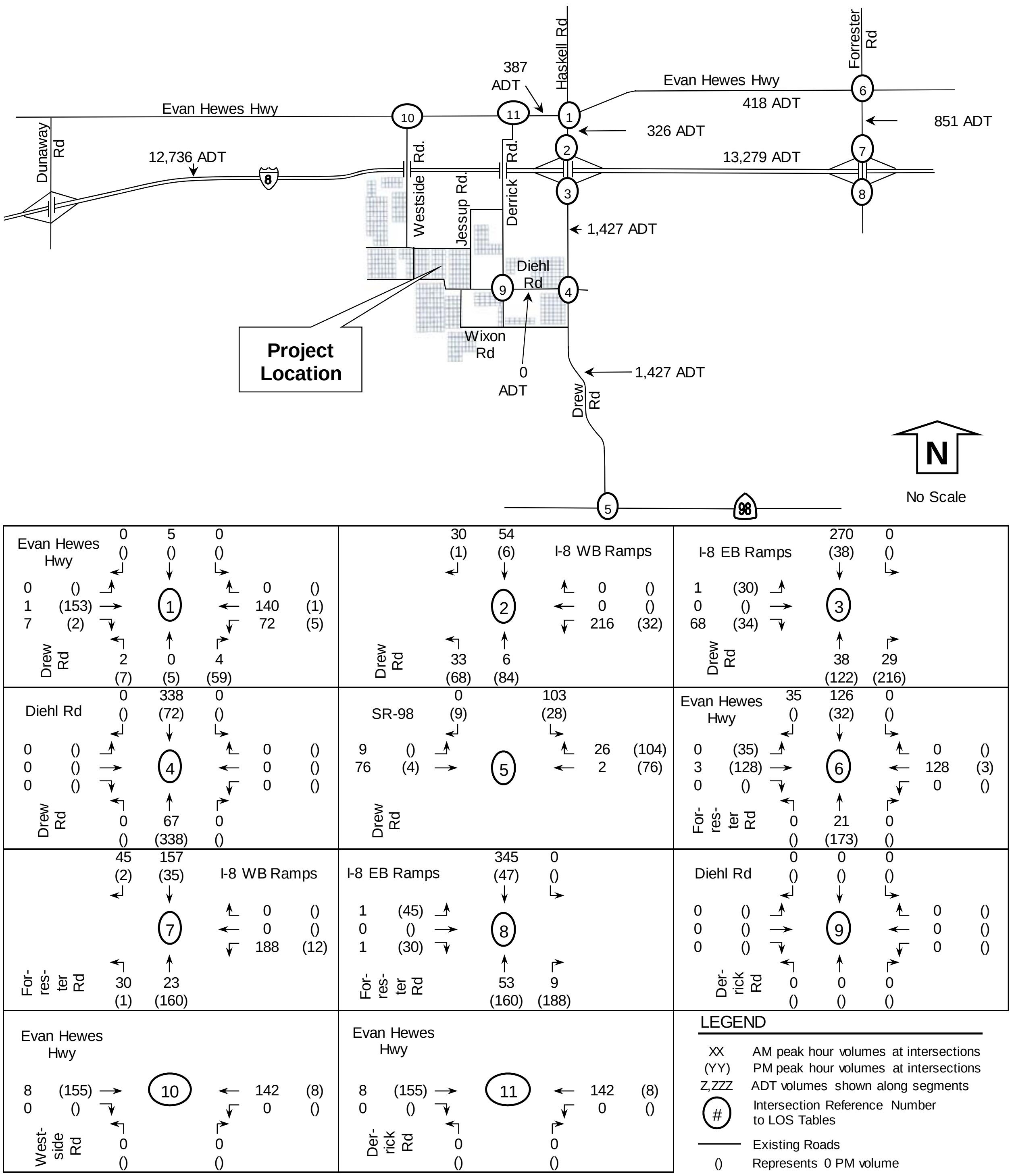
23) *Calexico II-B* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 732 acres generally located 6 miles west of the City of Calexico. The construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

24) *Silverleaf Solar Energy* – a photovoltaic solar facility capable of producing approximately 160 megawatts of electricity generally located west of Drew Road and south of I-8 (adjacent to the proposed Campo Verde project). According to the County of Imperial staff, the Silverleaf project is estimated to start construction approximately one year after the proposed Campo Verde project. This means the Silverleaf peak construction will occur in 2014, which is one year after the proposed Campo Verde construction peak of early 2013. Since the construction peaks do not coincide, the Silverleaf project is noted as a cumulative project, but the Silverleaf construction peak traffic is not added to the cumulative peak construction traffic volumes.

All of the cumulative projects listed above (with the exception of Silverleaf as noted above) were assumed to be generating construction traffic during the construction phase of the Campo Verde project while in reality some of the cumulative projects are only now initiating the environmental review process (i.e. Silverleaf) and thus may start to add construction traffic after the completion of the Campo Verde project. Furthermore, most if not all of the cumulative solar projects will have a peak construction period that may or may not coincide with the Campo Verde peak construction period; however, again being conservative all of the peak cumulative construction volumes were used in the cumulative analysis even though there is a good chance that all construction peaks will not coincide.

The cumulative project (new development) volumes are shown in **Figure 15**.

Figure 15: Cumulative Project (New Development) Volumes



9.0 Year 2013 + Project + Cumulative

This scenario documents the anticipated project construction traffic added onto year 2013 volumes. Year 2013 plus project volumes are shown in **Figure 16**. Intersection, segment, and freeway LOS are shown in **Tables 20, 21 and 22**. Intersection LOS calculations are included in **Appendix P**.

TABLE 20: YEAR 2013 + PROJECT + CUMULATIVE INTERSECTION LOS

Intersection &	Movement	Peak	Year 2013		Year 2013 + Project			Year 2013 + Project + Cumulative		
(Control)[1]		Hour	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Delay[2]	LOS[3]	Impact Type[5]
1) Drew Road at	All	AM	7.6	A	7.7	A	0.1	8.9	A	None
Evan Hewes Hwy (U)	All	PM	7.6	A	7.6	A	0.0	8.9	A	None
2) Drew Road at	WB LT	AM	8.7	A	10.1	B	1.4	19.3	C	None
I-8 WB Ramp (U)	WB LT	PM	8.7	A	9.6	A	0.9	13.0	B	None
3) Drew Road at	EB LT	AM	10.1	B	10.1	B	0.0	14.3	B	None
I-8 EB Ramp (U)	EB LT	PM	9.3	A	10.0	A	0.7	12.7	B	None
4) Drew Road at	EB LTR	AM	8.6	A	10.5	B	1.9	15.8	C	None
Diehl Road (U)	EB LTR	PM	8.6	A	10.8	B	2.2	24.6	C	None
5) Drew Road at	SB LR	AM	8.6	A	8.7	A	0.1	10.7	B	None
SR-98 (U)	SB LR	PM	9.3	A	9.7	A	0.4	11.1	B	None
6) Forrester Road at	All	AM	17.7	B	17.9	B	0.2	27.3	C	None
Evan Hewes Hwy (S)	All	PM	23.8	C	23.9	C	0.1	37.1	D	None
7) Forrester Road at	WB LT	AM	9.9	A	9.9	A	0.0	15.0	B	None
I-8 WB Ramp (U)	WB LT	PM	9.9	A	10.4	B	0.5	12.5	B	None
8) Forrester Road at	EB LT	AM	11.0	B	11.1	B	0.1	17.9	C	None
I-8 EB Ramp (U)	EB LT	PM	18.0	C	21.8	C	3.8	104.7	F	Cumulative
9) Derrick Road at	SB LTR	AM	8.7	A	11.0	B	2.3	11.0	B	None
Diehl Road (U)	SB LTR	PM	8.7	A	10.9	B	2.2	10.9	B	None
10) Westside Road at	NB LR	AM	9.1	A	9.2	A	0.1	9.5	A	None
Evan Hewes Hwy (U)	NB LR	PM	9.2	A	9.5	A	0.3	10.7	B	None
11) Derrick Road at	NB LR	AM	8.8	A	8.8	A	0.0	9.1	A	None
Evan Hewes Hwy (U)	NB LR	PM	9.4	A	9.5	A	0.1	10.6	B	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds.
3) LOS: Level of Service. 4) Delta is the increase in delay from project. 5) Impact type (none, direct, or cumulative).

TABLE 21: YEAR 2013 + PROJECT + CUMULATIVE SEGMENT LOS

Segment	Classification (as built)	LOS C Capacity	Year 2013			Year 2013 + Project			Cumulative	Year 2013 + Proj. + Cumulative			
			Daily Volume	V/C	LOS	Daily Volume	V/C	LOS	Daily Volumes	Daily Volume	V/C	LOS	Impact Type
Diehl Road													
Derrick Road to Drew Road	Minor Collector (2U)	7,100	210	0.030	A	1,128	0.159	A	0	1,128	0.159	A	None
Drew Road													
Evan Hewes Highway to I-8	Prime Arterial (2U)	7,100	2,582	0.364	B	2,589	0.365	B	326	2,915	0.411	B	None
I-8 to Diehl Road	Prime Arterial (2U)	7,100	1,092	0.154	A	1,912	0.269	B	1427	3,339	0.470	B	None
Diehl Road to SR-98	Prime Arterial (2U)	7,100	541	0.076	A	639	0.090	A	1427	2,066	0.291	B	None
Evan Hewes Highway													
Derrick Road to Drew Road	Prime Arterial (2U)	7,100	3,122	0.440	B	3,142	0.443	B	387	3,529	0.497	B	None
Drew Road to Forrester Road	Prime Arterial (2U)	7,100	3,005	0.423	B	3,031	0.427	B	418	3,449	0.486	B	None
Forrester Road													
Evan Hewes Highway to I-8	Prime Arterial (2U)	7,100	5,867	0.826	C	6,145	0.866	C	851	6,996	0.985	C	None

Notes: Classification based on 1/29/08 CIrculation and Scenic Highways Element. 2U= 2 lane undivided roadway.Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact Type (none, cumulative, or direct).

Figure 16: Year 2013 + Project + Cumulative Volumes

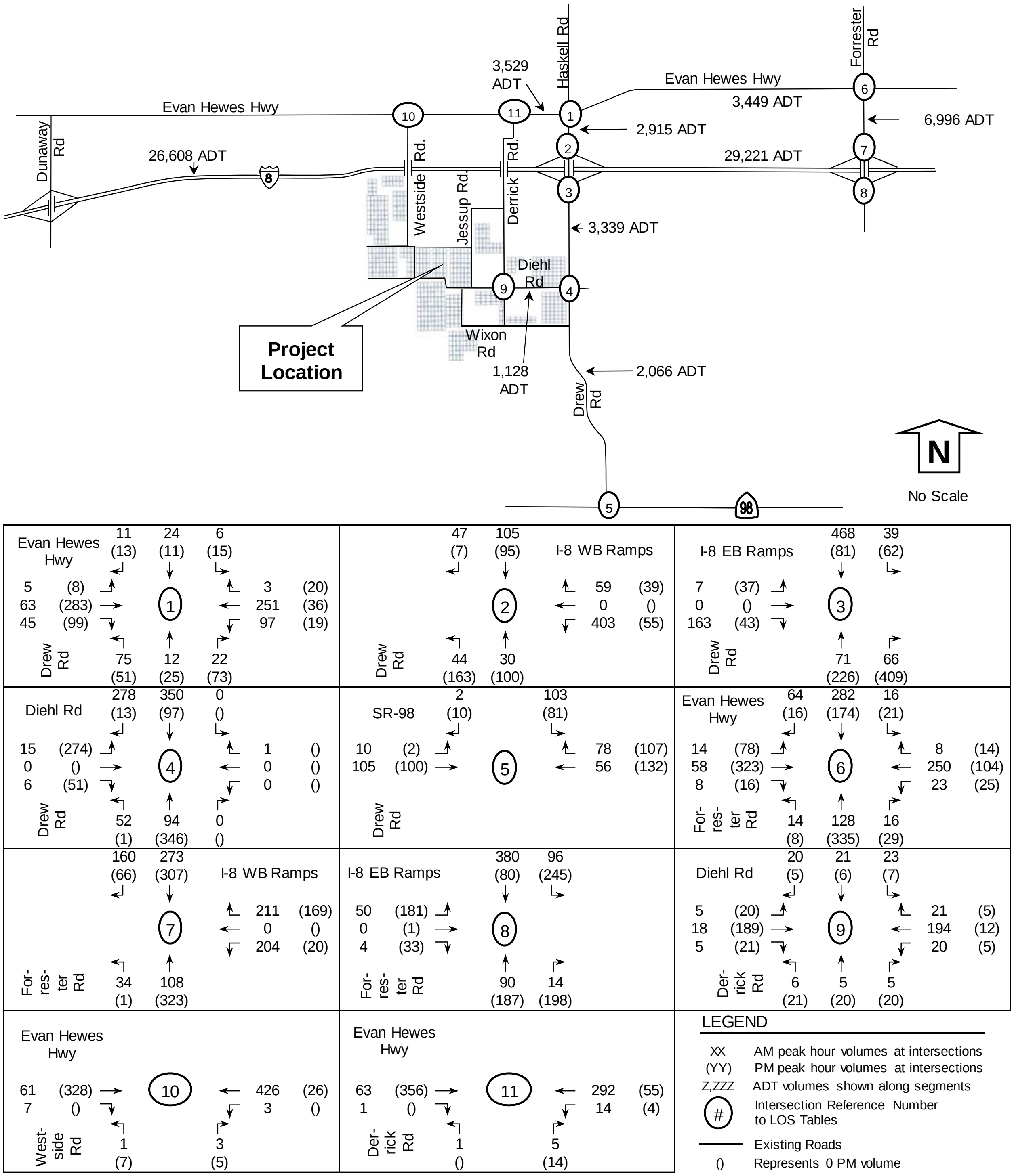


TABLE 22: YEAR 2013 + PROJECT + CUMULATIVE FREEWAY LOS

Freeway Segment	I-8 Dunaway Rd to Drew Rd				I-8 Drew Rd to Forrester Rd			
Year 2013 (Forecasted from 2010)								
ADT	13,600				15,400			
Peak Hour	A M		P M		A M		P M	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity (1)	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor (2)	0.1076	0.0963	0.0917	0.1517	0.1076	0.0963	0.0917	0.1517
D Factor (3)	0.2616	0.7384	0.4419	0.5581	0.2616	0.7384	0.4419	0.5581
Truck Factor (4)	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	457	1,155	658	1,375	518	1,307	745	1,557
Volume to Capacity	0.097	0.246	0.140	0.292	0.110	0.278	0.159	0.331
LOS	A	A	A	A	A	A	A	B
Project Pk Hr Vol	95	4	4	95	8	174	174	8
Year 2013 + Project								
Peak Hour Volume	552	1,159	662	1,470	526	1,481	919	1,565
Volume to Capacity	0.117	0.247	0.141	0.313	0.112	0.315	0.196	0.333
LOS	A	A	A	B	A	B	A	B
Increase in V/C	0.020	0.001	0.001	0.020	0.002	0.037	0.037	0.002
Impact?	None	None	None	None	None	None	None	None
Cumulative Pk Hr Vol	231	804	828	238	191	957	980	201
Year 2013 + Cumulative + Project								
Peak Hour Volume	783	1,963	1,490	1,708	717	2,438	1,899	1,766
Volume to Capacity	0.167	0.418	0.317	0.363	0.152	0.519	0.404	0.376
LOS	A	B	B	B	A	C	B	B
Increase in V/C	0.020	0.001	0.001	0.020	0.002	0.037	0.037	0.002
Impact?	None	None	None	None	None	None	None	None

Notes: (1) Capacity of 2,350 passenger cars per hour per lane (pcphpl) from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002. (2) Latest K factor (percentage of the AADT in both directions during the peak hour) from Caltrans (based on 2007 report). (3) Latest D factor (percentage of traffic in the peak direction during the peak hour) from Caltrans (based on 2007 report), which when multiplied by K and ADT will provide peak hour volume. (4) Latest truck factor from Caltrans (based on 2007 report). Impact? = Direct, Cumulative, or None.

Under year 2013 + project + cumulative conditions, the study roadways were calculated to operate at LOS C or better, except for the:

1) Intersection of Forrester Road at Evan Hewes Hwy (LOS D PM), and
2) Intersection of Forrester Road at I-8 EB Ramp (LOS F PM).

Based on the County of Imperial significance criteria, the project is calculated to have a potential cumulative impact at the intersection of Forrester Road and I-8 EB Ramp. This potential cumulative impact may not materialize if the other cumulative projects do not occur within the same timeframe. If all identified cumulative projects occur concurrently, the identified cumulative impact would be mitigated to an insignificant level by the implementation of the fair share contribution toward a mitigation measure identified in Section 12.

10.0 Horizon Year 2050 + Project Conditions

Horizon Year 2050 street segment information was obtained from the *Imperial County Circulation Element Update*, January 2008. An excerpt from the Circulation element is included in Appendix G. The horizon year 2050 + project segment information is shown in **Table 23**.

TABLE 23: HORIZON YEAR 2050 SEGMENT OPERATIONS

Segment	Year 2050 Recommended Classification (# of lanes)	Year 2050 ADT Volume	2050 LOS
Diehl Road			
Derrick Road to Drew Road	Minor Collector (2)	Not Reported	Not Reported
Drew Road			
Evan Hewes Highway to I-8	Prime Arterial (6-divided)	Not Reported	Not Reported
I-8 to Diehl Road	Prime Arterial (6-divided)	Not Reported	Not Reported
Diehl Road to SR-98	Prime Arterial (6-divided)	Not Reported	Not Reported
Evan Hewes Highway			
Derrick Road to Drew Road	Prime Arterial (6-divided)	Not Reported	Not Reported
Drew Road to Forrester Road	Prime Arterial (6-divided)	Not Reported	Not Reported
Forrester Road			
Evan Hewes Highway to I-8	Prime Arterial (6-divided)	Not Reported	Not Reported

Notes: Classification based on 1/29/08 CIrculation and Scenic Highways Element. 2 = 2 lane roadway. Daily volume is a 24 hour volume. LOS: Level of Service.

Under horizon year 2050 + project conditions, segments volumes and LOS were not reported as documented in Appendix G.

11.0 ITE Turn Lane Warrants

The Institute of Transportation Engineers (ITE) turn lane warrants were reviewed for applicability at the intersection of Drew Road at Diehl Road due to the concentration of project traffic. The ITE warrants are silent for application on temporary construction traffic; therefore, traffic from the operational phase was used in the warrant analysis. At the intersection of Drew Road and Diehl Road the ITE southbound right turn lane warrant was NOT satisfied and the ITE northbound left turn lane warrant was NOT satisfied; therefore, the construction of additional lanes are not recommended at this intersection (ITE warrants included in **Appendix Q**).

Due to the temporary nature of the project construction traffic, temporary warning signs identifying construction truck traffic per the Manual on Uniform Traffic Control Devices (MUTCD) may be required by the County.

12.0 Cumulative Impact and Recommended Mitigation

The project is calculated to have one (1) potential cumulative impact at the intersections of Forrester Road and the I-8 EB Ramp. The calculated cumulative impact is from the accumulative of new development traffic. If a majority of the proposed new developments do not materialize, then the cumulatively impacted intersection may continue to operate at acceptable levels of service and would not require mitigation. Normally, the recommended mitigation for cumulative impacts is a fair share contribution based on the Caltrans fair share formula for future intersection improvements. However, it should be noted that:

1) The fair share participation is based on the project's temporary construction traffic that is significantly higher than the project's traffic after completion of construction. At the intersection of Forrester Road/I-8 EB Ramps, the construction traffic fair share responsibility is 6.2% and 0.5% when based on permanent operation employees.

2) The project fair share responsibility should be validated at month 7 and yearly during the entire construction period. If the intersection of Forrester Road/I-8 EB Ramp is calculated to operate at an unacceptable LOS during the validation period, then the applicant shall pay the fair share amount based on project construction traffic. If the intersection of Forrester Road/I-8 EB Ramp is calculated to operate at acceptable LOS, then the applicant should not be required to pay the fair share amount because the intersection would be documented to operate at acceptable LOS.

It is recommended that the applicant enter into an agreement with the County to fulfill the California Environmental Quality Act (CEQA) cumulative mitigation requirement, but not be obligated to pay a fair share should the cumulatively impacted intersection never reach failing conditions during the project's temporary construction period.

The cumulatively impacted intersection with recommended mitigation measure of signalization is calculated to reduce the impact to below a level of significance as shown below in **Table 24**. LOS and fair share calculations are included in **Appendix R**.

TABLE 24: IMPACT SUMMARY AND MITIGATION

Cumualtive Impact Location	Peak Hour	Without Mitigation 2013 + P + C			Recommended Mitigation	WITH Mitigation 2013 + P + C			Fair Share % Construction Traffic	Fair Share % Operations Traffic
		Delay[1]	LOS[2]	Impact[3]		Delay[1]	LOS[2]	Impact[3]		
8) Forrester Rd at I-8 EB Ramp	AM	17.9	C	None	Install	12.1	B	None	6.2%	0.5%
	PM	104.7	F	Cumulative	Traffic Signal	20.2	C	None		

Notes: 1) Delay - HCM Average Control Delay in seconds. 2) LOS: Level of Service. 3) Impact type (None, cumulative, or direct).

13.0 Conclusions and Recommendations

The project is a solar photovoltaic facility on approximately 1,990 acres of private lands that have been used for agriculture. Construction is anticipated to start in the second quarter of 2012 with a construction schedule estimated between 12 and 24 months.

The project trip generation consists of a construction phase and operations phase. The construction phase will have the highest traffic intensity followed by an operations phase with significantly fewer vehicle trips. Therefore, the higher and more conservative construction based trip generation was used to determine potential project impacts. The construction workforce is expected to reach a peak during month number seven anticipated to occur during the 1st quarter of 2013 with a peak of up to 325 daily vehicles for construction workers and 50 daily truck deliveries. The peak construction traffic (during month number 7) is calculated at 950 ADT with 349 AM peak hour trips and 349 PM peak hour trips. During the operations phase after all construction has been completed, less than 10 fulltime personnel are anticipated for operations and maintenance creating about 20 ADT with approximately 10 AM and 10 PM peak hour trips.. During operations, the project will also require up to 10 daily water trucks for panel washing over approximately 15 business days; however, the washing frequency is estimated from one to four times a year. During the washing period, the total project daily traffic may increase to 40 or 50 ADT over a 15 business day period.

Information on cumulative projects (new development) was obtained from the County of Imperial and confirmed by County of Imperial planning staff to be current as of November 2011. The cumulative list also includes projects within the jurisdiction of the BLM. Twenty four cumulative projects were identified that would potentially add traffic to the study area roadways.

Six scenarios were analyzed, that accounted for existing, project construction, cumulative projects, and horizon year conditions. Operational findings by scenario are summarized below:

1) Under existing year 2011 conditions, the study intersections and roadways were calculated to operate at LOS C or better.

2) Under existing year 2011 + project conditions, the study intersections and roadways were calculated to operate at LOS C or better. No direct project impacts were calculated due to the addition of project traffic on top of existing traffic.

3) Under year 2013 conditions, the study intersections and roadways were calculated to operate at LOS C or better.

4) Under year 2013 + project conditions, the study intersections and roadways were calculated to operate at LOS C or better. No direct project impacts were calculated due to the addition of project traffic on top of existing traffic.

5) Under year 2013 + project + cumulative conditions, the study roadways were calculated to operate at LOS C or better, except for:
   a) Intersection of Forrester Road at Evan Hewes Hwy (LOS D PM), and
   b) Intersection of Forrester Road at I-8 EB Ramp (LOS F PM).

   Based on the County of Imperial significance criteria, the project is calculated to have one potential cumulative impact to the intersection of Forrester Road at I-8 EB Ramp. This potential cumulative impact may not materialize if the other cumulative projects do not occur within the same timeframe. If all identified cumulative projects occur concurrently, the identified cumulative impact would be mitigated to an insignificant level by the implementation of a fair share contribution.

6) Under horizon year 2050 + project conditions, segments volumes and LOS were not reported in the *Imperial County Circulation Element Update*, January 2008.

The Campo Verde Solar Project was analyzed for potential traffic impacts. No direct traffic impacts were calculated due to the addition of the project traffic onto the study area roadways and one (1) potential cumulative impact was calculated at the intersection of Forrester Road and the I-8 EB Ramp. The potential cumulative impact is from the accumulative of new development traffic. If a majority of the proposed new developments do not materialize, then the cumulatively impacted intersection may continue to operate at acceptable levels of service and would not require mitigation. Normally, the recommended mitigation for cumulative impacts is a fair share contribution based on the Caltrans fair share formula for future intersection improvements. However, it should be noted that:

1) The fair share participation is based on the project's temporary construction traffic that is significantly higher than the project's traffic after completion of construction. At the intersection of Forrester Road/I-8 EB Ramps, the construction traffic fair share responsibility is 6.2% and 0.5% when based on permanent operation employees.
2) The project fair share responsibility should be validated at month 7 and yearly during the entire construction period. If the intersection of Forrester Road/I-8 EB Ramp is calculated to operate at an unacceptable LOS during the validation period, then the applicant shall pay the fair share amount based on project construction traffic. If the intersection of Forrester Road/I-8 EB Ramp is calculated to operate at acceptable LOS, then the applicant should not be required to pay the fair share amount because the intersection would be documented to operate at acceptable LOS.

<u>It is recommended that the applicant enter into an agreement with the County to fulfill the California Environmental Quality Act (CEQA) cumulative mitigation requirement, but not be obligated to pay a fair share should the cumulatively impacted intersection never reach failing conditions during the project's temporary construction period.</u>

ITE turn lane warrants were reviewed for applicability at the intersection of Drew Road at Diehl Road due to the concentration of project traffic. The ITE warrants are silent for application on temporary construction traffic; therefore, traffic from the operational phase was used in the warrant analysis. At the intersection of Drew Road and Diehl Road the ITE southbound right turn lane warrant was NOT satisfied and the ITE northbound left turn lane warrant was NOT satisfied; therefore, the construction of additional lanes are not recommended at this intersection. Due to the temporary nature of the project construction traffic, temporary warning signs identifying construction truck traffic per the MUTCD may be required by the County.

14.0 References

Caltrans. December 2002. *Guide for the Preparation of Traffic Impact Studies.*

County of Imperial Department of Public Works. Dated March 12, 2007, revised June 29, 2007 and approved by the Board of Supervisors of the County of Imperial on August 7, 2007. *Traffic Study and Report Policy*.

Institute of Transportation Engineers, 1999. *Traffic Engineering Handbook, Fifth Edition.*

Imperial County Planning & Development Services Department. October 1, 2006. *Imperial County Circulation Element.*

Imperial County Planning & Development Services Department. January 29, 2008. *Circulation and Scenic Highways Element.*

Trafficware Ltd., 2003-2007. Synchro 7.0 computer software (build 773).

Transportation Research Board National Research Council Washington, D.C. 2000. *Highway Capacity Manual 2000*. CD ROM.

Appendix A

Excerpts from Imperial County's Traffic Study and Report Policy

COUNTY OF IMPERIAL

DEPARTMENT OF PUBLIC WORKS

TRAFFIC STUDY AND REPORT POLICY

Date: March, 12, 2007

Revised June 29, 2007

APPROVALS:

WILLIAM S. BRUNET, P. E.
DIRECTOR OF PUBLIC WORKS
ROAD COMMISSIONER

JURG HEUBERGER
PLANNING DIRECTOR

necessary to develop a traffic report that determines whether the traffic study general criteria have been met.

In the case of significant development, it may be necessary to hold one or more scope of work meetings which would be attended by a ICPDS staff, the County Traffic Engineer or other County Advisory Staff, the individual who will be responsible for preparing the traffic study report and the Traffic and/or Civil Engineer responsible for the report and its recommendations. The individual preparing the traffic study should be familiar with the project site and the local conditions which may affect any final conclusions and recommendations.

Listed below are the basic criteria that will be used to make the determination for providing a complete traffic study as a part of the project review process. The criteria are not a complete or exhaustive list, but they are intended to define when such a report is to be prepared and to indicate the necessary components of the study report to be submitted.

1. General Criteria

a. Any project that adds more than 8% of the total existing vehicle trips on the adjacent road system at full build-out of the project.

b. Any project that generates more than 400 daily residential trip ends, 800 commercial or industrial trip ends or 200 peak hour trip ends, as determined by the average trip rates contained in the ITE Trip Generation Informational Report or the **Imperial County local exceptions in Section 2.**

c. Any project that has the potential to degrade an existing road section, an existing signalized intersection, or an existing unsignalized intersection to below the existing level of service or to cause it to be lower than a level of service (LOS)

unit, unless it is for urban infill development, within one half mile of major retail and commercial developmentt.

b. Existing traffic on the adjacent road system and projected traffic on the adjacent road system, projected for a minimum of five (5) years, to project build-out, or both, depending on the project and the area; larger projects or high traffic generation may require future year build-out, currently Year 2030. Future CMP TIA reports would require additional traffic projection information.

c. Traffic projections on the adjacent road system for both the project and "normal background growth" (demonstrated growth, as detailed in the general plan, or as agreed upon with County staff). Normally, traffic will be projected to Year 2030 or later for an updated future year condition.

d. Traffic projections shall include the additional impact of undeveloped land or new development within an area surrounding the proposed development site (project) as agreed to by the County Director of Public Works, the County Planning Director and advisory staff.

e. Projected impacts on intersections adjacent to or within the defined impact area of the project, using intersection capacity analysis - Highway Capacity Manual Operations Delay Method. Right turn-on-red volumes and changes in signal timing can be incorporated in a signalized intersection analysis, but any signal timing changes must be specifically identified in the study recommendations with additional cautions or impact conclusions identified if the timing changes are not

m. Traffic counts, calculations, other basic information, and supporting data shall be included in an Appendix to the report or provided as a separate Technical Appendix. All actual traffic count data will be provided to the County in a useful summary form, digital and paper format, as specified by the County.

3. Analysis Methodology

The build-up method of traffic analysis will be followed, showing:

a. Existing traffic;

b. Existing traffic and normal background growth (rate and time to be agreed to by County staff);

c. Existing traffic and normal background growth (see C. 3. b. above) and project build-out traffic;

d. Existing traffic and normal background growth (see C. 3. b. above) and new development traffic (see C. 3. b. above);

e. Existing traffic and 5 year normal background growth (see b. above) and new development (see b. above) and project build out, if longer than 5 years to build out of project.

If the study period to build-out is longer than 5 years, the future projection time period appropriate for a new development will be determined by the County staff. Significant projects may require a future projection time period of 20 years or General Plan build out. The future year is currently year 2030 as of the date of adopting this Policy. State Highway traffic projections will usually be carried to the year 2030 or to Caltrans current policy and procedures.

Appendix B

Excerpts from Caltrans' Guide for the Preparation of Traffic Impact Studies

GUIDE FOR THE PREPARATION

OF

TRAFFIC IMPACT STUDIES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

December 2002

D. Travel Forecasting (Transportation Modeling)

The local or regional traffic model should reflect the most current land use and planned improvements (i.e., where programming or funding is secured). When a general plan build-out model is not available, the closest forecast model year to build-out should be used. If a traffic model is not available, historical growth rates and current trends can be used to project future traffic volumes. The TIS should clearly describe any changes made in the model to accommodate the analysis of a proposed project.

V. TRAFFIC IMPACT ANALYSIS METHODOLOGIES

Typically, the traffic analysis methodologies for the facility types indicated below are used by Caltrans and will be accepted without prior consultation. When a State highway has saturated flows, the use of a micro-simulation model is encouraged for the analysis (please note however, the micro-simulation model must be calibrated and validated for reliable results). Other analysis methods may be accepted, however, consultation between the lead agency, Caltrans and those preparing the TIS is recommended to agree on the data necessary for the analysis.

A. Freeway Segments – Highway Capacity Manual (HCM)*, operational analysis

B. Weaving Areas – Caltrans Highway Design Manual (HDM)

C. Ramps and Ramp Junctions – HCM*, operational analysis or Caltrans HDM, Caltrans Ramp Metering Guidelines (most recent edition)

D. Multi-Lane Highways – HCM*, operational analysis

E. Two-lane Highways – HCM*, operational analysis

F. Signalized Intersections[8] – HCM*, Highway Capacity Software**, operational analysis, TRAFFIX™**, Synchro**, see footnote 8

G. Unsignalized Intersections – HCM*, operational analysis, Caltrans Traffic Manual for signal warrants if a signal is being considered

H. Transit – HCM*, operational analysis

I. Pedestrians – HCM*

J. Bicycles – HCM*

K. Caltrans Criteria/Warrants – Caltrans Traffic Manual (stop signs, traffic signals, freeway lighting, conventional highway lighting, school crossings)

L. Channelization – Caltrans guidelines for Reconstruction of Intersections, August 1985, Ichiro Fukutome

*The most current edition of the Highway Capacity Manual, Transportation Research Board, National Research Council, should be used.

****NOTE**: Caltrans does not officially advocate the use of any special software. However, consistency with the HCM is advocated in most but not all cases. The Caltrans local development review units utilize the software mentioned above. If different software or analytical techniques are used for the TIS then consultation between the lead agency, Caltrans and those preparing the TIS is recommended. Results that are significantly different than those produced with the analytical techniques above should be challenged.

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[8] The procedures in the Highway Capacity Manual "do not explicitly address operations of closely spaced signalized intersections. Under such conditions, several unique characteristics must be considered, including spill-back potential from the downstream intersection to the upstream intersection, effects of downstream queues on upstream saturation flow rate, and unusual platoon dispersion or compression between intersections. An example of such closely spaced operations is signalized ramp terminals at urban interchanges. Queue interactions between closely spaced intersections may seriously distort the procedures in" the HCM.

Appendix C

Excerpts from Imperial County's Circulation and Scenic Highways Element

CIRCULATION AND
SCENIC HIGHWAYS ELEMENT

Prepared by:
Imperial County Planning & Development Services Department
801 Main Street
El Centro, CA 92243

in collaboration with the

Imperial County Public Works Department
155 South 11th Street
El Centro, CA 92243

WILLIAM S. BRUNET, P.E.
Director of Public Works

JURG HEUBERGER, AICP
Planning & Development Services Director

Approved by:
Board of Supervisors
January 29, 2008

TABLE 5 IMPERIAL COUNTY STANDARD STREET CLASSIFICATION AVERAGE DAILY VEHICLE TRIPS						
Road		**Level of Service (LOS)**				
Class	**X-Section**	**A**	**B**	**C**	**D**	**E**
Expressway	154/210	30,000	42,000	60,000	70,000	80,000
Prime Arterial	106/136	22,200	37,000	44,600	50,000	57,000
Minor Arterial	82/102	14,800	24,700	29,600	33,400	37,000
Major Collector (Collector)	64/84	13,700	22,800	27,400	30,800	34,200
Minor Collector (Local Collector)	40/70	1,900	4,100	7,100	10,900	16,200
Local County (Residential)	40/60	*	*	<1,500	*	*
Local County (Residential Cul-de-Sac or Loop Street)	40/60	*	*	<200	*	*
Major Industrial Collector – (Industrial)	76/96	5,000	10,000	14,000	17,000	20,000
Industrial Local	44/64	2,500	5,000	7,000	8,500	10,000

* Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

Table 5 was originally developed for the County of San Diego by the San Diego County Department of Public Works in 1985 and compares ADT to levels of service (LOS) for various roadway classifications. Proposed functional classifications were then inserted into this table and right-of-way widths adjusted to match County of Imperial standards.

Transition Areas

The Circulation and Scenic Highways Element is the graphical reference guide which shows the present and planned street system, along with the classification of those streets. It is important to note that where there is a change from one classification to another along a certain street, the transition will occur in mid-block areas to preclude non-continuing lanes and intersections. The design criteria (design, speed, curve radii, etc.) for the higher classification shall generally take precedence through the transition area.

Appendix D

Excerpts from Caltrans' Guide for the Preparation of Traffic Impact Studies

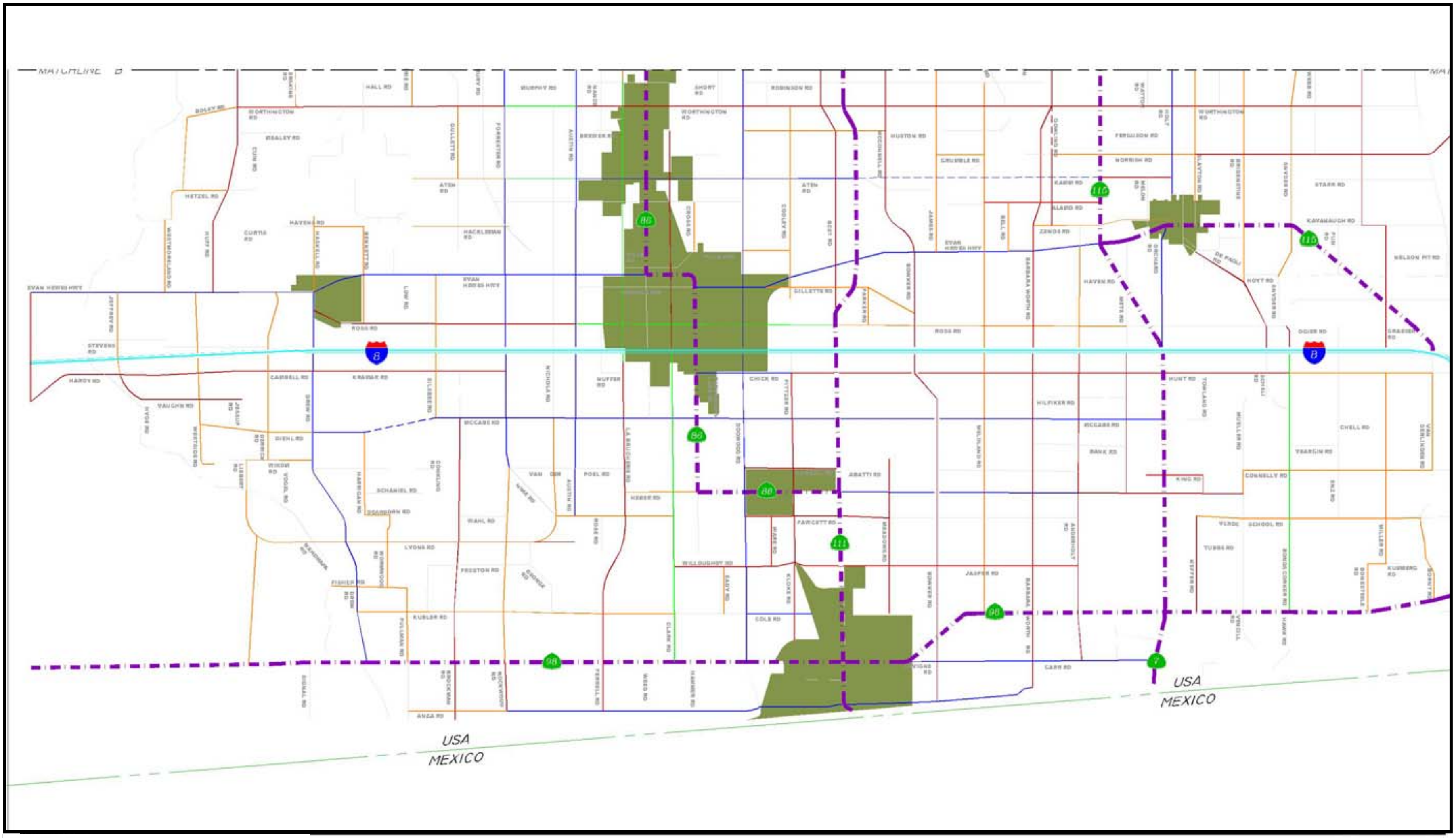
GUIDE FOR THE PREPARATION

OF

TRAFFIC IMPACT STUDIES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

December 2002



LEGEND

- Interstate (8-Lanes)
- State Highways/Expressway (6-Lanes divided)
- Prime Arterial (6-Lanes divided)
- Minor Arterial (4-Lanes divided)
- Major Collector-Collector (4-Lanes)
- Minor Collector-Local Collector (2-Lanes)
- Proposed Future Alignment
- Cities & Towns

DISCLAIMER: Every reasonable effort has been made to ensure the accuracy of this map. However, by accepting this material, you agree that Imperial County assumes no liability of any kind arising from the use of this map. THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, either expressed or implied, including but not limited to time, money or goodwill arising from the use, operation or modification of this map.

Imperial County Circulation Element Plan

Southern Section

(SHEET 4 of 4)

Figure 1c

NORTH

0 1 2 3
MILES

Transition between LOS "C" and LOS "D" Criteria

(Reference Highway Capacity Manual)

BASIC FREEWAY SEGMENTS @ 65 mi/hr

LOS	Maximum Density (pc/mi/ln)	Minimum Speed (mph)	Maximum v/c	Maximum Service Flow Rate (pc/hr/ln)
A	11	65.0	0.30	710
B	18	65.0	0.50	1170
C	26	64.6	0.71	1680
D	35	59.7	0.89	2090
E	45	52.2	1.00	2350

SIGNALIZED INTERSECTIONS and RAMP TERMINALS

LOS	Control Delay per Vehicle (sec/veh)
A	≤ 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

MULTI-LANE HIGHWAYS @ 55 mi/hr

LOS	Maximum Density (pc/mi/ln)	Minimum Speed (mph)	Maximum v/c	Maximum Service Flow Rate (pc/hr/ln)
A	11	55.0	0.29	600
B	18	55.0	0.47	990
C	26	54.9	0.68	1430
D	35	52.9	0.88	1850
E	41	51.2	1.00	2100

▪▪▪▪▪ Dotted line represents the transition between LOS "C" and LOS "D"

Appendix E

Excerpts from Imperial County's Circulation and Scenic Highways Element

CIRCULATION AND SCENIC HIGHWAYS ELEMENT

Prepared by:
Imperial County Planning & Development Services Department
801 Main Street
El Centro, CA 92243

in collaboration with the

Imperial County Public Works Department
155 South 11th Street
El Centro, CA 92243

WILLIAM S. BRUNET, P.E.
Director of Public Works

JURG HEUBERGER, AICP
Planning & Development Services Director

Approved by:
Board of Supervisors
January 29, 2008

The County Director of Public Works shall review these transition areas and provide guidance in achieving this policy.

c. New or enlarged Roads:

Local Roads

The County shall require all new developments to provide for local roads to serve the direct access needs of abutting property. These streets should be designed with a discontinuous pattern to discourage through traffic. They generally should not intersect with arterial street classifications. Typical design features include two travel lanes with parking on both sides of the street. Local roads include loop streets and cul-de-sacs.

Regional Roads (Roads beyond the actual development project)

The County shall require that all new developments participate in the improvement of regional roads that may be impacted by the proposed development. The extent to which a project impacts regional roads is generally determined by a traffic study. In some cases however the County may have predetermined improvement requirements for certain road segments or road intersections. The new developments will be required to either make certain regional improvements or in the alternative contribute a "fair share" towards the cost of such improvements.

d. Level of Service Standards

As the County continues to grow, transportation demand management and systems management will be necessary to preserve and increase available roadway "capacity". Level of Service (LOS) standards are used to assess the performance of a street or highway system and the capacity of a roadway.

An important goal when planning the transportation system is to maintain acceptable levels of service along the federal and state highways and the local roadway network. To accomplish this, the California Department of Transportation (Caltrans), Imperial County and local agencies adopt minimum levels of service to determine future infrastructure needs.

Imperial County must provide and maintain a highway system with adequate capacity and acceptable levels of service to accommodate projected travel demands associated with the projected population growth within the Land Use Element. This can be accomplished by establishing minimum service levels for the designated street and conventional state highway system. Strategies that result in improvements to the transportation system, coupled with local job creation, will allow County residents to have access to a wide range of job opportunities within reasonable commute times.

The County's goal for an acceptable traffic service standard on an ADT basis and during AM and PM peak periods for all County-Maintained Roads shall be LOS C for all street segment links and intersections. These service values are defined by the 1985 or 2000 edition of the *Highway Capacity* Manual or any subsequent edition thereof. This policy shall acknowledge that the aforementioned level of service standards may not be obtainable on some existing facilities where abutting development precludes acquisition of additional right-of-way needed for changes in facility classification.

In order to achieve the level of service goals in the previous policy, the County shall develop and institute a long-range funding program in which new land development shall bear the major burden of the associated costs and improvement requirements.

e. Design Standards

The County shall adopt design standards for all streets in accordance with their functional classifications and recognized design guidelines. In developing these standards, the County shall consider the design standards of Caltrans and the American Association of State and Highway Transportation Officials (AASHTO). All streets within the County shall be designed in accordance with the adopted County of Imperial Design Standards. Typical cross sections and design criteria for the various street classifications are shown as an attachment to this document.

f. Private Streets

The County may permit construction of private streets within individual development projects (gated community). providing the following are addressed:

- They are designed geometrically and structurally to meet County standards.
- Only project occupants are served (gated community).
- Emergency vehicle access requirements are satisfied.
- The streets do not provide a direct through route between public streets.
- The Homeowners Associations and/or property owners provide an acceptable program for financing regular street maintenance.
- If the private street is permitted with a waiver of any of the above standards, any future requests to make the private street a public street shall require that all adjacent property owners provide and pay for all improvements and right of way required to bring the street to current public street or road standards. This includes road width, right of way widths and structural section. In no circumstance shall the County pay for any costs to upgrade a private street to public street standards if the above-mentioned requirements were waived at the request of the original developer or subdivider.

Appendix F

Traffic Impact Significance Criteria from Imperial area EIRs

4.6.2 Impact Significance Criteria

Significance Criteria

The significance criteria summarized in Table 4.6-2 by Linscott, Law and Greenspan Engineers is based upon the City of El Centro and the County of Imperial's goal for intersections and roadway segments to operate at LOS C or better. In general, a degradation in LOS from LOS C or better to LOS D or worse is considered a significant direct impact. A cumulative impact can occur if the intersection or segment LOS is already operating below City/County standards and the project increases the delay by more than 2 seconds or the v/c ratio by more than 0.02.

Table 4.6-2
Significance Criteria

INTERSECTIONS			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS [1] C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS D or worse	-	Direct
LOS D	LOS E or F	-	Direct
LOS E	LOS F	-	Direct
Any LOS	Project does not degrade LOS and adds > 2.0 seconds of delay	LOS E or worse	Cumulative
Any LOS	Project does not degrade LOS and adds < 2.0 seconds of delay	Any LOS	None
SEGMENTS			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS D or worse	-	Direct [2]
LOS D	LOS E or F	-	Direct
LOS E	LOS F	-	Direct
Any LOS	LOS E or worse and v/c [3] > 0.02	LOS E or worse	Cumulative
Any LOS	LOS E or worse and v/c [3] < 0.02	Any LOS	None

Source: Linscott, Law & Greenspan, Engineers (July 2004)

Notes:

1. LOS: Level of Service
2. Exception: post-project segment operation is D and intersections along segment are D or better, no significant impact.
3. V/C: Volume to Capacity Ratio

In addition the project would have a significant impact if:

- It would substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

TABLE 5.1
SIGNIFICANCE CRITERIA

Intersections			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS C or better and project adds < 2.0 seconds of delay	LOS D or worse	None
LOS C or better	LOS C or better and project adds > 2.0 seconds of delay	LOS D or worse	Cumulative
LOS C or better	LOS D or worse	LOS D or worse	Direct
LOS D	LOS D and project adds < 2.0 seconds of delay	LOS D or worse	None
LOS D	LOS D and project adds > 2.0 seconds of delay	LOS D or worse	Cumulative
LOS D	LOS E or F	LOS E or F	Direct
LOS E	LOS E and project adds < 2.0 seconds of delay	LOS E or F	None
LOS E	LOS E and project adds > 2.0 seconds of delay	LOS E or F	Cumulative
LOS E	LOS F	LOS F	Direct
LOS F	Project add < 2.0 seconds of delay	LOS F	None
LOS F	Project adds 2.0 to 9.9 seconds of delay	LOS F	Cumulative
LOS F	Project adds 10.0 or more seconds of delay	LOS F	Direct
Segments			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS or better and project increases V/C by < 0.02	LOS D or worse	None
LOS C or better	LOS C or better and project increase V/C by >0.02	LOS D or worse	Cumulative
LOS C or better	LOS D or worse	LOS D or worse	Direct[1]
LOS D	LOS D and project increases V/C by < 0.02	LOS D or worse	None
LOS D	LOS D and project increases V/C by > 0.02	LOS D or worse	Cumulative
LOS D	LOS E or F	LOS E or F	Direct
LOS E	LOS E and project increases V/C by < 0.02	LOS E or F	None
LOS E	LOS E and project increases V/C by > 0.02	LOS E or F	Cumulative
LOS E	LOS F	LOS F	Direct
LOS F	Project increases V/C by < 0.02	LOS F	None
LOS F	Project increases V/C by > 0.02 and < 0.09	LOS F	Cumulative
LOS F	Project increases V/C by > 0.09	LOS F	Direct

Notes: LOS = Level of Service; V/C = Volume to Capacity Ratio; [1] Exception: If Existing + Project segment operation is LOS D and intersections along segment are LOS D or better, then there is no significant impact.

In addition to the above listed projects, the Lerno/Verhaegen project was recently submitted and is currently starting the CEQA process. This project is listed for information purposes but cannot be analyzed in cumulative terms. The following is a brief description based on the limited information available for this project.

Lerno-Verhaegen Specific Plan is proposed to be a mixed-use development of 2,708 dwelling units. The project consists of 680 acres on the west side of the City of El Centro. The project includes a zone change, Tentative Map, an amendment of the City's General Plan and an annexation.

Individual traffic assignments were completed for each cumulative project. Figure 2-7 depicts the total cumulative project traffic volumes in the area. Figure 2-8 shows the existing + project + cumulative projects traffic volumes for the vicinity. Appendix D of this Mitigated Negative Declaration contains the individual cumulative project traffic assignments.

Significance Criteria

The significance criteria summarized in Table 2-7 by Linscott, Law and Greenspan, engineers is based upon the County of Imperial's goal for intersections and roadway segments to operate at LOS C or better. Intersections or segments operating at LOS D, E or F are unacceptable and therefore constitute a significant impact.

Table 2-7 – Significance Criteria

INTERSECTIONS			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS [1] C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS D or worse	-	Direct
LOS D	LOS E or F	-	Direct
LOS E	LOS F	-	Direct
Any LOS	Project does not degrade LOS and adds > 2.0 seconds of delay	LOS E or worse	Cumulative
Any LOS	Project does not degrade LOS and adds < 2.0 seconds of delay	Any LOS	None
SEGMENTS			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS D or worse	-	Direct [2]
LOS D	LOS E or F	-	Direct
LOS E	LOS F	-	Direct
Any LOS	LOS E or worse and v/c [3] > 0.02	LOS E or worse	Cumulative
Any LOS	LOS E or worse and v/c [3] < 0.02	Any LOS	None

Source: LL&G, July 2004.

Notes:

1. LOS: Level of Service
2. Exception: post-project segment operation is D and intersections along segment are D or better, no significant impact.
3. V/C: Volume to Capacity Ratio

Table 5-1
Significance Criteria

Existing	Existing + Project	Existing + Project + Cumulative Projects	Impact Type
Intersections			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS [a] C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS D or worse	—	Direct
LOS D	LOS D and adds 2.0 seconds or more of delay	LOS D or worse	Cumulative
LOS D	LOS E or F	—	Direct
LOS E	LOS F	—	Direct
LOS F	LOS F and delay increases by ≥ 10.0 seconds	LOS F	Direct
Any LOS	Project does not degrade LOS and adds 2.0 to 9.9 seconds of delay	LOS E or worse	Cumulative
Any LOS	Project does not degrade LOS and adds < 2.0 seconds of delay	Any LOS	None
Segments			
Existing	**Existing + Project**	**Existing + Project + Cumulative Projects**	**Impact Type**
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS C or better and v/c [b] > 0.02	LOS D or worse	Cumulative
LOS C or better	LOS D or worse	—	Direct
LOS D	LOS D and v/c > 0.02	LOS D or worse	Cumulative
LOS D	LOS E or F	—	Direct
LOS E	LOS F	—	Direct
LOS F	LOS F and v/c increases by > 0.09	LOS F	Direct
Any LOS	LOS E or worse and v/c 0.02 to 0.09	LOS E or worse	Cumulative
Any LOS	LOS E or worse and v/c < 0.02	Any LOS	None

Source: Linscott, Law & Greenspan, Engineers

Footnotes:

a. Level of Service

b. Volume to Capacity Ratio

Appendix G

Excerpts from Imperial County Circulation Element

CIRCULATION AND
SCENIC HIGHWAYS ELEMENT

Prepared by:
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Director of Public Works

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Planning & Development Services Director

Approved by:
Board of Supervisors
January 29, 2008

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Alamo Road								
Meloland/SR-115	Major Collector						Major Collector (4)	
Albright Road								
SR-111/SR-115	Minor Collector						Minor Collector (2)	
SR-115/Butters	Major Collector						Major Collector (4)	
Anderholt Road								
Evan Hewes (S-80)/Hunt	Minor Collector						Minor Collector (2)	
Hunt/Carr	Major Collector						Major Collector (4)	
Andre Road								
Forrester/End	Minor Collector						Minor Collector (2)	
Anza Road								
Pulliam/Rockwood	Local						Minor Collector (2)	
Rockwood/Calexico	Prime Arterial						Prime Arterial (6-divided)	
Calexico/Barbara Worth	Prime Arterial						Prime Arterial (6-divided)	
Aten Road								
End/Forrester	Minor Collector						Minor Collector (2)	
Forrester/Austin	Minor Arterial						Minor Arterial (6-divided)	
East Imperial City Limits/Dogwood	Prime Arterial	7,300	8,450	39,000	1.13	44,500	Prime Arterial (6-divided)	C
Dogwood/SR-111	Prime Arterial						Prime Arterial (6-divided)	
Proposed/SR-111/River	None						Prime Arterial (6-divided)	
Austin Road								
McCabe/Wahl	Local						Prime Arterial (6-divided)	
Proposed Wahl/SR-98	None						Prime Arterial (6-divided)	
Evan Hewes Hwy/McCabe	Major Collector						Prime Arterial (6-divided)	
Aten/Evan Hewes Hwy	Minor Arterial						Prime Arterial (6-divided)	
Keystone/Aten	Major Collector						Prime Arterial (6-divided)	
SR-86/Keystone	Minor Collector						Prime Arterial (6-divided)	
Bannister Road								
SR-86/Brandt	Major Collector						Major Collector (4)	
Barbara Worth Road								
Zenos/Evan Hewes (S-80)	Minor Collector						Major Collector (4)	
Evan Hewes Hwy/Anza	Major Collector						Major Collector (4)	
Baughman Road								
Garvey/Lack	Minor Collector						Minor Collector (2)	
Lack/SR-86	Major Collector						Major Collector (4)	
Bell Road								
Alamo/Evan Hewes Hwy	Minor Collector						Minor Collector (2)	
Bennett Road								
Havens/Ross	Minor Collector						Minor Collector (2)	
Best Road								
Rutherford/Brawley	Minor Arterial						Minor Arterial (4)	
Blair Road								
Pound/Sinclair	Minor Collector						Minor Collector (2)	
Peterson/Lindsey	Major Collector						Major Collector (4)	
Lindsey/SR-115	Major Collector						Major Collector (4)	
SR-115/Yocum	Local						Major Collector (4)	
Blais Road								
Wieman/Forrester	Minor Collector						Minor Collector	
Boarts Road (S26)								
Westmorland/Kalin	Major Collector						Major Collector (4)	
Boley Road								
Westmorland/Huff	Minor Collector						Minor Collector (2)	
Bonds Corner Road								
Holtville/I-8	Major Collector						Major Collector (4)	
I-8/SR-98	Minor Arterial						Minor Arterial (4)	
Bonesteele Road								
Kumberg/SR-98	Minor Collector						Minor Collector (2)	
Bornt Road								
Verde School/SR-98	Minor Collector						Minor Collector (2)	
Bowker Road								
Evan Hewes Hwy/I-8	Major Collector						Major Collector (4)	
I-8/SR-98	Minor Arterial						Expressway (6)	
SR-98/Anza	None						Minor Arterial (4)	

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Bowles Road								
Riley/Lyerly	Minor Collector						Minor Collector (2)	
Boyd Road								
Wiest/SR-78	Local						Minor Collector (2)	
SR-115/Highline	Local						Minor Collector (2)	
Highline/End	Minor Collector						Minor Collector (2)	
Brandt Road								
Sinclair/Lindsey	Local						Minor Collector (2)	
Lindsey/Eddins	Minor Collector						Minor Collector (2)	
Eddins/Webster	Minor Collector						Minor Collector (2)	
Bridenstein Road								
Proposed SR-78/Hartshorn							Minor Collector (2)	
Hartshorn/Bonds Corner	Minor Collector						Minor Collector (2)	
Brockman Road (S30)								
McCabe/SR-98	Major Collector						Major Collector (4)	
Butters Road (S32)								
Gonder/SR-78	Prime Arterial						Prime Arterial (6)	A
Bowles/Albright	Local						Major Collector (4)	
Albright/SR-78	Major Collector						Major Collector (4)	
Cady Road								
Pellett/SR-86	Major Collector						Major Collector (4)	
Cambell Road								
Jessup/Derrick	Major Collector						Major Collector (4)	
Derrick/Drew	Major Collector						Major Collector (4)	
Carey Road								
SR-86/Dogwood	Minor Collector						Minor Collector (2)	
Carr Road								
Barbara Worth/SR-7	Major Collector						Minor Arterial (4)	
Carter Road								
Kalin/Forrester	Minor Collector						Major Collector (4)	
Casey Road								
Dickerman/SR-78	Minor Collector						Minor Collector (2)	
SR-78/Worthington	Minor Collector						Major Collector (4)	
Proposed Worthington/Norrish	None						Major Collector (4)	
Chick Road								
El Centro/Pitzer	Prime Arterial						Prime Arterial (6)	
Pitzer/Barbara Worth	Major Collector						Major Collector (4)	
Clark Road								
El Centro/SR-98	Minor Arterial						Minor Arterial (4)	
North El Centro City Limits/Worthington	Major Collector	2,100	2,430	12,550	1.64	21,000	Major Collector (4)	B
Worthington/Larsen	Minor Collector	800	930	6,220	1.64	10,500	Major Collector (4)	A
Cole Road								
Dogwood/Calexico	Prime Arterial						Prime Arterial (6-divided)	
East Calexico City Limits/SR-98	Minor Arterial	9,700	11,230	18,340	1.64	30,500	Prime Arterial (6-divided)	B
Connelly Road								
Vencill/Van Der Linden	Minor Collector						Minor Collector (2)	
Cooley Road								
Worthington/Gillett	Minor Collector						Minor Collector (2)	
Corn Road								
Bowles/Eddins	Minor Collector						Minor Collector (2)	
Correll Road								
Dogwood/SR 111	Minor Arterial						Minor Arterial (4)	
Cross Road								
Imperial (City)/Villa	Minor Collector						Minor Collector (2)	
Davis Road								
Gillespie/Schrimpf	Major Collector						Major Collector (4)	
Proposed Schrimpf/Sinclair	Major Collector						Major Collector (4)	
Dearborn Road								
Harrigan/Wormwood	Minor Collector						Minor Collector (2)	
Derrick Road								
Evan Hewes Hwy/Wixom	Minor Collector						Minor Collector (2)	
Dickerman Road								
SR-115/Butters	Minor Collector						Minor Collector (2)	

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Diehl Road								
Westside/Drew	Minor Collector						Minor Collector (2)	
Drew/Harrigan	Major Collector						Prime Arterial (6)	
Proposed Harrigan/Silsbee	Major Collector						Prime Arterial (6)	
Dietrich Road								
Rutherford/Shank	Minor Collector						Major Collector (4)	
Proposed Shank/SR-78	None						Major Collector (4)	
Doetsch Road								
Elder/SR-86	Minor Collector						Minor Collector (2)	
Dogwood Road (S31)*								
Proposed Lindsey/Hovley	None						Prime Arterial (6-divided)	
Brawley/SR-98	Prime Arterial						Prime Arterial (6-divided)	
Dowden Road								
Proposed Forrester/Gentry	None						Local Collector (2)	
Gentry/Kershaw	None						Prime Arterial (6)	
Kershaw/Butters	Minor Collector						Prime Arterial (6)	
Drew Road (S29)								
Evan Hewes/SR-98	Prime Arterial						Prime Arterial (6-divided)	
Dunaway Road								
I-8/Evan Hewes Hwy	Major Collector	900	1,040	2,756	1.64	4,500	Major Collector (4)	A
Eady Road								
Willoughby/Cole	Minor Collector						Minor Collector (2)	
Eddins Road (S30)								
Gentry/SR-111(Calipatria City Limits)	Major Collector						Major Collector (4)	
Edgar Road								
Pierle/Forrester	Minor Collector						Minor Collector (2)	
Elder Road								
Doetsch/Cady	Minor Collector						Minor Collector (2)	
English Road								
Sinclair/Wilkins	Minor Collector						Minor Collector (2)	
Erskine Road								
Wheeler/Payne	Minor Collector						Minor Collector	
Evan Hewes Hwy (S80)								
Imperial Hwy/El Centro	Prime Arterial						Prime Arterial (6-divided)	
El Centro/SR-115	Prime Arterial						Prime Arterial (6-divided)	
SR-115/End	Prime Arterial						Prime Arterial (6-divided)	
Fawcett Road								
Dogwood/Meadows	Minor Collector						Major Collector (4)	
Ferrell Road								
Kubler/SR-98	Major Collector						Major Collector (4)	
SR-98/Anza	Minor Collector						Minor Collector (2)	
Fifield Road								
SR-78/Streiby	Minor Collector						Minor Collector (2)	
Fisher Road								
Drew/Pulliam	Minor Collector						Minor Collector (2)	
Flett Road								
Wilkinson/Wirt	Minor Collector						Minor Collector (2)	
Forrester Road (S30)								
Proposed Sinclair/Walker	None						Prime Arterial (6-divided)	
Walker/Westmorland	Major Collector						Prime Arterial (6-divided)	
Westmorland/McCabe	Prime Arterial						Prime Arterial (6-divided)	
McCabe/Hime	Minor Collector						Prime Arterial (6-divided)	
Proposed Hime/River	Minor Collector						Prime Arterial (6-divided)	
North Westmorland City Limits/Gentry	Major Collector	1,200	1,390	9,000	1.64	15,000	Prime Arterial (6-divided)	A
Foulds Road								
Pellett/Lack	Minor Collector						Minor Collector (2)	
Fredericks Road								
Loveland/SR-111	Minor Collector						Minor Collector (2)	
Frontage Road								
Ross/Brawley (City)	Major Collector						Major Collector (4)	
Garst Road								
Sinclair/McDonald	Minor Collector						Minor Collector (2)	
Garvey Road								
Baughman/Andre	Minor Collector						Minor Collector (2)	

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Gentry Road								
Sinclair/Walker	Major Collector						Major Collector (4)	
Gillespie Road								
Davis/Wilkins	Minor Collector						Minor Collector (2)	
Gillett Road								
Cooley/Bowker	Minor Collector						Minor Collector (2)	
Gonder Road								
Proposed New River/SR-115	None						Major Collector (4)	
SR-115/Butters	Local						Minor Collector (2)	
Butters/Green	Minor Collector						Minor Collector (2)	
Green/Highline	Major Collector						Major Collector (4)	
Gowling Road								
Norrish/Zenos	Minor Collector						Major Collector (4)	
Green Road								
SR-78/Gonder	Major Collector						Major Collector (4)	
Griffin Road								
Wiest/SR-115	Minor Collector						Minor Collector (2)	
Grumbles Road								
James/Meloland	Minor Collector						Minor Collector (2)	
Gullett Road								
Worthington/Aten	Minor Collector						Minor Collector (2)	
Gutherie Road								
Wienert/Worthington	Minor Collector						Minor Collector (2)	
Proposed Worthington/Hackleman	Minor Collector						Minor Collector (2)	
Hackleman Road								
Low/Forrester	Minor Collector						Minor Collector (2)	
Hardy Road								
Dunaway/Jeffrey	Major Collector						Major Collector (4)	
Jeffrey/Hyde	Major Collector						Major Collector (4)	
Hyde/Jessup	Major Collector						Major Collector (4)	
Harrigan Road								
Diehl/Dearborn	Minor Collector						Minor Collector (2)	
Harris Road								
Austin/SR-86	Local						Major Collector (4)	
SR-86/McConnel	Major Collector						Major Collector (4)	
McConnell/Highline	Minor Collector						Major Collector (4)	
Hart Road								
Wiest/SR-115	Minor Collector						Minor Collector (2)	
Hartshorn Road								
Bridenstein/Proposed Bridenstein	Minor Collector						Minor Collector	
Haskell Road								
Evan Hewes Hwy/End	Minor Collector						Minor Collector (2)	
Hastain Road								
Taecker/SR-78	Minor Collector						Minor Collector (2)	
Young/Dickerman	Minor Collector						Minor Collector (2)	
Havens Road								
Haskell/Bennett	Minor Collector						Minor Collector (2)	
Hetzel Road								
Westmorland/Huff	Minor Collector						Minor Collector (2)	
Heber Road								
La Brucherie/SR-86	Local						Minor Collector (2)	
SR-111/Anderholt	Minor Arterial	N/A	2,040	16,700	1.64	27,500	Prime Arterial (6-divided)	B
Anderholt/Keffer	Major Collector						Major Collector (4)	
Keffer/Vencill	Minor Collector						Major Collector (4)	
Highline Road (S33)								
Proposed SR-78/Gonder	None						Major Collector (4)	
Gonder/Kavanuagh	Major Collector						Major Collector (4)	
Proposed Kavanaugh/I-8	None						Major Collector (4)	
Holt Road. (S32)								
Gonder/Holtville city limits	Prime Arterial						Prime Arterial (6-divided)	
Hoskins Road								
SR-86/Steiner	Minor Collector						Minor Collector	
Hovley Road								
Rutherford/Brawley	Major Collector						Major Collector (4)	

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Huff Road								
Imler/Evan Hewes Hwy	Major Collector						Major Collector (4)	
Hunt Road								
Barbara Worth/Bonds Corner	Major Collector						Major Collector (4)	
Bonds Corner/Van Der Linden	Minor Collector						Minor Collector (2)	
Huston Road								
Dogwood/McConnell	Minor Collector						Minor Collector (2)	
Imler Road								
Huff/Forrester	Major Collector						Major Collector (4)	
International Road								
Noffsinger/Pound	Minor Collector						Minor Collector (2)	
Irvine Road								
Shank/End	Minor Collector						Minor Collector (2)	
James Road								
Ralph/Evan Hewes Hwy	Minor Collector						Minor Collector (2)	
Jasper Road								
Calexico/Anderholt	Major Collector						Expressway (6)	
Proposed Anderholt/ SR-7	None						Expressway (6)	
Jeffery Road								
Evan Hewes Hwy/Hardy	Minor Collector						Minor Collector (2)	
Kaiser Road								
Wirt/Albright	Minor Collector						Minor Collector (2)	
Kalin (S26)								
Sinclair/SR-78/86	Major Collector						Major Collector (4)	
SR-78/86/Webster	Minor Collector						Minor Collector (4)	
Kamm Road								
River/SR-115	Local						Prime Arterial (6)	
SR-115/Holt	Minor Collector						Major Collector (4)	
Keffer Road								
SR-98/King	Major Collector						Major Collector (4)	
Kershaw Road								
Yocum/Rutherford	Minor Collector						Minor Collector (2)	
Keystone Road (S27)								
Forrester/SR-111	Prime Arterial						Expressway (6)	
SR-111/Highline	Major Collector						Expressway (6)	
King Road								
Orchard/Keffer	Major Collector						Major Collector (4)	
Kloke Road								
Willoughby/Calexico	Major Collector						Major Collector (4)	
Kramar Road								
Drew/Forrester	Major Collector						Major Collector (4)	
Kubler Road								
Drew/Clark	Minor Collector						Minor Collector (2)	
Kumberg Road								
Bonesteele/Miller	Minor Collector						Minor Collector (2)	
La Brucherie Road								
El Centro city limits/Kubler	Major Collector						Major Collector (4)	
Larsen/Murphy	Minor Collector						Minor Collector (2)	
Murphy/Imperial city limits	Minor Collector						Minor Collector (2)	
Lack Road								
Lindsey/Blais	Minor Collector						Minor Collector (2)	
Larsen Road								
Forrester/SR-86	Major Collector						Major Collector (4)	
SR-86/Clark	Minor Collector						Minor Collector (2)	
Lavigne Road								
SR-98/Bowker	Prime Arterial						Prime Arterial (6)	
Proposed Bowker/Barbara Worth	Prime Arterial						Prime Arterial (6)	
Liebert Road								
Wixom/Rd 8018	Minor Collector						Minor Collector (2)	
Proposed Road 8018/SR-98	Minor Collector						Minor Collector (2)	
Lindsey Road								
Lack/Wiest	Minor Collector						Minor Collector (2)	
Loveland Road								
Fredericks/Monte	Minor Collector						Minor Collector (2)	
Low Road								
Hackleman/Evan Hewes Hwy	Minor Collector						Minor Collector (2)	

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Lyerly Road								
Bowles/Eddins	Minor Collector						Minor Collector (2)	
Lyons Road								
Drew/Nichols	Minor Collector						Major Collector (4)	
Proposed Nichols/La Brucherie	None						Major Collector (4)	
Main ST (Niland)								
SR-111/Blair	Major Collector						Major Collector (4)	
Martin Road								
Baughman/7th	Minor Collector						Minor Collector (2)	
7th/Bannister	Local						Minor Collector (2)	
Mead Road								
Dogwood/McConnell	Minor Collector						Minor Collector (2)	
Meadows Road								
Heber/Calexico (City)	Major Collector						Major Collector (4)	
Meloland Road								
Worthington/Correll	Minor Collector						Minor Collector (2)	
Proposed Correll/SR-98	Minor Collector						Minor Collector (2)	
McCabe Road								
Silsbee/La Brucherie	Major Collector						Prime Arterial (6-divided)	
La Brucherie/SR-111	Minor Arterial	N/A	200	17,270	1.64	28,500	Prime Arterial (6-divided)	B
SR-111/SR-7	Major Collector						Prime Arterial (6-divided)	
McConnell Road								
SR-78/Evan Hewes Hwy	Major Collector						Major Collector (4)	
McDonald Road								
Garst/SR-111	Minor Collector						Minor Collector (2)	
SR-111 TO Rd 8041	Minor Collector						Minor Collector (2)	
McKim Road								
Harris/Ralph	Minor Collector						Minor Collector (2)	
Miller Road (S33)								
I-8/Kumberg	Minor Collector						Minor Collector (2)	
I-8/SR-115	Major Collector	200	230	5,250	1.64	9,000	Major Collector (4)	A
SR-115/Kavanaugh	Major Collector	100	120	5,300	1.64	9,000	Major Collector (4)	A
Monte Road								
Pellett/Loveland	Minor Collector						Minor Collector (2)	
Neckel Road								
Austin/Clark	Minor Collector						Minor Collector (2)	
Nichols Road								
McCabe/Lyons	Minor Collector						Minor Collector (2)	
Noffsinger Road								
SR-111/McDonald	Minor Collector						Minor Collector (2)	
Norrish Road								
Gowling/Holt	Minor Collector						Minor Collector (2)	
Holt/Highline	Local						Major Collector (4)	
Highline/End	Major Collector						Major Collector (4)	
Orchard Road (S32)/ SR 7								
King/McCabe	Major Collector	700	810	50,740	1.13	57,500	Expressway (6)	C
McCabe/I-8	Major Collector	900	1,040	49,000	1.13	56,000	Expressway (6)	C
Holtville/I-8	Minor Arterial						Prime Arterial (6-divided)	
I-8/Connelly	Major Collector						Major Collector (4)	
Orr Road								
Baughman/SR-86	Minor Collector						Minor Collector (2)	
Park Road								
Proposed Dowden/Williams	None						Major Collector (4)	
Williams/Rutherford	Minor Collector						Major Collector (4)	
Proposed Rutherford/Dietrich	None						Major Collector (4)	
Parker Road								
Ross/Gilllett	Minor Collector						Minor Collector (2)	
Payne Road								
Huff/Erskine	Minor Collector						Minor Collector (2)	
Pellett Road								
Foulds/Monte	Minor Collector						Minor Collector (2)	
Proposed Monte/Imler	Minor Collector						Minor Collector (2)	
Pickett Road								
Hastain/Butters	Minor Collector						Minor Collector (2)	

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Pierle Road								
Edgar/Wheeler	Minor Collector						Minor Collector(2)	
Pitzer Road								
Proposed Jasper/Willoughby	None						Major Collector (4)	
Chick/SR-86	Major Collector						Major Collector (4)	
SR-86/Jasper	Minor Collector						Major Collector (4)	
Pound Road								
Davis/International	Major Collector						Major Collector (4)	
International/Noffsinger	Minor Collector						Minor Collector (2)	
Pulliam Road								
Fisher/ SR-98	Minor Collector						Minor Collector (2)	
Ralph Road								
Imperial (City)/Dogwood	Major Collector						Major Collector (4)	
Dogwood/Mckim	Minor Collector						Minor Collector (2)	
Riley Road								
Bowles/Eddins	Minor Collector						Minor Collector	
Rockwood Road								
Proposed River/Lyons	Minor Collector						Prime Arterial (6)	
Lyons SR-98	Minor Collector						Prime Arterial (6)	
SR-98/Anza	Major Collector						Major Collector	
Ross Road								
Drew/Bennett	Major Collector	1,500	1,740	2,310	1.64	4,000	Major Collector (4)	A
Drew/Austin	Major Collector						Major Collector (4)	
El Centro/SR-111	Minor Arterial						Minor Arterial (4)	
SR-111/Mets	Local	N/A	560	2,120	1.64	3,500	Minor Collector (2)	B
Ruegger Road								
Kalin/SR-111	Minor Collector						Minor Collector (2)	
Rutherford Road (S26)								
Proposed Banister/Kalin							Major Collector (4)	
Kalin/Butters	Major Collector						Major Collector (4)	
Butters/Irvine	Minor Collector						Minor Collector (2)	
Schartz Road								
Proposed SR-86/Dogwood	None						Major Collector (4)	
Dogwood/McConnell	Minor Collector						Major Collector (4)	
Proposed McConnell/River	None						Major Collector (4)	
Seybert Road								
Taecker/SR-78	Minor Collector						Minor Collector	
Shank Road								
Best/SR-115	Minor Arterial						Minor Arterial (4)	
SR-115/Irvine	Minor Collector						Minor Collector (2)	
Silsbee Road								
Evan Hewes Hwy/McCabe	Minor Collector						Minor Collector (2)	
Sinclair Road								
Gentry/SR-111	Major Collector						Prime Arterial (6-divided)	
SR-111/Weist	Minor Collector						Minor Collector (2)	
Slayton Road								
Worthington/Holtville (City)	Minor Collector						Minor Collector (2)	
Snyder Road								
Worthington/Bonds Corner Road	Minor Collector						Minor Collector (2)	
Stahl Road								
McConnell/End	Minor Collector						Minor Collector (2)	
Streiby Road								
Fifield/Wiest	Minor Collector						Minor Collector (2)	
Taecker Road								
Seybert/Hastain	Minor Collector						Minor Collector (2)	
Titsworth Road								
Butters/End	Minor Collector						Minor Collector (2)	
Townsend Road								
SR-115/Holt	Minor Collector						Minor Collector (2)	
Vail Road								
Lack/Kalin	Minor Collector						Minor Collector (2)	
Van Der Linden								
Hunt/Connelly	Minor Collector						Minor Collector (2)	
Vencill Road								
Connelly/Heber	Minor Collector						Minor Collector (2)	

TABLE 3

IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
Verde School Road								
Keffer/Bornt	Minor Collector						Minor Collector (2)	
Villa Road								
Dogwood/Cooley	Minor Collector						Minor Collector (2)	
Wahl Road								
Nichols/Clark	Minor Collector						Minor Collector (2)	
Walker Road								
Gentry/End	Major Collector						Major Collector (4)	
Gentry/Brandt	Minor Collector						Minor Collector (2)	
Ware Road								
Fawcett/Willoughby	Major Collector						Major Collector (4)	
Weaver Road								
Kalin/SR-86	Minor Collector						Minor Collector (2)	
Webster Road								
Kalin/Brandt	Minor Collector						Minor Collector (2)	
Westmorland Road								
Boley/Evan Hewes Hwy	Minor Collector						Minor Collector (2)	
Westside Road								
Evan Hewes Hwy/End	Minor Collector						Minor Collector (2)	
Wheeler Road								
Erskine/Pierle	Minor Collector						Minor Collector (2)	
Wieman Road								
Steiner/Cady	Minor Collector						Minor Collector (2)	
Wienert Road								
Guthrie/Forrester	Minor Collector						Minor Collector (2)	
Wiest Road								
SR-78/Griffin	Minor Collector						Minor Collector (2)	
Griffin/Boyd	Local						Minor Collector (2)	
McDonald/SR-115	Minor Collector						Minor Collector (2)	
Wilkins Road								
English/Cuff	Minor Collector						Minor Collector (2)	
Wilkinson Road								
Brandt/SR-111	Minor Collector						Minor Collector (2)	
Wiest/Flett	Minor Collector						Minor Collector (2)	
Willoughby Road								
Proposed La Brucherie/Clark	none						Major Collector (4)	
Clark/Dogwood	Minor Collector						Major Collector (4)	
Dogwood/Kloke	Major Collector						Major Collector (4)	
Wirt Road								
Wiest/Kaiser	Minor Collector						Minor Collector (2)	
Wixom Road								
Liebert/Drew	Minor Collector						Minor Collector (2)	
Wormwood Road								
Dearborn/Fisher	Minor Collector						Minor Collector (2)	
Worthington Road (S28)								
Huff/Highline	Major Collector						Major Collector (4)	
Yocum Road								
Proposed Dogwood/Lyerly	none						Major Collector (2)	
Lyerly/Kershaw	Minor Collector						Major Collector (4)	
Kershaw/Blair	Local						Major Collector (4)	
Young Road								
SR-111/Blair	Minor Collector						Minor Collector (2)	
Zenos Road								
Barbara Worth/Holtville (City)	Minor Collector						Minor Collector (2)	
State Route 78								
S.D.-Imperial County Line/Junction SR-86	State Hwy	N/A	920	8,104	1.64	13,500	Collector (4)	A
SR-111/SR-115N	State Hwy	N/A	3,950	10,592	1.64	17,500	Collector (4)	B
SR-115N/SR-115S	State Hwy	N/A	3,100	13,447	1.64	22,500	Collector (4)	B
115S/Glamis	State Hwy	N/A	1,950	7,340	1.64	12,500	Collector (4)	A
Glamis/Olgilby	State Hwy	N/A	1,850	4,909	1.64	8,500	Collector (4)	A
Olgilby/Palo Verde, Fourth	State Hwy	N/A	2,000	5,307	1.64	9,000	Collector (4)	A
Palo Verde, Fourth/Imperial County Line	State Hwy	N/A	2,000	5,307	1.64	9,000	Collector (4)	A

TABLE 3
IMPERIAL COUNTY PROJECTED STREET SEGMENT CONFIGURATIONS AND VOLUMES (continued)

Segment Location	2003 Classification	Year 2002 ADT Volume[a]	Year 2005 ADT Volume[a]	Year 2025 ADT Volume[c]	25 Year Total Growth Factor[d]	Year 2050 ADT Volume	Year 2050 Recommended Classification (# of Lanes)	2050 LOS[e]
State Route 86								
Imperial County Line/Desert Shores	State Hwy	N/A	12,900	21,138	1.28	27,500	Minor Arterial (4)	C
Desert Shores/Brawley Ave.	State Hwy	N/A	12,400	20,319	1.28	26,500	Collector (4)	C
Brawley Ave./S. Marina	State Hwy	N/A	13,400	21,957	1.28	28,500	Minor Arterial (4)	C
S. Marina/Air Park	State Hwy	N/A	12,100	19,827	1.64	33,000	Prime Arterial (6-divided)	B
Air Park/SR-78 West	State Hwy	N/A	10,800	17,697	1.64	29,500	Minor Arterial (4)	C
SR-78 West/Lack	State Hwy	N/A	10,800	17,890	1.64	29,500	Minor Arterial (4)	C
Lack/West Westmorland City Limits	State Hwy	N/A	10,200	19,650	1.64	32,500	Prime Arterial (6-divided)	B
E Westmorland C. Limits/W Brawley C. Limits	State Hwy	N/A	14,000	19,440	1.64	32,000	Prime Arterial (6-divided)	B
South Brawley City Limits/Legion	State Hwy	N/A	21,400	28,300	1.13	32,500	Prime Arterial (6-divided)	B
Legion/Keystone	State Hwy	N/A	19,100	27,940	1.13	32,000	Prime Arterial (6-divided)	B
Keystone/Imperial Ave.	State Hwy	N/A	14,700	27,980	1.13	32,000	Prime Arterial (6-divided)	B
I-8/McCabe	State Hwy	N/A	21,500	24,890	1.28	32,000	Prime Arterial (6-divided)	B
McCabe/Heber	State Hwy	N/A	7,100	26,100	1.28	33,500	Prime Arterial (6-divided)	B
Heber/Dogwood	State Hwy	N/A	7,500	26,100	1.28	33,500	Prime Arterial (6-divided)	B
Dogwood/SR-111	State Hwy	N/A	5,200	26,000	1.28	33,500	Prime Arterial (6-divided)	B
South Imperial City Limits/North El Centro City Limits	State Hwy	N/A	6,500	27,980	1.13	32,000	Prime Arterial (6-divided)	B
State Route 98								
Imperial Hwy/Drew	State Hwy	N/A	2,300	1,730	1.64	3,000	Local Collector (2)	B
Drew/Clark	State Hwy	N/A	3,800	5,350	1.64	9,000	Collector (4)	A
Clark/Dogwood	State Hwy	N/A	4,550	8,800	1.64	14,500	Collector (4)	B
Dogwood/West Calexico City Limits	State Hwy	N/A	9,800	24,180	1.64	31,500	Prime Arterial (6-divided)	B
East Calexico City Limits/Barbara Worth	State Hwy	N/A	24,400	26,000	1.64	33,500	Prime Arterial (6-divided)	B
Barbara Worth/Bonds Corner	State Hwy	N/A	16,300	26,000	1.64	33,500	Prime Arterial (6-divided)	B
Bonds Corner/E. Highline Canal	State Hwy	N/A	4,500	770	1.64	1,500	Local Collector (2)	A
E. Highline Canal/I-8	State Hwy	N/A	2,200	250	1.64	500	Local Collector (2)	A
State Route 111								
North Calexico City Limits	State Hwy	N/A	50,000	97,570	1.13	111,000	Freeway (8)	C
Heber/McCabe	State Hwy	N/A	33,500	98,650	1.13	112,000	Freeway (8)	C
McCabe/I-8	State Hwy	N/A	37,000	90,830	1.13	103,000	Freeway (8)	C
I-8/Evan Hewes Hwy	State Hwy	N/A	16,300	52,980	1.13	60,500	Expressway (6)	D
Evan Hewes/Aten	State Hwy	N/A	14,100	60,200	1.13	68,500	Expressway (6)	D
Aten/Worthington	State Hwy	N/A	11,300	58,160	1.13	66,000	Expressway (6)	D
Worthington/Keystone	State Hwy	N/A	10,600	58,710	1.13	67,000	Expressway (6)	D
Keystone/E. Junction 78	State Hwy	N/A	9,300	57,590	1.13	65,500	Expressway (6)	D
North Brawley City Limits/Rutherford	State Hwy	N/A	9,500	18,510	1.64	30,500	Prime Arterial (6-divided)	B
Rutherford/South Calipatria City Limits	State Hwy	N/A	6,600	18,560	1.64	30,500	Prime Arterial (6-divided)	B
North Calipatria City Limits/Sinclair	State Hwy	N/A	5,700	15,640	1.64	26,000	Minor Arterial (4)	C
Sinclair/Niland Ave	State Hwy	N/A	5,100	13,532	1.64	22,500	Collector (4)	B
Niland Ave/English	State Hwy	N/A	3,700	9,817	1.64	16,500	Collector (4)	B
English/Bombay Beach	State Hwy	N/A	2,300	6,103	1.64	10,500	Collector (4)	A
Bombay Beach/Imperial-Riverside County line	State Hwy	N/A	1,900	5,041	1.64	8,500	Collector (4)	A
State Route 115								
Junction I-8/East Holtville City Limits	State Hwy	N/A	1,850	4,140	1.64	7,000	Local Collector (2)	C
West Holtville City Limits/West Junction Evan Hewes Hwy	State Hwy	N/A	6,600	8,320	1.64	14,000	Collector (4)	B
West Junction Evan Hewes Hwy/SR-78	State Hwy	N/A	2,850	27,870	1.13	32,000	Prime Arterial (6-divided)	B
SR-78/Rutherford	State Hwy	N/A	990	13,450	1.64	22,500	Minor Arterial (4)	B
Rutherford/Wirt	State Hwy	N/A	1,650	9,720	1.64	16,000	Collector (4)	B
Wirt/East Calipatria City Limits	State Hwy	N/A	1,150	9,240	1.64	15,500	Collector (4)	B
State Route 186								
I-8/International Border	State Hwy	N/A					State Hwy	

Notes:
* See Table 1 regarding additional right-of-way for transit facility with roadway.
a. Volume from Imperial County Circulation and Scenic Highways Element Manual (Dec. 2003).
b. Volume from Caltrans, Imperial County, or Linscott Law & Greenspan, Engineers counts.
c. Volumes from Caltrans CalexGP+ Model and adjusted higher in some cases.
d. A 0.5%, 1.0%, or 2.0% annual growth rate was applied to the Year 2025 volumes to obtain Year 2050 volumes.
e. Capacity based on the Imperial County Classification Table (depending on the Year 2050 volume amount).

Appendix H

Count Data

WEDNESDAY, JUNE 22 2011 CITY: IMPERIAL PROJECT: CA11-0624-02-002

DIEHL BTN DERRICK & DREW

AM Period	NB	SB	EB		WB			PM Period	NB	SB	EB		WB		
00:00			0		0			12:00			2		3		
00:15			0		0			12:15			1		4		
00:30			0		1			12:30			0		3		
00:45			1	1	0	1	2	12:45			0	3	3	13	16
01:00			1		0			13:00			6		2		
01:15			0		0			13:15			0		2		
01:30			0		0			13:30			2		0		
01:45			1	2	0	0	2	13:45			0	8	0	4	12
02:00			0		0			14:00			0		0		
02:15			0		1			14:15			2		0		
02:30			0		0			14:30			0		0		
02:45			0	0	0	1	1	14:45			2	4	1	1	5
03:00			0		0			15:00			0		2		
03:15			1		0			15:15			2		0		
03:30			0		1			15:30			2		0		
03:45			1	2	0	1	3	15:45			1	5	2	4	9
04:00			0		0			16:00			1		0		
04:15			0		0			16:15			2		0		
04:30			0		0			16:30			2		1		
04:45			0	0	1	1	1	16:45			0	5	1	2	7
05:00			1		1			17:00			0		0		
05:15			1		0			17:15			2		1		
05:30			0		1			17:30			0		0		
05:45			0	2	0	2	4	17:45			2	4	0	1	5
06:00			1		2			18:00			3		1		
06:15			0		2			18:15			2		6		
06:30			1		0			18:30			0		2		
06:45			2	4	5	9	13	18:45			2	7	1	10	17
07:00			2		2			19:00			0		0		
07:15			5		3			19:15			2		4		
07:30			4		2			19:30			0		0		
07:45			2	13	2	9	22	19:45			1	3	1	5	8
08:00			0		2			20:00			0		0		
08:15			0		3			20:15			1		1		
08:30			6		3			20:30			0		0		
08:45			4	10	1	9	19	20:45			0	1	0	1	2
09:00			1		1			21:00			5		3		
09:15			1		3			21:15			0		1		
09:30			3		1			21:30			2		0		
09:45			4	9	1	6	15	21:45			0	7	1	5	12
10:00			0		2			22:00			0		1		
10:15			0		0			22:15			0		0		
10:30			0		0			22:30			0		0		
10:45			2	2	0	2	4	22:45			1	1	1	2	3
11:00			1		2			23:00			0		1		
11:15			1		0			23:15			0		0		
11:30			5		1			23:30			0		0		
11:45			3	10	2	5	15	23:45			1	1	0	1	2
Total Vol.				55		46	**101**					49		49	**98**

Daily Totals

NB	SB	EB	WB	Combined
		104	95	**199**

	AM			PM		
Split %	54.5%	45.5%	**50.8%**	50.0%	50.0%	**49.2%**
Peak Hour	06:45	06:45	**06:45**	12:45	12:00	**12:15**
Volume	13	12	**25**	8	13	**19**
P.H.F.	0.65	0.60	**0.78**	0.33	0.81	**0.59**

WEDNESDAY, JUNE 22 2011 CITY: IMPERIAL PROJECT: CA11-0624-02-003

DREW BTN EVAN HEWES & I-8

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	4		3					12:00	13		18				
00:15	2		4					12:15	20		16				
00:30	2		1					12:30	13		19				
00:45	4	12	4	12			24	12:45	18	64	30	83			147
01:00	2		2					13:00	10		33				
01:15	1		6					13:15	13		24				
01:30	6		1					13:30	35		20				
01:45	2	11	1	10			21	13:45	29	87	10	87			174
02:00	3		0					14:00	19		13				
02:15	0		1					14:15	14		41				
02:30	2		1					14:30	16		38				
02:45	0	5	4	6			11	14:45	13	62	19	111			173
03:00	3		0					15:00	14		10				
03:15	2		3					15:15	17		30				
03:30	3		3					15:30	18		24				
03:45	4	12	5	11			23	15:45	15	64	19	83			147
04:00	8		2					16:00	11		35				
04:15	5		1					16:15	12		20				
04:30	1		6					16:30	15		22				
04:45	4	18	6	15			33	16:45	12	50	16	93			143
05:00	11		3					17:00	18		21				
05:15	6		8					17:15	11		15				
05:30	31		12					17:30	15		12				
05:45	18	66	15	38			104	17:45	9	53	9	57			110
06:00	10		10					18:00	7		8				
06:15	15		8					18:15	9		9				
06:30	20		9					18:30	9		27				
06:45	28	73	18	45			118	18:45	5	30	14	58			88
07:00	21		15					19:00	7		14				
07:15	26		22					19:15	14		3				
07:30	25		33					19:30	10		5				
07:45	39	111	36	106			217	19:45	10	41	9	31			72
08:00	29		36					20:00	11		7				
08:15	23		13					20:15	5		11				
08:30	7		19					20:30	16		4				
08:45	23	82	24	92			174	20:45	5	37	7	29			66
09:00	13		22					21:00	9		5				
09:15	12		26					21:15	8		3				
09:30	19		21					21:30	14		2				
09:45	10	54	19	88			142	21:45	14	45	5	15			60
10:00	8		28					22:00	12		12				
10:15	18		17					22:15	8		31				
10:30	9		11					22:30	6		14				
10:45	15	50	27	83			133	22:45	6	32	1	58			90
11:00	12		26					23:00	8		1				
11:15	13		19					23:15	3		5				
11:30	11		27					23:30	2		1				
11:45	13	49	17	89			138	23:45	9	22	6	13			35
Total Vol.		543		595			**1138**			587		718			**1305**

Daily Totals

NB	SB	EB	WB	Combined
1130	1313			**2443**

	AM			PM		
	NB	SB	Total	NB	SB	Total
Split %	47.7%	52.3%	**46.6%**	45.0%	55.0%	**53.4%**
Peak Hour	07:15	07:15	**07:15**	13:30	14:00	**12:45**
Volume	119	127	**246**	97	111	**183**
P.H.F.	0.76	0.88	**0.82**	0.73	0.68	**0.83**

WEDNESDAY, JUNE 22 2011 CITY: IMPERIAL PROJECT: CA11-0624-02-004

DREW BTN I-8 & DIEHL

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	0		2					12:00	7		5				
00:15	0		1					12:15	11		13				
00:30	1		0					12:30	8		2				
00:45	0	1	3	6			7	12:45	6	32	7	27			59
01:00	1		2					13:00	5		9				
01:15	1		1					13:15	8		8				
01:30	1		0					13:30	13		7				
01:45	1	4	1	4			8	13:45	4	30	3	27			57
02:00	0		1					14:00	7		7				
02:15	1		0					14:15	9		8				
02:30	2		0					14:30	14		12				
02:45	0	3	1	2			5	14:45	9	39	8	35			74
03:00	0		0					15:00	8		7				
03:15	0		0					15:15	9		12				
03:30	1		1					15:30	10		7				
03:45	1	2	1	2			4	15:45	10	37	11	37			74
04:00	0		0					16:00	6		9				
04:15	2		1					16:15	10		13				
04:30	3		1					16:30	8		8				
04:45	2	7	2	4			11	16:45	2	26	10	40			66
05:00	3		2					17:00	1		12				
05:15	7		12					17:15	5		11				
05:30	8		10					17:30	1		9				
05:45	5	23	12	36			59	17:45	12	19	8	40			59
06:00	7		6					18:00	6		8				
06:15	5		4					18:15	7		8				
06:30	12		5					18:30	2		12				
06:45	18	42	4	19			61	18:45	4	19	6	34			53
07:00	11		8					19:00	2		5				
07:15	14		5					19:15	3		7				
07:30	9		9					19:30	5		4				
07:45	15	49	7	29			78	19:45	4	14	3	19			33
08:00	7		10					20:00	3		3				
08:15	6		7					20:15	2		9				
08:30	6		9					20:30	1		5				
08:45	6	25	15	41			66	20:45	4	10	9	26			36
09:00	5		7					21:00	1		2				
09:15	11		6					21:15	1		5				
09:30	9		3					21:30	1		2				
09:45	7	32	6	22			54	21:45	0	3	3	12			15
10:00	9		10					22:00	2		0				
10:15	8		6					22:15	2		4				
10:30	7		8					22:30	1		1				
10:45	9	33	7	31			64	22:45	0	5	1	6			11
11:00	6		8					23:00	0		1				
11:15	11		3					23:15	2		0				
11:30	15		13					23:30	0		1				
11:45	10	42	6	30			72	23:45	1	3	2	4			7
Total Vol.		263		226			**489**			237		307			**544**

Daily Totals

NB	SB	EB	WB	Combined
500	533			**1033**

	AM			PM		
	NB	SB	Combined	NB	SB	Combined
Split %	53.8%	46.2%	**47.3%**	43.6%	56.4%	**52.7%**
Peak Hour	06:30	08:00	**11:30**	14:15	16:15	**14:30**
Volume	55	41	**80**	40	43	**79**
P.H.F.	0.76	0.68	**0.71**	0.73	0.83	**0.76**

WEDNESDAY, JUNE 22 2011 CITY: IMPERIAL PROJECT: CA11-0624-02-005

DREW BTN DIEHL & KUBLER

AM Period	NB		SB		EB		WB			PM Period	NB		SB		EB		WB		
00:00	0		2							12:00	2		1						
00:15	0		1							12:15	8		8						
00:30	1		0							12:30	5		0						
00:45	1	2	2	5					7	12:45	3	18	2	11					29
01:00	0		1							13:00	6		6						
01:15	2		1							13:15	1		1						
01:30	0		0							13:30	10		2						
01:45	0	2	0	2					4	13:45	2	19	2	11					30
02:00	0		1							14:00	6		4						
02:15	1		0							14:15	5		3						
02:30	3		0							14:30	3		5						
02:45	1	5	2	3					8	14:45	2	16	7	19					35
03:00	0		0							15:00	3		4						
03:15	0		0							15:15	5		4						
03:30	0		1							15:30	2		2						
03:45	1	1	1	2					3	15:45	6	16	4	14					30
04:00	0		1							16:00	2		7						
04:15	1		1							16:15	1		1						
04:30	1		0							16:30	0		10						
04:45	1	3	2	4					7	16:45	5	8	8	26					34
05:00	1		2							17:00	2		1						
05:15	3		13							17:15	2		8						
05:30	4		3							17:30	2		1						
05:45	2	10	2	20					30	17:45	1	7	2	12					19
06:00	5		4							18:00	1		4						
06:15	3		3							18:15	5		3						
06:30	9		2							18:30	2		3						
06:45	6	23	2	11					34	18:45	4	12	4	14					26
07:00	9		1							19:00	1		3						
07:15	10		6							19:15	0		0						
07:30	8		5							19:30	3		1						
07:45	6	33	10	22					55	19:45	1	5	2	6					11
08:00	3		5							20:00	0		1						
08:15	3		1							20:15	0		2						
08:30	4		7							20:30	1		1						
08:45	1	11	10	23					34	20:45	0	1	0	4					5
09:00	6		6							21:00	0		2						
09:15	7		2							21:15	2		1						
09:30	3		3							21:30	0		0						
09:45	2	18	2	13					31	21:45	0	2	1	4					6
10:00	1		7							22:00	0		0						
10:15	5		4							22:15	3		1						
10:30	1		3							22:30	0		0						
10:45	5	12	4	18					30	22:45	0	3	0	1					4
11:00	2		5							23:00	1		1						
11:15	4		1							23:15	0		0						
11:30	7		7							23:30	0		0						
11:45	8	21	3	16					37	23:45	0	1	1	2					3
Total Vol.		141		139					**280**			108		124					**232**

Daily Totals

NB	SB	EB	WB	Combined
249	263			**512**

	AM			PM		
Split %	50.4%	49.6%	**54.7%**	46.6%	53.4%	**45.3%**
Peak Hour	06:30	07:15	**07:00**	13:30	16:30	**12:15**
Volume	34	26	**55**	23	27	**38**
P.H.F.	0.85	0.65	**0.86**	0.60	0.68	**0.59**

EVAN HEWES BTN DERRICK & DREW

AM Period	NB	SB	EB		WB			PM Period	NB	SB	EB		WB		
00:00			0		1			12:00			19		22		
00:15			1		0			12:15			22		26		
00:30			0		0			12:30			26		20		
00:45			0	1	0	1	2	12:45			31	98	18	86	184
01:00			2		0			13:00			22		12		
01:15			1		2			13:15			35		15		
01:30			0		1			13:30			31		11		
01:45			0	3	0	3	6	13:45			25	113	19	57	170
02:00			0		0			14:00			28		16		
02:15			2		0			14:15			22		14		
02:30			1		2			14:30			26		10		
02:45			0	3	1	3	6	14:45			31	107	11	51	158
03:00			0		0			15:00			33		9		
03:15			0		2			15:15			26		15		
03:30			0		1			15:30			32		12		
03:45			0	0	3	6	6	15:45			42	133	16	52	185
04:00			2		4			16:00			80		18		
04:15			1		5			16:15			55		25		
04:30			0		9			16:30			62		20		
04:45			2	5	11	29	34	16:45			40	237	28	91	328
05:00			3		20			17:00			31		22		
05:15			7		18			17:15			33		16		
05:30			15		70			17:30			26		12		
05:45			12	37	41	149	186	17:45			20	110	10	60	170
06:00			20		35			18:00			15		9		
06:15			10		31			18:15			16		13		
06:30			28		44			18:30			20		11		
06:45			31	89	36	146	235	18:45			11	62	10	43	105
07:00			20		35			19:00			15		9		
07:15			22		20			19:15			12		12		
07:30			19		44			19:30			11		6		
07:45			22	83	55	154	237	19:45			12	50	7	34	84
08:00			26		30			20:00			9		9		
08:15			31		33			20:15			8		8		
08:30			33		18			20:30			2		12		
08:45			35	125	20	101	226	20:45			5	24	7	36	60
09:00			20		16			21:00			3		6		
09:15			26		11			21:15			4		15		
09:30			28		15			21:30			6		11		
09:45			21	95	20	62	157	21:45			7	20	9	41	61
10:00			15		22			22:00			17		10		
10:15			12		18			22:15			11		7		
10:30			18		11			22:30			18		6		
10:45			22	67	15	66	133	22:45			3	49	2	25	74
11:00			20		10			23:00			5		3		
11:15			19		16			23:15			2		1		
11:30			10		22			23:30			5		2		
11:45			16	65	10	58	123	23:45			3	15	3	9	24
Total Vol.				573		778	**1351**					1018		585	**1603**

Daily Totals

NB	SB	EB	WB	**Combined**
		1591	1363	**2954**

	AM			PM		
Split %	42.4%	57.6%	**45.7%**	63.5%	36.5%	**54.3%**
Peak Hour	08:00	05:30	**07:30**	15:45	16:15	**16:00**
Volume	125	177	**260**	239	95	**328**
P.H.F.	0.89	0.63	**0.84**	0.75	0.85	**0.84**

WEDNESDAY, JUNE 22 2011 CITY: IMPERIAL PROJECT: CA11-0624-02-007

EVAN HEWES BTN DREW & FORRESTER

AM Period	NB	SB	EB		WB			PM Period	NB	SB	EB		WB		
00:00			1		3			12:00			22		26		
00:15			1		3			12:15			27		22		
00:30			2		0			12:30			29		15		
00:45			2	6	2	8	14	12:45			21	99	31	94	193
01:00			1		2			13:00			33		18		
01:15			4		0			13:15			32		31		
01:30			3		2			13:30			19		32		
01:45			1	9	0	4	13	13:45			20	104	26	107	211
02:00			2		0			14:00			29		17		
02:15			0		0			14:15			37		18		
02:30			0		0			14:30			46		19		
02:45			0	2	0	0	2	14:45			40	152	22	76	228
03:00			2		0			15:00			35		14		
03:15			3		2			15:15			35		12		
03:30			0		3			15:30			32		23		
03:45			2	7	4	9	16	15:45			41	143	23	72	215
04:00			0		5			16:00			40		19		
04:15			2		3			16:15			39		12		
04:30			0		6			16:30			33		15		
04:45			5	7	9	23	30	16:45			46	158	21	67	225
05:00			5		9			17:00			26		12		
05:15			3		12			17:15			33		16		
05:30			4		17			17:30			19		11		
05:45			6	18	42	80	98	17:45			12	90	11	50	140
06:00			10		27			18:00			5		12		
06:15			7		17			18:15			10		15		
06:30			11		17			18:30			9		13		
06:45			20	48	20	81	129	18:45			11	35	15	55	90
07:00			29		21			19:00			14		10		
07:15			31		34			19:15			12		10		
07:30			30		49			19:30			13		14		
07:45			19	109	57	161	270	19:45			12	51	7	41	92
08:00			16		38			20:00			10		6		
08:15			21		17			20:15			9		3		
08:30			23		12			20:30			10		5		
08:45			25	85	19	86	171	20:45			11	40	10	24	64
09:00			28		17			21:00			10		7		
09:15			29		20			21:15			4		7		
09:30			23		22			21:30			5		12		
09:45			18	98	18	77	175	21:45			9	28	15	41	69
10:00			16		17			22:00			16		9		
10:15			12		13			22:15			25		6		
10:30			26		12			22:30			12		2		
10:45			30	84	22	64	148	22:45			4	57	4	21	78
11:00			25		27			23:00			3		3		
11:15			17		22			23:15			3		4		
11:30			17		15			23:30			2		3		
11:45			12	71	10	74	145	23:45			7	15	2	12	27
Total Vol.				544		667	**1211**					972		660	**1632**

Daily Totals

NB	SB	EB	WB	Combined
		1516	1327	**2843**

	AM			PM		
	EB	WB	Combined	EB	WB	Combined
Split %	44.9%	55.1%	**42.6%**	59.6%	40.4%	**57.4%**
Peak Hour	06:45	07:15	**07:15**	14:15	12:45	**14:15**
Volume	110	178	**274**	158	112	**231**
P.H.F.	0.89	0.78	**0.87**	0.86	0.88	**0.89**

WEDNESDAY, JUNE 22 2011 CITY: IMPERIAL PROJECT: CA11-0624-02-008

FORRESTER BTN EVAN HEWES & I-8

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	9		6					12:00	36		33				
00:15	7		12					12:15	46		31				
00:30	8		15					12:30	47		31				
00:45	8	32	20	53			85	12:45	41	170	42	137			307
01:00	10		12					13:00	44		44				
01:15	6		10					13:15	28		45				
01:30	7		18					13:30	34		51				
01:45	10	33	13	53			86	13:45	51	157	55	195			352
02:00	12		19					14:00	48		40				
02:15	9		7					14:15	30		57				
02:30	11		23					14:30	43		40				
02:45	22	54	9	58			112	14:45	47	168	32	169			337
03:00	14		13					15:00	63		33				
03:15	8		8					15:15	31		40				
03:30	14		16					15:30	40		38				
03:45	20	56	15	52			108	15:45	65	199	42	153			352
04:00	21		10					16:00	31		39				
04:15	22		13					16:15	33		58				
04:30	18		18					16:30	38		40				
04:45	28	89	26	67			156	16:45	40	142	32	169			311
05:00	29		22					17:00	44		44				
05:15	28		42					17:15	32		48				
05:30	32		22					17:30	36		32				
05:45	28	117	28	114			231	17:45	41	153	33	157			310
06:00	22		30					18:00	47		30				
06:15	12		25					18:15	37		28				
06:30	35		26					18:30	43		26				
06:45	28	97	38	119			216	18:45	58	185	22	106			291
07:00	31		33					19:00	31		35				
07:15	33		30					19:15	31		21				
07:30	38		31					19:30	31		20				
07:45	30	132	33	127			259	19:45	27	120	28	104			224
08:00	48		40					20:00	43		18				
08:15	28		44					20:15	30		26				
08:30	27		51					20:30	31		23				
08:45	33	136	50	185			321	20:45	23	127	23	90			217
09:00	37		38					21:00	27		20				
09:15	22		32					21:15	25		19				
09:30	46		33					21:30	26		26				
09:45	32	137	31	134			271	21:45	30	108	18	83			191
10:00	31		28					22:00	26		10				
10:15	39		26					22:15	25		9				
10:30	33		32					22:30	26		12				
10:45	40	143	34	120			263	22:45	25	102	15	46			148
11:00	49		30					23:00	9		11				
11:15	42		33					23:15	14		9				
11:30	42		37					23:30	11		10				
11:45	51	184	26	126			310	23:45	13	47	16	46			93
Total Vol.		1210		1208			**2418**			1678		1455			**3133**

Daily Totals

NB	SB	EB	WB	**Combined**
2888	2663			**5551**

	AM				PM			
Split %	50.0%	50.0%	**43.6%**		53.6%	46.4%		**56.4%**
Peak Hour	11:00	08:00	**08:00**		15:00	13:30		**13:30**
Volume	184	185	**321**		199	203		**366**
P.H.F.	0.90	0.91	**0.91**		0.69	0.89		**0.86**

CALTRANS 2010 AADT

Dist	Route	CO		Postmile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
11	8	IMP	R	23.48	DUNAWAY RD	1,800	14,200	12,100	1,800	13,200	12,200
11	8	IMP	R	29.933	DREW RD	1,800	13,200	12,200	2,000	15,100	13,800
11	8	IMP	R	33.991	FORRESTER RD	2,000	15,100	13,800	2,150	19,000	17,000

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

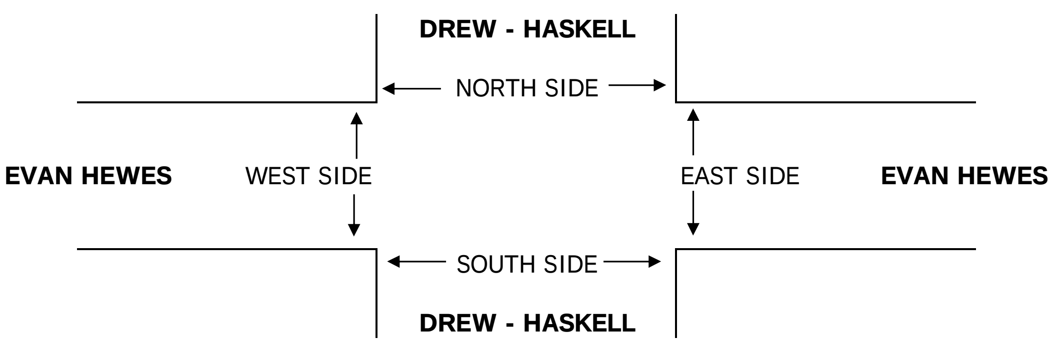
DATE:	LOCATION:	IMPERIAL	PROJECT #:	CA11-0624-02
6/22/11	NORTH & SOUTH:	DREW - HASKELL	LOCATION #:	2
WEDNESDAY	EAST & WEST:	EVAN HEWES	CONTROL:	4 WAY STOP

NOTES:

AM / PM / MD / OTHER / OTHER

▲ N / ◀ W / E ▶ / S ▼

		NORTHBOUND DREW - HASKELL			SOUTHBOUND DREW - HASKELL			EASTBOUND EVAN HEWES			WESTBOUND EVAN HEWES			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
AM	5:30 AM	34	2	0	1	5	1	0	6	5	3	37	2	96
AM	5:45 AM	17	1	0	3	1	0	1	4	6	2	20	1	56
AM	6:00 AM	12	1	0	0	1	1	1	6	11	0	17	0	50
AM	6:15 AM	20	1	4	3	3	0	0	6	3	1	16	0	57
AM	6:30 AM	17	1	2	2	3	1	1	16	8	1	23	0	75
AM	6:45 AM	18	2	7	0	4	1	1	17	10	3	18	1	82
AM	7:00 AM	10	5	7	1	3	2	2	13	8	7	18	1	77
AM	7:15 AM	24	3	1	3	8	6	1	13	10	10	37	1	117
AM	VOLUMES	152	16	21	13	28	12	7	81	61	27	186	6	610
AM	APPROACH %	80%	8%	11%	25%	53%	23%	5%	54%	41%	12%	85%	3%	
AM	APP/DEPART	189	/	29	53	/	116	149	/	115	219	/	350	0
AM	BEGIN PEAK HR		6:30 AM											
AM	VOLUMES	69	11	17	6	18	10	5	59	36	21	96	3	351
AM	APPROACH %	71%	11%	18%	18%	53%	29%	5%	59%	36%	18%	80%	3%	
AM	PEAK HR FACTOR		0.866			0.500			0.893			0.625		0.750
AM	APP/DEPART	97	/	19	34	/	75	100	/	82	120	/	175	0
PM	4:00 PM	10	5	2	2	4	2	5	37	32	4	3	6	112
PM	4:15 PM	10	2	1	6	3	1	0	25	14	4	11	3	80
PM	4:30 PM	10	7	4	2	2	5	2	30	24	2	10	3	101
PM	4:45 PM	12	5	3	4	1	4	1	22	22	3	9	7	93
PM	5:00 PM	13	9	1	2	2	0	1	16	11	6	7	5	73
PM	5:15 PM	9	7	1	2	3	1	2	12	19	4	8	6	74
PM	5:30 PM	2	4	3	0	3	3	2	10	8	3	4	7	49
PM	5:45 PM	1	6	1	2	0	0	2	6	6	0	13	3	40
PM	VOLUMES	67	45	16	20	18	16	15	158	136	26	65	40	622
PM	APPROACH %	52%	35%	13%	37%	33%	30%	5%	51%	44%	20%	50%	31%	
PM	APP/DEPART	128	/	100	54	/	180	309	/	194	131	/	148	0
PM	BEGIN PEAK HR		4:00 PM											
PM	VOLUMES	42	19	10	14	10	12	8	114	92	13	33	19	386
PM	APPROACH %	59%	27%	14%	39%	28%	33%	4%	53%	43%	20%	51%	29%	
PM	PEAK HR FACTOR		0.845			0.900			0.723			0.855		0.862
PM	APP/DEPART	71	/	46	36	/	115	214	/	138	65	/	87	0



INTERSECTION TURNING MOVEMENT COUNTS

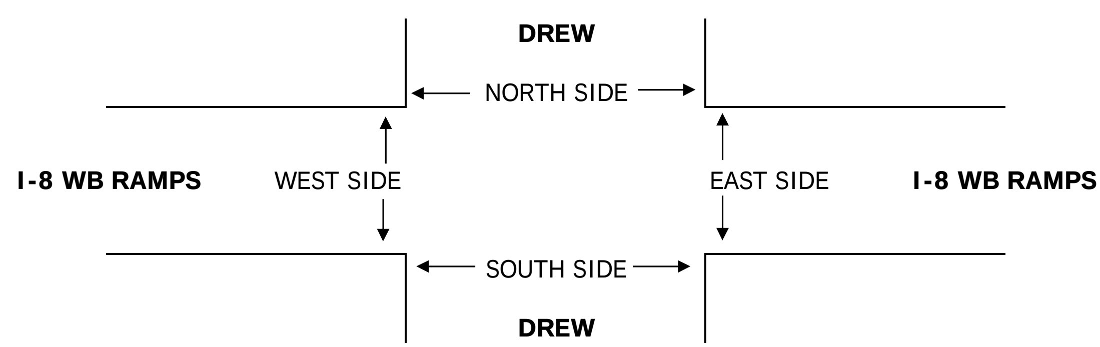
PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE: 6/22/11 WEDNESDAY	LOCATION:	IMPERIAL	PROJECT #: CA11-0624-02
	NORTH & SOUTH:	DREW	LOCATION #: 4
	EAST & WEST:	I-8 WB RAMPS	CONTROL: 1 WAY STOP WB

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N — ◀ W — E ▶ — S ▼

		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
			DREW			DREW			I-8 WB RAMPS			I-8 WB RAMPS		
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	1	1	X	X	1	0	X	X	X	0.5	0	0.5	
AM	5:30 AM	1	2			10	0				3	0	27	43
AM	5:45 AM	1	2			12	1				8	0	13	37
AM	6:00 AM	2	1			7	0				7	0	10	27
AM	6:15 AM	0	6			8	1				1	0	11	27
AM	6:30 AM	0	4			9	0				4	0	12	29
AM	6:45 AM	1	11			14	1				2	0	14	43
AM	7:00 AM	0	8			9	7				3	0	10	37
AM	7:15 AM	6	0			13	8				3	0	20	50
AM	VOLUMES	11	34	0	0	82	18	0	0	0	31	0	117	293
AM	APPROACH %	24%	76%	0%	0%	82%	18%	0%	0%	0%	21%	0%	79%	
AM	APP/DEPART	45	/	151	100	/	113	0	/	0	148	/	29	0
AM	BEGIN PEAK HR		6:30 AM											
AM	VOLUMES	7	23	0	0	45	16	0	0	0	12	0	56	159
AM	APPROACH %	23%	77%	0%	0%	74%	26%	0%	0%	0%	18%	0%	82%	
AM	PEAK HR FACTOR		0.625			0.726			0.000			0.739		0.795
AM	APP/DEPART	30	/	79	61	/	57	0	/	0	68	/	23	0
PM	4:00 PM	0	2			33	1				2	0	8	46
PM	4:15 PM	0	3			16	2				5	0	7	33
PM	4:30 PM	0	3			16	2				4	0	12	37
PM	4:45 PM	0	4			19	1				3	0	10	37
PM	5:00 PM	0	6			18	0				5	0	9	38
PM	5:15 PM	0	3			14	0				6	0	7	30
PM	5:30 PM	0	5			11	2				4	0	8	30
PM	5:45 PM	0	5			7	0				7	0	3	22
PM	VOLUMES	0	31	0	0	134	8	0	0	0	36	0	64	273
PM	APPROACH %	0%	100%	0%	0%	94%	6%	0%	0%	0%	36%	0%	64%	
PM	APP/DEPART	31	/	95	142	/	170	0	/	0	100	/	8	0
PM	BEGIN PEAK HR		4:00 PM											
PM	VOLUMES	0	12	0	0	84	6	0	0	0	14	0	37	153
PM	APPROACH %	0%	100%	0%	0%	93%	7%	0%	0%	0%	27%	0%	73%	
PM	PEAK HR FACTOR		0.750			0.662			0.000			0.797		0.832
PM	APP/DEPART	12	/	49	90	/	98	0	/	0	51	/	6	0



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

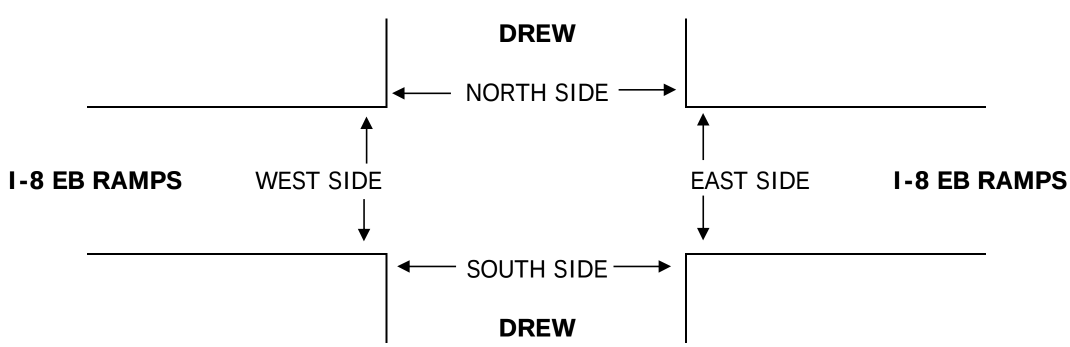
DATE: 6/22/11 WEDNESDAY			
LOCATION:	IMPERIAL	PROJECT #:	CA11-0624-02
NORTH & SOUTH:	DREW	LOCATION #:	5
EAST & WEST:	I-8 EB RAMPS	CONTROL:	1 WAY STOP EB

NOTES:

AM PM MD OTHER OTHER

▲ N ◀ W E ▶ S ▼

		NORTHBOUND DREW			SOUTHBOUND DREW			EASTBOUND I-8 EB RAMPS			WESTBOUND I-8 EB RAMPS			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	X	1	0	0	1	X	0.5	0	0.5	X	X	X	
AM	5:30 AM		3	4	6	11		0	0	0				24
AM	5:45 AM		3	3	6	9		0	0	0				21
AM	6:00 AM		2	5	9	5		1	0	0				22
AM	6:15 AM		2	3	9	3		4	0	1				22
AM	6:30 AM		3	8	7	6		1	0	0				25
AM	6:45 AM		11	6	11	3		1	0	0				32
AM	7:00 AM		5	5	9	7		3	0	0				29
AM	7:15 AM		8	8	10	4		1	0	0				31
AM	VOLUMES	0	37	42	67	48	0	11	0	1	0	0	0	206
AM	APPROACH %	0%	47%	53%	58%	42%	0%	92%	0%	8%	0%	0%	0%	
AM	APP/DEPART	79	/	48	115	/	49	12	/	109	0	/	0	0
AM	BEGIN PEAK HR		6:30 AM											
AM	VOLUMES	0	27	27	37	20	0	6	0	0	0	0	0	117
AM	APPROACH %	0%	50%	50%	65%	35%	0%	100%	0%	0%	0%	0%	0%	
AM	PEAK HR FACTOR		0.794			0.891			0.500			0.000		0.914
AM	APP/DEPART	54	/	33	57	/	20	6	/	64	0	/	0	0
PM	4:00 PM		2	3	22	9		1	0	1				38
PM	4:15 PM		1	8	10	9		1	0	2				31
PM	4:30 PM		2	6	14	6		2	0	2				32
PM	4:45 PM		1	1	13	9		3	0	0				27
PM	5:00 PM		1	0	11	12		4	0	1				29
PM	5:15 PM		2	3	8	10		5	0	0				28
PM	5:30 PM		1	0	9	9		1	0	0				20
PM	5:45 PM		3	6	4	7		2	0	0				22
PM	VOLUMES	0	13	27	91	71	0	19	0	6	0	0	0	227
PM	APPROACH %	0%	33%	68%	56%	44%	0%	76%	0%	24%	0%	0%	0%	
PM	APP/DEPART	40	/	32	162	/	77	25	/	118	0	/	0	0
PM	BEGIN PEAK HR		4:00 PM											
PM	VOLUMES	0	6	18	59	33	0	7	0	5	0	0	0	128
PM	APPROACH %	0%	25%	75%	64%	36%	0%	58%	0%	42%	0%	0%	0%	
PM	PEAK HR FACTOR		0.667			0.742			0.750			0.000		0.842
PM	APP/DEPART	24	/	13	92	/	38	12	/	77	0	/	0	0



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

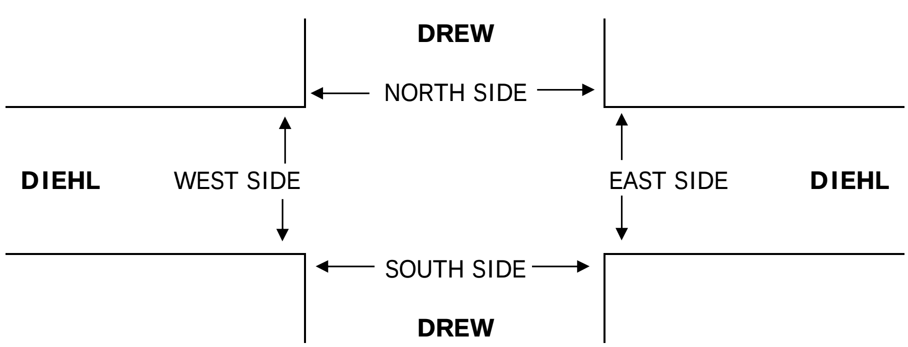
DATE:	LOCATION:	IMPERIAL	PROJECT #:	CA11-0624-02
6/22/11	NORTH & SOUTH:	DREW	LOCATION #:	6
WEDNESDAY	EAST & WEST:	DIEHL	CONTROL:	2 WAY STOP EW

NOTES:

AM / PM / MD / OTHER / OTHER

▲ N / ◄ W / E ► / S ▼

		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
			DREW			DREW			DIEHL			DIEHL		
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
AM	5:30 AM	1	1	0	0	2	0	0	0	0	0	0	0	4
AM	5:45 AM	0	4	0	0	4	0	0	0	0	0	0	0	8
AM	6:00 AM	1	2	0	0	2	0	0	0	1	0	0	0	6
AM	6:15 AM	3	5	0	0	2	0	0	0	0	0	0	0	10
AM	6:30 AM	0	6	0	0	3	0	0	0	1	0	0	0	10
AM	6:45 AM	1	7	0	0	1	3	2	0	0	0	0	0	14
AM	7:00 AM	0	8	0	0	3	2	0	0	2	0	0	0	15
AM	7:15 AM	2	5	0	0	4	1	1	0	3	0	0	1	17
AM	VOLUMES	8	38	0	0	21	6	3	0	7	0	0	1	84
AM	APPROACH %	17%	83%	0%	0%	78%	22%	30%	0%	70%	0%	0%	100%	
AM	APP/DEPART	46	/	42	27	/	28	10	/	0	1	/	14	0
AM	BEGIN PEAK HR		6:30 AM											
AM	VOLUMES	3	26	0	0	11	6	3	0	6	0	0	1	56
AM	APPROACH %	10%	90%	0%	0%	65%	35%	33%	0%	67%	0%	0%	100%	
AM	PEAK HR FACTOR		0.906			0.850			0.563			0.250		0.824
AM	APP/DEPART	29	/	30	17	/	17	9	/	0	1	/	9	0
PM	4:00 PM	0	1	0	0	2	0	1	0	0	0	0	0	4
PM	4:15 PM	0	0	0	0	8	0	2	0	0	0	0	0	10
PM	4:30 PM	1	4	0	0	8	1	0	0	1	0	0	0	15
PM	4:45 PM	0	2	0	0	1	0	0	0	0	0	0	0	3
PM	5:00 PM	0	2	0	0	7	0	0	0	1	0	0	0	10
PM	5:15 PM	0	2	0	0	1	1	2	0	0	0	0	0	6
PM	5:30 PM	0	1	0	0	2	0	0	0	0	0	0	0	3
PM	5:45 PM	0	1	0	0	2	0	0	0	2	0	0	0	5
PM	VOLUMES	1	13	0	0	31	2	5	0	4	0	0	0	56
PM	APPROACH %	7%	93%	0%	0%	94%	6%	56%	0%	44%	0%	0%	0%	
PM	APP/DEPART	14	/	18	33	/	35	9	/	0	0	/	3	0
PM	BEGIN PEAK HR		4:15 PM											
PM	VOLUMES	1	8	0	0	24	1	2	0	2	0	0	0	38
PM	APPROACH %	11%	89%	0%	0%	96%	4%	50%	0%	50%	0%	0%	0%	
PM	PEAK HR FACTOR		0.450			0.694			0.500			0.000		0.633
PM	APP/DEPART	9	/	10	25	/	26	4	/	0	0	/	2	0



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:	LOCATION:	EL CENTRO	PROJECT #:	CA11-0325-03
3/24/11	NORTH & SOUTH:	DREW	LOCATION #:	3
THURSDAY	EAST & WEST:	SR-98	CONTROL:	1 WAY STOP SB

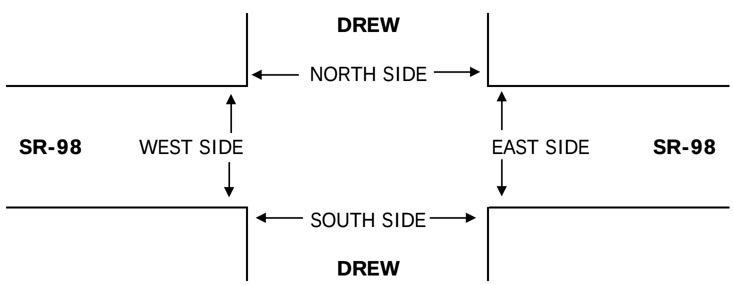
NOTES:

AM
PM
MD
OTHER
OTHER

▲ N
◄ W
E ►
S ▼

	NORTHBOUND DREW			SOUTHBOUND DREW			EASTBOUND SR-98			WESTBOUND SR-98			TOTAL
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	X	X	X	0.5	X	0.5	0	1	X	X	1	0	
AM													
6:00 AM				0		0	0	5			10	2	17
6:15 AM				0		1	1	1			5	1	9
6:30 AM				0		1	0	6			12	0	19
6:45 AM				0		0	0	5			17	1	23
7:00 AM				0		0	1	8			13	1	23
7:15 AM				0		1	0	8			9	1	19
7:30 AM				0		0	1	3			11	1	16
7:45 AM				0		0	3	10			3	0	16
VOLUMES	0	0	0	0	0	3	6	46	0	0	80	7	142
APPROACH %	0%	0%	0%	0%	0%	100%	12%	88%	0%	0%	92%	8%	
APP/DEPART	0	/	13	3	/	0	52	/	46	87	/	83	0
BEGIN PEAK HR		6:30 AM											
VOLUMES	0	0	0	0	0	2	1	27	0	0	51	3	84
APPROACH %	0%	0%	0%	0%	0%	100%	4%	96%	0%	0%	94%	6%	
PEAK HR FACTOR		0.000			0.500			0.778			0.750		0.913
APP/DEPART	0	/	4	2	/	0	28	/	27	54	/	53	0
PM													
4:00 PM				1		0	2	13			8	2	26
4:15 PM				2		0	0	21			10	1	34
4:30 PM				2		0	2	28			10	2	44
4:45 PM				1		0	0	24			14	0	39
5:00 PM				1		1	0	16			17	1	36
5:15 PM				0		0	0	23			12	0	35
5:30 PM				1		0	0	10			11	0	22
5:45 PM				0		0	0	13			9	0	22
VOLUMES	0	0	0	8	0	1	4	148	0	0	91	6	258
APPROACH %	0%	0%	0%	89%	0%	11%	3%	97%	0%	0%	94%	6%	
APP/DEPART	0	/	10	9	/	0	152	/	156	97	/	92	0
BEGIN PEAK HR		4:30 PM											
VOLUMES	0	0	0	4	0	1	2	91	0	0	53	3	154
APPROACH %	0%	0%	0%	80%	0%	20%	2%	98%	0%	0%	95%	5%	
PEAK HR FACTOR		0.000			0.625			0.775			0.778		0.875
APP/DEPART	0	/	5	5	/	0	93	/	95	56	/	54	0

U-TURNS	NB	SB	EB	WB	TTL
	X	X	X	X	
6:00 AM					0
6:15 AM					0
6:30 AM					0
6:45 AM					0
7:00 AM					0
7:15 AM					0
7:30 AM					0
7:45 AM					0
VOLUMES	0	0	0	0	0
4:00 PM					0
4:15 PM					0
4:30 PM					0
4:45 PM					0
5:00 PM					0
5:15 PM					0
5:30 PM					0
5:45 PM					0
VOLUMES	0	0	0	0	0



	PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM															
6:00 AM					0					0					0
6:15 AM					0					0					0
6:30 AM					0					0					0
6:45 AM					0					0					0
7:00 AM					0					0					0
7:15 AM					0					0					0
7:30 AM					0					0					0
7:45 AM					0					0					0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM															
4:00 PM					0					0					0
4:15 PM					0					0					0
4:30 PM					0					0					0
4:45 PM					0					0					0
5:00 PM					0					0					0
5:15 PM					0					0					0
5:30 PM					0					0					0
5:45 PM					0					0					0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

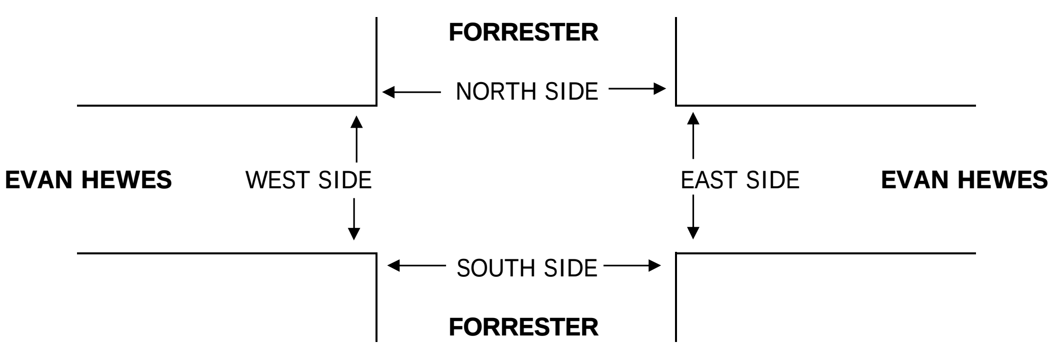
DATE:	LOCATION:	IMPERIAL	PROJECT #:	CA11-0624-02
6/22/11	NORTH & SOUTH:	FORRESTER	LOCATION #:	3
WEDNESDAY	EAST & WEST:	EVAN HEWES	CONTROL:	SIGNAL

NOTES:

AM / PM / MD / OTHER / OTHER

▲ N / ◄ W / E ► / S ▼

		NORTHBOUND FORRESTER			SOUTHBOUND FORRESTER			EASTBOUND EVAN HEWES			WESTBOUND EVAN HEWES			TOTAL
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	LANES:	1	1	0	1	1	0	0	1	0	0	1	0	
AM	5:30 AM	5	23	3	2	19	13	4	16	2	2	20	6	115
AM	5:45 AM	4	19	2	2	24	8	3	7	0	2	19	4	94
AM	6:00 AM	2	19	2	2	22	8	2	11	2	4	10	3	87
AM	6:15 AM	0	8	1	2	20	7	4	11	0	4	20	1	78
AM	6:30 AM	6	24	3	3	22	6	2	9	1	5	29	0	110
AM	6:45 AM	2	20	5	6	27	3	2	14	1	3	20	3	106
AM	7:00 AM	4	27	4	2	30	9	5	10	1	1	31	3	127
AM	7:15 AM	1	24	3	4	25	7	4	19	5	3	26	2	123
AM	VOLUMES	24	164	23	23	189	61	26	97	12	24	175	22	840
AM	APPROACH %	11%	78%	11%	8%	69%	22%	19%	72%	9%	11%	79%	10%	
AM	APP/DEPART	211	/	212	273	/	225	135	/	143	221	/	260	0
AM	BEGIN PEAK HR		6:30 AM											
AM	VOLUMES	13	95	15	15	104	25	13	52	8	12	106	8	466
AM	APPROACH %	11%	77%	12%	10%	72%	17%	18%	71%	11%	10%	84%	6%	
AM	PEAK HR FACTOR		0.879			0.878			0.652			0.900		0.917
AM	APP/DEPART	123	/	116	144	/	124	73	/	82	126	/	144	0
PM	4:00 PM	1	27	4	6	26	4	8	50	5	8	24	6	169
PM	4:15 PM	1	23	8	4	42	2	6	36	6	7	27	4	166
PM	4:30 PM	4	30	3	3	29	5	14	49	2	4	25	2	170
PM	4:45 PM	2	30	3	7	31	4	10	40	2	5	20	1	155
PM	5:00 PM	2	33	4	3	33	4	3	29	1	5	21	4	142
PM	5:15 PM	5	25	8	2	36	3	2	29	4	6	15	3	138
PM	5:30 PM	1	28	5	5	33	3	4	15	2	1	28	5	130
PM	5:45 PM	5	24	8	2	21	6	9	15	6	3	29	4	132
PM	VOLUMES	21	220	43	32	251	31	56	263	28	39	189	29	1,202
PM	APPROACH %	7%	77%	15%	10%	80%	10%	16%	76%	8%	15%	74%	11%	
PM	APP/DEPART	284	/	305	314	/	318	347	/	338	257	/	241	0
PM	BEGIN PEAK HR		4:00 PM											
PM	VOLUMES	8	110	18	20	128	15	38	175	15	24	96	13	660
PM	APPROACH %	6%	81%	13%	12%	79%	9%	17%	77%	7%	18%	72%	10%	
PM	PEAK HR FACTOR		0.919			0.849			0.877			0.875		0.971
PM	APP/DEPART	136	/	161	163	/	167	228	/	213	133	/	119	0



INTERSECTION TURNING MOVEMENT COUNTS

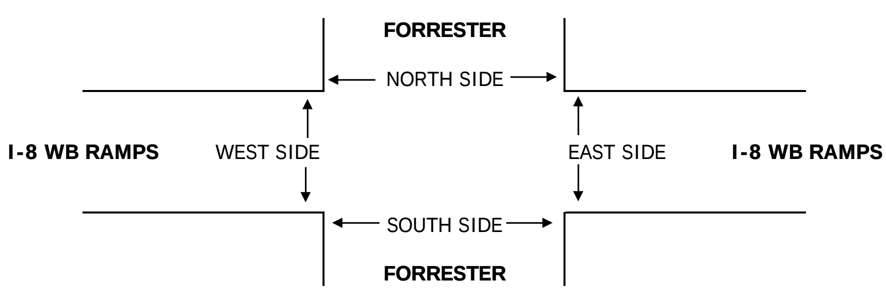
PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE: 3/24/11 THURSDAY	LOCATION:	EL CENTRO	PROJECT #: CA11-0325-03
	NORTH & SOUTH:	FORRESTER	LOCATION #: 4
	EAST & WEST:	I-8 WB RAMPS	CONTROL: 1 WAY STOP WB

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

		NORTHBOUND FORRESTER			SOUTHBOUND FORRESTER			EASTBOUND I-8 WB RAMPS			WESTBOUND I-8 WB RAMPS			TOTAL	U-TURNS NB	SB	EB	WB	TTL
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR		NB	SB	EB	WB	TTL
	LANES:	0	1	0	0	1	0	X	X	X	0.5	0.5	1		X	X	X	X	
AM	6:00 AM	0	4			13	8				5	0	44	74					0
AM	6:15 AM	0	3			26	8				6	0	51	94					0
AM	6:30 AM	0	9			25	9				3	0	66	112					0
AM	6:45 AM	1	14			26	10				4	0	48	103					0
AM	7:00 AM	0	14			15	11				1	0	44	85					0
AM	7:15 AM	0	24			34	13				3	0	50	124					0
AM	7:30 AM	2	19			27	23				1	0	55	127					0
AM	7:45 AM	2	17			34	9				10	0	51	123					0
AM	VOLUMES	5	104	0	0	200	91	0	0	0	33	0	409	842	0	0	0	0	0
AM	APPROACH %	5%	95%	0%	0%	69%	31%	0%	0%	0%	7%	0%	93%						
AM	APP/DEPART	109	/	513	291	/	233	0	/	0	442	/	96	0					
AM	BEGIN PEAK HR		7:00 AM																
AM	VOLUMES	4	74	0	0	110	56	0	0	0	15	0	200	459					
AM	APPROACH %	5%	95%	0%	0%	66%	34%	0%	0%	0%	7%	0%	93%						
AM	PEAK HR FACTOR		0.813			0.830			0.000			0.881		0.904					
AM	APP/DEPART	78	/	274	166	/	125	0	/	0	215	/	60	0					
PM	4:00 PM	0	31			68	16				2	0	38	155					0
PM	4:15 PM	0	29			71	11				2	0	32	145					0
PM	4:30 PM	0	11			67	16				3	0	48	145					0
PM	4:45 PM	0	30			51	11				1	0	42	135					0
PM	5:00 PM	1	32			54	8				3	0	33	131					0
PM	5:15 PM	5	21			48	9				3	0	31	117					0
PM	5:30 PM	1	13			31	10				2	0	28	85					0
PM	5:45 PM	1	10			42	13				4	0	26	96					0
PM	VOLUMES	8	177	0	0	432	94	0	0	0	20	0	278	1,009	0	0	0	0	0
PM	APPROACH %	4%	96%	0%	0%	82%	18%	0%	0%	0%	7%	0%	93%						
PM	APP/DEPART	185	/	455	526	/	452	0	/	0	298	/	102	0					
PM	BEGIN PEAK HR		4:00 PM																
PM	VOLUMES	0	101	0	0	257	54	0	0	0	8	0	160	580					
PM	APPROACH %	0%	100%	0%	0%	83%	17%	0%	0%	0%	5%	0%	95%						
PM	PEAK HR FACTOR		0.815			0.926			0.000			0.824		0.935					
PM	APP/DEPART	101	/	261	311	/	265	0	/	0	168	/	54	0					



		PEDESTRIAN CROSSINGS N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	PEDESTRIAN ACTIVATIONS N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	BICYCLE CROSSINGS NS	SS	ES	WS	TOTAL
AM	6:00 AM					0					0					0
AM	6:15 AM					0					0					0
AM	6:30 AM					0					0					0
AM	6:45 AM					0					0					0
AM	7:00 AM					0					0					0
AM	7:15 AM					0					0					0
AM	7:30 AM					0					0					0
AM	7:45 AM					0					0					0
AM	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:00 PM					0					0					0
PM	4:15 PM					0					0					0
PM	4:30 PM					0					0					0
PM	4:45 PM					0					0					0
PM	5:00 PM					0					0					0
PM	5:15 PM					0					0					0
PM	5:30 PM					0					0					0
PM	5:45 PM					0					0					0
PM	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE: 3/24/11 THURSDAY	LOCATION:	EL CENTRO		PROJECT #:	CA11-0325-03
	NORTH & SOUTH:	FORRESTER		LOCATION #:	5
	EAST & WEST:	I-8 EB RAMPS		CONTROL:	1 WAY STOP EB

NOTES:

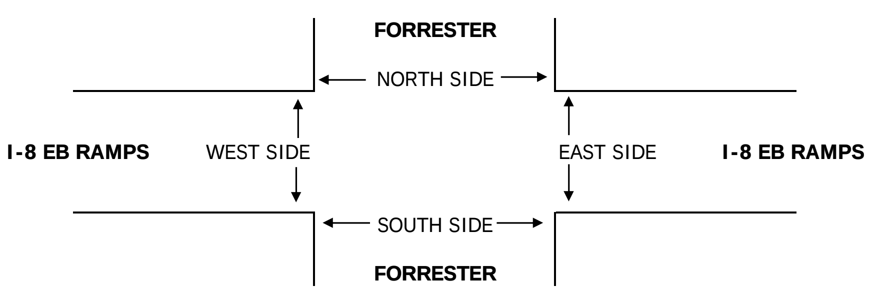
AM / PM / MD / OTHER / OTHER

▲ N / ◄ W / E ► / S ▼

	NORTHBOUND FORRESTER			SOUTHBOUND FORRESTER			EASTBOUND I-8 EB RAMPS			WESTBOUND I-8 EB RAMPS			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	X	1	0	0	1	X	0.5	0.5	1	X	X	X	
AM 6:00 AM		4	2	12	5		2	0	0				25
6:15 AM		0	3	20	13		3	0	1				40
6:30 AM		4	2	22	6		4	0	2				40
6:45 AM		6	3	18	11		10	0	0				48
7:00 AM		7	2	13	3		7	0	0				32
7:15 AM		8	1	25	11		15	0	1				61
7:30 AM		11	0	25	3		9	0	1				49
7:45 AM		9	2	28	16		9	0	1				65
VOLUMES	0	49	15	163	68	0	59	0	6	0	0	0	360
APPROACH %	0%	77%	23%	71%	29%	0%	91%	0%	9%	0%	0%	0%	
APP/DEPART	64	/	108	231	/	74	65	/	178	0	/	0	0
BEGIN PEAK HR		7:00 AM											
VOLUMES	0	35	5	91	33	0	40	0	3	0	0	0	207
APPROACH %	0%	88%	13%	73%	27%	0%	93%	0%	7%	0%	0%	0%	
PEAK HR FACTOR		0.909			0.705			0.672			0.000		0.796
APP/DEPART	40	/	75	124	/	36	43	/	96	0	/	0	0
PM 4:00 PM		10	2	62	1		22	1	2				100
4:15 PM		8	3	64	12		21	0	0				108
4:30 PM		2	3	63	8		10	0	1				87
4:45 PM		6	1	43	10		23	0	0				83
5:00 PM		10	1	50	7		25	0	1				94
5:15 PM		8	0	46	9		14	0	0				77
5:30 PM		4	3	27	5		12	0	0				51
5:45 PM		4	0	38	6		8	0	0				56
VOLUMES	0	52	13	393	58	0	135	1	4	0	0	0	656
APPROACH %	0%	80%	20%	87%	13%	0%	96%	1%	3%	0%	0%	0%	
APP/DEPART	65	/	187	451	/	62	140	/	407	0	/	0	0
BEGIN PEAK HR		4:00 PM											
VOLUMES	0	26	9	232	31	0	76	1	3	0	0	0	378
APPROACH %	0%	74%	26%	88%	12%	0%	95%	1%	4%	0%	0%	0%	
PEAK HR FACTOR		0.729			0.865			0.800			0.000		0.875
APP/DEPART	35	/	102	263	/	34	80	/	242	0	/	0	0

U-TURNS

	NB	SB	EB	WB	TTL
	X	X	X	X	
6:00 AM					0
6:15 AM					0
6:30 AM					0
6:45 AM					0
7:00 AM					0
7:15 AM					0
7:30 AM					0
7:45 AM					0
VOLUMES	0	0	0	0	0
4:00 PM					0
4:15 PM					0
4:30 PM					0
4:45 PM					0
5:00 PM					0
5:15 PM					0
5:30 PM					0
5:45 PM					0
VOLUMES	0	0	0	0	0



	PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM 6:00 AM					0					0					0
6:15 AM					0					0					0
6:30 AM					0					0					0
6:45 AM					0					0					0
7:00 AM					0					0					0
7:15 AM					0					0					0
7:30 AM					0					0					0
7:45 AM					0					0					0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM 4:00 PM					0					0					0
4:15 PM					0					0					0
4:30 PM					0					0					0
4:45 PM					0					0					0
5:00 PM					0					0					0
5:15 PM					0					0					0
5:30 PM					0					0					0
5:45 PM					0					0					0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

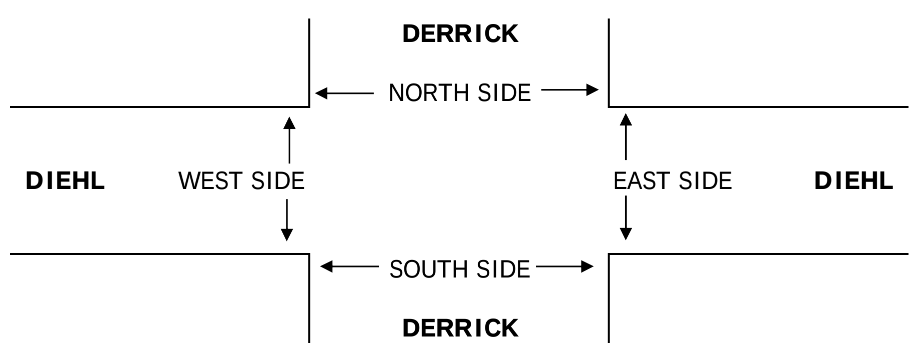
DATE:	LOCATION:	IMPERIAL	PROJECT #:	CA11-0624-02
6/22/11	NORTH & SOUTH:	DERRICK	LOCATION #:	7
WEDNESDAY	EAST & WEST:	DIEHL	CONTROL:	2 WAY STOP NS

NOTES:

AM PM MD OTHER OTHER

▲ N ◄ W E ► S ▼

		NORTHBOUND DERRICK			SOUTHBOUND DERRICK			EASTBOUND DIEHL			WESTBOUND DIEHL			TOTAL
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
AM	5:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	1
AM	5:45 AM	0	0	0	0	1	0	0	0	0	0	0	0	1
AM	6:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1
AM	6:15 AM	0	0	0	0	0	0	1	0	0	0	3	1	5
AM	6:30 AM	0	0	0	1	0	0	0	2	0	0	0	0	3
AM	6:45 AM	0	0	0	0	1	0	0	3	0	0	4	0	8
AM	7:00 AM	1	0	0	0	0	0	0	1	0	0	2	0	4
AM	7:15 AM	0	0	0	2	0	0	0	1	0	0	2	1	6
AM	VOLUMES	1	0	0	3	2	0	1	7	0	0	13	2	29
AM	APPROACH %	100%	0%	0%	60%	40%	0%	13%	88%	0%	0%	87%	13%	
AM	APP/DEPART	1	/	3	5	/	2	8	/	10	15	/	14	0
AM	BEGIN PEAK HR		6:30 AM											
AM	VOLUMES	1	0	0	3	1	0	0	7	0	0	8	1	21
AM	APPROACH %	100%	0%	0%	75%	25%	0%	0%	100%	0%	0%	89%	11%	
AM	PEAK HR FACTOR		0.250			0.500			0.583			0.563		0.656
AM	APP/DEPART	1	/	1	4	/	1	7	/	10	9	/	9	0
PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:15 PM	1	0	0	0	0	0	0	1	0	0	0	0	2
PM	4:30 PM	0	0	0	0	1	0	0	1	0	0	2	0	4
PM	4:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	1
PM	5:00 PM	1	0	0	1	0	0	0	0	0	0	0	0	2
PM	5:15 PM	0	0	0	0	0	0	0	2	0	0	0	0	2
PM	5:30 PM	0	0	0	1	0	0	0	0	0	0	1	0	2
PM	5:45 PM	0	0	0	0	1	0	0	1	1	0	0	0	3
PM	VOLUMES	2	0	1	2	2	0	0	5	1	0	3	0	16
PM	APPROACH %	67%	0%	33%	50%	50%	0%	0%	83%	17%	0%	100%	0%	
PM	APP/DEPART	3	/	0	4	/	3	6	/	8	3	/	5	0
PM	BEGIN PEAK HR		5:00 PM											
PM	VOLUMES	1	0	0	2	1	0	0	3	1	0	1	0	9
PM	APPROACH %	100%	0%	0%	67%	33%	0%	0%	75%	25%	0%	100%	0%	
PM	PEAK HR FACTOR		0.250			0.750			0.500			0.125		0.563
PM	APP/DEPART	1	/	0	3	/	2	4	/	5	1	/	2	0



LOS Engineering, Inc.

5114 Sea Mist Ct, San Diego, CA 92121

Counted by: LOS Emp. #01 | Start Date: 05/22/2008
Location: Westside Rd & Evan Hewes Hwy | File Name: 804-1-1

	Westside Rd Northbound				Southbound				Evan Hewes Hwy Eastbound				Evan Hewes Hwy Westbound				Vehicle
Start Time	Left	Thru	Right	Ped	Left	Thru	Right	Ped	Left	Thru	Right	Ped	Left	Thru	Right	Ped	Interval Total
7:00	0	0	0	0	0	0	0	0	0	14	0	0	1	23	0	0	38
7:15	0	0	0	0	0	0	0	0	0	14	0	0	2	53	0	0	69
7:30	1	0	3	0	0	0	0	0	0	8	0	0	0	75	0	0	87
7:45	0	0	0	0	0	0	0	0	0	10	0	0	0	96	0	0	106
Total	1	0	3	0	0	0	0	0	0	46	0	0	3	247	0	0	300
8:00	0	0	0	0	0	0	0	0	0	4	0	0	0	31	0	0	35
8:15	0	0	0	0	0	0	0	0	0	7	0	0	0	30	0	0	37
8:30	0	0	0	0	0	0	0	0	0	9	0	0	0	8	0	0	17
8:45	0	0	0	0	0	0	0	0	0	13	0	0	0	21	0	0	34
Total	0	0	0	0	0	0	0	0	0	33	0	0	0	90	0	0	123
Grand Total	1	0	3	0	0	0	0	0	0	79	0	0	3	337	0	0	423
Approach%	25.0	0.0	75.0	-	0.0	0.0	0.0	-	0.0	100.0	0.0	-	0.9	99.1	0.0	-	
Total%	0.2	0.0	0.7	-	0.0	0.0	0.0	-	0.0	18.7	0.0	-	0.7	79.7	0.0	-	

Peak hour analysis for the period 07:00 to 07:45

Volume	1	0	3	0	0	0	0	0	0	46	0	0	3	247	0	0	300
Approach%	25.0	0.0	75.0	-	0.0	0.0	0.0	-	0.0	100.0	0.0	-	1.2	98.8	0.0	-	
Total%	0.3	0.0	1.0	-	0.0	0.0	0.0	-	0.0	15.3	0.0	-	1.0	82.3	0.0	-	

LOS Engineering, Inc.

5114 Sea Mist Ct, San Diego, CA 92121

Counted by: LOS Emp. #01
Location: Westside Rd & Evan Hewes Hwy

Start Date: 05/21/2008
File Name: 804-1-2

	Westside Rd Northbound				Southbound				Evan Hewes Hwy Eastbound				Evan Hewes Hwy Westbound				Vehicle
Start Time	Left	Thru	Right	Ped	Left	Thru	Right	Ped	Left	Thru	Right	Ped	Left	Thru	Right	Ped	Interval Total
16:00	0	0	2	0	0	0	0	0	0	32	0	0	0	4	0	0	38
16:15	0	0	1	0	0	0	0	0	0	30	0	0	0	3	0	0	34
16:30	0	0	1	0	0	0	0	0	0	67	0	0	0	8	0	0	76
16:45	0	0	0	0	0	0	0	0	0	22	0	0	0	1	0	0	23
Total	0	0	4	0	0	0	0	0	0	151	0	0	0	16	0	0	171
17:00	0	0	0	0	0	0	0	0	0	21	0	0	0	4	0	0	25
17:15	0	0	1	0	0	0	0	0	0	21	0	0	0	6	0	0	28
17:30	0	0	0	0	0	0	0	0	0	7	0	0	0	9	0	0	16
17:45	0	0	0	0	0	0	0	0	0	10	0	0	0	3	0	0	13
Total	0	0	1	0	0	0	0	0	0	59	0	0	0	22	0	0	82
Grand Total	0	0	5	0	0	0	0	0	0	210	0	0	0	38	0	0	253
Approach%	0.0	0.0	100.0	-	0.0	0.0	0.0	-	0.0	100.0	0.0	-	0.0	100.0	0.0	-	
Total%	0.0	0.0	2.0	-	0.0	0.0	0.0	-	0.0	83.0	0.0	-	0.0	15.0	0.0	-	

Peak hour analysis for the period 16:00 to 16:45

Volume	0	0	4	0	0	0	0	0	0	151	0	0	0	16	0	0	171
Approach%	0.0	0.0	100.0	-	0.0	0.0	0.0	-	0.0	100.0	0.0	-	0.0	100.0	0.0	-	
Total%	0.0	0.0	2.3	-	0.0	0.0	0.0	-	0.0	88.3	0.0	-	0.0	9.4	0.0	-	

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

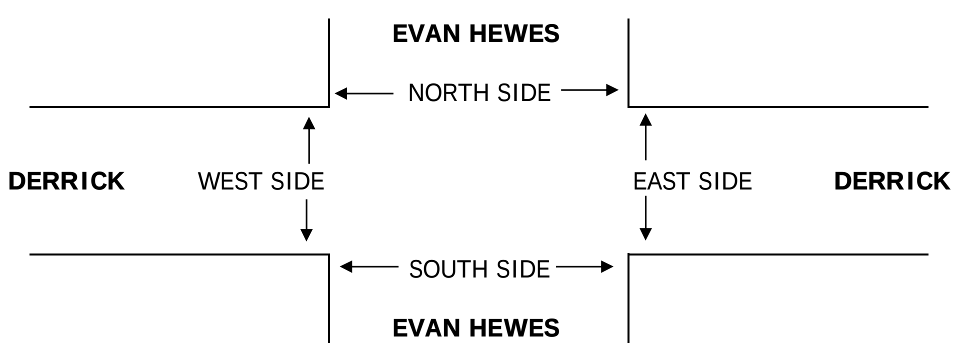
DATE:	LOCATION:	IMPERIAL	PROJECT #:	CA11-0624-02
6/22/11	NORTH & SOUTH:	EVAN HEWES	LOCATION #:	1
WEDNESDAY	EAST & WEST:	DERRICK	CONTROL:	1 WAY STOP NB

NOTES:

AM PM MD OTHER OTHER

N / W / E / S

		NORTHBOUND EVAN HEWES			SOUTHBOUND EVAN HEWES			EASTBOUND DERRICK			WESTBOUND DERRICK			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	0.5	X	0.5	X	X	X	X	1	0	0	1	X	
AM	5:30 AM	0		0					5	0	1	71		77
	5:45 AM	0		1					8	0	2	34		45
	6:00 AM	0		0					16	2	2	27		47
	6:15 AM	0		0					7	0	0	25		32
	6:30 AM	1		2					7	1	1	39		51
	6:45 AM	0		1					19	0	1	24		45
	7:00 AM	0		0					12	0	0	30		42
	7:15 AM	0		2					14	0	2	49		67
	VOLUMES	1	0	6	0	0	0	0	88	3	9	299	0	406
	APPROACH %	14%	0%	86%	0%	0%	0%	0%	97%	3%	3%	97%	0%	
	APP/DEPART	7	/	0	0	/	12	91	/	94	308	/	300	0
	BEGIN PEAK HR		6:30 AM											
	VOLUMES	1	0	5	0	0	0	0	52	1	4	142	0	205
	APPROACH %	17%	0%	83%	0%	0%	0%	0%	98%	2%	3%	97%	0%	
	PEAK HR FACTOR		0.500			0.000			0.697			0.716		0.765
	APP/DEPART	6	/	0	0	/	5	53	/	57	146	/	143	0
PM	4:00 PM	0		2					71	0	1	4		78
	4:15 PM	0		1					33	0	2	12		48
	4:30 PM	0		1					56	0	1	19		77
	4:45 PM	0		0					30	0	0	9		39
	5:00 PM	1		0					26	0	1	4		32
	5:15 PM	0		1					17	0	0	7		25
	5:30 PM	0		1					15	0	1	0		17
	5:45 PM	0		0					6	0	2	2		10
	VOLUMES	1	0	6	0	0	0	0	254	0	8	57	0	326
	APPROACH %	14%	0%	86%	0%	0%	0%	0%	100%	0%	12%	88%	0%	
	APP/DEPART	7	/	0	0	/	8	254	/	260	65	/	58	0
	BEGIN PEAK HR		4:00 PM											
	VOLUMES	0	0	4	0	0	0	0	190	0	4	44	0	242
	APPROACH %	0%	0%	100%	0%	0%	0%	0%	100%	0%	8%	92%	0%	
	PEAK HR FACTOR		0.500			0.000			0.669			0.600		0.776
	APP/DEPART	4	/	0	0	/	4	190	/	194	48	/	44	0



PEAK HOUR VOLUME DATA

Peak hour volume data consists of hourly volume relationships and data location. The hourly volumes are expressed as a percentage of the Annual Average Daily Traffic (AADT). The percentages are shown for both the AM and the PM peak periods.

The principle data described here are the K factor, the D factor and their product (KD). The K factor is the percentage of AADT during the peak hour for both directions of travel. The D factor is the percentage of the peak hour travel in the peak direction. KD multiplied with the AADT gives the one way peak period directional flow rate or the design hourly volume (DHV). The design hourly volume is used for either Operational Analysis or Design Analysis. Refer to the 2000 Highway Capacity Manual for more details.

Following is a glossary of terms used in this listing of peak hour volume data:

Dir	Indicates direction of travel for peak volume
AADT	Annual Average Daily Traffic in vehicles per day (vpd).
AM Peak	Represents the morning peak period for traffic analysis
CS	Control Station Number, Caltrans identification number for monitoring site.
CO	County abbreviation used by Caltrans
D	D factor. The percentage of traffic in the peak direction during the peak hour. Values in this book are derived by dividing the measured PHV by the sum of both directions of travel during the peak hour.
DAY	Day of week for the peak volume.
DDHV	The directional design hour volume, in vehicles per hour (vph) DDHV=AADTxKxD. See equation (8-1) on page 8-11 of the 2000 Highway Capacity Manual.
DI	Caltrans has twelve transportation districts statewide. This abbreviation identifies the district in which the count station is located.
HR	The ending time for the peak hour volume listed. The volume observed fro 1 to 2 would be recorded as 2.

K	The percentage of the AADT in both directions during the peak hour. Values in this table are derived by dividing the measured 2-way PHV by the AADT.
KD	The product of K and D. The percentage of AADT in the peak direction during the peak hour. Values in this table are derived by dividing the measured 1-way PHV by the AADT.
LEG	For traffic counting purposes, a highway intersection or interchange is assigned two legs according to increasing postmiles (route direction) and with a postmile reference at the center of the intersection or interchange. The volume of traffic on each leg is denoted by an A, B or O. A = ahead leg, B = back leg, and O – traffic volume being same for both back and ahead legs.
MNTH	The month that the peak volume occurred.
PHV	Peak Hour Volume in the peak direction. A one way volume in vehicles per hour (vph) as used here. The PHV is analogous to the DDHV as used for design purposes.
PM	The Post Mile is the mileage measured from the county line, or from the beginning of a route. Each postmile along a route in a county is a unique location on the state highway system.
PM Peak	Represents the afternoon peak period for traffic analysis.
PRE	The postmile may have a prefix like R, T, L, M, etc. When a length of highway is changed due to construction or realigment, new postmile values are assigned. To distinguish the new values from the old, an alpha code is prefixed to the new postmile.
RTE	The state highway route number
YR	The year when the count was made. Traffic counting is on a 3-year cycle.

									AM PEAK								PM PEAK						
DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH
11	008	SD	L	1.213	958	A	08	E	4637	7.47	61.45	4.59	7	TUE	FEB	W	4604	8.33	54.73	4.56	17	FRI	AUG
11	008	SD		.946	804	A	08	W	8170	7.41	57.07	4.23	7	THU	SEP	E	8446	8.02	54.48	4.37	16	TUE	MAR
11	008	SD		5.638	953	B	08	W	11617	7.43	64.73	4.81	7	TUE	APR	E	10959	7.96	56.96	4.53	15	THU	DEC
11	008	SD		8.336	807	B	08	W	11072	8.06	60.93	4.91	7	THU	NOV	E	10737	8.02	59.36	4.76	15	WED	OCT
11	008	SD		8.336	808	A	08	W	10170	7.6	67.39	5.12	7	THU	MAY	E	9780	7.99	61.61	4.92	16	FRI	JAN
11	008	SD		11.76	810	B	08	W	8307	6.82	63.17	4.31	7	THU	JAN	E	9011	8.24	56.73	4.67	16	WED	FEB
11	008	SD		14.59	806	B	07	W	8456	6.87	59.41	4.08	7	THU	OCT	E	9132	8.15	54.13	4.41	15	THU	DEC
11	008	SD	R	18.73	824	B	08	W	4555	7.07	69.67	4.93	7	TUE	OCT	E	4273	8.06	57.38	4.62	15	TUE	NOV
11	008	SD	R	20.04	888	B	08	W	3944	7.07	69.41	4.9	7	TUE	MAR	E	3787	8.05	58.53	4.71	17	FRI	APR
11	008	SD	R	23.64	979	O	08	W	2444	7.79	55.9	4.35	12	FRI	DEC	W	2926	8.57	60.81	5.21	17	WED	NOV
11	008	SD	R	37.83	811	A	08	E	1143	8.94	64.36	5.76	10	FRI	NOV	W	1404	11.46	61.69	7.07	15	WED	DEC
11	008	SD	R	51.98	621	B	08	E	999	11.26	56.73	6.39	11	THU	NOV	W	1284	12.29	66.81	8.21	14	MON	FEB
11	008	SD	R	65.90	981	A	08	E	1001	12.07	59.55	7.19	10	WED	DEC	E	1189	14.5	58.86	8.53	16	SUN	JUL
11	008	IMP	R	10.29	993	B	08	W	984	11.35	61.85	7.02	11	MON	FEB	W	1180	12.22	68.89	8.42	15	TUE	JAN
11	008	IMP	R	10.29	994	A	08	E	914	14.57	51.55	7.51	12	MON	MAY	W	1079	12.69	69.84	8.87	15	TUE	JAN
11	008	IMP	R	23.48	624	A	08	W	872	9.63	73.84	7.11	9	FRI	JUL	W	1038	15.17	55.81	8.46	15	MON	MAY
11	008	IMP	R	36.97	982	B	08	E	1034	10.76	53	5.7	12	SAT	DEC	W	1215	10.94	61.24	6.7	15	SAT	NOV
11	008	IMP	R	40.94	638	B	08	W	1401	8.35	53.37	4.46	12	MON	MAY	E	1805	9.17	62.63	5.74	18	FRI	MAY
11	008	IMP	R	53.50	964	A	08	E	909	12.78	61.21	7.82	10	SAT	DEC	W	1018	15.25	57.42	8.76	13	SAT	NOV
11	008	IMP	R	96.55	995	B	08	E	1276	12.1	54.39	6.58	12	FRI	FEB	E	1300	10.71	62.65	6.71	13	MON	SEP
11	008	IMP	R	96.99	988	B	08	E	1097	11.54	56.58	6.53	12	MON	JAN	E	1173	11.9	58.71	6.98	15	MON	FEB
05	009	SCR		.63	681	A	08	S	380	8.29	91.79	7.61	8	TUE	DEC	S	390	8.27	94.43	7.81	17	MON	DEC
05	009	SCR		8.11	430	B	08	S	1364	8.35	78.89	6.58	7	THU	MAR	N	1250	9.09	66.38	6.03	17	TUE	DEC
05	009	SCR		13.04	169	B	08	N	731	9.14	64.92	5.93	10	WED	DEC	N	643	8.85	58.99	5.22	17	MON	DEC
05	009	SCR		27.09	49	B	08	N	294	12.23	97.35	11.91	7	MON	JUN	S	233	11.06	85.35	9.44	17	WED	SEP
04	009	SCL		7.09	170	A	07	S	456	10.67	61.13	6.52	11	SAT	JUL	N	537	9.69	79.2	7.68	22	SAT	JUL
04	009	SCL		11.45	171	B	07	N	1613	7.59	60.8	4.62	8	WED	OCT	N	1841	8.84	59.64	5.27	15	TUE	JAN
07	010	LA		18.41	456	B	08	W	819	11.39	93.81	10.69	9	FRI	DEC	E	580	9.9	76.42	7.57	15	FRI	JUL
07	010	LA		19.71	783	O	08	W	868	11.22	92.34	10.36	9	THU	OCT	E	569	8.93	76.07	6.79	17	THU	NOV
07	010	LA		24.31	785	A	08	W	1498	6.78	86.74	5.88	9	WED	MAR	E	1523	8.2	72.98	5.98	15	WED	MAR
07	010	LA	R	3.89	402	B	06	W	7499	7.61	52.15	3.97	7	WED	SEP	E	6834	6.82	53.07	3.62	14	WED	MAY
07	010	LA		24.32	721	A	08	E	7451	6.26	53.18	3.33	12	SAT	SEP	E	7695	6.01	57.18	3.43	16	TUE	AUG
07	010	LA		30.3	429	A	08	W	7633	6.41	55.24	3.54	10	SAT	MAR	E	7707	6.31	56.63	3.57	14	WED	MAR

2007

Annual Average Daily Truck Traffic on the California State Highway System

Compiled by
Traffic Data Branch
Division of Traffic Operations

State of California
Business, Transportation and Housing Agency
Department of Transportation

Prepared in cooperation with the
U.S. Department of Transportation
Federal Highway Administration

SEPTEMBER 2008

RTE	DIST	CNTY	POST MILE	LEG	DESCRIPTION	VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOT VEH	TRUCK AADT TOTAL By Axle 2	3	4	5+	% TRUCK AADT By Axle 2	3	4	5+	EAL 2-WAY (1000)	YEAR VER/ EST
008	11	IMP	R10.01	A	JCT. RTE. 98	12200	1696	13.9	607	78	39	972	35.8	4.6	2.3	57.3	369	05E
008	11	IMP	R23.48	A	DUNAWAY ROAD	12300	1931	15.7	583	90	39	1219	30.18	4.68	2.03	63.12	455	08V
008	11	IMP	R29.933	B	DREW ROAD	12300	1998	16.24	592	93	37	1277	29.63	4.63	1.85	63.89	475	05E
008	11	IMP	R37.972	B	JCT. RTE. 86	32500	3478	10.7	1120	191	77	2090	32.2	5.5	2.2	60.1	789	05E
008	11	IMP	R37.972	A	JCT. RTE. 86	34500	3509	10.17	1131	192	77	2109	32.24	5.46	2.19	60.11	796	05E
008	11	IMP	R40.944	B	JCT. RTE. 111	31500	2844	9.03	684	178	52	1930	24.04	6.27	1.83	67.85	714	08V
008	11	IMP	R40.944	A	JCT. RTE. 111	14600	3358	23	860	222	87	2189	25.6	6.6	2.6	65.2	819	00E
008	11	IMP	R53.497	B	JCT. RTE. 115 NORTH	11000	3300	30	845	218	86	2152	25.6	6.6	2.6	65.2	805	00E
008	11	IMP	R53.497	A	JCT. RTE. 115 NORTH	11600	3074	26.5	787	203	80	2004	25.6	6.6	2.6	65.2	749	00E
008	11	IMP	R65.752	B	EAST JCT. RTE. 98 WEST	11600	3074	26.5	787	203	80	2004	25.6	6.6	2.6	65.2	749	00E
008	11	IMP	R65.752	A	EAST JCT. RTE. 98 WEST	14000	3360	24	860	222	87	2191	25.6	6.6	2.6	65.2	819	00E
008	11	IMP	R96.546	B	4TH AVENUE	19400	1505	7.76	279	110	78	1038	18.51	7.31	5.21	68.96	389	06V
008	11	IMP	R96.986	B	ARIZONA STATE LINE	16800	3259	19.4	834	215	85	2125	25.6	6.6	2.6	65.2	795	00E

Appendix I

Existing Intersection LOS Calculations

AM Existing
1: Evan Hewes & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	59	36	21	96	3	69	11	17	6	18	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	64	39	23	104	3	75	12	18	7	20	11

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	38	71	75	55	105	37
Volume Left (vph)	5	0	23	0	75	7
Volume Right (vph)	0	39	0	3	18	11
Hadj (s)	0.11	-0.35	0.19	-0.01	0.07	-0.11
Departure Headway (s)	5.1	4.6	5.1	4.9	4.6	4.5
Degree Utilization, x	0.05	0.09	0.11	0.08	0.13	0.05
Capacity (veh/h)	686	747	673	701	747	749
Control Delay (s)	7.2	6.9	7.5	7.1	8.3	7.7
Approach Delay (s)	7.0		7.4		8.3	7.7
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.5		
HCM Level of Service	A		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

AM Existing
2: I-8 WB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	12	0	56	7	23	0	0	45	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	13	0	61	8	25	0	0	49	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	128	98	58	98	107	25	66			25		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	128	98	58	98	107	25	66			25		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	94	100			100		
cM capacity (veh/h)	793	788	1009	881	780	1051	1535			1589		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	74	33	66
Volume Left	13	8	0
Volume Right	61	0	17
cSH	1276	1535	1700
Volume to Capacity	0.06	0.00	0.04
Queue Length 95th (ft)	5	0	0
Control Delay (s)	8.7	1.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.7	1.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

3: I-8 EB Ramp & Drew Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	0	0	0	0	0	0	27	27	37	20	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	0	0	0	0	0	29	29	40	22	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	146	161	22	146	146	44	22			59		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146	161	22	146	146	44	22			59		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	100	100			97		
cM capacity (veh/h)	806	712	1055	806	726	1026	1594			1545		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	59	62
Volume Left	7	0	40
Volume Right	0	29	0
cSH	721	1700	1545
Volume to Capacity	0.01	0.03	0.03
Queue Length 95th (ft)	1	0	2
Control Delay (s)	10.0	0.0	4.9
Lane LOS	B		A
Approach Delay (s)	10.0	0.0	4.9
Approach LOS	B		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		

4: Diehl Rd & Drew Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	0	6	0	0	1	3	26	0	0	11	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	7	0	0	1	3	28	0	0	12	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	51	50	15	57	53	28	18			28		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	51	50	15	57	53	28	18			28		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	100			100		
cM capacity (veh/h)	946	840	1064	933	836	1047	1598			1585		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	1	32	18
Volume Left	3	0	3	0
Volume Right	7	1	0	7
cSH	1022	1047	1598	1585
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	8.6	8.4	0.8	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.6	8.4	0.8	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	13.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	1	27	51	3	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	29	55	3	0	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	59				89	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	59				89	57
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1545				911	1009

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	30	59	2
Volume Left	1	0	0
Volume Right	0	3	2
cSH	1545	1700	1009
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.3	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	52	8	12	106	8	13	95	15	15	104	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.98			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1825		1770	1842			1823			1810	
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (perm)	1770	1825		1770	1842			1823			1810	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	57	9	13	115	9	14	103	16	16	113	27
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	7	0
Lane Group Flow (vph)	14	61	0	13	122	0	0	129	0	0	149	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	4.1	4.1		7.2	7.2			7.4			8.0	
Effective Green, g (s)	4.1	4.1		7.2	7.2			7.4			8.0	
Actuated g/C Ratio	0.10	0.10		0.17	0.17			0.17			0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	170	175		298	311			316			339	
v/s Ratio Prot	0.01	c0.03		0.01	c0.07			c0.07			c0.08	
v/s Ratio Perm												
v/c Ratio	0.08	0.35		0.04	0.39			0.41			0.44	
Uniform Delay, d1	17.6	18.0		14.9	15.8			15.7			15.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	1.2		0.1	0.8			0.9			0.9	
Delay (s)	17.8	19.2		14.9	16.6			16.6			16.3	
Level of Service	B	B		B	B			B			B	
Approach Delay (s)		19.0			16.5			16.6			16.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	42.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	24.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

AM Existing

7: I-8 WB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	15	0	200	4	74	0	0	110	56
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	16	0	217	4	80	0	0	120	61
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked												
vC, conflicting volume	348	239	150	239	270	80	180			80		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	348	239	150	239	270	80	180			80		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	78	100			100		
cM capacity (veh/h)	471	660	896	713	635	980	1395			1517		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	234	85	180
Volume Left	16	4	0
Volume Right	217	0	61
cSH	1053	1395	1700
Volume to Capacity	0.22	0.00	0.11
Queue Length 95th (ft)	21	0	0
Control Delay (s)	9.8	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.8	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

AM Existing

8: I-8 EB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	0	3	0	0	0	0	35	5	91	33	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	0	3	0	0	0	0	38	5	99	36	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	274	277	36	276	274	41	36			43		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274	277	36	276	274	41	36			43		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	100	100	100	100	100			94		
cM capacity (veh/h)	645	591	1037	642	593	1030	1575			1565		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	47	43	135
Volume Left	43	0	99
Volume Right	3	5	0
cSH	694	1700	1565
Volume to Capacity	0.07	0.03	0.06
Queue Length 95th (ft)	5	0	5
Control Delay (s)	10.8	0.0	5.6
Lane LOS	B		A
Approach Delay (s)	10.8	0.0	5.6
Approach LOS	B		

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	23.4%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

AM Existing
9: Diehl Rd & Derrick Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	7	0	0	8	1	1	0	0	3	1	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	8	0	0	9	1	1	0	0	3	1	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10			8			17	17	8	17	17	9
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			8			17	17	8	17	17	9
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1610			1613			996	877	1075	998	877	1072

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	8	10	1	4
Volume Left	0	0	1	3
Volume Right	0	1	0	0
cSH	1610	1613	996	965
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	8.6	8.7
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	8.6	8.7
Approach LOS			A	A

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

AM Existing
10: Evan Hewes & Westside Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	50	0	3	268	1	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	0	3	291	1	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			54		352	54
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			54		352	54
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1551		644	1013

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	54	295	4
Volume Left	0	3	1
Volume Right	0	0	3
cSH	1700	1551	886
Volume to Capacity	0.03	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	52	1	4	142	1	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	1	4	154	1	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	790					
pX, platoon unblocked						
vC, conflicting volume			58		220	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			58		220	57
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1547		766	1009

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	58	159	7
Volume Left	0	4	1
Volume Right	1	0	5
cSH	1700	1547	958
Volume to Capacity	0.03	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.2	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	0.2	8.8
Approach LOS			A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	20.7%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing

1: Evan Hewes & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	114	92	13	33	19	42	19	10	14	10	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	124	100	14	36	21	46	21	11	15	11	13

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	71	162	32	39	77	39
Volume Left (vph)	9	0	14	0	46	15
Volume Right (vph)	0	100	0	21	11	13
Hadj (s)	0.10	-0.40	0.25	-0.34	0.07	-0.09
Departure Headway (s)	4.9	4.5	5.2	4.6	4.7	4.6
Degree Utilization, x	0.10	0.20	0.05	0.05	0.10	0.05
Capacity (veh/h)	710	784	659	744	724	730
Control Delay (s)	7.3	7.4	7.3	6.7	8.2	7.8
Approach Delay (s)	7.3		7.0		8.2	7.8
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.5		
HCM Level of Service	A		
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing

2: I-8 WB Ramp & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	14	0	37	0	12	0	0	84	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	15	0	40	0	13	0	0	91	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	128	108	95	108	111	13	98			13		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	128	108	95	108	111	13	98			13		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	96	100			100		
cM capacity (veh/h)	814	782	962	871	779	1067	1495			1605		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	55	13	98
Volume Left	15	0	0
Volume Right	40	0	7
cSH	1471	1495	1700
Volume to Capacity	0.04	0.00	0.06
Queue Length 95th (ft)	3	0	0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	14.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	5	0	0	0	0	6	18	59	33	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	5	0	0	0	0	7	20	64	36	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	180	190	36	183	180	16	36			26		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	180	190	36	183	180	16	36			26		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	100	100	100	100			96		
cM capacity (veh/h)	757	676	1037	750	685	1063	1575			1588		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	13	26	100
Volume Left	8	0	64
Volume Right	5	20	0
cSH	1298	1700	1588
Volume to Capacity	0.01	0.02	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	9.3	0.0	4.8
Lane LOS	A		A
Approach Delay (s)	9.3	0.0	4.8
Approach LOS	A		

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	0	2	0	0	0	1	8	0	0	24	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	2	0	0	0	1	9	0	0	26	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	38	38	27	40	38	9	27			9		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	38	38	27	40	38	9	27			9		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	967	854	1049	962	854	1073	1587			1611		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	0	10	27
Volume Left	2	0	1	0
Volume Right	2	0	0	1
cSH	1006	1700	1587	1611
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	8.6	0.0	0.8	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.6	0.0	0.8	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing
5: SR-98 & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	91	53	3	4	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	99	58	3	4	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	61				162	59
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	61				162	59
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1542				827	1006

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	101	61	5
Volume Left	2	0	4
Volume Right	0	3	1
cSH	1542	1700	858
Volume to Capacity	0.00	0.04	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.2	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	16.4%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing
6: Evan Hewes & Forrester Road

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	175	15	24	96	13	8	110	18	20	128	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1841		1770	1830			1823			1829	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (perm)	1770	1841		1770	1830			1823			1829	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	190	16	26	104	14	9	120	20	22	139	16
RTOR Reduction (vph)	0	2	0	0	4	0	0	5	0	0	3	0
Lane Group Flow (vph)	41	204	0	26	114	0	0	144	0	0	174	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	13.5	13.5		8.0	8.0			11.4			12.5	
Effective Green, g (s)	13.5	13.5		8.0	8.0			11.4			12.5	
Actuated g/C Ratio	0.22	0.22		0.13	0.13			0.19			0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	389	405		231	238			338			372	
v/s Ratio Prot	0.02	c0.11		0.01	c0.06			c0.08			c0.10	
v/s Ratio Perm												
v/c Ratio	0.11	0.50		0.11	0.48			0.43			0.47	
Uniform Delay, d1	19.1	21.0		23.6	24.8			22.1			21.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	1.0		0.2	1.5			0.9			0.9	
Delay (s)	19.2	22.0		23.8	26.3			23.0			22.4	
Level of Service	B	C		C	C			C			C	
Approach Delay (s)		21.5			25.8			23.0			22.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	61.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	8	0	160	0	101	0	0	257	54
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	174	0	110	0	0	279	59
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.97	0.97	0.97	0.97	0.97		0.97					
vC, conflicting volume	505	418	309	418	448	110	338			110		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	476	387	274	387	417	110	304			110		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	82	100			100		
cM capacity (veh/h)	395	532	743	555	512	944	1221			1480		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	183	110	338
Volume Left	9	0	0
Volume Right	174	0	59
cSH	991	1221	1700
Volume to Capacity	0.18	0.00	0.20
Queue Length 95th (ft)	17	0	0
Control Delay (s)	9.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	76	1	3	0	0	0	0	26	9	232	31	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	1	3	0	0	0	0	28	10	252	34	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	571	576	34	573	571	33	34			38		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	571	576	34	573	571	33	34			38		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	100	100	100	100	100	100			84		
cM capacity (veh/h)	378	359	1040	375	362	1040	1578			1572		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	87	38	286
Volume Left	83	0	252
Volume Right	3	10	0
cSH	393	1700	1572
Volume to Capacity	0.22	0.02	0.16
Queue Length 95th (ft)	21	0	14
Control Delay (s)	16.9	0.0	7.0
Lane LOS	C		A
Approach Delay (s)	16.9	0.0	7.0
Approach LOS	C		

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing
9: Diehl Rd & Derrick Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	3	1	0	1	0	1	0	0	2	1	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	3	1	0	1	0	1	0	0	2	1	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1			4			5	5	4	5	5	1
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1			4			5	5	4	5	5	1
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1622			1617			1014	890	1080	1016	890	1083

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	1	1	3
Volume Left	0	0	1	2
Volume Right	1	0	0	0
cSH	1622	1617	1014	970
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	8.6	8.7
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	8.6	8.7
Approach LOS			A	A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing
10: Evan Hewes & Westside Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	164	0	0	17	0	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	178	0	0	18	0	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			178		197	178
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			178		197	178
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1398		792	865

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	178	18	4
Volume Left	0	0	0
Volume Right	0	0	4
cSH	1700	1398	865
Volume to Capacity	0.10	0.00	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	9.2
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	18.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	190	0	4	44	0	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	207	0	4	48	0	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	790					
pX, platoon unblocked						
vC, conflicting volume			207		263	207
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			207		263	207
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1365		724	834

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	207	52	4
Volume Left	0	4	0
Volume Right	0	0	4
cSH	1700	1365	834
Volume to Capacity	0.12	0.00	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.7	9.3
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	9.3
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix J

Project Description Details

Appendix C

Construction Summary for

Campo Verde Solar Project

11/15/11

TABLE OF CONTENTS

This Appendix provides detailed information regarding construction equipment, workforce estimates, and other construction-related activities for the Campo Verde Solar Project. The information presented in this Appendix is generally categorized based on the four primary project components, including the PV arrays, the on-site substation/switchyard, the transmission line and the operation and maintenance building(s).

C.1 CONSTRUCTION SCHEDULE

Construction of the approximately 140 MW Project is planned to occur over 12 to 24 months.

C.2 WEEKLY WORK SCHEDULES

Consistent with the construction schedule estimates, the scenarios presented in this Appendix assume that construction crews will work a maximum of 12-hour days (typically Monday through Friday), generally beginning work at 6 AM and concluding at 6 PM each day. A split schedule with night shift and/or weekend hours may be implemented. Early start days may be utilized during summer months.

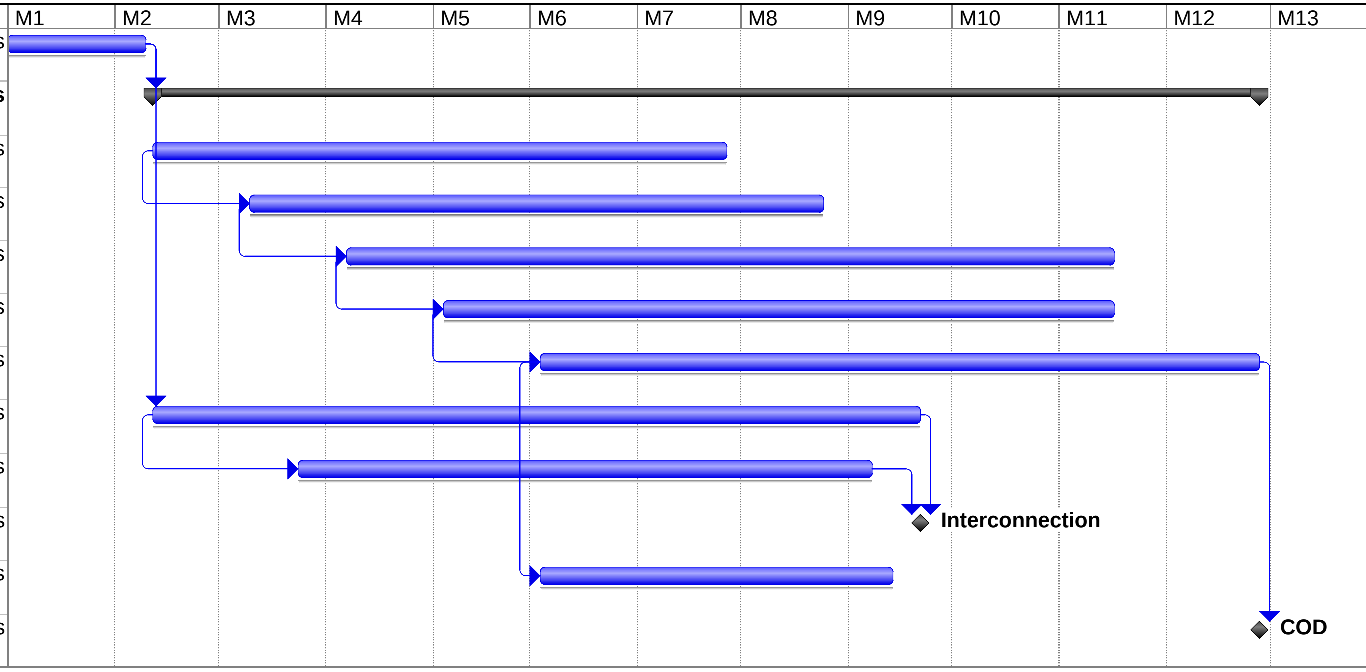
C.3 DETAILED CONSTRUCTION SCHEDULE

As discussed above, construction is expected to occur for approximately 12 to 24 months. The Project will be constructed so that individual photovoltaic (PV) arrays can be energized and begin generating electricity as they are completed. The transmission line, substation and interconnection to IV Substation will be completed and commissioned prior to the operation of any PV arrays.

Figure C-1 provides a representative construction schedule for the Project for the accelerated 12 month duration. It anticipates that construction will start in the second quarter of 2012 following CUP approval. However, the actual start of construction will be determined based on the receipt of all construction permits and approvals and securing financing for the Project.

Figure C-1
Construction Schedulde
Campo Verde Solar

ID	Task Name	Duration
1	Mobilization	1.5 months
2	**PV Arrays**	**11.5 months**
3	Site Preparation	6 months
4	Post Installation	6 months
5	BOS Installation	8 months
6	Module Installation	7 months
7	Commissioning	7.5 months
8	**Substation**	8 months
9	**Transmission Line**	6 months
10	Interconnection	0 days
11	**O&M Building**	3.7 months
12	COD	0 days



Project: Campo Verde Schedule
Date: Tue 11/15/11

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

C.4 EQUIPMENT QUANTITIES AND SPECIFICATIONS

To focus on the expected maximum impacts, this data assumes that construction activities may occur on the PV Areas, the substation, the transmission line and the O&M building(s) simultaneously. This peak construction activity is shown as month 7 on the representative construction schedule provided as C-1. The highest construction workforce levels and equipment operating hours occur during this period. Equipment lists for the peak construction activities (month 7) are provided in Attachment C-1 Table C-1 for PV Areas, Table C-2-A for the substation, Table C-3 for the transmission line and Table C-4 for common services. Table C-2-B is substation equipment list for non-peak month. Actual schedule and equipment may change during detail design, permitting and construction management to meet commercial requirements.

C.5 WORKFORCE ESTIMATES

Based on the construction schedule provided in Figure C-1 for 12 month construction duration, the construction employment will be approximately 30 workers in month 1, ramping up to a peak of approximately 500 workers during month 7 of construction. The workforce is expected to average approximately 250 workers from months 2 through 11. The workforce will decrease as the transmission line and substation are completed. The construction workforce will decline in month 9 until construction is completed.

Given the long construction duration, it is expected that approximately 60% of the construction workforce will come from a combination of (i) existing residents in the Imperial Valley and (ii) construction workers that temporarily reside in the Imperial County during construction such that their week day commutes originate in the Imperial County.

Voluntary carpooling by workforce is expected to be consistent with other large scale solar construction projects at about 40-50%. Therefore, the peak daily workforce may generate up to 325 trips per day.

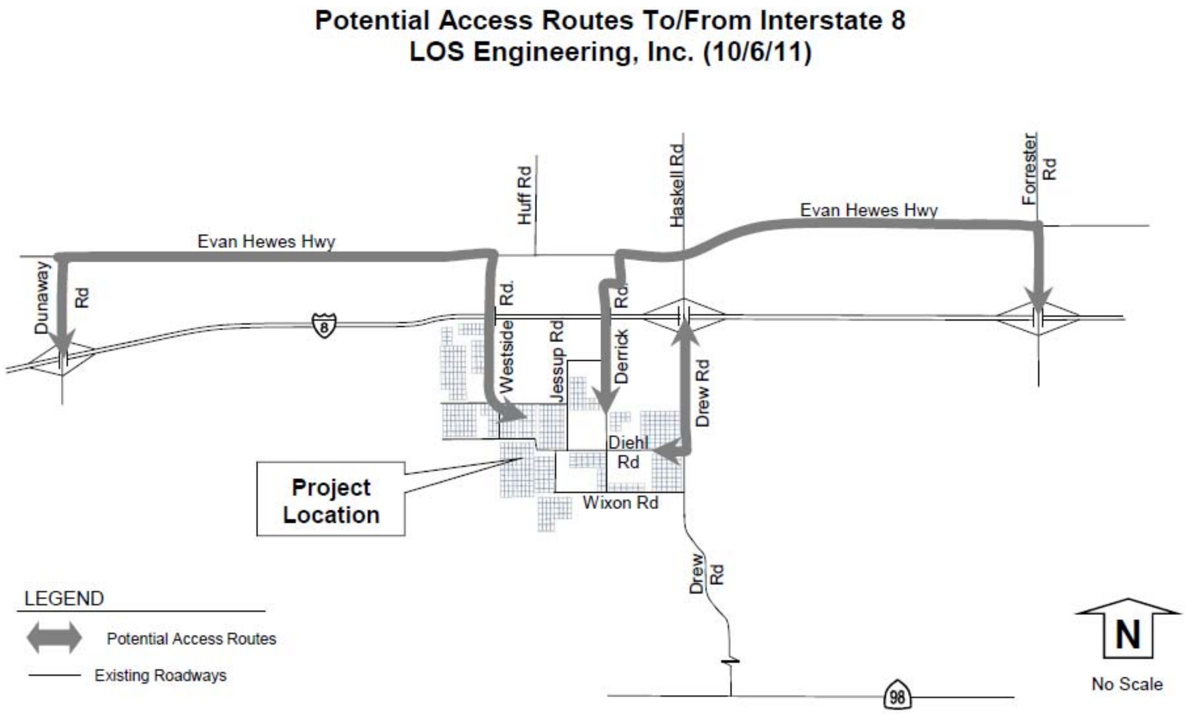
C.6 CONSTRUCTION ACCESS

Access to the Project area will be provided from Interstate 8 via Drew Road exit to West Diehl Road and Wixom Road. Alternate access is via Dunaway Road or Forrester Road exits. This is shown on Figure C-3. All entrances to the Campo Verde Project are proposed to use local roads. The construction logistics areas may be located off West Diehl Road/Westside Road/Vaugh Road and/or Wixom Road. The exact locations of construction logistic areas and driveways to be determined during detailed design.

Each block of land will have gates that will be used to access. Secondary gates may be installed if required for emergency access.

Liebert Road would be used to access the substation and the common services areas. For the transmission line, existing access roads off of Liebert Road and IID access roads would be used. Access points for the portion of the transmission line on federal lands are shown in the Plan of Development which has been submitted to the BLM.

Figure C-3. Construction Access Points



C.7 CONSTRUCTION PARKING, DELIVERIES, STORAGE, AND STAGING AREAS

One or more dedicated construction logistics areas will be graveled for uses related to support construction. The uses of these areas will include temporary construction trailers, construction employee parking, equipment and material staging and storage, trash and recycling area. In addition, each PV array land block will have a small staging area with a mobile construction trailer during construction duration of that land block. These locations are to be determined within the Project boundaries. An area near the substation will be used for constructing staging and assembly for the substation. An area near the substation and/or an area off-site on private land will be used for constructing staging and assembly for the transmission area.

Construction workers will be directed to park their personal vehicles in one of the construction logistics areas. From these locations construction workers will be transported by shuttle bus or van, or when in close proximity, walk to the active construction area.

Deliveries of equipment and materials are expected to occur during normal work hours and may occur at any time throughout the work day. All delivery vehicles will report to the construction logistics area and then go to the subject work area for unloading. Equipment that will be stored longer will be delivered to and stored at the construction logistics areas.

At the peak of construction for accelerated duration, approximately 50 deliveries per day are estimated to be made to the various construction areas. On average, 30 deliveries per day are expected during construction. Deliveries will be made via dump truck, box truck, semi tractor, or flatbed truck.

For portions of the transmission line on federal land, the pulling and tensioning sites and wire splicing sites will not be utilized for temporary storage during construction. For portions of the transmission line on federal land, temporary storage of equipment and materials will occur within the Project site or within easement or at temporary laydown areas within Rabley Holdings, Inc. property.

Attachment C-1. Construction Equipment Lists

TABLE C-1. EQUIPMENT LIST FOR PV AREAS CONSTRUCTION (Month 7)							
Equipment Description	**Daily Quantity**	**Horsepower**	**Fuel Type**	**Equivalent Full-Load Operating Time (hr/day)**	**Vehicle Weight (pounds)**	**Vehicle Miles (VMT) per Day on Unpaved Surface**	**Estimated Workforce for this Activity**
Install SWPPP Measures (Part of Site Preparation)							
Rough Terrain Forklift	2	75	Diesel	1.7	10,000	10	10
Delivery / Work Trucks	3	200	Diesel	2	20,000	5	
Site Prep - Arrays							
Truck, Pick-Up (Survey Crew)	2	180	Gas	1.7	5,300	5	30
Grader	6	200	Diesel	6.8	41,000	20	
Backhoe/Front Loader	2	120	Diesel	3.4	41,000	10	
Tractor / Disc	3	210	Diesel	6.8	15,000	20	
Scraper	4	265	Diesel	3.4	65,000	15	
Compactor	2	120	Diesel	1.7	25,000	10	
Water Truck	2	175	Diesel	6.8	N/A	N/A	
Site Prep - Roads							
Grader	3	200	Diesel	6.8	41,000	20	24
Backhoe/Front Loader	1	120	Diesel	6.8	41,000	10	
Compactor	2	120	Diesel	6.8	25,000	20	
Water Truck	2	175	Diesel	6.8	N/A	N/A	
Dump Truck	5	235	Diesel	2.7	30,000	10	
Install Fencing							
Rough Terrain Forklift	2	75	Diesel	1.7	10,000	10	10
Delivery / Work Trucks	3	200	Diesel	1	20,000	5	
Post Installation							
Delivery / Work Trucks	2	200	Diesel	1	20,000	5	32
Post Machine	7	45	Diesel	8.1	10,000	1	
Rough Terrain Forklift	2	75	Diesel	6.8	10,000	10	
Install Support Structure							
Rough Terrain Forklift	6	75	Diesel	6.8	10,000	10	68
Delivery / Work Trucks	2	200	Diesel	1	20,000	5	
Install Inverters and Switchgear & sub-structure							
Crane	2	125	Diesel	4.5	65,500	1	12
Backhoe/Front End Loader	2	120	Diesel	6.8	41,000	10	
Delivery / Work Trucks	2	200	Diesel	1	20,000	5	
DC and AC Wire Installation (UG)							
Backhoe/Front Loader	4	120	Diesel	6.8	41,000	10	45
Crawling Trencher	2	100	Diesel	4.1	8,000	1	
Mini-Excavator	4	42	Diesel	6.8	12,000	10	
Delivery / Work Trucks	2	200	Diesel	1	20,000	5	
DC and AC Wire Installation (AG)							
Rough Terrain Forklift	3	75	Diesel	1.7	10,000	10	24
Delivery / Work Trucks	2	200	Diesel	1	20,000	5	
Module Installation							
Rough Terrain Forklift	15	75	Diesel	1.7	10,000	10	120
Delivery / Work Trucks	5	200	Diesel	1	20,000	5	
O&M Building							
Rough Terrain Forklift	1	75	Diesel	1	10,000	1	35
Manlift	2	110	Diesel	3	24,000	1	
Misc. (Across Project Site)							
Rough Terrain Forklift	5	75	Diesel	1.7	10,000	5	n/a
AWD Gator/Cart	40	15	Diesel	8.1	2,000	10	
Water Truck	4	175	Diesel	6.8	N/A	N/A	
Delivery / Work Trucks	10	200	Diesel	1	20,000	5	

TABLE C-2-A. EQUIPMENT LIST FOR SUBSTATION CONSTRUCTION (Month 7)							
Equipment Description	**Daily Quantity**	**Horsepower**	**Fuel Type**	**Equivalent Full-Load Operating Time (hr/day)**	**Vehicle Weight (pounds)**	**Vehicle Miles (VMT) per Day on Unpaved Surface**	**Estimated Workforce for this Activity**
Steel Structures							
Boom Truck - 33 Ton	1	290	Diesel	1.5	52,000	1	10
Manlift	1	110	Diesel	1.2	24,000	1	
Material Delivery - Hwy Tractor w 40' Flat	3	220	Diesel	0.2	20,000	4	
Insulators, Bus, & Electrical Equipment							
Boom Truck	1	220	Diesel	1.5	51,800	1	10
Manlift	2	110	Diesel	1.2	24,000	1	
Welder Truck	2	210	Diesel	1.2	18,000	4	
Material Delivery - Hwy Tractor w 40' Flat	4	310	Diesel	0.2	20,000	4	
Material Delivery - Heavy Haul	1	300	Diesel	1.5	40,000	4	
Crane	1	500	Diesel	1	N/A	N/A	
Control Wiring							
Boom Truck	1	220	Diesel	0.6	51,800	1	8
Manlift	2	110	Diesel	0.8	24,000	1	
1 ton crew vehicle	1	260	Diesel	0.2	30,000	4	
Fiber Splicer Van	1	180	Gas	0.6	5,300	4	
Test Equipment Van	1	180	Gas	1.7	5,300	4	
Rough Terrain Forklift	1	75	Diesel	1.7	10,000	6	

TABLE C-2-B. EQUIPMENT LIST FOR SUBSTATION CONSTRUCTION (Non-peak month)							
Equipment Description	**Daily Quantity**	**Horsepower**	**Fuel Type**	**Equivalent Full-Load Operating Time (hr/day)**	**Vehicle Weight (pounds)**	**Vehicle Miles (VMT) per Day on Unpaved Surface**	**Estimated Workforce for this Activity**
Site Development							
Dozer	1	300	Diesel	3	88,000	8	10
Roller Compactor	1	156	Diesel	4.5	25,000	8	
Excavator	1	304	Diesel	3	106,000	1	
Water Truck	1	175	Diesel	5	N/A	N/A	
Fuel Truck	1	260	Diesel	3	36,000	1	
Foundations							
Drill	1	158	Diesel	2	61,900	1	10
Boom Truck	1	220	Diesel	0.5	51,800	4	
Excavator	1	148	Diesel	2	38,000	1	
Roller Compactor	1	50	Diesel	1.5	25,000	4	
Plate Compactor	1	12	Diesel	3	25,000	4	
Rubber Tire Backhoe	1	102	Diesel	2	16,000	1	
End Dump	1	230	Diesel	0.2	30,000	4	
Concrete Truck	1	310	Diesel	0.4	65,000	4	
Fuel Truck	1	210	Diesel	0.2	36,000	1	
Grounding							
MiniEx	1	34	Diesel	3	9,200	1	8
Dozer	1	80	Diesel	3	17,000	3	
Rubber Tire Backhoe	1	102	Diesel	1	16,000	1	
Air Compressor	1	80	Diesel	1.5	2,500	N/A	
Boom Truck	1	220	Diesel	0.5	51,800	1	
Underground Raceways							
Excavator	1	148	Diesel	3	38,000	4	17
Roller Compactor	1	50	Diesel	1.5	25,000	4	
Plate Compactor	2	12	Diesel	1.5	25,000	4	
Rubber Tire Backhoe	1	102	Diesel	1.5	16,000	1	
Dump Truck	1	235	Diesel	0.2	30,000	4	
Fuel Truck	1	210	Diesel	0.2	36,000	1	
Air Compressor	1	50	Diesel	1.5	2,500	N/A	
Flatbed Truck	2	260	Diesel	0.2	30,000	4	
Boom Truck	1	220	Diesel	0.8	51,800	1	
Material Delivery - Hwy Tractor w 40' Flat	2	310	Diesel	0.2	20,000	4	

TABLE C-3. EQUIPMENT LIST FOR TRANSMISSION LINE CONSTRUCTION (Month 7)							
Equipment Description	Daily Quantity	Horsepower	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Weight (pounds)	Vehicle Miles (VMT) per Day on Unpaved Surface	Estimated Workforce for this Activity
Steel (Hauling, Shake-Out, Assembly and Erection)							
Crane, Hydraulic, 150/300 Ton	1	250	Diesel	1.8	135,000	5	35
Crane, Hydraulic, Rough Terrain, 25 Ton	1	125	Diesel	1.8	65,500	5	
Truck, Flatbed w/Boom, 12 Ton	1	235	Diesel	1	51,800	10	
Truck, Crew Cab, Flatbed, 1 Ton	6	180	Gas	1.1	12,000	10	
Truck, Semi Tractor	1	310	Diesel	6	20,000	10	
Trailer, Flatbed, 40'	1	N/A	N/A		10,000	10	
Water Truck	1	175	Diesel	4.5	N/A	N/A	
Motor, Auxillary Power	1	5	Gas	1	150	0	
Compressor, Air	1	75	Gas	2	1,500	15	
Conductor / Shield Wire / OPGW (Stringing, Sagging, Deadending and Clipping)							
Truck, Flatbed, w/ Bucket	3	235	Diesel	3	51,800	15	15
Tension Machine, Conductor	1	135	Diesel	1.5	42,000	1	
Tension Machine, Static	1	135	Diesel	0.2	32,000	1	
Truck, Sock Line, Puller, 3 Drum	1	310	Diesel	2.3	55,000	1	
Truck, Wire Puller, 1 Drum	1	310	Diesel	2.3	72,000	1	
Truck, Semi, Tractor	2	310	Diesel	6	20,000	10	
Water Truck	1	175	Diesel	4.5	N/A	N/A	
Truck, Crew Cab, Flatbed, 1 Ton	3	180	Gas	1.4	12,000	10	
Back Hoe, w/ Bucket	1	85	Diesel	3	15,770	1	
Truck, Mechanics	1	260	Diesel	3	18,000	15	
Crane, Hydraulic, Rough Terrain	1	125	Diesel	1	65,500	10	
Motor, Auxillary Power	2	5	Gas	2.3	N/A	N/A	
Cleanup & Restoration							
Truck, Flatbed, w/ Bucket, 5 Ton	1	235	Diesel	2	51,800	5	4
Excavator, Bucket Type	1	165	Diesel	4.5	41,000	5	
Truck, Semi, Tractor	1	310	Diesel	4.5	20,000	10	
Truck, Dump, 10 Ton	1	235	Diesel	3	30,000	10	
Motor Grader	1	110	Diesel	8	32,460	20	
Truck, Flatbed	1	210	Diesel	2.1	12,000	10	
Truck, Pick-Up	1	210	Diesel	2.1	5,300	10	
Motor, Auxillary Power	1	5	Gas	0.5	N/A	N/A	

TABLE C-4. EQUIPMENT LIST FOR COMMON SERVICES CONSTRUCTION (Month 7)							
Equipment Description	**Daily Quantity**	**Horsepower**	**Fuel Type**	**Equivalent Full-Load Operating Time (hr/day)**	**Vehicle Weight (pounds)**	**Vehicle Miles (VMT) per Day on Unpaved Surface**	**Estimated Workforce for this Activity**
Dedicated Storage Areas During Construction							
Crane, Hydraulic, Rough Terrain	1	125	Diesel	1.5	N/A	N/A	8
Delivery: Truck, Semi, Tractor	1	310	Diesel	0.5	20,000	5	
Delivery: Truck, Flatbed, 1 Ton	1	180	Gas	0.5	12,000	5	
Forklift, less than 5 Ton	3	75	Diesel	3.8	16,400	5	
Forklift, greater than 5 Ton	2	85	Diesel	3.8	21,500	5	
Motor, Auxillary Generator Power	3	24	Gas	8	N/A	N/A	
Trailer, Office, 40'	14	N/A	N/A	N/A	N/A	N/A	
Trailer, Office, 20'	4	N/A	N/A	N/A	N/A	N/A	

Appendix K

Existing + Project Intersection LOS Calculations

AM Existing + Project

1: Evan Hewes & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	59	36	24	106	3	69	11	17	6	18	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	64	39	26	115	3	75	12	18	7	20	11

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	38	71	84	61	105	37
Volume Left (vph)	5	0	26	0	75	7
Volume Right (vph)	0	39	0	3	18	11
Hadj (s)	0.11	-0.35	0.19	0.00	0.07	-0.11
Departure Headway (s)	5.1	4.6	5.1	4.9	4.6	4.5
Degree Utilization, x	0.05	0.09	0.12	0.08	0.13	0.05
Capacity (veh/h)	683	745	672	701	741	742
Control Delay (s)	7.2	6.9	7.6	7.2	8.3	7.7
Approach Delay (s)	7.0		7.4		8.3	7.7
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.6		
HCM Level of Service	A		
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

AM Existing + Project

2: I-8 WB Ramp & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	186	0	56	11	23	0	0	48	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	202	0	61	12	25	0	0	52	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	140	110	61	110	118	25	70			25		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	140	110	61	110	118	25	70			25		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	77	100	94	99			100		
cM capacity (veh/h)	777	774	1004	863	766	1051	1531			1589		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	263	37	70
Volume Left	202	12	0
Volume Right	61	0	17
cSH	1123	1531	1700
Volume to Capacity	0.23	0.01	0.04
Queue Length 95th (ft)	23	1	0
Control Delay (s)	10.0	2.4	0.0
Lane LOS	B	A	
Approach Delay (s)	10.0	2.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

AM Existing + Project
3: I-8 EB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	0	95	0	0	0	0	31	35	37	197	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	103	0	0	0	0	34	38	40	214	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	347	366	214	399	347	53	214			72		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	347	366	214	399	347	53	214			72		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	87	100	100	100	100			97		
cM capacity (veh/h)	595	547	826	481	561	1015	1356			1528		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	110	72	254
Volume Left	7	0	40
Volume Right	103	38	0
cSH	878	1700	1528
Volume to Capacity	0.13	0.04	0.03
Queue Length 95th (ft)	11	0	2
Control Delay (s)	10.0	0.0	1.4
Lane LOS	B		A
Approach Delay (s)	10.0	0.0	1.4
Approach LOS	B		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	29.1%	ICU Level of Service	A
Analysis Period (min)	15		

AM Existing + Project
4: Diehl Rd & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	6	0	0	1	52	26	0	0	11	278
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	0	7	0	0	1	57	28	0	0	12	302
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	305	304	163	311	455	28	314			28		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	305	304	163	311	455	28	314			28		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	99	100	100	100	95			100		
cM capacity (veh/h)	624	581	882	615	478	1047	1246			1585		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	1	85	314
Volume Left	16	0	57	0
Volume Right	7	1	0	302
cSH	681	1047	1246	1585
Volume to Capacity	0.03	0.00	0.05	0.00
Queue Length 95th (ft)	3	0	4	0
Control Delay (s)	10.5	8.4	5.5	0.0
Lane LOS	B	A	A	
Approach Delay (s)	10.5	8.4	5.5	0.0
Approach LOS	B	A		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

AM Existing + Project
5: SR-98 & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	1	27	51	52	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	29	55	57	0	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	112				115	84
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	112				115	84
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1478				880	976

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	30	112	2
Volume Left	1	0	0
Volume Right	0	57	2
cSH	1478	1700	976
Volume to Capacity	0.00	0.07	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.3	0.0	8.7
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	8.7
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	15.9%	ICU Level of Service	A
Analysis Period (min)	15		

AM Existing + Project
6: Evan Hewes & Forrester Road
HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	52	8	22	116	8	13	102	15	15	150	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.98			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1825		1770	1844			1825			1820	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (perm)	1770	1825		1770	1844			1825			1820	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	57	9	24	126	9	14	111	16	16	163	30
RTOR Reduction (vph)	0	8	0	0	3	0	0	6	0	0	7	0
Lane Group Flow (vph)	14	58	0	24	132	0	0	135	0	0	202	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	4.0	4.0		7.3	7.3			7.5			8.8	
Effective Green, g (s)	4.0	4.0		7.3	7.3			7.5			8.8	
Actuated g/C Ratio	0.09	0.09		0.17	0.17			0.17			0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	162	167		296	309			314			367	
v/s Ratio Prot	0.01	c0.03		0.01	c0.07			c0.07			c0.11	
v/s Ratio Perm												
v/c Ratio	0.09	0.35		0.08	0.43			0.43			0.55	
Uniform Delay, d1	18.1	18.6		15.3	16.3			16.1			15.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	1.3		0.1	0.9			1.0			1.7	
Delay (s)	18.4	19.8		15.4	17.2			17.1			17.3	
Level of Service	B	B		B	B			B			B	
Approach Delay (s)		19.6			17.0			17.1			17.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	43.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

AM Existing + Project
7: I-8 WB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	15	0	200	4	81	0	0	110	112
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	16	0	217	4	88	0	0	120	122
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.99	0.99	0.99	0.99	0.99		0.99					
vC, conflicting volume	386	277	180	277	338	88	241			88		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	370	259	161	259	321	88	223			88		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	78	100			100		
cM capacity (veh/h)	448	634	871	682	585	970	1327			1508		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	234	92	241
Volume Left	16	4	0
Volume Right	217	0	122
cSH	1043	1327	1700
Volume to Capacity	0.22	0.00	0.14
Queue Length 95th (ft)	21	0	0
Control Delay (s)	9.8	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.8	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

AM Existing + Project
8: I-8 EB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	47	0	3	0	0	0	0	35	5	91	33	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	51	0	3	0	0	0	0	38	5	99	36	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	274	277	36	276	274	41	36			43		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274	277	36	276	274	41	36			43		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	100	100	100	100	100			94		
cM capacity (veh/h)	645	591	1037	642	593	1030	1575			1565		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	54	43	135
Volume Left	51	0	99
Volume Right	3	5	0
cSH	686	1700	1565
Volume to Capacity	0.08	0.03	0.06
Queue Length 95th (ft)	6	0	5
Control Delay (s)	10.9	0.0	5.6
Lane LOS	B		A
Approach Delay (s)	10.9	0.0	5.6
Approach LOS	B		

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	23.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	18	5	20	194	21	6	5	5	23	21	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	20	5	22	211	23	7	5	5	25	23	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	234			25			332	310	22	307	302	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	234			25			332	310	22	307	302	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	99	99	96	96	97
cM capacity (veh/h)	1334			1589			579	594	1055	629	600	817

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	255	17	70
Volume Left	5	22	7	25
Volume Right	5	23	5	22
cSH	1334	1589	680	666
Volume to Capacity	0.00	0.01	0.03	0.10
Queue Length 95th (ft)	0	1	2	9
Control Delay (s)	1.4	0.7	10.4	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	1.4	0.7	10.4	11.0
Approach LOS			B	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	50	7	3	268	1	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	8	3	291	1	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			62		356	58
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			62		356	58
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1541		641	1008

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	62	295	4
Volume Left	0	3	1
Volume Right	8	0	3
cSH	1700	1541	882
Volume to Capacity	0.04	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	52	1	14	142	1	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	1	15	154	1	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			58		242	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			58		242	57
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1547		739	1009

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	58	170	7
Volume Left	0	15	1
Volume Right	1	0	5
cSH	1700	1547	951
Volume to Capacity	0.03	0.01	0.01
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	0.7	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	8.8
Approach LOS			A

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing + Project
1: Evan Hewes & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	124	92	13	33	19	42	19	13	14	10	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	135	100	14	36	21	46	21	14	15	11	13

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	76	167	32	39	80	39
Volume Left (vph)	9	0	14	0	46	15
Volume Right (vph)	0	100	0	21	14	13
Hadj (s)	0.09	-0.38	0.25	-0.34	0.04	-0.09
Departure Headway (s)	5.0	4.5	5.3	4.7	4.7	4.6
Degree Utilization, x	0.10	0.21	0.05	0.05	0.10	0.05
Capacity (veh/h)	710	780	656	740	724	725
Control Delay (s)	7.3	7.4	7.3	6.7	8.2	7.8
Approach Delay (s)	7.4		7.0		8.2	7.8
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.5		
HCM Level of Service	A		
Intersection Capacity Utilization	24.4%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

PM Existing + Project
2: I-8 WB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	22	0	37	95	15	0	0	84	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	24	0	40	103	16	0	0	91	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	338	317	95	317	321	16	98			16		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	338	317	95	317	321	16	98			16		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	96	100	96	93			100		
cM capacity (veh/h)	562	557	962	602	555	1063	1495			1601		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	64	120	98
Volume Left	24	103	0
Volume Right	40	0	7
cSH	1614	1495	1700
Volume to Capacity	0.04	0.07	0.06
Queue Length 95th (ft)	3	6	0
Control Delay (s)	9.5	6.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	6.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	22.7%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

PM Existing + Project
3: I-8 EB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	9	0	0	0	0	104	192	59	41	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	10	0	0	0	0	113	209	64	45	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	390	495	45	395	390	217	45			322		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	390	495	45	395	390	217	45			322		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	100	100	100	100			95		
cM capacity (veh/h)	546	451	1025	537	517	822	1564			1238		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	322	109
Volume Left	8	0	64
Volume Right	10	209	0
cSH	1249	1700	1238
Volume to Capacity	0.01	0.19	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	9.9	0.0	4.9
Lane LOS	A		A
Approach Delay (s)	9.9	0.0	4.9
Approach LOS	A		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing + Project
4: Diehl Rd & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	274	0	51	0	0	0	1	8	0	0	24	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	298	0	55	0	0	0	1	9	0	0	26	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	44	44	33	99	51	9	40			9		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	44	44	33	99	51	9	40			9		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	100	95	100	100	100	100			100		
cM capacity (veh/h)	958	847	1040	835	840	1073	1569			1611		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	353	0	10	40
Volume Left	298	0	1	0
Volume Right	55	0	0	14
cSH	970	1700	1569	1611
Volume to Capacity	0.36	0.00	0.00	0.00
Queue Length 95th (ft)	42	0	0	0
Control Delay (s)	10.8	0.0	0.8	0.0
Lane LOS	B	A	A	
Approach Delay (s)	10.8	0.0	0.8	0.0
Approach LOS	B	A		

Intersection Summary			
Average Delay	9.5		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing + Project
5: SR-98 & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	91	53	3	53	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	99	58	3	58	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	61				162	59
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	61				162	59
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				93	100
cM capacity (veh/h)	1542				827	1006

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	101	61	59
Volume Left	2	0	58
Volume Right	0	3	1
cSH	1542	1700	830
Volume to Capacity	0.00	0.04	0.07
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.2	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	16.4%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing + Project
6: Evan Hewes & Forrester Road

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	185	15	24	96	13	8	156	28	20	135	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1842		1770	1830			1823			1830	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (perm)	1770	1842		1770	1830			1823			1830	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	201	16	26	104	14	9	170	30	22	147	16
RTOR Reduction (vph)	0	3	0	0	7	0	0	7	0	0	4	0
Lane Group Flow (vph)	45	214	0	26	111	0	0	202	0	0	181	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	13.1	13.1		7.2	7.2			12.7			8.8	
Effective Green, g (s)	13.1	13.1		7.2	7.2			12.7			8.8	
Actuated g/C Ratio	0.23	0.23		0.12	0.12			0.22			0.15	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	401	417		220	228			401			279	
v/s Ratio Prot	0.03	c0.12		0.01	c0.06			c0.11			c0.10	
v/s Ratio Perm												
v/c Ratio	0.11	0.51		0.12	0.49			0.50			0.65	
Uniform Delay, d1	17.7	19.6		22.5	23.6			19.8			23.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	1.1		0.2	1.6			1.0			5.1	
Delay (s)	17.9	20.6		22.7	25.2			20.8			28.1	
Level of Service	B	C		C	C			C			C	
Approach Delay (s)		20.2			24.8			20.8			28.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

PM Existing + Project

7: I-8 WB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰	↱		↰			↳	
Volume (veh/h)	0	0	0	8	0	160	0	157	0	0	257	61
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	174	0	171	0	0	279	66
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96					
vC, conflicting volume	570	483	312	483	516	171	346			171		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	533	442	265	442	477	171	299			171		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	80	100			100		
cM capacity (veh/h)	352	490	744	505	468	873	1213			1407		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	183	171	346
Volume Left	9	0	0
Volume Right	174	0	66
cSH	917	1213	1700
Volume to Capacity	0.20	0.00	0.20
Queue Length 95th (ft)	19	0	0
Control Delay (s)	10.2	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.2	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

PM Existing + Project

8: I-8 EB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱					↳			↰	
Volume (veh/h)	132	1	3	0	0	0	0	26	9	232	31	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	1	3	0	0	0	0	28	10	252	34	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	571	576	34	573	571	33	34			38		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	571	576	34	573	571	33	34			38		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	62	100	100	100	100	100	100			84		
cM capacity (veh/h)	378	359	1040	375	362	1040	1578			1572		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	148	38	286
Volume Left	143	0	252
Volume Right	3	10	0
cSH	387	1700	1572
Volume to Capacity	0.38	0.02	0.16
Queue Length 95th (ft)	44	0	14
Control Delay (s)	20.0	0.0	7.0
Lane LOS	C		A
Approach Delay (s)	20.0	0.0	7.0
Approach LOS	C		

Intersection Summary			
Average Delay	10.5		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	189	21	5	12	5	21	20	20	7	6	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	205	23	5	13	5	23	22	22	8	7	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	18			228			296	290	217	320	298	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			228			296	290	217	320	298	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			96	96	97	99	99	99
cM capacity (veh/h)	1598			1340			639	610	823	592	603	1064

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	250	24	66	20
Volume Left	22	5	23	8
Volume Right	23	5	22	5
cSH	1598	1340	678	680
Volume to Capacity	0.01	0.00	0.10	0.03
Queue Length 95th (ft)	1	0	8	2
Control Delay (s)	0.7	1.8	10.9	10.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.7	1.8	10.9	10.5
Approach LOS			B	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	164	0	0	17	7	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	178	0	0	18	8	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			178		197	178
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			178		197	178
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1398		792	865

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	178	18	12
Volume Left	0	0	8
Volume Right	0	0	4
cSH	1700	1398	817
Volume to Capacity	0.10	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	9.5
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.5
Approach LOS			A

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	18.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	190	0	4	44	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	207	0	4	48	0	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			207		263	207
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			207		263	207
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	98
cM capacity (veh/h)			1365		724	834

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	207	52	15
Volume Left	0	4	0
Volume Right	0	0	15
cSH	1700	1365	834
Volume to Capacity	0.12	0.00	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.7	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	9.4
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix L

Growth Factor Support Data

LAND USE ELEMENT
of the Imperial County
GENERAL PLAN

Prepared by:

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Approved By:

Board of Supervisors

October 17, 2006

II. EXISTING CONDITIONS AND TRENDS

A. Preface

Knowledge, experience and reasoned expectations of future conditions determines the scope of the issues that the Land Use Element must address. This chapter includes a generalized description of existing physical, cultural, and land use features within the County, from both a historic and expected future perspective.

B. Land Use/Population

Imperial County is, and will continue for the foreseeable future to be, a predominantly agricultural area, **although in 2003 a significant increase in urbanization began to show.** Presently, approximately one-fifth (534,328) of the nearly 3 million acres of the County is irrigated for agricultural purposes. In addition, approximately 50 percent of County lands are largely undeveloped and under federal ownership. The developed area where the County's incorporated cities, 'nincorporated communities, and supporting facilities are situated comprise less than one percent of the land (see Table 1).

Imperial County Planning & Development Services Department bases its population estimates on building permits and housing unit change. From this annual compilation, the Population Research Unit of the California Department of Finance (DOF) estimates the annual change in population. According to the Department of Finance's January 1, 2006, estimates, the population for the unincorporated area is 36,166 with the total population for Imperial County being 166,585. This compares to the 1990 census results of 27,339 for the unincorporated area with the total population for the County being 109,303 and the 2000 census results of 32,772 for the unincorporated area and 147,361 for the entire County (see Table 2). According to DOF 2006 figures, the average household size county-wide is approximately 3.32 persons per household, with the average in cities being 3.42 persons per household and the average in the unincorporated area being 2.96 persons per household.

Population in the unincorporated areas of the County tends to concentrate in agricultural areas and in recreation/retirement communities. Agricultural related communities include the townsites of Heber, Niland and Seeley in the Imperial Valley. Along the Colorado River, in the eastern portion of the County, small population clusters exist within the townsites of Palo Verde and Winterhaven. Recreation/retirement communities include Ocotillo/Nomirage located in the southwest portion of the County, and Hot Mineral Spa and Bombay Beach, on the northeastern shore of the Salton Sea. The West Shores communities of Salton City, Salton Sea Beach, and Desert Shores are also largely retirement and recreation communities, though increasingly their populations are becoming more diversified. These communities experience a noticeable increase in population during the winter months when visitors converge to the area to avoid cold/wet winters in other parts of the country.

E-2. California County Population Estimates and Components of Change
Revised July 1, 2006 and Provisional July 1, 2007
Table 1.

	Total Population		Change 2006-2007		Components of Change					
County	Revised July 1, 2006	Provisional July 1, 2007	Number	Percent	Births	Deaths	Natural Increase	Net Migration	Net Immigration	Net Domestic Migration
Alameda	1,513,859	1,530,620	16,761	1.11	20,906	9,384	11,522	5,239	10,033	-4,794
Alpine	1,254	1,261	7	0.56	16	9	7	0	2	-2
Amador	38,083	38,320	237	0.62	291	418	-127	364	19	345
Butte	217,548	219,101	1,553	0.71	2,584	2,148	436	1,117	312	805
Calaveras	45,663	45,950	287	0.63	390	429	-39	326	32	294
Colusa	21,551	21,945	394	1.83	400	142	258	136	108	28
Contra Costa	1,031,012	1,044,201	13,189	1.28	13,584	6,836	6,748	6,441	4,168	2,273
Del Norte	29,009	29,207	198	0.68	374	290	84	114	25	89
El Dorado	176,969	178,689	1,720	0.97	1,981	1,250	731	989	290	699
Fresno	906,365	923,052	16,687	1.84	17,110	5,951	11,159	5,528	4,365	1,163
Glenn	28,628	29,018	390	1.36	455	249	206	184	99	85
Humboldt	131,876	132,364	488	0.37	1,605	1,255	350	138	77	61
Imperial	168,979	174,322	5,343	3.16	3,280	914	2,366	2,977	2,373	604
Inyo	18,221	18,253	32	0.18	242	239	3	29	28	1
Kern	790,246	809,903	19,657	2.49	15,446	5,406	10,040	9,617	3,114	6,503
Kings	149,883	153,268	3,385	2.26	2,742	841	1,901	1,484	564	920
Lake	63,618	63,821	203	0.32	737	850	-113	316	155	161
Lassen	35,521	36,223	702	1.98	268	209	59	643	19	624
Los Angeles	10,247,672	10,294,280	46,608	0.45	152,479	60,800	91,679	-45,071	69,567	-114,638
Madera	146,064	149,916	3,852	2.64	2,565	921	1,644	2,208	505	1,703
Marin	254,000	256,310	2,310	0.91	2,625	1,787	838	1,472	534	938
Mariposa	18,187	18,356	169	0.93	148	176	-28	197	13	184
Mendocino	89,264	89,669	405	0.45	1,137	857	280	125	238	-113
Merced	248,258	252,544	4,286	1.73	4,867	1,435	3,432	854	1,271	-417
Modoc	9,690	9,747	57	0.59	77	114	-37	94	3	91
Mono	14,019	14,055	36	0.26	167	47	120	-84	43	-127
Monterey	421,463	425,356	3,893	0.92	7,371	2,431	4,940	-1,047	2,490	-3,537
Napa	134,186	135,554	1,368	1.02	1,760	1,266	494	874	615	259
Nevada	99,248	99,587	339	0.34	773	982	-209	548	95	453
Orange	3,075,341	3,098,183	22,842	0.74	44,582	17,389	27,193	-4,351	17,584	-21,935
Placer	322,953	329,818	6,865	2.13	3,897	2,257	1,640	5,225	699	4,526
Plumas	21,013	20,891	-122	-0.58	174	226	-52	-70	29	-99
Riverside	2,004,174	2,070,315	66,141	3.30	35,144	13,539	21,605	44,536	7,898	36,638
Sacramento	1,396,496	1,415,117	18,621	1.33	21,703	9,716	11,987	6,634	5,424	1,210
San Benito	57,128	57,493	365	0.64	886	275	611	-246	245	-491
San Bernardino	2,011,404	2,039,467	28,063	1.40	35,351	12,227	23,124	4,939	6,907	-1,968
San Diego	3,077,877	3,120,088	42,211	1.37	46,460	20,298	26,162	16,049	13,067	2,982
San Francisco	806,210	817,537	11,327	1.40	8,683	6,105	2,578	8,749	9,192	-443
San Joaquin	671,115	680,183	9,068	1.35	11,880	4,392	7,488	1,580	3,572	-1,992
San Luis Obispo	264,972	267,154	2,182	0.82	2,740	2,082	658	1,524	431	1,093
San Mateo	726,260	734,453	8,193	1.13	9,667	4,626	5,041	3,152	4,820	-1,668
Santa Barbara	421,337	425,710	4,373	1.04	5,998	2,884	3,114	1,259	1,884	-625
Santa Clara	1,790,272	1,820,176	29,904	1.67	26,347	8,454	17,893	12,011	12,867	-856
Santa Cruz	262,150	265,183	3,033	1.16	3,583	1,666	1,917	1,116	1,340	-224
Shasta	180,129	181,380	1,251	0.69	2,213	1,838	375	876	107	769
Sierra	3,464	3,400	-64	-1.85	14	37	-23	-41	1	-42
Siskiyou	45,618	45,695	77	0.17	532	533	-1	78	43	35
Solano	421,815	423,970	2,155	0.51	5,909	2,668	3,241	-1,086	1,637	-2,723
Sonoma	477,615	482,034	4,419	0.93	5,874	3,836	2,038	2,381	1,226	1,155
Stanislaus	515,660	523,095	7,435	1.44	8,918	3,598	5,320	2,115	1,959	156
Sutter	92,715	95,516	2,801	3.02	1,634	725	909	1,892	871	1,021
Tehama	61,369	62,093	724	1.18	839	641	198	526	109	417
Trinity	13,959	14,012	53	0.38	124	153	-29	82	6	76
Tulare	422,594	430,974	8,380	1.98	8,633	2,668	5,965	2,415	2,106	309
Tuolumne	56,882	56,910	28	0.05	497	620	-123	151	42	109
Ventura	818,803	826,550	7,747	0.95	12,442	5,120	7,322	425	3,575	-3,150
Yolo	193,262	197,530	4,268	2.21	2,689	1,121	1,568	2,700	949	1,751
Yuba	70,053	71,612	1,559	2.23	1,376	554	822	737	184	553
California	37,332,976	37,771,431	438,455	1.17	565,169	237,884	327,285	111,170	199,931	-88,761

POPULATION PROJECTIONS BY RACE/ETHNICITY FOR CALIFORNIA AND ITS COUNTIES 2000-2050
REPORT 06 P-1

TABLE 1 — **TOTAL POPULATION**

	2000	2010	2020	2030	2040	2050
ALAMEDA	1,453,078	1,550,133	1,663,481	1,791,721	1,923,505	2,047,658
ALPINE	1,261	1,369	1,453	1,462	1,411	1,377
AMADOR	35,357	40,337	47,593	54,788	61,550	68,487
BUTTE	204,065	230,116	281,442	334,842	387,743	441,596
CALAVERAS	40,870	47,750	56,318	64,572	72,230	80,424
COLUSA	19,027	23,787	29,588	34,488	38,131	41,662
CONTRA COSTA	956,497	1,075,931	1,237,544	1,422,840	1,609,257	1,812,242
DEL NORTE	27,680	30,983	36,077	42,420	49,029	56,218
EL DORADO	158,621	189,308	221,140	247,570	280,720	314,126
FRESNO	804,508	983,478	1,201,792	1,429,228	1,670,542	1,928,411
GLENN	26,764	30,880	37,959	45,181	54,000	63,586
HUMBOLDT	126,839	134,785	142,167	147,217	150,121	152,333
IMPERIAL	143,763	189,675	239,149	283,693	334,951	387,763
INYO	18,181	19,183	20,495	22,132	23,520	25,112
KERN	665,519	871,728	1,086,113	1,352,627	1,707,239	2,106,024
KINGS	130,202	164,535	205,707	250,516	299,770	352,750
LAKE	58,724	67,530	77,912	87,066	96,885	106,887
LASSEN	34,108	37,918	42,394	47,240	51,596	55,989
LOS ANGELES	9,578,960	10,514,663	11,214,237	11,920,289	12,491,606	13,061,787
MADERA	124,696	162,114	212,874	273,456	344,455	413,569
MARIN	248,449	253,682	260,305	273,151	287,153	307,868
MARIPOSA	17,150	19,108	21,743	23,981	26,169	28,091
MENDOCINO	86,736	93,166	102,017	111,151	121,780	134,358
MERCED	211,481	273,935	348,690	439,905	541,161	652,355
MODOC	9,628	10,809	13,134	16,250	20,064	24,085
MONO	13,013	14,833	18,080	22,894	29,099	36,081
MONTEREY	404,031	433,283	476,642	529,145	584,878	646,590
NAPA	125,146	142,767	165,786	191,734	219,156	251,630
NEVADA	92,532	102,649	114,451	123,940	130,404	136,113
ORANGE	2,863,834	3,227,836	3,520,265	3,705,322	3,849,650	3,987,625
PLACER	252,223	347,543	428,535	512,509	625,964	751,208
PLUMAS	20,868	21,824	22,934	24,530	26,279	28,478
RIVERSIDE	1,559,039	2,239,053	2,904,848	3,507,498	4,103,182	4,730,922
SACRAMENTO	1,233,575	1,451,866	1,622,306	1,803,872	1,989,221	2,176,508
SAN BENITO	53,927	64,230	83,792	103,340	123,406	145,570
SAN BERNARDINO	1,721,942	2,177,596	2,581,371	2,958,939	3,309,292	3,662,193
SAN DIEGO	2,836,303	3,199,706	3,550,714	3,950,757	4,241,399	4,508,728
SAN FRANCISCO	781,209	818,163	844,466	854,675	858,532	854,852
SAN JOAQUIN	569,083	741,417	965,094	1,205,198	1,477,473	1,783,973
SAN LUIS OBISPO	248,322	269,734	293,540	316,613	338,760	364,748
SAN MATEO	711,031	736,667	761,455	786,069	807,587	819,125
SANTA BARBARA	401,115	434,497	459,498	484,570	509,920	534,447
SANTA CLARA	1,693,128	1,837,361	1,992,805	2,192,501	2,412,411	2,624,670
SANTA CRUZ	256,695	268,016	287,480	304,465	318,413	333,083
SHASTA	164,794	191,722	224,386	260,179	295,281	331,724
SIERRA	3,701	3,628	3,508	3,290	3,356	3,547
SISKIYOU	44,634	47,109	51,283	55,727	60,656	66,588
SOLANO	396,995	441,061	503,248	590,166	697,206	815,524
SONOMA	461,618	495,412	546,151	606,346	676,179	761,177
STANISLAUS	451,190	559,708	699,144	857,893	1,014,365	1,191,344
SUTTER	79,632	102,326	141,159	182,401	229,620	282,894
TEHAMA	56,130	65,593	79,484	93,477	108,345	124,475
TRINITY	13,155	15,172	18,236	22,136	26,030	30,209
TULARE	369,873	466,893	599,117	742,969	879,480	1,026,755
TUOLUMNE	54,863	58,721	64,161	67,510	70,325	73,291
VENTURA	758,884	855,876	956,392	1,049,758	1,135,684	1,229,737
YOLO	170,190	206,100	245,052	275,360	301,934	327,982
YUBA	60,598	80,411	109,216	137,322	168,040	201,327
CALIFORNIA	34,105,437	39,135,676	44,135,923	49,240,891	54,226,115	59,507,876

Department of Finance
Demographic Research Unit
2007

COUNTY OF IMPERIAL

2000-2005 HOUSING ELEMENT

JURG HEUBERGER, AICP, CEP
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#1177.00

The exception of this low density aspect can be found in the several small rural unincorporated communities such as Heber, Seeley, Niland, Salton City and Palo Verde that have the basic infrastructure (to a lesser extent) associated with the incorporated cities. These small rural communities tend to be isolated from the cities. Beyond these small rural communities and located in the agricultural lands and the desert open space areas of the unincorporated County, there is a relatively small and geographically dispersed population that lacks the infrastructure associated with either the incorporated cities or the small rural communities.

The majority of the growth that occurs in the County tends to happen in the incorporated cities or in the areas surrounding the cities. The County has essentially established urban buffer areas around all the cities and communities located in agricultural areas (Please see the “Urban Areas” illustrated in the County General Plan Land Use Map provided in Appendix A of this Element). It is these buffer areas where growth outside of the incorporated cities tends to occur. Development in these areas is accomplished through the connection of services from a neighboring city, annexation into the city, or the establishment of new services to support the development. Growth outside of the “urban area” tends to be on a single lot basis. With the exception of a few small districts, neither major subdivisions nor major developments typically occur in the unincorporated areas outside of the “urban areas” due to the County’s rural character, lack of available infrastructure and the agricultural based activities.

2. County Growth Trends

The best available source of demographic information is the federal census, which is conducted once every ten years. The Population Research Unit of the California Department of Finance is the best source for annual population estimates. One problem with the federal census is that it does not take into account the seasonal population changes. Imperial County attracts many seasonal migratory workers and retired people, especially during the months of November through February.

Population Characteristics

Based on the 1990 census, the total population of Imperial County increased from 92,500 to 109,303 between 1980 and 1990, an increase of 16,803 persons or 18.2 percent. The unincorporated area increased from 24,459 to 27,339 persons in the same period of time. This 11.8 percent increase represents a population growth of 2,880 persons in the unincorporated area and highlights the lower population growth in the unincorporated areas when compared to the County as a whole. Based on April 1998 SCAG estimates, the year 2000 population of Imperial County is 148,980, with an estimated 39,422 people living in unincorporated areas.

There are a number of potential factors that may support an accelerated population growth in the near future. These factors include: growth of the geothermal industry in the County; additional prisons; an additional USA/Mexico border crossing; the possible expansion of the U.S. Naval Air Facility; and a possible regional airport.

Household Characteristics

A household is any group of people living together in a residence, whether related or unrelated. A survey of household characteristics is useful to determine household size trends, income, overcrowding or under-utilization of housing, and the number of special needs households such as large families and female-headed households.

According to the 1997 Housing Survey there were an estimated 4,388 households in the unincorporated portions of the County in 1997. Approximately 24.5 percent of the households were renter-occupied, while the remaining 75.5 percent were owner-occupied.

The average household size was estimated to be 3.45 persons per household. Further, larger households with five or more persons per household comprised 29.7 percent of the community, while three or four person households constituted 36.8 percent of the households in the unincorporated County.

As depicted in Table 1, approximately 66 percent of the owner- and renter-occupied households in the unincorporated County have annual incomes below 80 percent of the area median income, meaning 2/3 of the households are considered lower income households. In addition, Table 1 also shows that a majority of renter households have annual incomes less than 50 percent of the median income, or 60 percent of the renter households are considered very low income.

Community Development Division
Southern California Association of Governments

2004 Regional Transportation Plan/ Growth Vision:

SOCIO-ECONOMIC FORECAST REPORT

June 2004

Counties and Subregions

Imperial County Subregion

Population and Households

Imperial County shares a border with Mexico and is primarily agricultural. The county currently has about 1 percent of the SCAG regional population and about 1 percent of the households. The 2000 July figure shows that the population is 147,000 with 39,500 households.

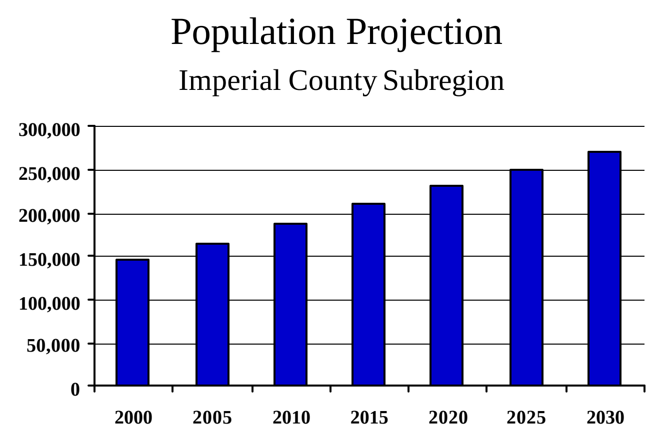

Figure 24

Imperial County's population is projected to be 270,000 in 2030, an 84 percent increase from its 2000 population. The number of households is projected to be 84,000 in 2030, up 112 percent from 2000. Based on the SCAG adopted 2004 RTP Socioeconomic Forecast, the Imperial County population and households are expected to grow at a faster pace than the regional average. Population is projected to grow at an annual rate of 2.8 percent and households are projected to grow at annual rate of 3.7 percent.

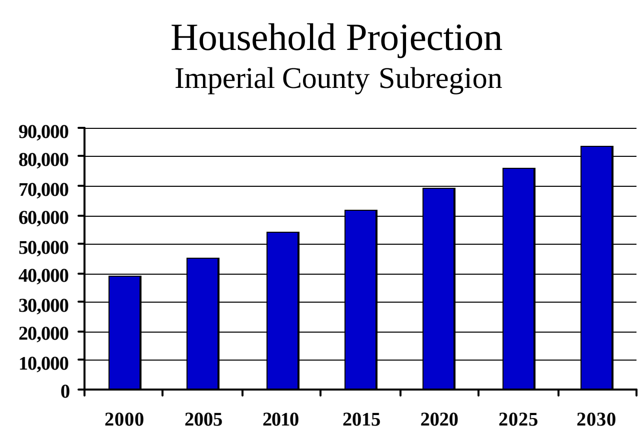

Figure 25

The County's rapid growth rate is primarily a result of the large Hispanic population in the county. In 2000, seventy two percent of the Imperial County population was Hispanic. Hispanics have the highest fertility rate,

Appendix M

Year 2013 Intersection LOS Calculations

AM Year 2013
1: Evan Hewes & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	62	38	22	101	3	73	12	18	6	19	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	67	41	24	110	3	79	13	20	7	21	12

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	39	75	79	58	112	39
Volume Left (vph)	5	0	24	0	79	7
Volume Right (vph)	0	41	0	3	20	12
Hadj (s)	0.10	-0.35	0.19	-0.01	0.07	-0.12
Departure Headway (s)	5.1	4.6	5.2	5.0	4.6	4.5
Degree Utilization, x	0.06	0.10	0.11	0.08	0.14	0.05
Capacity (veh/h)	681	741	668	696	741	743
Control Delay (s)	7.2	6.9	7.6	7.2	8.4	7.7
Approach Delay (s)	7.0		7.4		8.4	7.7
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.6		
HCM Level of Service	A		
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

AM Year 2013
2: I-8 WB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	13	0	59	7	24	0	0	48	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	14	0	64	8	26	0	0	52	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	135	103	61	103	112	26	71			26		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	135	103	61	103	112	26	71			26		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	94	100			100		
cM capacity (veh/h)	783	783	1004	874	774	1050	1530			1588		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	78	34	71
Volume Left	14	8	0
Volume Right	64	0	18
cSH	1281	1530	1700
Volume to Capacity	0.06	0.00	0.04
Queue Length 95th (ft)	5	0	0
Control Delay (s)	8.7	1.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.7	1.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

AM Year 2013
3: I-8 EB Ramp & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	0	0	0	0	0	0	29	29	39	21	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	0	0	0	0	0	32	32	42	23	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	155	171	23	155	155	47	23			63		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	155	171	23	155	155	47	23			63		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	100	100			97		
cM capacity (veh/h)	795	702	1054	795	717	1022	1592			1540		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	63	65
Volume Left	7	0	42
Volume Right	0	32	0
cSH	711	1700	1540
Volume to Capacity	0.01	0.04	0.03
Queue Length 95th (ft)	1	0	2
Control Delay (s)	10.1	0.0	4.9
Lane LOS	B		A
Approach Delay (s)	10.1	0.0	4.9
Approach LOS	B		

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	19.9%	ICU Level of Service		A
Analysis Period (min)	15			

AM Year 2013
4: Diehl Rd & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	0	6	0	0	1	3	27	0	0	12	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	7	0	0	1	3	29	0	0	13	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	53	52	16	59	55	29	20			29		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	53	52	16	59	55	29	20			29		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	100			100		
cM capacity (veh/h)	943	837	1063	930	834	1045	1597			1584		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	1	33	20
Volume Left	3	0	3	0
Volume Right	7	1	0	7
cSH	1020	1045	1597	1584
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	8.6	8.4	0.7	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.6	8.4	0.7	0.0
Approach LOS	A	A		

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	13.9%	ICU Level of Service		A
Analysis Period (min)	15			

AM Year 2013
5: SR-98 & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	1	29	54	3	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	32	59	3	0	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	62				94	60
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62				94	60
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1541				905	1005

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	33	62	2
Volume Left	1	0	0
Volume Right	0	3	2
cSH	1541	1700	1005
Volume to Capacity	0.00	0.04	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.2	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013
6: Evan Hewes & Forrester Road

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	55	8	13	112	8	14	100	16	16	110	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.98			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1826		1770	1844			1823			1811	
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (perm)	1770	1826		1770	1844			1823			1811	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	60	9	14	122	9	15	109	17	17	120	28
RTOR Reduction (vph)	0	4	0	0	3	0	0	4	0	0	7	0
Lane Group Flow (vph)	15	65	0	14	128	0	0	137	0	0	158	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	5.7	5.7		7.3	7.3			7.5			8.1	
Effective Green, g (s)	5.7	5.7		7.3	7.3			7.5			8.1	
Actuated g/C Ratio	0.13	0.13		0.16	0.16			0.17			0.18	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	226	233		290	302			307			329	
v/s Ratio Prot	0.01	c0.04		0.01	c0.07			c0.08			c0.09	
v/s Ratio Perm												
v/c Ratio	0.07	0.28		0.05	0.43			0.45			0.48	
Uniform Delay, d1	17.1	17.6		15.7	16.8			16.7			16.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	0.7		0.1	1.0			1.0			1.1	
Delay (s)	17.2	18.2		15.8	17.7			17.7			17.5	
Level of Service	B	B		B	B			B			B	
Approach Delay (s)		18.1			17.5			17.7			17.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	44.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

7: I-8 WB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	16	0	211	4	78	0	0	116	59
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	17	0	229	4	85	0	0	126	64
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked												
vC, conflicting volume	366	252	158	252	284	85	190			85		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	366	252	158	252	284	85	190			85		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	76	100			100		
cM capacity (veh/h)	450	649	887	700	623	974	1384			1512		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	247	89	190
Volume Left	17	4	0
Volume Right	229	0	64
cSH	1048	1384	1700
Volume to Capacity	0.24	0.00	0.11
Queue Length 95th (ft)	23	0	0
Control Delay (s)	9.9	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		

8: I-8 EB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	42	0	3	0	0	0	0	37	5	96	35	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	0	3	0	0	0	0	40	5	104	38	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	290	292	38	291	290	43	38			46		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	290	292	38	291	290	43	38			46		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	100	100	100	100	100			93		
cM capacity (veh/h)	629	577	1034	625	579	1027	1572			1562		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	49	46	142
Volume Left	46	0	104
Volume Right	3	5	0
cSH	674	1700	1562
Volume to Capacity	0.07	0.03	0.07
Queue Length 95th (ft)	6	0	5
Control Delay (s)	11.0	0.0	5.6
Lane LOS	B		A
Approach Delay (s)	11.0	0.0	5.6
Approach LOS	B		

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	7	0	0	8	1	1	0	0	3	1	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	8	0	0	9	1	1	0	0	3	1	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10			8			17	17	8	17	17	9
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			8			17	17	8	17	17	9
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1610			1613			996	877	1075	998	877	1072

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	8	10	1	4
Volume Left	0	0	1	3
Volume Right	0	1	0	0
cSH	1610	1613	996	965
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	8.6	8.7
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	8.6	8.7
Approach LOS			A	A

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	53	0	3	284	1	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	0	3	309	1	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			58		373	58
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			58		373	58
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1547		627	1009

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	58	312	4
Volume Left	0	3	1
Volume Right	0	0	3
cSH	1700	1547	875
Volume to Capacity	0.03	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	55	1	4	150	1	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	1	4	163	1	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			61		232	60
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			61		232	60
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1542		754	1005

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	61	167	7
Volume Left	0	4	1
Volume Right	1	0	5
cSH	1700	1542	952
Volume to Capacity	0.04	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.2	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	0.2	8.8
Approach LOS			A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	120	97	14	35	20	44	20	11	15	11	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	130	105	15	38	22	48	22	12	16	12	14

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	74	171	34	41	82	42
Volume Left (vph)	9	0	15	0	48	16
Volume Right (vph)	0	105	0	22	12	14
Hadj (s)	0.09	-0.40	0.26	-0.34	0.06	-0.09
Departure Headway (s)	5.0	4.5	5.3	4.7	4.7	4.6
Degree Utilization, x	0.10	0.21	0.05	0.05	0.11	0.05
Capacity (veh/h)	707	779	653	737	717	722
Control Delay (s)	7.3	7.5	7.4	6.7	8.3	7.9
Approach Delay (s)	7.4		7.0		8.3	7.9
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.6		
HCM Level of Service	A		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	15	0	39	0	13	0	0	89	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	16	0	42	0	14	0	0	97	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	135	114	100	114	117	14	103			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	135	114	100	114	117	14	103			14		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	96	100			100		
cM capacity (veh/h)	803	776	956	863	773	1066	1489			1604		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	59	14	103
Volume Left	16	0	0
Volume Right	42	0	7
cSH	1476	1489	1700
Volume to Capacity	0.04	0.00	0.06
Queue Length 95th (ft)	3	0	0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	15.0%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013
3: I-8 EB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	5	0	0	0	0	6	19	62	35	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	5	0	0	0	0	7	21	67	38	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	190	200	38	192	190	17	38			27		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	190	200	38	192	190	17	38			27		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	100	100	100	100			96		
cM capacity (veh/h)	745	666	1034	738	675	1062	1572			1587		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	13	27	105
Volume Left	8	0	67
Volume Right	5	21	0
cSH	1278	1700	1587
Volume to Capacity	0.01	0.02	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	9.3	0.0	4.8
Lane LOS	A		A
Approach Delay (s)	9.3	0.0	4.8
Approach LOS	A		

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

PM Year 2013
4: Diehl Rd & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	0	2	0	0	0	1	8	0	0	25	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	2	0	0	0	1	9	0	0	27	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	39	39	28	41	39	9	28			9		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	39	39	28	41	39	9	28			9		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	966	853	1048	960	852	1073	1585			1611		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	0	10	28
Volume Left	2	0	1	0
Volume Right	2	0	0	1
cSH	1005	1700	1585	1611
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	8.6	0.0	0.8	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.6	0.0	0.8	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

5: SR-98 & Drew Rd

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	96	56	3	4	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	104	61	3	4	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	64				171	62
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64				171	62
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1538				818	1002

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	107	64	5
Volume Left	2	0	4
Volume Right	0	3	1
cSH	1538	1700	849
Volume to Capacity	0.00	0.04	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.2	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	16.7%	ICU Level of Service	A
Analysis Period (min)	15		

6: Evan Hewes & Forrester Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	185	16	25	101	14	8	116	19	21	135	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1841		1770	1829			1824			1829	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (perm)	1770	1841		1770	1829			1824			1829	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	201	17	27	110	15	9	126	21	23	147	17
RTOR Reduction (vph)	0	2	0	0	4	0	0	5	0	0	3	0
Lane Group Flow (vph)	43	216	0	27	121	0	0	151	0	0	184	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	14.3	14.3		8.3	8.3			11.9			13.1	
Effective Green, g (s)	14.3	14.3		8.3	8.3			11.9			13.1	
Actuated g/C Ratio	0.22	0.22		0.13	0.13			0.19			0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	398	414		231	239			341			377	
v/s Ratio Prot	0.02	c0.12		0.02	c0.07			c0.08			c0.10	
v/s Ratio Perm												
v/c Ratio	0.11	0.52		0.12	0.50			0.44			0.49	
Uniform Delay, d1	19.6	21.6		24.4	25.7			22.9			22.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	1.2		0.2	1.7			0.9			1.0	
Delay (s)	19.7	22.8		24.6	27.4			23.8			23.3	
Level of Service	B	C		C	C			C			C	
Approach Delay (s)		22.3			26.9			23.8			23.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

7: I-8 WB Ramp & Forrester Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	8	0	169	0	107	0	0	272	57
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	184	0	116	0	0	296	62
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96					
vC, conflicting volume	535	443	327	443	474	116	358			116		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	497	401	280	401	434	116	313			116		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	80	100			100		
cM capacity (veh/h)	374	517	730	538	496	936	1200			1472		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	192	116	358
Volume Left	9	0	0
Volume Right	184	0	62
cSH	980	1200	1700
Volume to Capacity	0.20	0.00	0.21
Queue Length 95th (ft)	18	0	0
Control Delay (s)	9.9	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.9	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		

8: I-8 EB Ramp & Forrester Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	80	1	3	0	0	0	0	27	10	245	33	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	1	3	0	0	0	0	29	11	266	36	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	603	609	36	605	603	35	36			40		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	603	609	36	605	603	35	36			40		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	100	100	100	100	100	100			83		
cM capacity (veh/h)	357	340	1037	354	343	1038	1575			1569		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	91	40	302
Volume Left	87	0	266
Volume Right	3	11	0
cSH	370	1700	1569
Volume to Capacity	0.25	0.02	0.17
Queue Length 95th (ft)	24	0	15
Control Delay (s)	18.0	0.0	7.0
Lane LOS	C		A
Approach Delay (s)	18.0	0.0	7.0
Approach LOS	C		

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

9: Diehl Rd & Derrick Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	3	1	0	1	0	1	0	0	2	1	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	3	1	0	1	0	1	0	0	2	1	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1			4			5	5	4	5	5	1
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1			4			5	5	4	5	5	1
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1622			1617			1014	890	1080	1016	890	1083

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	1	1	3
Volume Left	0	0	1	2
Volume Right	1	0	0	0
cSH	1622	1617	1014	970
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	8.6	8.7
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	8.6	8.7
Approach LOS			A	A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

10: Evan Hewes & Westside Rd

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	173	0	0	18	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	188	0	0	20	0	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			188		208	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			188		208	188
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1386		781	854

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	188	20	5
Volume Left	0	0	0
Volume Right	0	0	5
cSH	1700	1386	854
Volume to Capacity	0.11	0.00	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	9.2
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	201	0	4	47	0	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	218	0	4	51	0	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			218		278	218
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			218		278	218
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1351		709	821

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	218	55	4
Volume Left	0	4	0
Volume Right	0	0	4
cSH	1700	1351	821
Volume to Capacity	0.13	0.00	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.6	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	0.6	9.4
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix N

Year 2013 + Project Intersection LOS Calculations

AM Year 2013 + Project
1: Evan Hewes & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	62	38	25	111	3	73	12	18	6	19	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	67	41	27	121	3	79	13	20	7	21	12

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	39	75	88	64	112	39
Volume Left (vph)	5	0	27	0	79	7
Volume Right (vph)	0	41	0	3	20	12
Hadj (s)	0.10	-0.35	0.19	0.00	0.07	-0.12
Departure Headway (s)	5.1	4.7	5.2	5.0	4.6	4.5
Degree Utilization, x	0.06	0.10	0.13	0.09	0.14	0.05
Capacity (veh/h)	678	738	668	695	735	736
Control Delay (s)	7.2	7.0	7.7	7.3	8.4	7.8
Approach Delay (s)	7.1		7.5		8.4	7.8
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.7		
HCM Level of Service	A		
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project
2: I-8 WB Ramp & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	187	0	59	11	24	0	0	51	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	203	0	64	12	26	0	0	55	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	147	115	65	115	124	26	74			26		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	147	115	65	115	124	26	74			26		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	76	100	94	99			100		
cM capacity (veh/h)	767	769	999	857	760	1050	1526			1588		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	267	38	74
Volume Left	203	12	0
Volume Right	64	0	18
cSH	1127	1526	1700
Volume to Capacity	0.24	0.01	0.04
Queue Length 95th (ft)	23	1	0
Control Delay (s)	10.1	2.4	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	2.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project
3: I-8 EB Ramp & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱					↱			↰	
Volume (veh/h)	6	0	95	0	0	0	0	33	37	39	198	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	103	0	0	0	0	36	40	42	215	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	356	376	215	408	356	56	215			76		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	356	376	215	408	356	56	215			76		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	87	100	100	100	100			97		
cM capacity (veh/h)	586	540	825	474	554	1011	1355			1523		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	110	76	258
Volume Left	7	0	42
Volume Right	103	40	0
cSH	877	1700	1523
Volume to Capacity	0.13	0.04	0.03
Queue Length 95th (ft)	11	0	2
Control Delay (s)	10.1	0.0	1.4
Lane LOS	B		A
Approach Delay (s)	10.1	0.0	1.4
Approach LOS	B		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project
4: Diehl Rd & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Volume (veh/h)	15	0	6	0	0	1	52	27	0	0	12	278
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	0	7	0	0	1	57	29	0	0	13	302
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	308	307	164	313	458	29	315			29		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	308	307	164	313	458	29	315			29		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	99	100	100	100	95			100		
cM capacity (veh/h)	622	580	880	613	477	1045	1245			1584		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	1	86	315
Volume Left	16	0	57	0
Volume Right	7	1	0	302
cSH	679	1045	1245	1584
Volume to Capacity	0.03	0.00	0.05	0.00
Queue Length 95th (ft)	3	0	4	0
Control Delay (s)	10.5	8.4	5.4	0.0
Lane LOS	B	A	A	
Approach Delay (s)	10.5	8.4	5.4	0.0
Approach LOS	B	A		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project
5: SR-98 & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	1	29	54	52	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	32	59	57	0	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	115				121	87
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	115				121	87
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1474				874	972

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	33	115	2
Volume Left	1	0	0
Volume Right	0	57	2
cSH	1474	1700	972
Volume to Capacity	0.00	0.07	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.3	0.0	8.7
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	8.7
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project
6: Evan Hewes & Forrester Road
HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	55	8	23	122	8	14	107	16	16	156	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.98			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	1826		1770	1845			1825			1819	
Flt Permitted	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (perm)	1770	1826		1770	1845			1825			1819	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	60	9	25	133	9	15	116	17	17	170	32
RTOR Reduction (vph)	0	7	0	0	3	0	0	6	0	0	8	0
Lane Group Flow (vph)	15	62	0	25	139	0	0	142	0	0	211	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	4.1	4.1		7.5	7.5			7.7			8.9	
Effective Green, g (s)	4.1	4.1		7.5	7.5			7.7			8.9	
Actuated g/C Ratio	0.09	0.09		0.17	0.17			0.17			0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	164	169		300	313			318			366	
v/s Ratio Prot	0.01	c0.03		0.01	c0.08			c0.08			c0.12	
v/s Ratio Perm												
v/c Ratio	0.09	0.37		0.08	0.44			0.45			0.58	
Uniform Delay, d1	18.3	18.8		15.5	16.5			16.3			15.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	1.3		0.1	1.0			1.0			2.2	
Delay (s)	18.6	20.2		15.6	17.5			17.3			18.1	
Level of Service	B	C		B	B			B			B	
Approach Delay (s)		19.9			17.2			17.3			18.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

AM Year 2013 + Project
7: I-8 WB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	16	0	211	4	85	0	0	116	115
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	17	0	229	4	92	0	0	126	125
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.98	0.98	0.98	0.98	0.98		0.98					
vC, conflicting volume	404	290	189	290	352	92	251			92		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	379	261	158	261	325	92	222			92		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	97	100	76	100			100		
cM capacity (veh/h)	430	627	867	674	577	965	1316			1502		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	247	97	251
Volume Left	17	4	0
Volume Right	229	0	125
cSH	1038	1316	1700
Volume to Capacity	0.24	0.00	0.15
Queue Length 95th (ft)	23	0	0
Control Delay (s)	9.9	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	24.4%	ICU Level of Service	A
Analysis Period (min)	15		

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AM Year 2013 + Project
8: I-8 EB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	49	0	3	0	0	0	0	37	5	96	35	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	0	3	0	0	0	0	40	5	104	38	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	290	292	38	291	290	43	38			46		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	290	292	38	291	290	43	38			46		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	100	100	100	100	100			93		
cM capacity (veh/h)	629	577	1034	625	579	1027	1572			1562		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	57	46	142
Volume Left	53	0	104
Volume Right	3	5	0
cSH	667	1700	1562
Volume to Capacity	0.08	0.03	0.07
Queue Length 95th (ft)	7	0	5
Control Delay (s)	11.1	0.0	5.6
Lane LOS	B		A
Approach Delay (s)	11.1	0.0	5.6
Approach LOS	B		

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

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AM Year 2013 + Project
9: Diehl Rd & Derrick Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	18	5	20	194	21	6	5	5	23	21	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	20	5	22	211	23	7	5	5	25	23	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	234			25			332	310	22	307	302	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	234			25			332	310	22	307	302	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	99	99	96	96	97
cM capacity (veh/h)	1334			1589			579	594	1055	629	600	817

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	255	17	70
Volume Left	5	22	7	25
Volume Right	5	23	5	22
cSH	1334	1589	680	666
Volume to Capacity	0.00	0.01	0.03	0.10
Queue Length 95th (ft)	0	1	2	9
Control Delay (s)	1.4	0.7	10.4	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	1.4	0.7	10.4	11.0
Approach LOS			B	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project
10: Evan Hewes & Westside Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	53	7	3	284	1	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	8	3	309	1	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			65		377	61
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			65		377	61
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1537		624	1004

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	65	312	4
Volume Left	0	3	1
Volume Right	8	0	3
cSH	1700	1537	871
Volume to Capacity	0.04	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	9.2
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	55	1	14	150	1	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	1	15	163	1	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			61		254	60
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			61		254	60
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1542		728	1005

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	61	178	7
Volume Left	0	15	1
Volume Right	1	0	5
cSH	1700	1542	945
Volume to Capacity	0.04	0.01	0.01
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	0.7	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	8.8
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project
1: Evan Hewes & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	130	97	14	35	20	44	20	14	15	11	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	141	105	15	38	22	48	22	15	16	12	14

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	79	176	34	41	85	42
Volume Left (vph)	9	0	15	0	48	16
Volume Right (vph)	0	105	0	22	15	14
Hadj (s)	0.09	-0.39	0.26	-0.34	0.04	-0.09
Departure Headway (s)	5.0	4.5	5.3	4.7	4.7	4.6
Degree Utilization, x	0.11	0.22	0.05	0.05	0.11	0.05
Capacity (veh/h)	706	776	650	733	717	717
Control Delay (s)	7.4	7.6	7.4	6.8	8.3	7.9
Approach Delay (s)	7.5		7.0		8.3	7.9
Approach LOS	A		A		A	A

Intersection Summary			
Delay	7.6		
HCM Level of Service	A		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project
2: I-8 WB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	23	0	39	95	16	0	0	89	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	25	0	42	103	17	0	0	97	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	345	324	100	324	327	17	103			17		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	345	324	100	324	327	17	103			17		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	96	100	96	93			100		
cM capacity (veh/h)	554	553	956	596	550	1061	1489			1600		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	67	121	103
Volume Left	25	103	0
Volume Right	42	0	7
cSH	1606	1489	1700
Volume to Capacity	0.04	0.07	0.06
Queue Length 95th (ft)	3	6	0
Control Delay (s)	9.6	6.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	6.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	9	0	0	0	0	104	193	62	43	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	10	0	0	0	0	113	210	67	47	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	399	504	47	404	399	218	47			323		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	399	504	47	404	399	218	47			323		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	100	100	100	100			95		
cM capacity (veh/h)	538	444	1023	528	509	822	1561			1237		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	323	114
Volume Left	8	0	67
Volume Right	10	210	0
cSH	1229	1700	1237
Volume to Capacity	0.01	0.19	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	10.0	0.0	5.0
Lane LOS	A		A
Approach Delay (s)	10.0	0.0	5.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	274	0	51	0	0	0	1	8	0	0	25	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	298	0	55	0	0	0	1	9	0	0	27	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	45	45	34	101	52	9	41			9		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	45	45	34	101	52	9	41			9		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	100	95	100	100	100	100			100		
cM capacity (veh/h)	956	846	1039	833	839	1073	1568			1611		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	353	0	10	41
Volume Left	298	0	1	0
Volume Right	55	0	0	14
cSH	968	1700	1568	1611
Volume to Capacity	0.36	0.00	0.00	0.00
Queue Length 95th (ft)	42	0	0	0
Control Delay (s)	10.8	0.0	0.8	0.0
Lane LOS	B	A	A	
Approach Delay (s)	10.8	0.0	0.8	0.0
Approach LOS	B	A		

Intersection Summary			
Average Delay	9.5		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project

5: SR-98 & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	96	56	3	53	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	104	61	3	58	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	64				171	62
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64				171	62
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				93	100
cM capacity (veh/h)	1538				818	1002

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	107	64	59
Volume Left	2	0	58
Volume Right	0	3	1
cSH	1538	1700	821
Volume to Capacity	0.00	0.04	0.07
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.2	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	16.7%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project

6: Evan Hewes & Forrester Road

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	195	16	25	101	14	8	162	29	21	142	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1842		1770	1829			1822			1830	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (perm)	1770	1842		1770	1829			1822			1830	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	212	17	27	110	15	9	176	32	23	154	17
RTOR Reduction (vph)	0	4	0	0	7	0	0	8	0	0	4	0
Lane Group Flow (vph)	47	225	0	27	118	0	0	209	0	0	190	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	13.4	13.4		7.4	7.4			13.0			9.0	
Effective Green, g (s)	13.4	13.4		7.4	7.4			13.0			9.0	
Actuated g/C Ratio	0.23	0.23		0.13	0.13			0.22			0.15	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	403	420		223	230			403			280	
v/s Ratio Prot	0.03	c0.12		0.02	c0.06			c0.11			c0.10	
v/s Ratio Perm												
v/c Ratio	0.12	0.54		0.12	0.51			0.52			0.68	
Uniform Delay, d1	18.0	20.0		22.8	24.0			20.1			23.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	1.3		0.2	1.9			1.1			6.4	
Delay (s)	18.1	21.3		23.1	25.9			21.3			29.9	
Level of Service	B	C		C	C			C			C	
Approach Delay (s)		20.7			25.4			21.3			29.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	8	0	169	0	163	0	0	272	64
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	184	0	177	0	0	296	70
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.95	0.95	0.95	0.95	0.95		0.95					
vC, conflicting volume	599	508	330	508	542	177	365			177		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	556	459	274	459	496	177	310			177		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	79	100			100		
cM capacity (veh/h)	332	475	730	488	453	866	1192			1399		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	192	177	365
Volume Left	9	0	0
Volume Right	184	0	70
cSH	907	1192	1700
Volume to Capacity	0.21	0.00	0.21
Queue Length 95th (ft)	20	0	0
Control Delay (s)	10.4	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.4	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	136	1	3	0	0	0	0	27	10	245	33	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	1	3	0	0	0	0	29	11	266	36	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	603	609	36	605	603	35	36			40		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	603	609	36	605	603	35	36			40		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	59	100	100	100	100	100	100			83		
cM capacity (veh/h)	357	340	1037	354	343	1038	1575			1569		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	152	40	302
Volume Left	148	0	266
Volume Right	3	11	0
cSH	365	1700	1569
Volume to Capacity	0.42	0.02	0.17
Queue Length 95th (ft)	50	0	15
Control Delay (s)	21.8	0.0	7.0
Lane LOS	C		A
Approach Delay (s)	21.8	0.0	7.0
Approach LOS	C		

Intersection Summary			
Average Delay	11.0		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project
9: Diehl Rd & Derrick Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	189	21	5	12	5	21	20	20	7	6	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	205	23	5	13	5	23	22	22	8	7	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	18			228			296	290	217	320	298	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			228			296	290	217	320	298	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			96	96	97	99	99	99
cM capacity (veh/h)	1598			1340			639	610	823	592	603	1064

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	250	24	66	20
Volume Left	22	5	23	8
Volume Right	23	5	22	5
cSH	1598	1340	678	680
Volume to Capacity	0.01	0.00	0.10	0.03
Queue Length 95th (ft)	1	0	8	2
Control Delay (s)	0.7	1.8	10.9	10.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.7	1.8	10.9	10.5
Approach LOS			B	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project
10: Evan Hewes & Westside Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	173	0	0	18	7	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	188	0	0	20	8	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			188		208	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			188		208	188
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1386		781	854

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	188	20	13
Volume Left	0	0	8
Volume Right	0	0	5
cSH	1700	1386	810
Volume to Capacity	0.11	0.00	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	9.5
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.5
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	201	0	4	47	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	218	0	4	51	0	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			218		278	218
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			218		278	218
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	98
cM capacity (veh/h)			1351		709	821

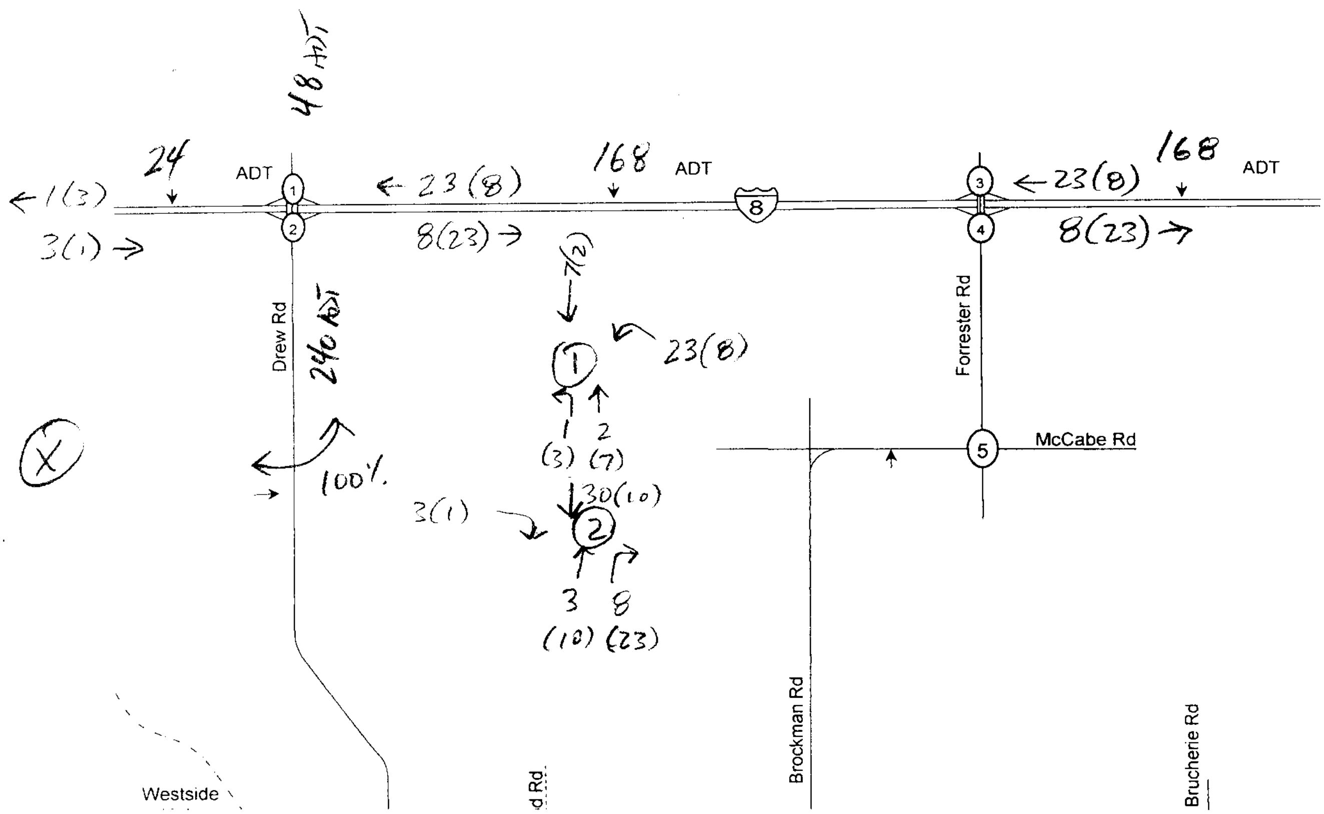
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	218	55	15
Volume Left	0	4	0
Volume Right	0	0	15
cSH	1700	1351	821
Volume to Capacity	0.13	0.00	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.6	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	0.6	9.5
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix O

Cumulative Project (New Development) Data

CUMULATIVE PROJECT #1 ——> "S" LINE UPGRADE (IID)



CUMULATIVE: IMPERIAL VALLEY SOLAR (FORMERLY SES SOLAR II)

EXECUTIVE SUMMARY

Christopher Meyer

INTRODUCTION

Imperial Valley Solar, LLC (formerly Stirling Energy Systems Solar Two, LLC) is seeking approval to construct and operate the Imperial Valley Solar (formerly the Stirling Energy Systems Solar Two) Project and its ancillary facilities. The applicant is a wholly owned subsidiary of Tessera Solar. The main objective of the Imperial Valley Solar (IVS) Project is to provide clean, renewable, solar-powered electricity to the State of California. The electricity from the IVS Project would assist the State in meeting its objectives as mandated by the California Renewable Portfolio Standard (RPS) Program and the California Global Warming Solutions Act. The IVS Project would also address other local mandates adopted by California's electric utilities for the provision of renewable energy.

San Diego Gas & Electric (SDG&E) selected the IVS Project to help meet its objectives under the legislative requirements of the RPS Program through a least-cost, best-fit competitive solicitation. Because the IVS Project is one of the three projects that SDG&E selected from the solicitation, the applicant and SDG&E entered into a 20-year Power Purchase Agreement (PPA) for the provision of renewable electricity. This PPA would help SDG&E meet both its statutory mandate to purchase at least 20% of its electric power from renewable resources by 2010 and its future electricity requirements. The California Public Utilities Commission approved the PPA on December 1, 2005. The IVS Project represents approximately 44% of SDG&E's RPS goals.

The applicant has submitted an Application for Certification (AFC) to the California Energy Commission (Energy Commission) for the proposed project. The Energy Commission is the lead State agency responsible for evaluating the environmental effects of project and for complying with the California Environmental Quality Act (CEQA). The project proposes the use of land managed by the United States Department of the Interior, Bureau of Land Management (BLM); therefore the applicant has submitted a request for a right-of-way grant to the BLM. The BLM is the federal lead agency for the evaluation of project effects and compliance of the proposed project with the requirements of the National Environmental Policy Act (NEPA) related to possible BLM discretionary actions related to the right-of-way grant request.

The BLM and the Energy Commission prepared separate final documents for compliance with NEPA and CEQA, respectively. Specifically, the BLM is preparing the Final Environmental Impact Statement (FEIS) and the Energy Commission prepared this Supplemental Staff Assessment (SSA). The Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) was the primary reference used by the BLM in preparing the FEIS and is incorporated by reference in the BLM's FEIS for the IVS Project. After the publication of the FEIS, the BLM will prepare a Record of Decision (ROD) regarding the Agency Preferred Alternative. The publication of the ROD in the Federal Register is the final step required of the BLM to meet the requirements of NEPA for the IVS Project. While the Energy Commission SSA is not written jointly with the BLM, the proponent will be required to comply with all terms and conditions required by the BLM, as will be described in the BLM's Record of Decision and Right-of-Way grant documents for this project. The conditions of certification within this document may also require the submittal of documents and reports to other federal, state, or local agencies. It is the project owner's responsibility to ensure the timely submittal of these documents and reports.

The Energy Commission staff identified significant unmitigable impacts to Biological Resources, Land Use, Soil & Water Resources, and Visual Resources. Impacts to Cultural Resources are being analyzed and will be addressed in a document filed subsequently to this document. Because many of the unmitigable impacts identified by staff could be significantly reduced through implementation of Drainage Alternative #1, the Energy Commission staff recommends that it, rather than the proposed project, be approved by the Energy Commission. The BLM has addressed the reduction of potential impacts identified in the FEIS by coordinating with the U.S. Army Corps of Engineers (USACE) on identifying and analyzing a draft Least Environmentally Damaging Alternative (LEDPA). A final LEDPA will ultimately be identified by USACE and will be required in order for the project to proceed. The Energy Commission staff believe that when the LEDPA is finalized, it will be similar to Drainage Alternative #1 recommended by staff.

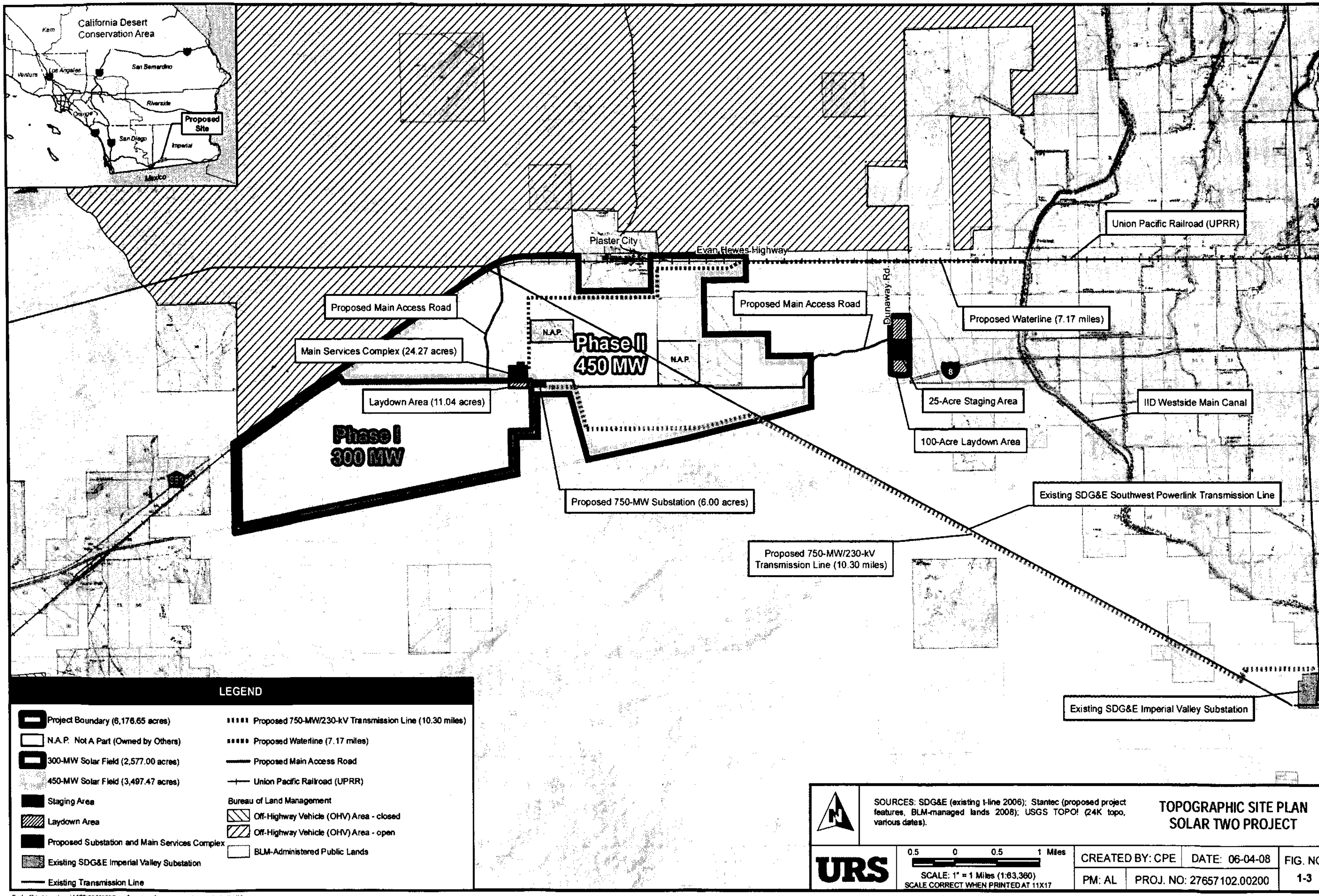
PROPOSED PROJECT

Project Location and Description

The applicant intends to develop an electric-generating facility with a nominal capacity of 750 megawatts (MW) using concentrated solar power. The IVS Project would be constructed on an approximately 6,500-acre (just over 10 square miles) site in the Imperial Valley in Imperial County, California. The site is approximately 100 miles east of San Diego, 14 miles west of El Centro, and 4 miles east of Ocotillo Wells. The IVS Project site is predominantly comprised of BLM managed lands with some private parcels within the approximately 6,500 acre site. Key features of the proposed project are described briefly below and in more detail in the following sections:

The electric-generating facility would include the construction of a new 230-kilovolt (kV) substation approximately in the center of the project site, an operation and administration building, a maintenance building, and a substation building.

The IVS Project as proposed would be constructed in two phases: Phase I would consist of up to 12,000 SunCatchers configured in 200 1.5-MW solar groups of 60 SunCatchers per group. The total net nominal generating capacity of Phase 1 is 300 MW. Phase I would require approximately 2,600 acres. The renewable energy from Phase I would be transmitted via the existing 500-kV SDG&E Southwest Powerlink transmission line. The IVS Project would be connected to the grid at the SDG&E Imperial Valley Substation via a 10.3-mi long, 230-kV interconnection transmission line that would be constructed as part of the project in a corridor parallel to the existing Southwest Powerlink transmission line.


California Desert Conservation Area
Proposed Site
Plaster City
Evan Hewes Highway
Proposed Main Access Road
Main Services Complex (24.27 acres)
Laydown Area (11.04 acres)
Phase I 300 MW
Phase II 450 MW
N.A.P.
Proposed Main Access Road
Dunaway Rd.
Proposed Waterline (7.17 miles)
Union Pacific Railroad (UPRR)
25-Acre Staging Area
100-Acre Laydown Area
IID Westside Main Canal
Proposed 750-MW Substation (6.00 acres)
Existing SDG&E Southwest Powerlink Transmission Line
Proposed 750-MW/230-kV Transmission Line (10.30 miles)
Existing SDG&E Imperial Valley Substation
LEGEND
Project Boundary (6,176.65 acres)
N.A.P. Not A Part (Owned by Others)
300-MW Solar Field (2,577.00 acres)
450-MW Solar Field (3,497.47 acres)
Staging Area
Laydown Area
Proposed Substation and Main Services Complex
Existing SDG&E Imperial Valley Substation
Existing Transmission Line
Proposed 750-MW/230-kV Transmission Line (10.30 miles)
Proposed Waterline (7.17 miles)
Proposed Main Access Road
Union Pacific Railroad (UPRR)
Bureau of Land Management
Off-Highway Vehicle (OHV) Area - closed
Off-Highway Vehicle (OHV) Area - open
BLM-Administered Public Lands
SOURCES: SDG&E (existing t-line 2006); Stantec (proposed project features, BLM-managed lands 2008); USGS TOPO! (24K topo, various dates).
TOPOGRAPHIC SITE PLAN
SOLAR TWO PROJECT
URS
SCALE: 1" = 1 Miles (1:63,360)
SCALE CORRECT WHEN PRINTED AT 11X17
CREATED BY: CPE
DATE: 06-04-08
FIG. NO: 1-3
PM: AL
PROJ. NO: 27657102.00200

N

Table 5.11-6
Project Construction Trip Generation

Vehicle Type	Peak Daily Round Trips	Morning Peak Trips			Evening Peak Trips		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Construction worker vehicles[1]	1,462	731	0	731	0	731	**731**
Truck deliveries[2]	274	41	0	41	0	41	**41**

Source: SES Solar Two, LLC, 2008.

Notes:

[1]Peak workforce was conservatively analyzed at 731 worker trips conservatively assumed to drive alone during both the morning (0700 to 0900) and evening (1600 to 1800) peak hours.

[2]Trucks deliveries shown in the table were adjusted into PCE vehicles (3 PCE per month). 1,099 truck trips per month = 3,297 PCEs divided by 24 working days = 137 PCE one-way trips or 274 round trips per day on average. It was also assumed that 30 percent of the truck delivery trips arrive during the morning peak hour and leave during the evening peak hour while the remaining deliveries (70 percent) would arrive and leave during off-peak hours.

PCE = passenger car equivalent

Project Operations Trip Generation

During Project operations, the Project study area will experience increases in traffic associated primarily with operation worker commute and operation and maintenance (O&M) trips. Some visitor trips were also assumed for a proposed visitor center that could potentially be built on-site. The traffic analysis evaluated the worst-case Project operations scenario by accounting for both planned (operations and delivery) and future visitor trips within the Project study area.

Operations

The operational workforce projections provided by the Project design engineer estimated that by Year 7 of Project operations, up to 164 workers will be working on-site on a daily basis. The estimated vehicle requirements for operational workers include 100 cars and 4 van pool vehicles. The operational projections also included 8 daily visitor trips for sales, deliveries, and other services. To evaluate the worst-case scenario, these vehicle trips were assumed to arrive during the morning peak period (0700 to 0900) and depart during the evening peak period (1600 to 1800).

Deliveries

To sustain and support Project operations, five weekly delivery trips of hydrogen, O&M supplies, waste management, and hazardous waste handling are anticipated at the Project Site. In addition, one weekly tractor trailer trip is anticipated for spare parts, building supplies, and temporary rental equipments. It is estimated that there will be an average of 12 truck round trips or 36 PCE operational delivery round trips on a daily basis accessing the Project Site during operations. Delivery trips will likely arrive and depart throughout the day. The analysis assumed the worst-case scenario: that these trips occur on the same day.

Project Site Visits

The Project trip generation data in Table 5.11-7, Project Operations Trip Generation, show the resultant trips that would be generated by operations, deliveries, and Project Site trips.

Table 5.11-7
Project Operations Trip Generation

Vehicle Type	Peak Daily Round Trips[1]	Morning Peak Trips			Evening Peak Trips		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Operations	224	112	0	**112**	0	112	**112**
Deliveries[2]	36	9	5	**14**	0	4	**4**
Visitor Center	20	5	5	**10**	5	5	**10**

Source: SES Solar Two, LLC, 2008; URS Corporation, 2008.

Notes:

[1]Peak workforce was conservatively analyzed at 731 worker trips conservatively assumed to drive alone during both the morning (0700 to 0900) and evening (1600 to 1800) peak hours.

[2]Trucks deliveries shown in the table were adjusted into PCE vehicles (3 PCE per month).

PCE = passenger car equivalent

Project Trip Distribution

Trip Distribution and Assignment

It is assumed that workers will come from Imperial and adjoining counties. As shown in Table 5.11-8, Workforce Distribution, it is anticipated that the construction and operation workforces will be originating from the following geographical areas:

- Imperial County,
- San Diego County, and
- Riverside County.

Table 5.11-8
Workforce Distribution

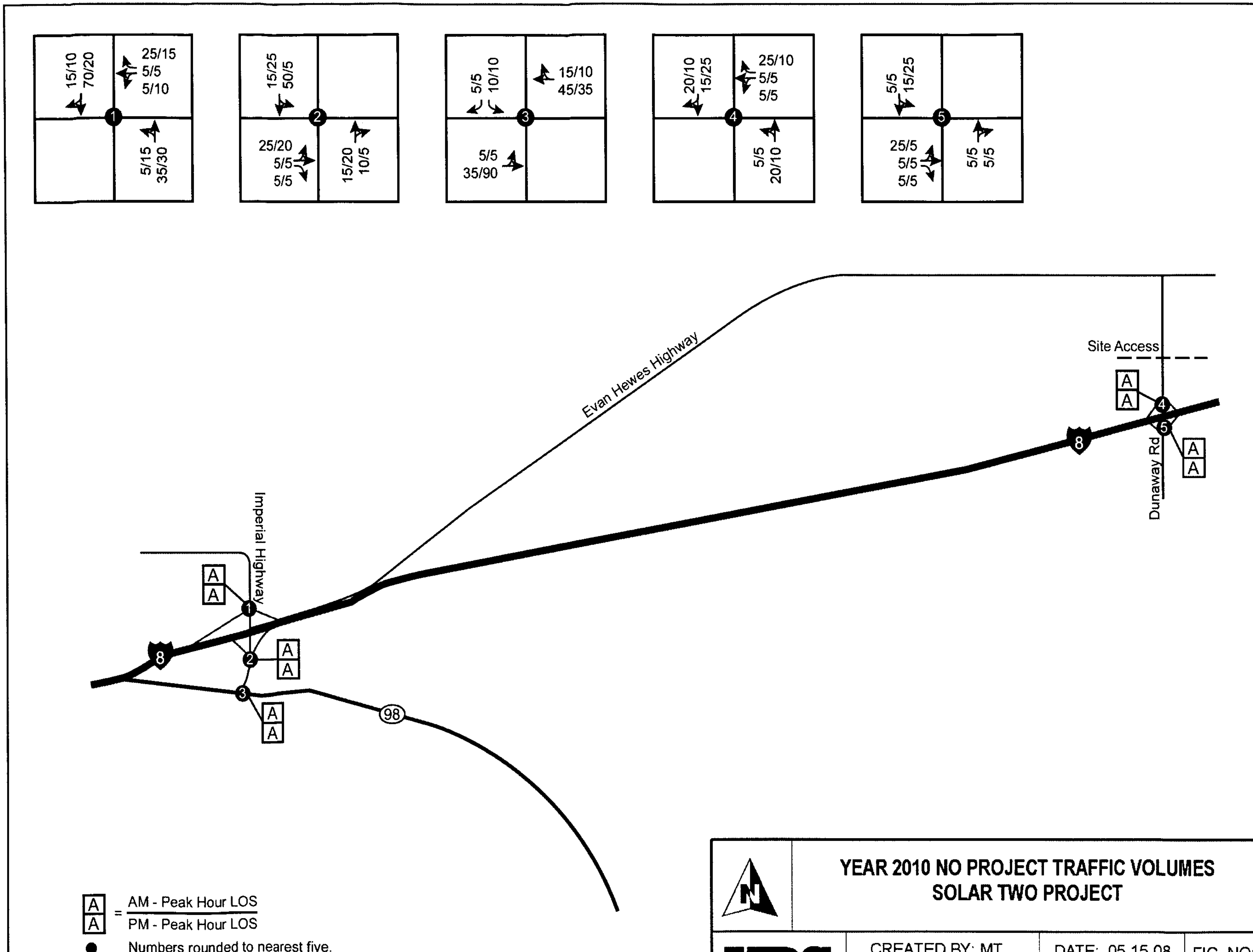
Origin of Workforce Vehicle Travel to Project Site	Construction Workforce	Operation Workforce
I-8 East (Imperial County)	60.0%	65.0%
I-8 East (outside of Imperial County)	5.0%	1.0%
Evan Hewes Highway east (local)	15.0% ✓	23.0%
I-8 West (Imperial County)	5.0%	5.0%
I-8 West (outside of Imperial County)	10.0%	5.0%
Evan Hewes Highway west (Local)	5.0%	1.0%
Totals	**100.0%**	**100.0%**

Source: SES Solar Two, LLC, 2008; URS Corporation, 2008.

Notes:

% = percent

I-8 = Interstate 8



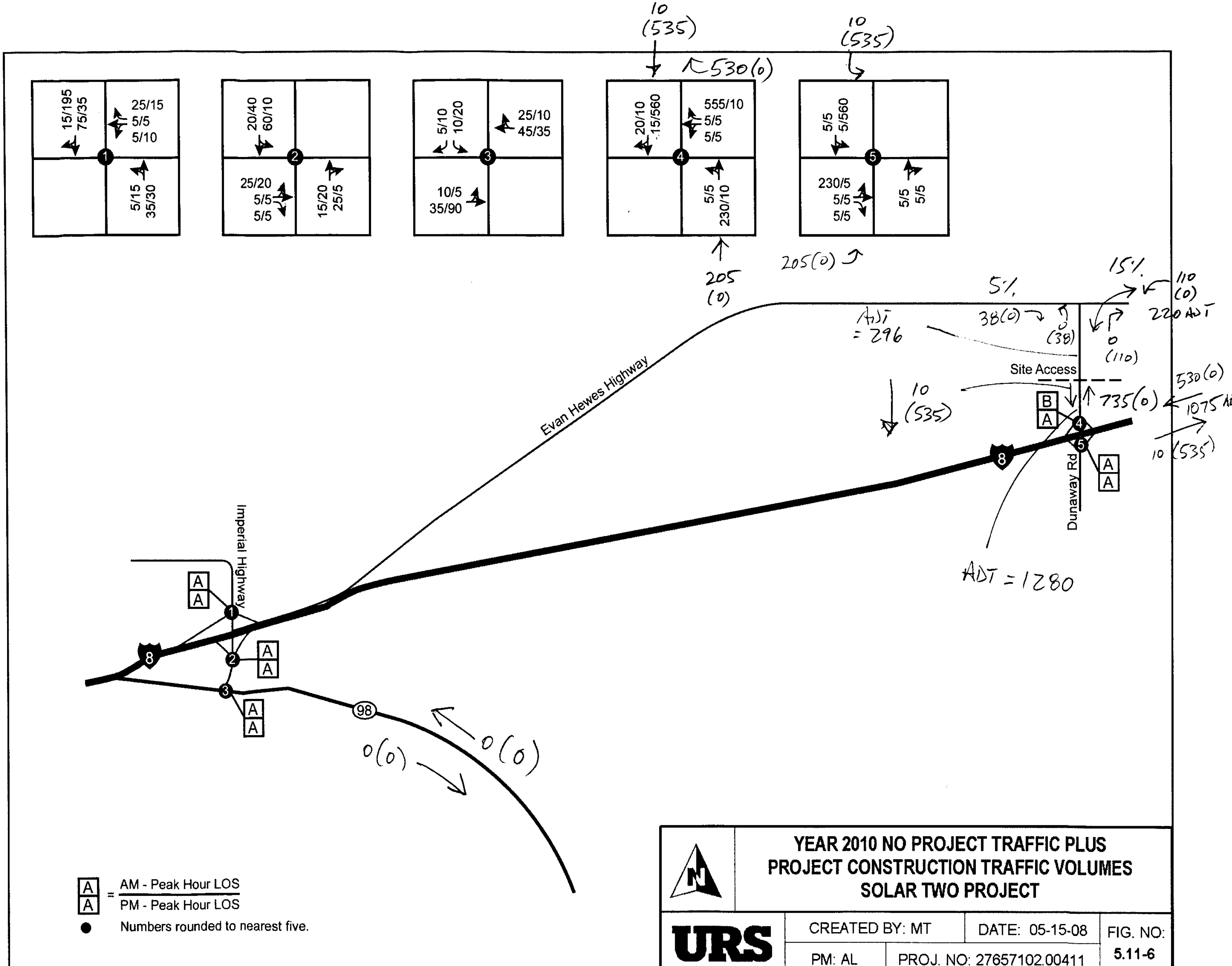
YEAR 2010 NO PROJECT TRAFFIC VOLUMES
SOLAR TWO PROJECT

URS

CREATED BY: MT	DATE: 05-15-08	FIG. NO:
PM: AL	PROJ. NO: 27657102.00411	5.11-5

K:/2008/SES Solar 2/figure 5.11-5.ai

2



YEAR 2010 NO PROJECT TRAFFIC PLUS PROJECT CONSTRUCTION TRAFFIC VOLUMES SOLAR TWO PROJECT

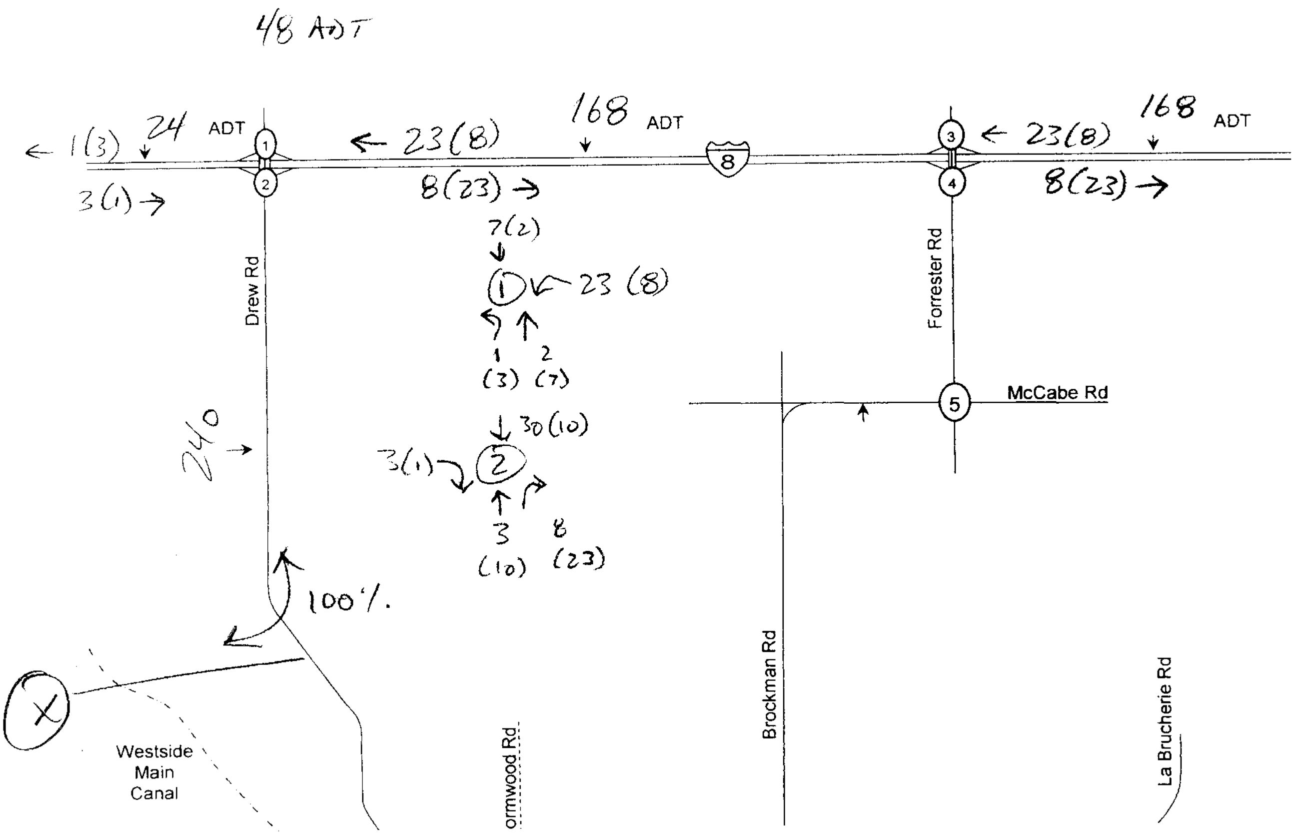
URS

CREATED BY: MT | DATE: 05-15-08 | FIG. NO: 5.11-6

PM: AL | PROJ. NO: 27657102.00411

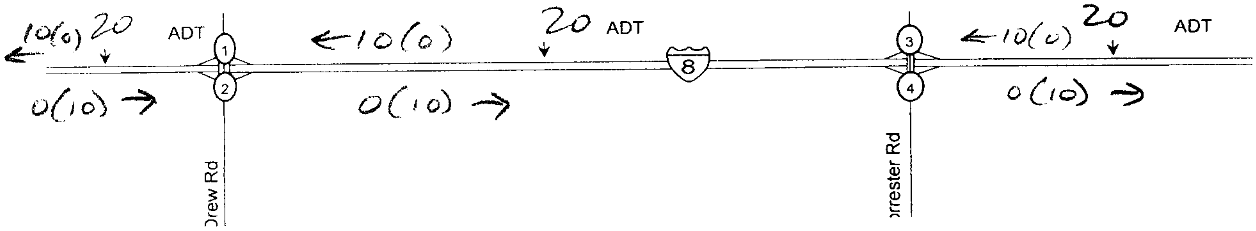
K:/2008/SES Solar 2/figure 5.11-6.ai

CUMULATIVE PROJECT #3 · SUNRISE POWERLINK



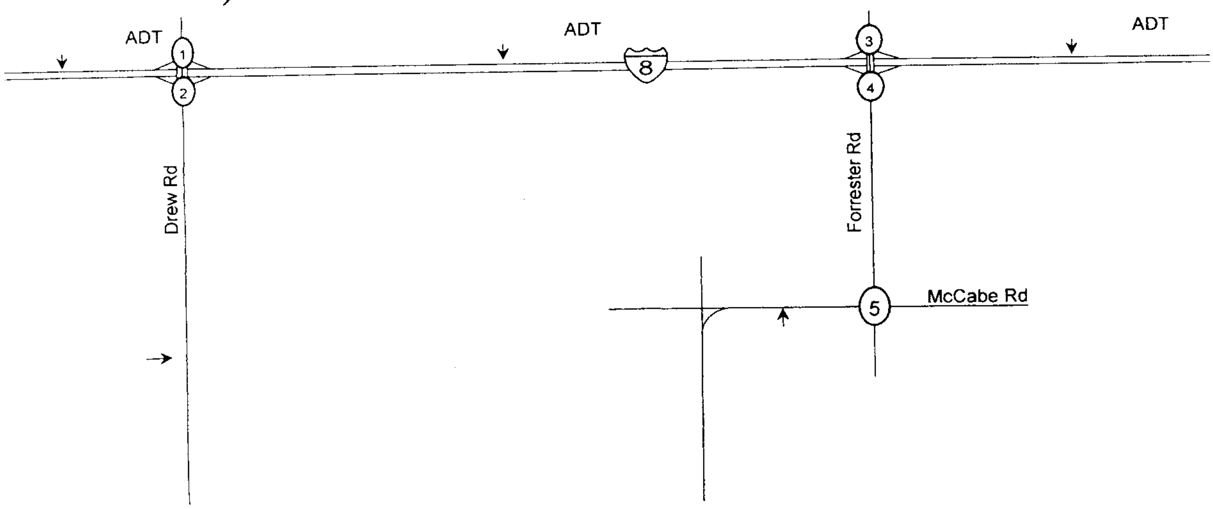
4

Cumulative Project 4 (EIR [D]): SDG&E PV Solar Field approx. 18 miles northwest of the project site; therefore, no cumualtive traffic is anticipated to be added to the study intersections and segments south of I-8. However, the cumulative project is anticipated to add regional traffic to I-8 as shown below.

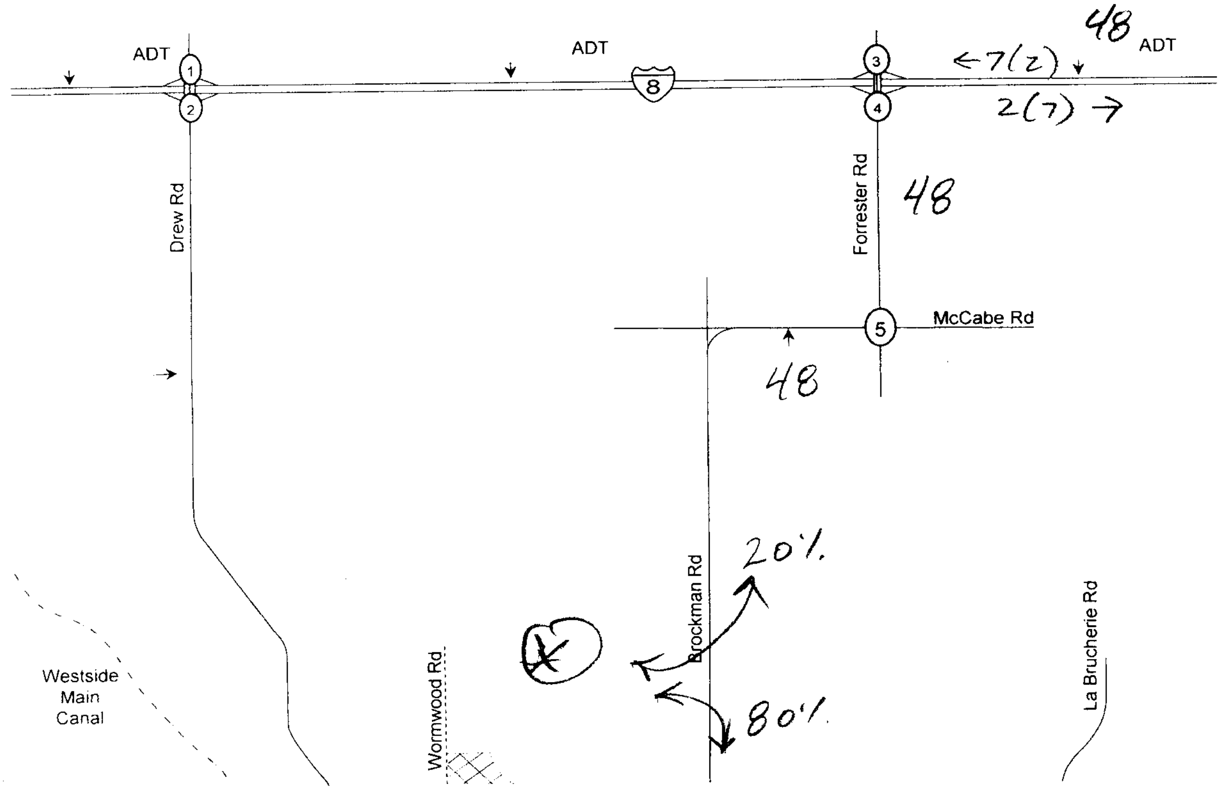


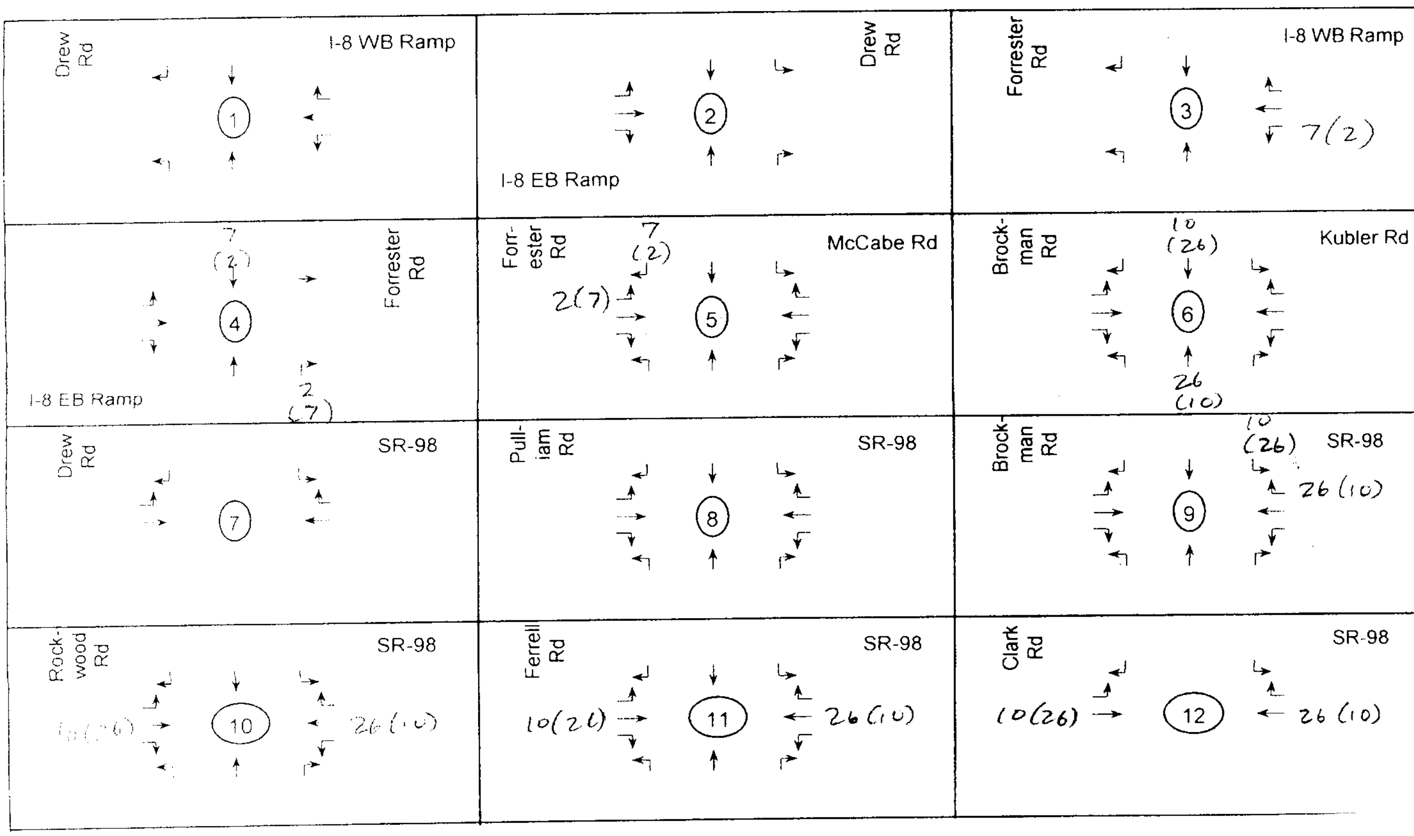
5

CUMULATIVE PROJECT #5 (EIR[E]): SDG&E GEOTECHNICAL INVESTIGATION. LIMITED CONSTRUCTION TRAFFIC IS ANTICIPATED TO LAST NO LONGER THAN ONE WEEK IN SEPT 2011; THEREFORE, NO CUMULATIVE TRAFFIC ADDED TO STUDY ROADWAYS.



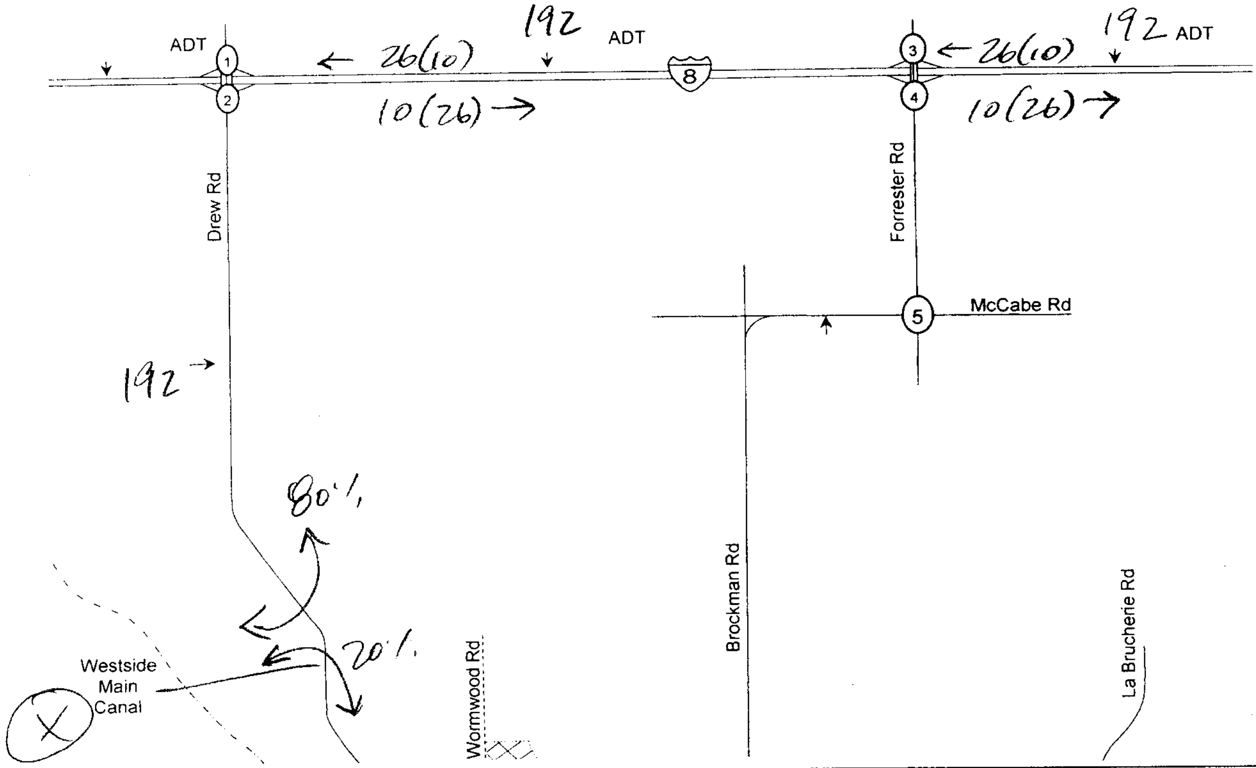
CUMULATIVE PROJECT #6 : NORTH GILA TO IMPERIAL VALLEY #2 TRANSMISSION LINE

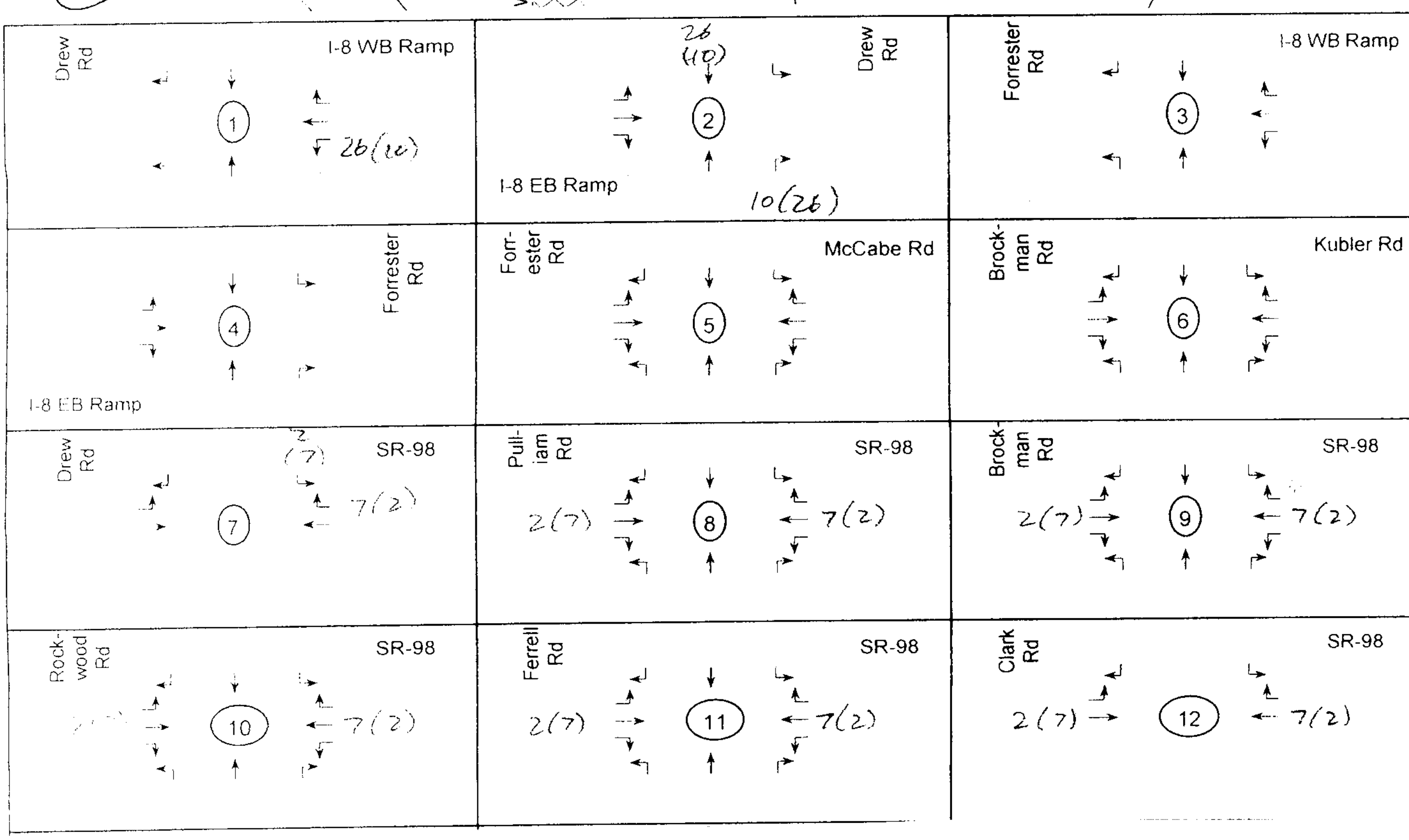




CUMULATIVE PROJECT #7 — DIXIELAND CONNECTION

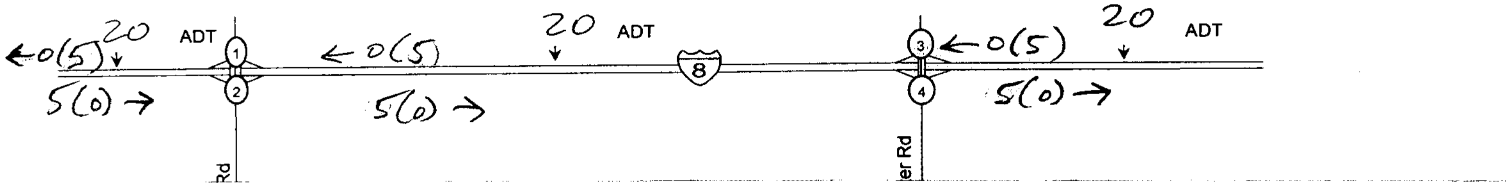
TO IID TRANSMISSION DISTRICT





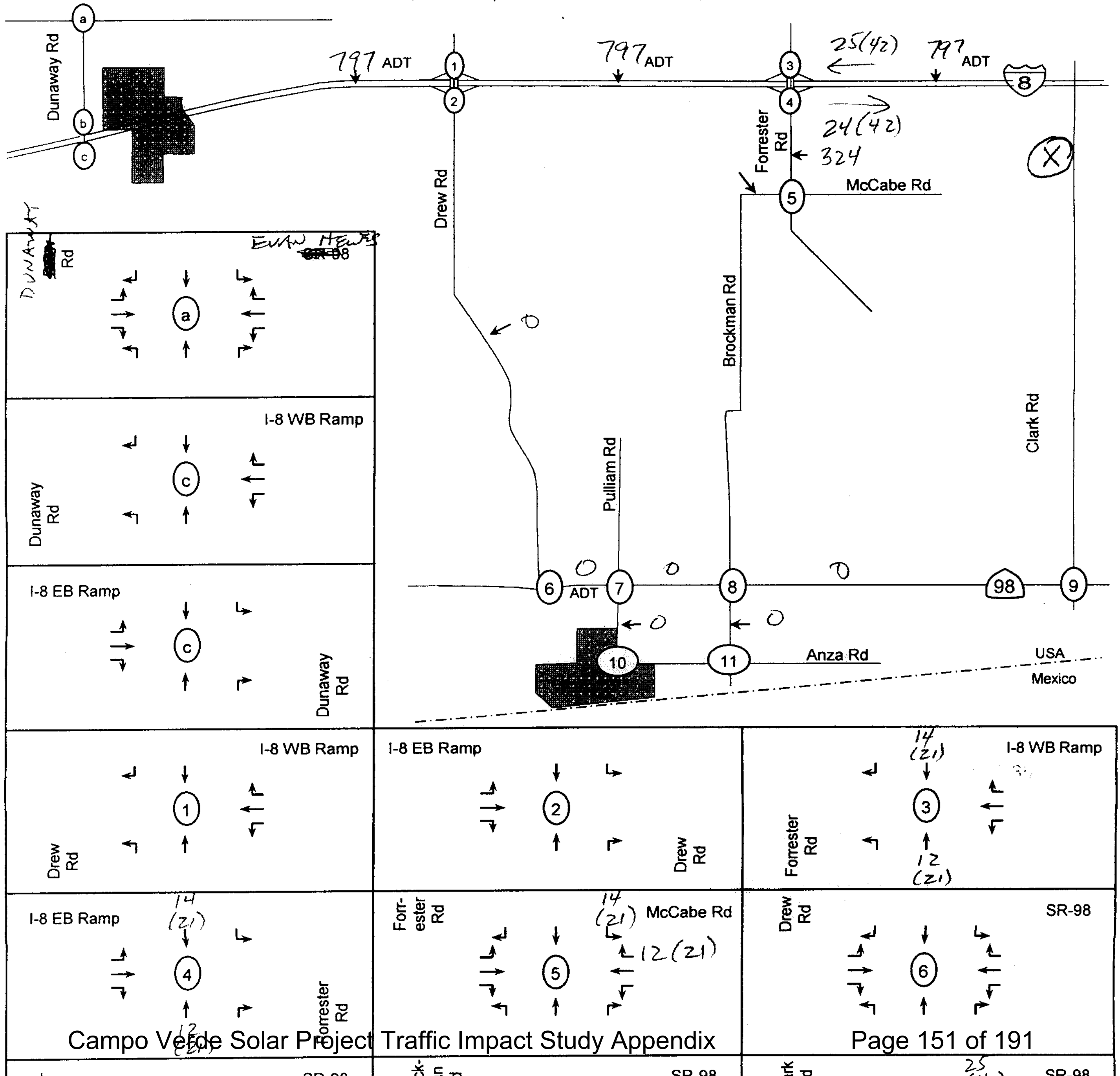
8

Cumulative Project 8 : Solar Reserve Imperial Valley approx. 30 miles east of the project site; therefore, no cumualtive traffic is anticipated to be added to the study intersections and segments south of I-8. However, the cumulative project is anticipated to add regional traffic to I-8 and SR-98 as shown below.



9

#9 CUMULATIVE: LINDA VISTA



9

8.0 CUMULATIVE PROJECTS

There are other planned projects in the areas adjacent to the project site that will add traffic to the roadways surrounding the project site. Based a review of potential projects in the City of El Centro, City of Calexico, and the County of Imperial, it was determined that thirty-four (34) near-term development projects should be included in the traffic study. The following is a brief description of these cumulative projects. ***Figure 8–1*** shows the total cumulative projects traffic volumes & Figure 8–2 depicts the existing + project + cumulative projects traffic volumes. ***Appendix E*** contains more detailed information on the cumulative projects. There are several longer –term projects in the City of Calexico which are not included in the near-tem cumulative scenario but are included in the 2030 cumulative scenario.

8.1 Description of Projects

Linda Vista Mixed Use proposes to develop 182 single-family dwelling units along with a 6-acre commercial lot. The project site is currently undeveloped agricultural land. Based on the trip generation calculations, the total project is calculated to generate 7,175 ADT with 109 inbound / 143 outbound trips during the AM peak hour and 349 inbound / 327 outbound trips during the PM peak hour. The traffic study for this project was prepared by LLG (August 2004).

Desert Village Mixed Use proposes to develop 95 single-family residential homes along with 260 apartment units and 7.3 acres of commercial space. The project site is currently undeveloped agricultural land. Based on the trip generation calculations, the total project is calculated to generate 8,740 ADT with 129 inbound / 202 outbound trips during the AM peak hour and 431 inbound / 387 outbound trips during the PM peak hour. The traffic study for this project was prepared by LLG (February 2005).

Countryside Estates proposes to develop a 152-unit residential subdivision on 39.80 acres. The project site is currently undeveloped agricultural land. Based on the trip generation calculations, the total project is calculated to generate 1,530 ADT with 29 inbound / 87 outbound trips during the AM peak hour and 98 inbound / 58 outbound trips during the PM peak hour. The traffic study for this project was prepared by LLG (November 2004).

Venezia Planned Community proposes to develop approximately 250 single-family residential dwelling units and 135,100 square feet of commercial space. The project is located southeast of SR 98, east of Bowker Road and south of the All American Canal. The project is calculated to generate 12,140 ADT with 279 inbound / 279 outbound trips during the AM peak hour and 640 inbound / 576 outbound trips during the PM peak hour. The traffic study for this project was prepared by LLG (March 2005).

The McCabe Ranch proposes to develop 428 single-family residential dwelling units located south of Interstate 8 and west of Dogwood Road. The project is calculated to generate 3,550 ADT with 76 inbound / 206 outbound trips during the AM peak hour and 243 inbound / 142 outbound trips during the PM peak hour. The traffic study for this project was prepared by LLG (July 2002).

CUMULATIVE: COUNTY CENTER II

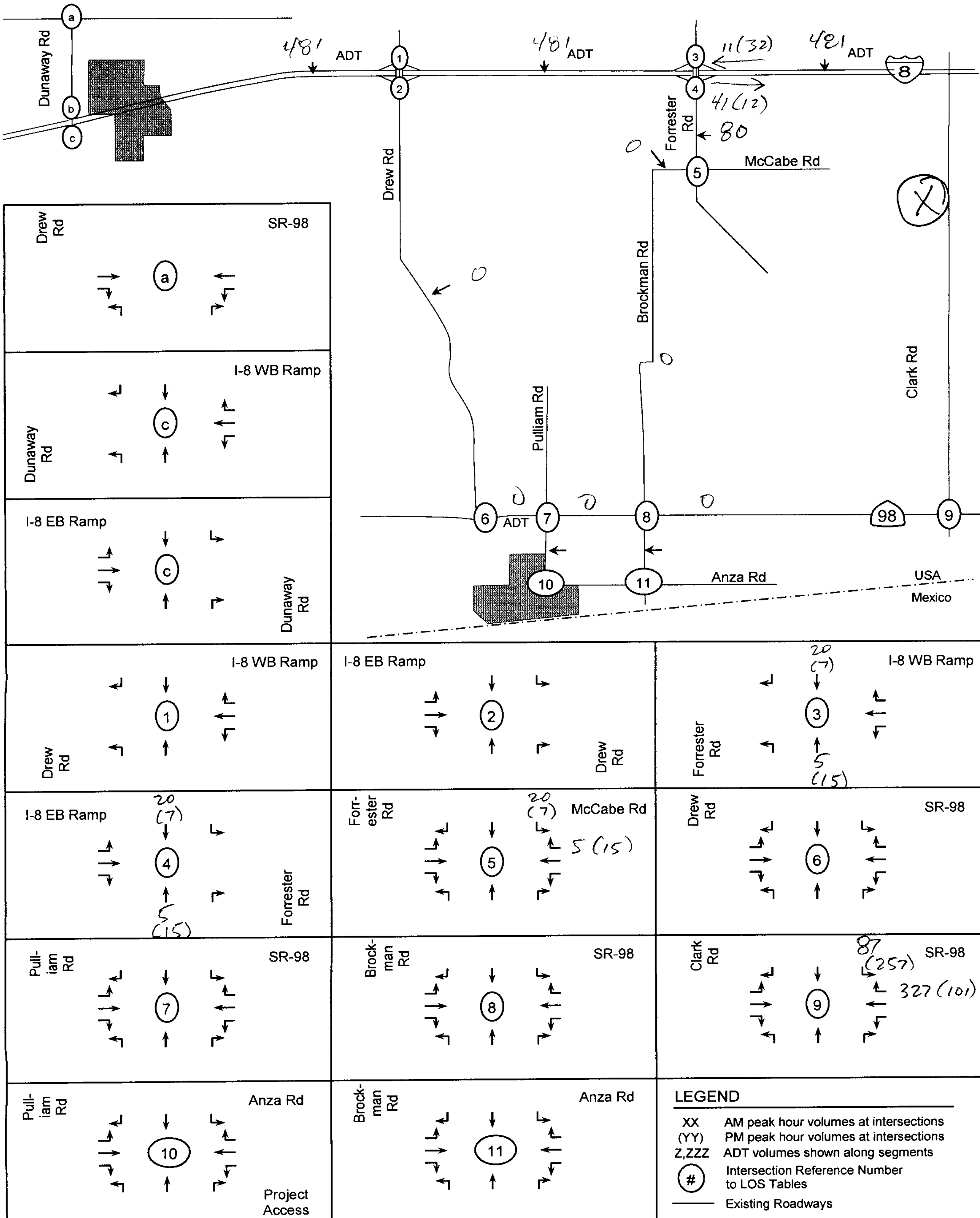


Figure 15: Project Assignment (All Phases)

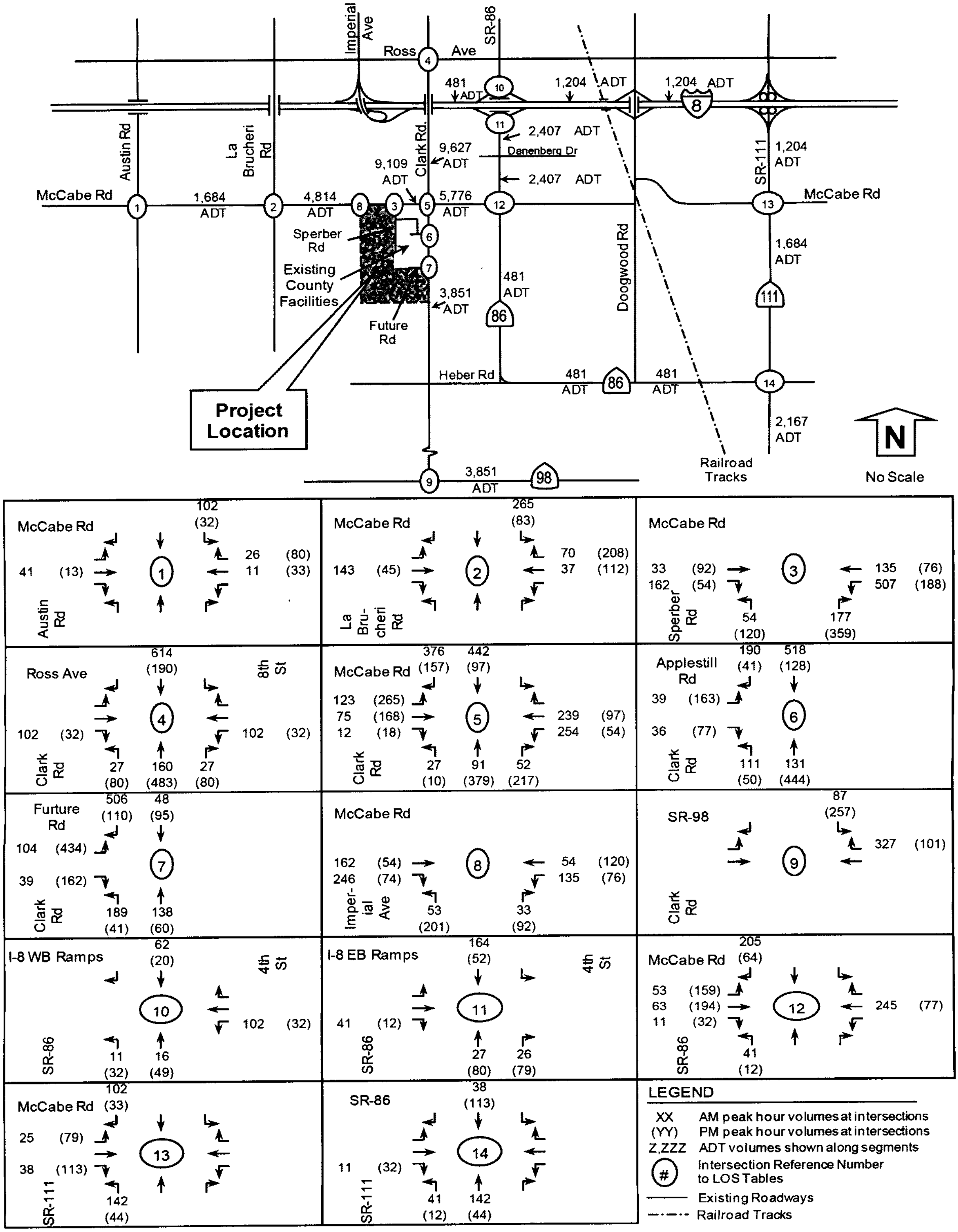


Figure 7: Construction Trip Assignment

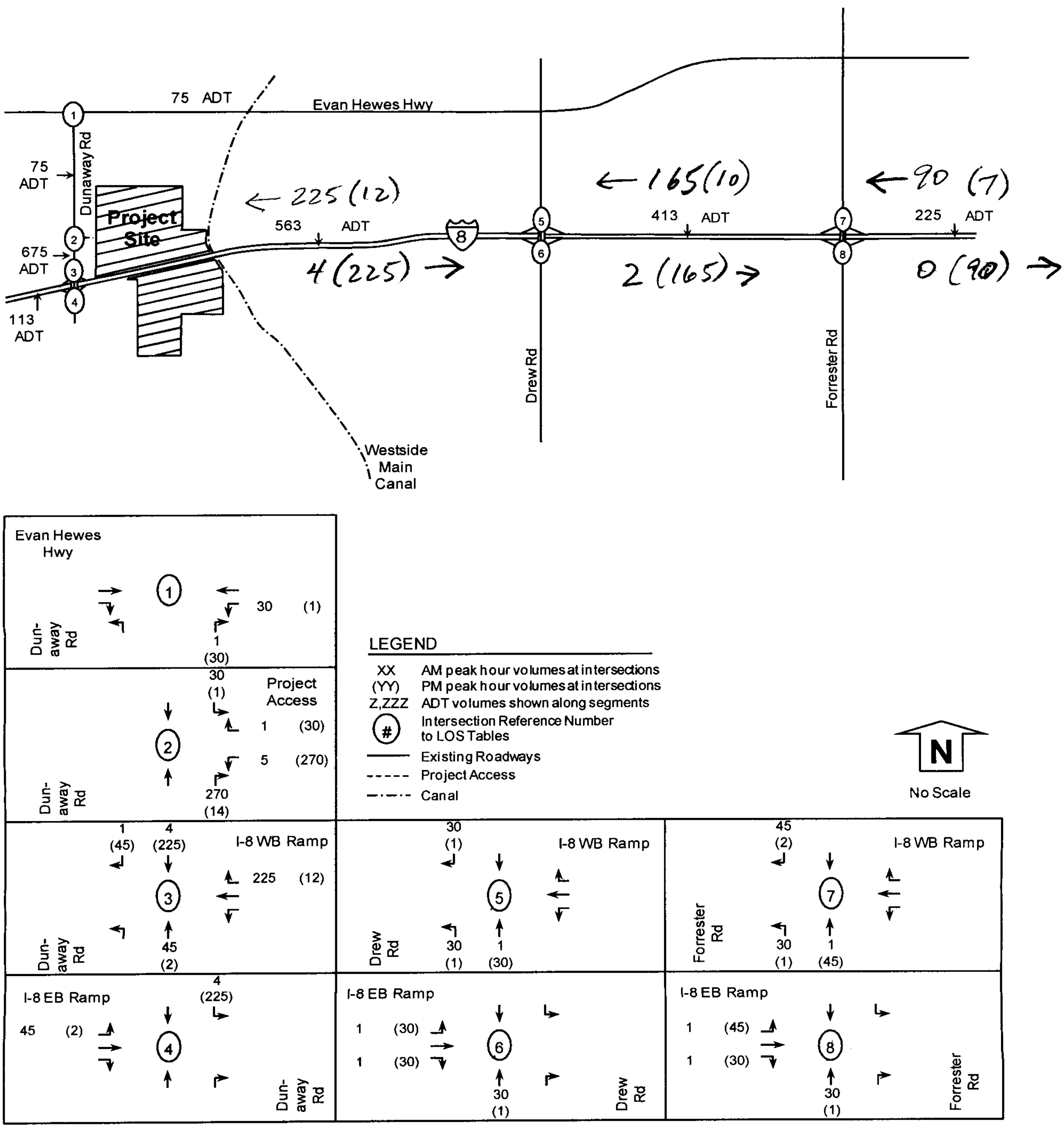
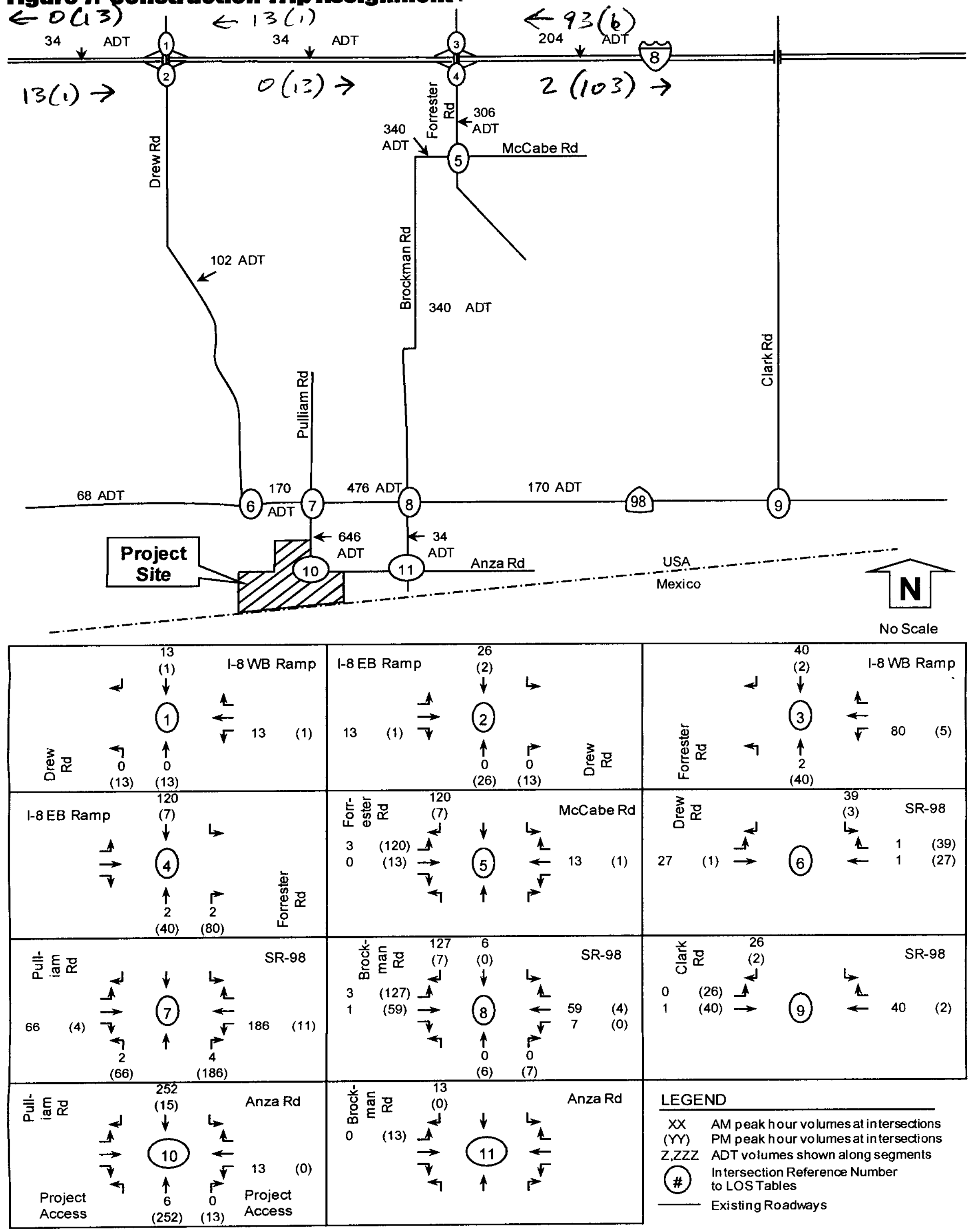


Figure 7: Construction Trip Assignment



2.0 PROJECT DESCRIPTION

The proposed Mount Signal Solar Farm I project would construct a 200 megawatt photovoltaic plant on a currently undeveloped parcel in Imperial County. The Project is comprised of eight parcels totaling 1,375 acres situated about 2.5 miles west of Calexico in Imperial County, California. The eight parcels are all located generally south of SR-98 and north of Mandrapa Road. The current use is irrigated agriculture.

Construction is anticipated to begin in March 2014, and is expected to take about 12-15 months. Construction traffic will consist of both truck traffic and employee traffic, and will comprise the majority of traffic associated with development and operation of the project.

Primary access to the site is will be provided as paved, public road access via SR-98, County Highway S30, and Ferrell Road. For the purposes of this analysis, all traffic was assumed to use a single access point at the SR 98/Ferrell Road intersection. This provides the most conservative analysis since it assumes the highest concentration of traffic at one location.

Post-construction Operations and Maintenance will be comprised of 3 on-site staff members during normal business hours, plus one security guard on-site during each of three daily shifts: 1st watch, 2nd watch and 3rd watch. Operations and maintenance traffic will be a small percentage of the short-term traffic associated with the project's construction phase.

TABLE 7–1
PROJECT TRIP GENERATION

Trip Type	Daily Total (ADT) [a]	AM Peak Hour			PM Peak Hour		
		In	Out	*Total*	In	Out	*Total*
Construction							
Vehicles	462	150	0	*150*	0	150	*150*
Trucks	30	6	0	*6*	0	6	*6*
Total (w/PCE [b])	***522***	***162***	***0***	***162***	***0***	***162***	***162***
Operations and Maintenance (O&M)							
Vehicles	40	8	2	*10*	2	8	*10*
Trucks	0	0	0	*0*	0	0	*0*
Total (w/PCE)	***40***	***8***	***2***	***10***	***2***	***8***	***10***

General Notes:

1. Source: 8minuteenergy Renewables, LLC, and Fehr & Peers, 2010.

Footnotes:

a. ADT = Average Daily Traffic (24-hour total bi-directional traffic on a roadway segment)

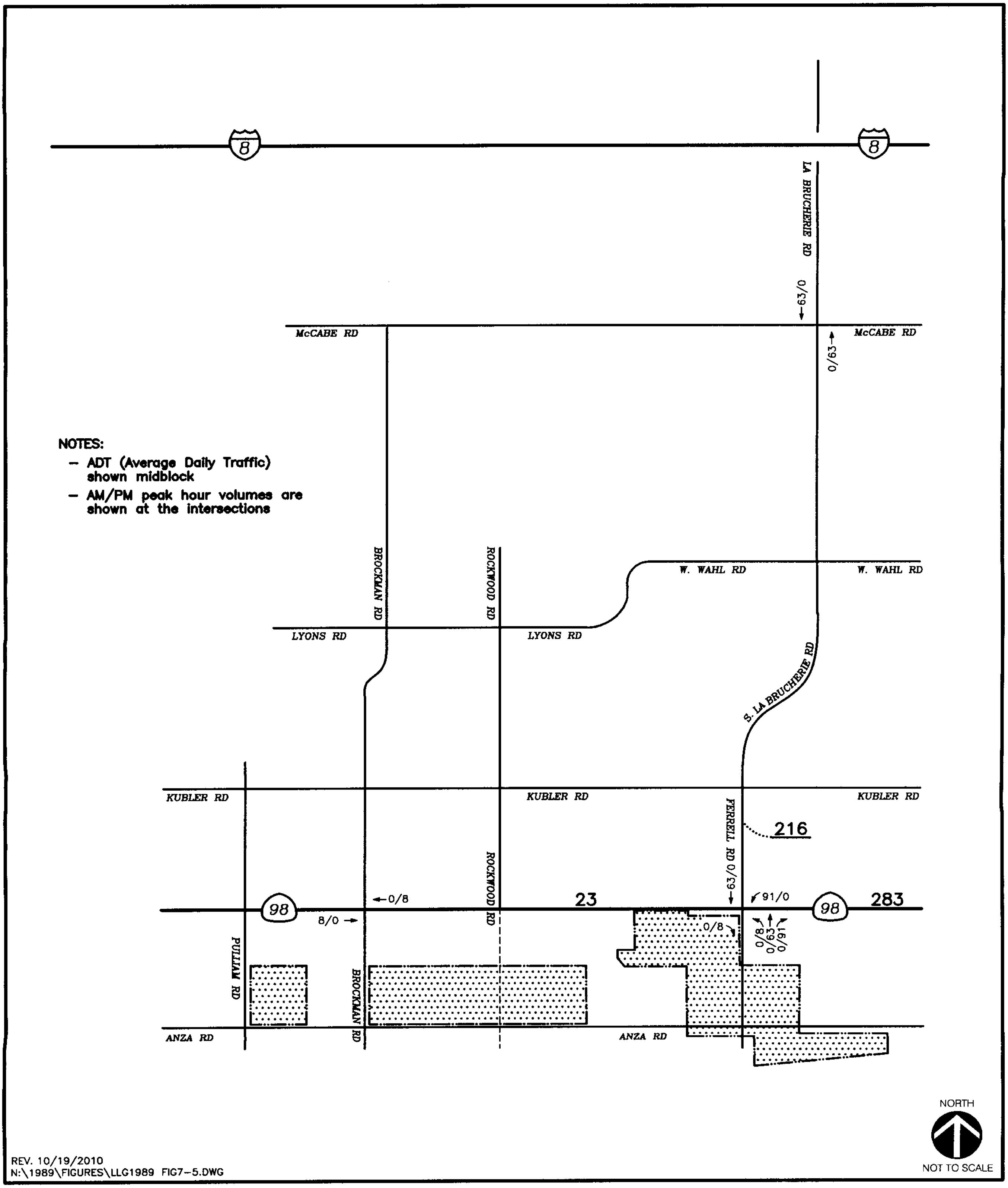
b. PCE = Passenger Car Equivalent, used to reflect the additional impacts of heavy vehicles in the technical analyses.

Table 7–1 shows that the construction traffic is substantially greater than the O&M traffic, which validates the assertion that analysis of the construction impacts would represent the worst-case potential traffic impacts of the project. The total construction traffic analyzed in this report is 522 ADT, with 162 inbound/0 outbound trips during the AM peak hour, and 0 inbound/162 outbound trips during the PM peak hour.

7.1 Trip Distribution

Regional trip distribution for construction truck traffic was estimated based on information from the applicant that material deliveries will be from the Los Angeles area. ***Figure 7–1*** shows the distribution of truck traffic, which is primarily oriented along La Brucherie Road and SR 98 in the study area.

It is anticipated that the majority of construction workers will be from the local population centers of Calipatria, El Centro, and Calexico. ***Figure 7–2*** shows the distribution of construction employee passenger car traffic north, west and east of the site. The majority of employee traffic (95%) is anticipated to be to/from north and east of the site, from the local labor pool utilizing I-8 and SR 98as their primary routes to work.



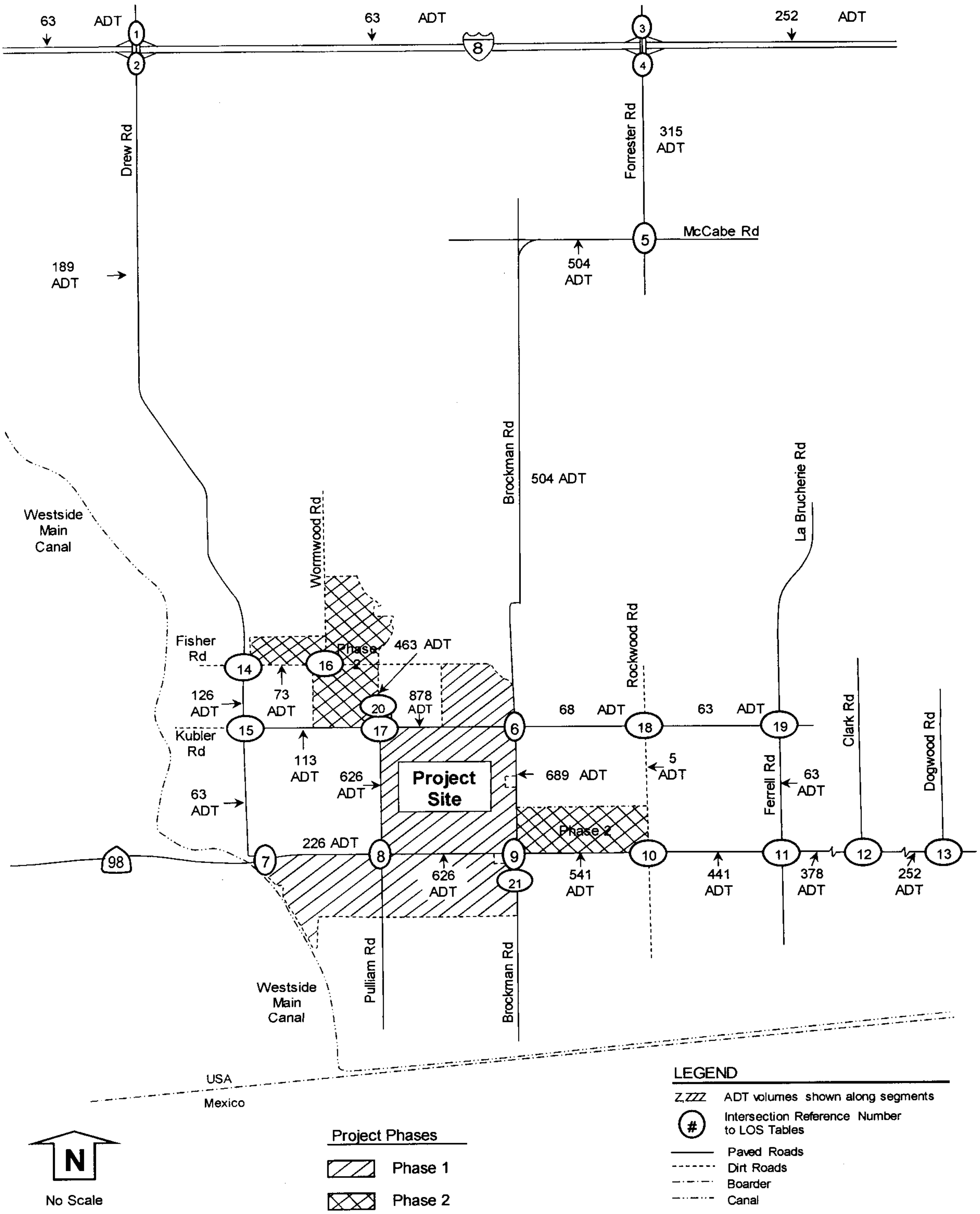
LINSCOTT LAW & GREENSPAN engineers

Figure 7-5
Construction Project Traffic Vlumes
Total Trips
AM/PM Peak Hours & ADT

CUMULATIVE PROJECT #14: CENTINELA

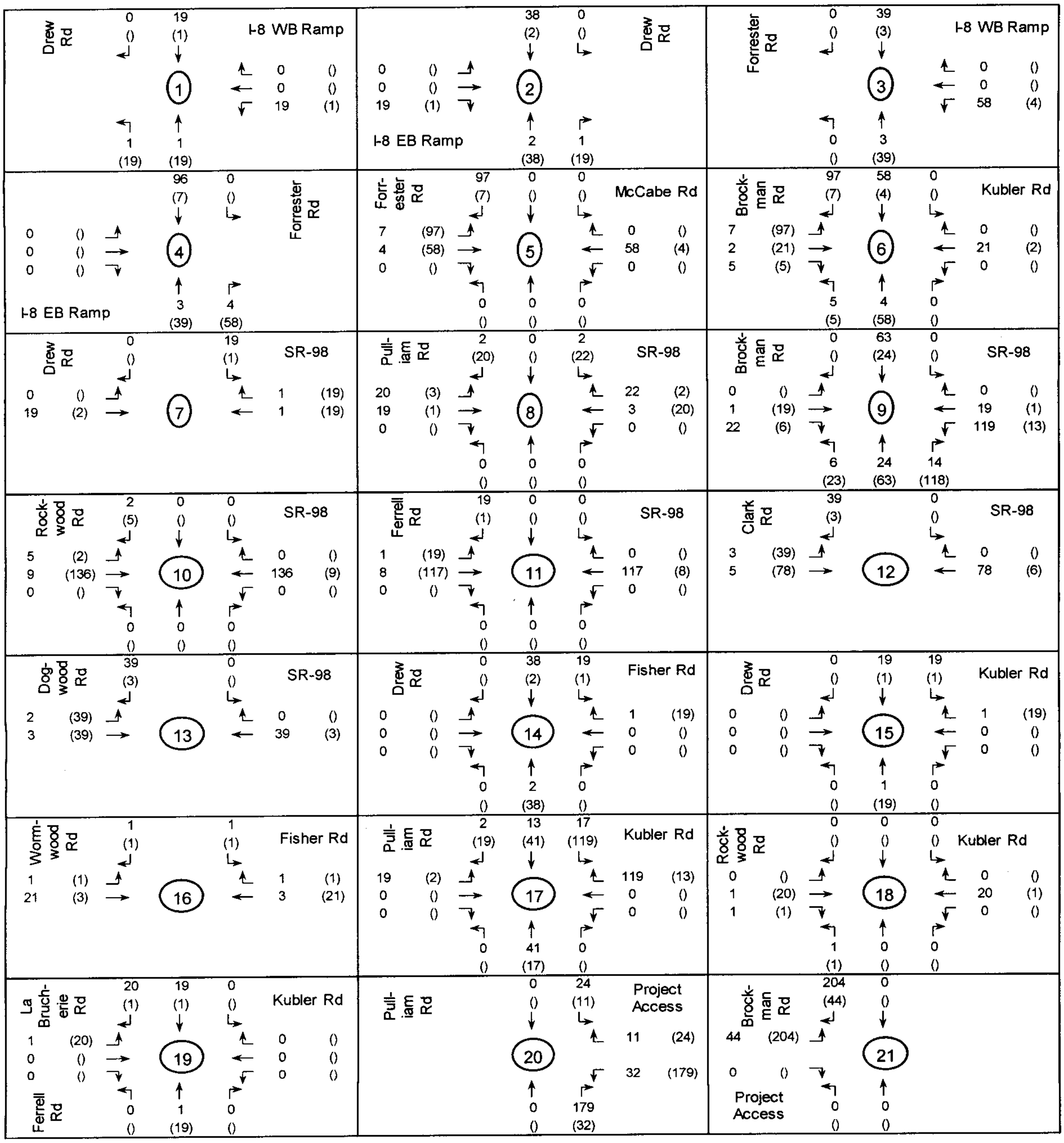
14

Figure 10a: Project (Construction and Shuttle) Trip Assignment



14

Figure 10b: Project (Construction and Shuttle) Trip Assignment



LEGEND

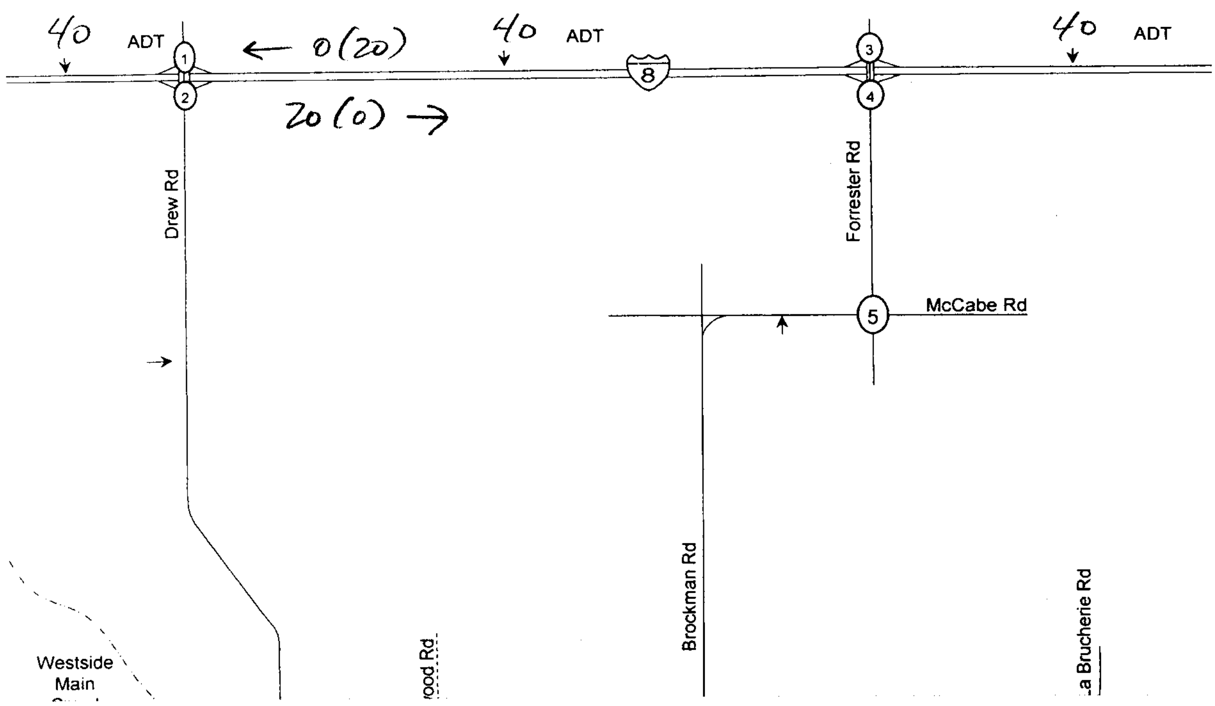
XX AM peak hour volumes at intersections
(YY) PM peak hour volumes at intersections
An empty PM () represents a 0 volume

(#) Intersection Reference Number to LOS Tables

N
No Scale

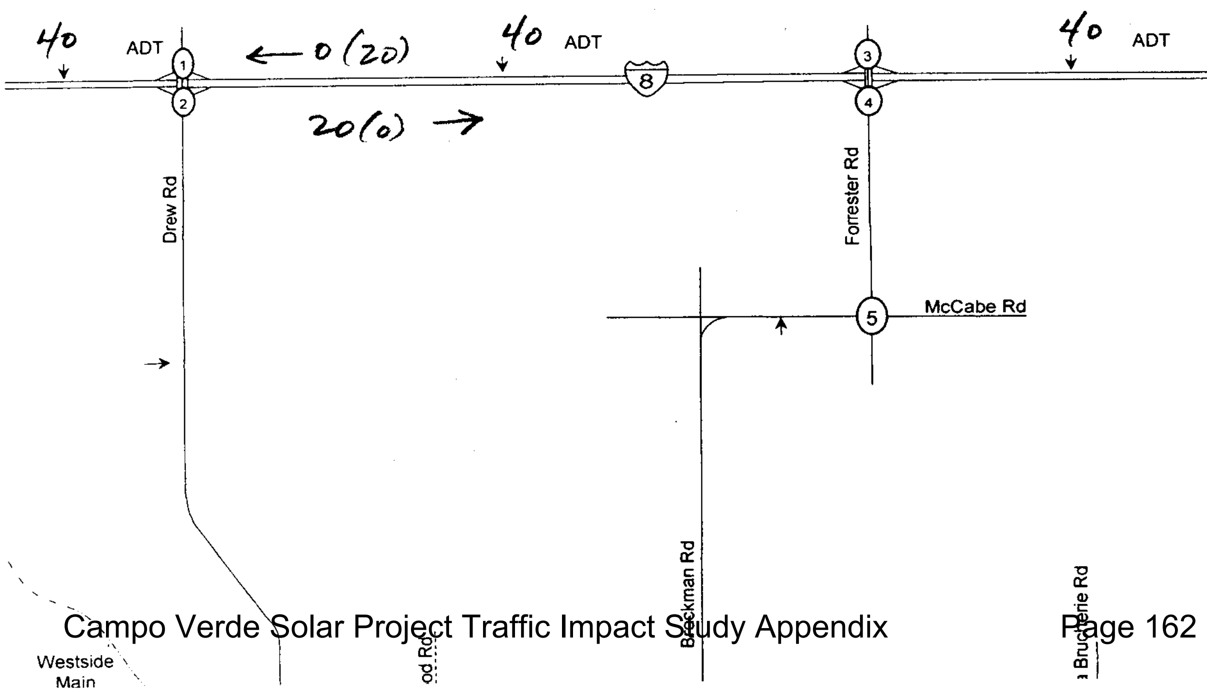
15

Cumulative Project 15): Mayflower Solar Farm approx. 27 miles north and slightly east of the project site; therefore, no cumualtive traffic is anticipated to be added to the study intersections and segments south of I-8. However, the cumulative project is anticipated to add regional traffic to I-8 as shown below.



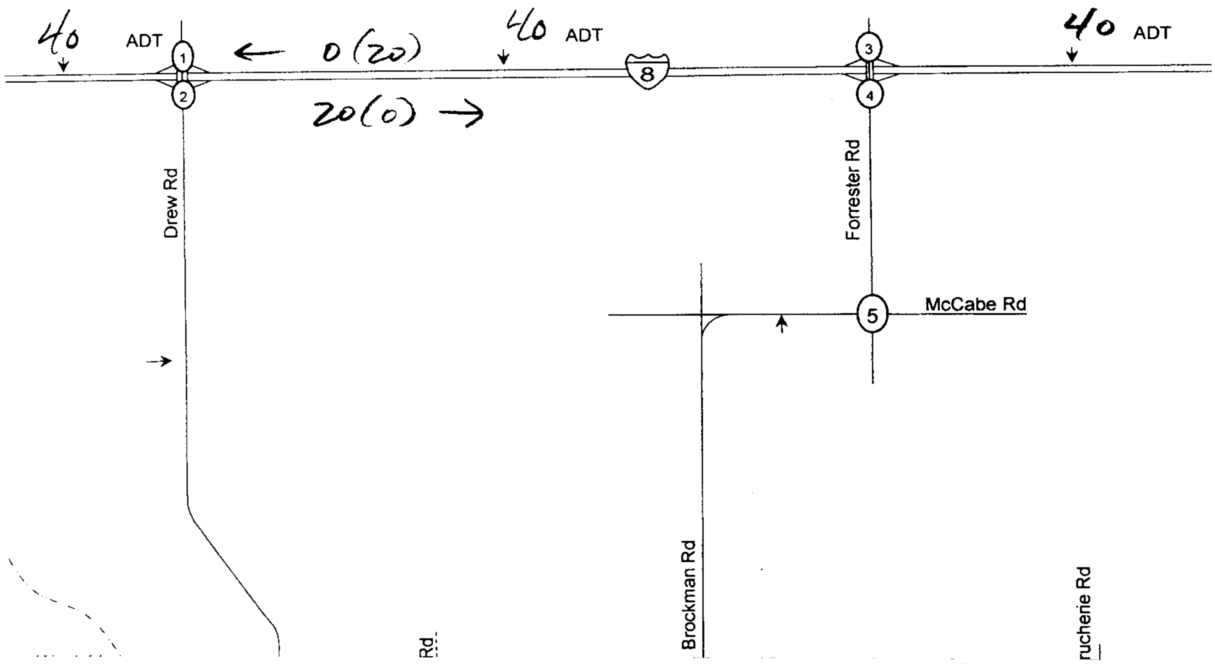
16

Cumulative Project 16 : Arkansas Solar Farm approx. 32 miles north and slightly east of the project site; therefore, no cumualtive traffic is anticipated to be added to the study intersections and segment south of I-8. However, the cumulative project is anticipated to add regional traffic to I-8 as shown below.



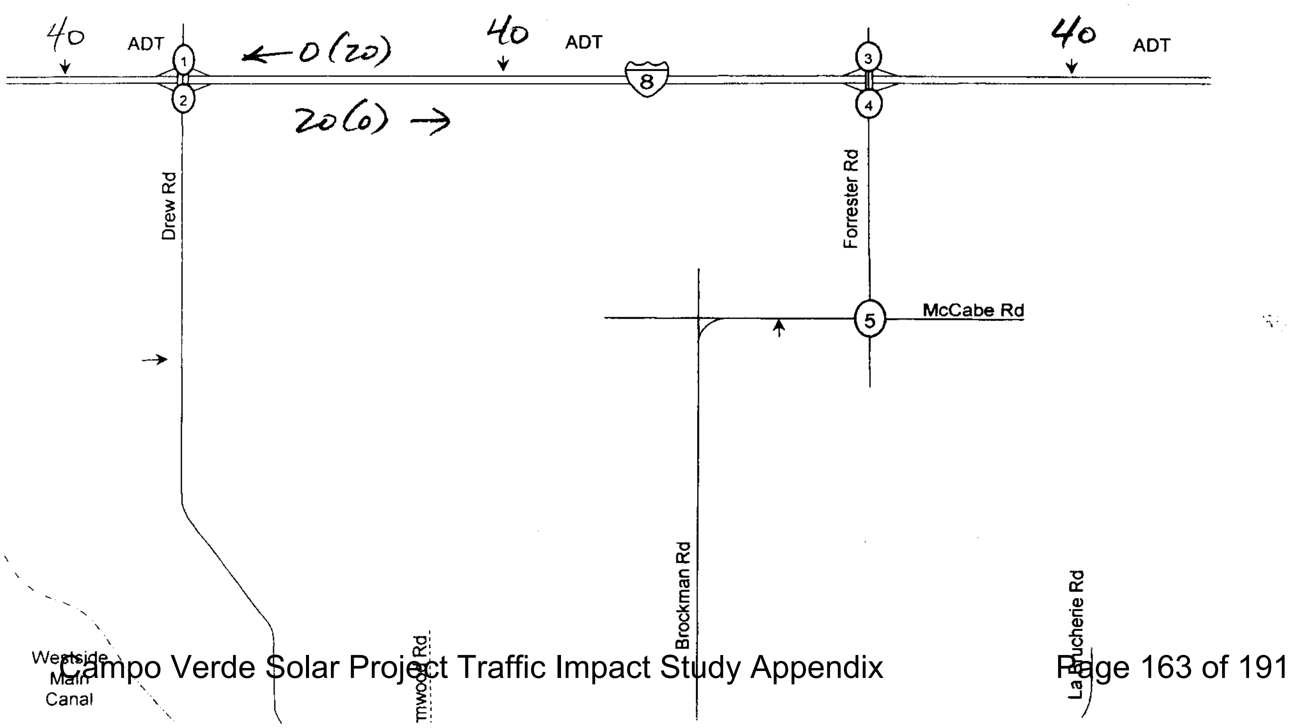
17

Cumulative Project 17 (EIR [9]): Sonora Solar Farm approx. 33 miles north and slightly east of the project site; therefore, no cumualtive traffic is anticipated to be added to the study intersections and segments south of I-8. However, the cumulative project is anticipated to add regional traffic to I-8 as shown below.

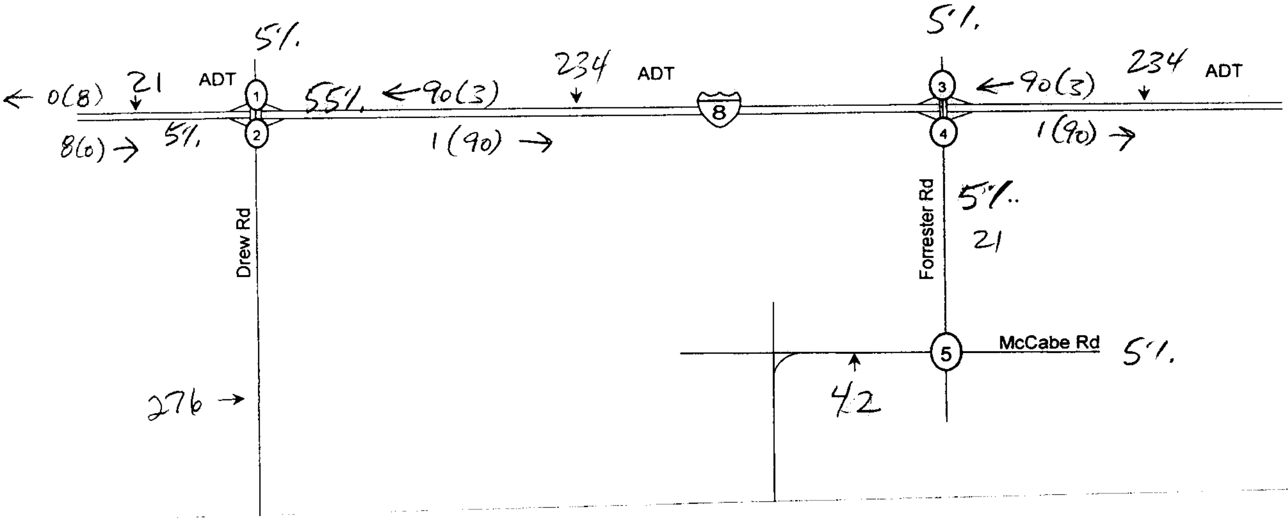


18

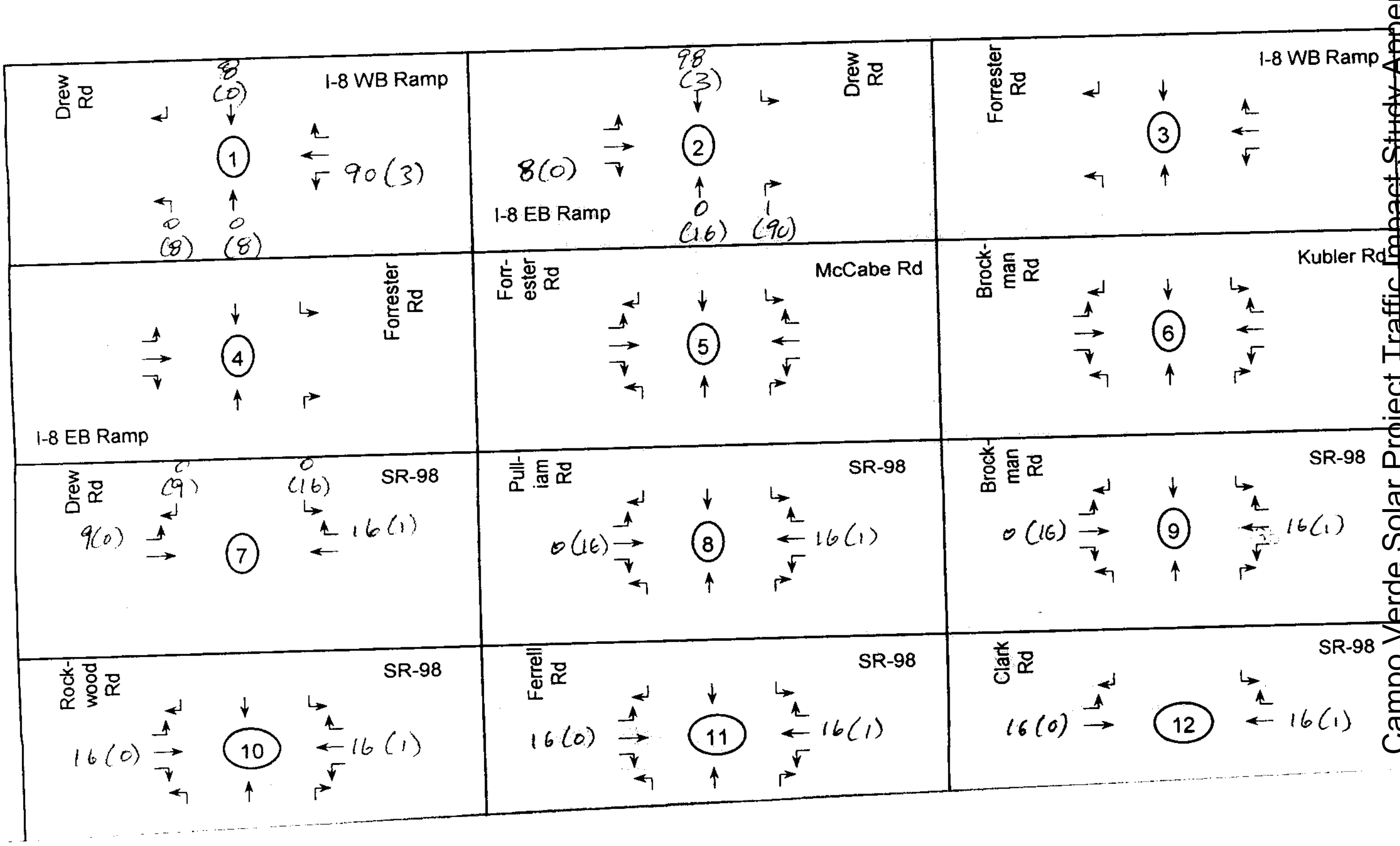
Cumulative Project 18 (EIR [10]): Alhambra Solar Farm approx. 28 miles north and slightly east of the project site; therefore, no cumualtive traffic is anticipated to be added to the study intersections and segments south of I-8. However, the cumulative project is anticipated to add regional traffic to I-8 as shown below.



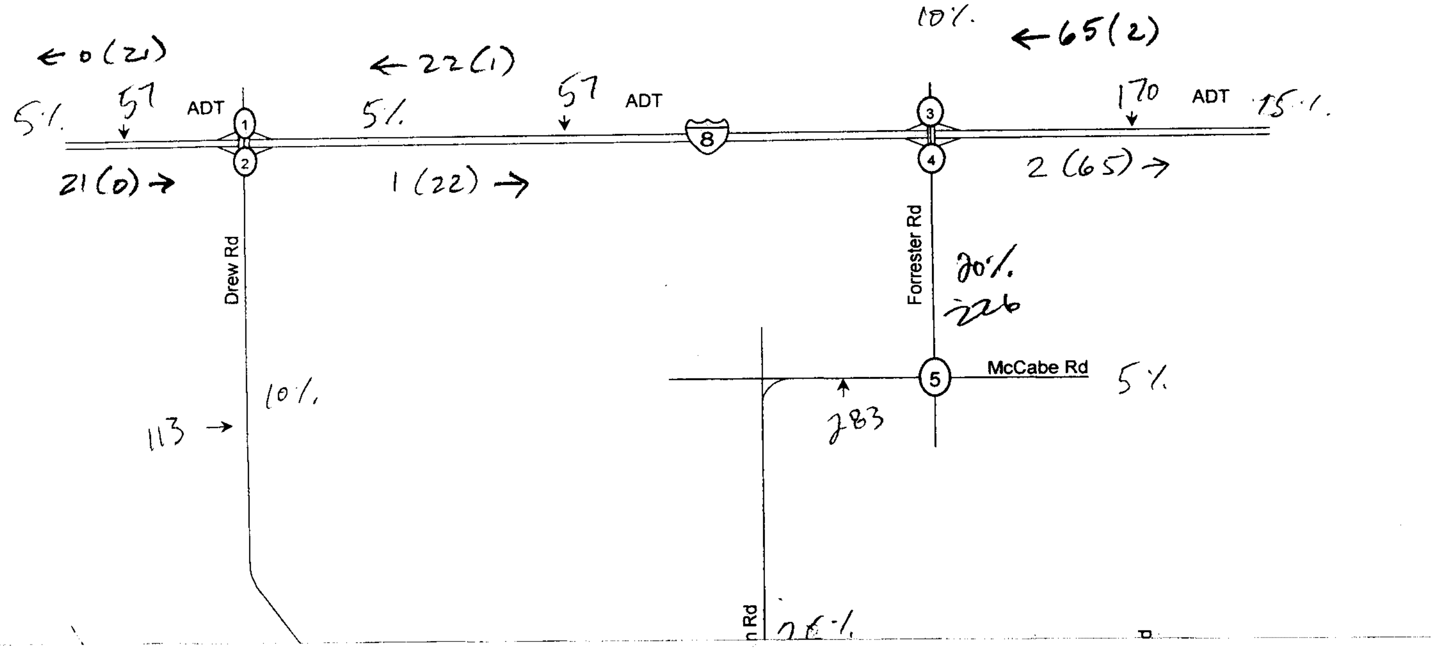
CUMULATIVE PROJECT #19: ACORN GREENWORKS



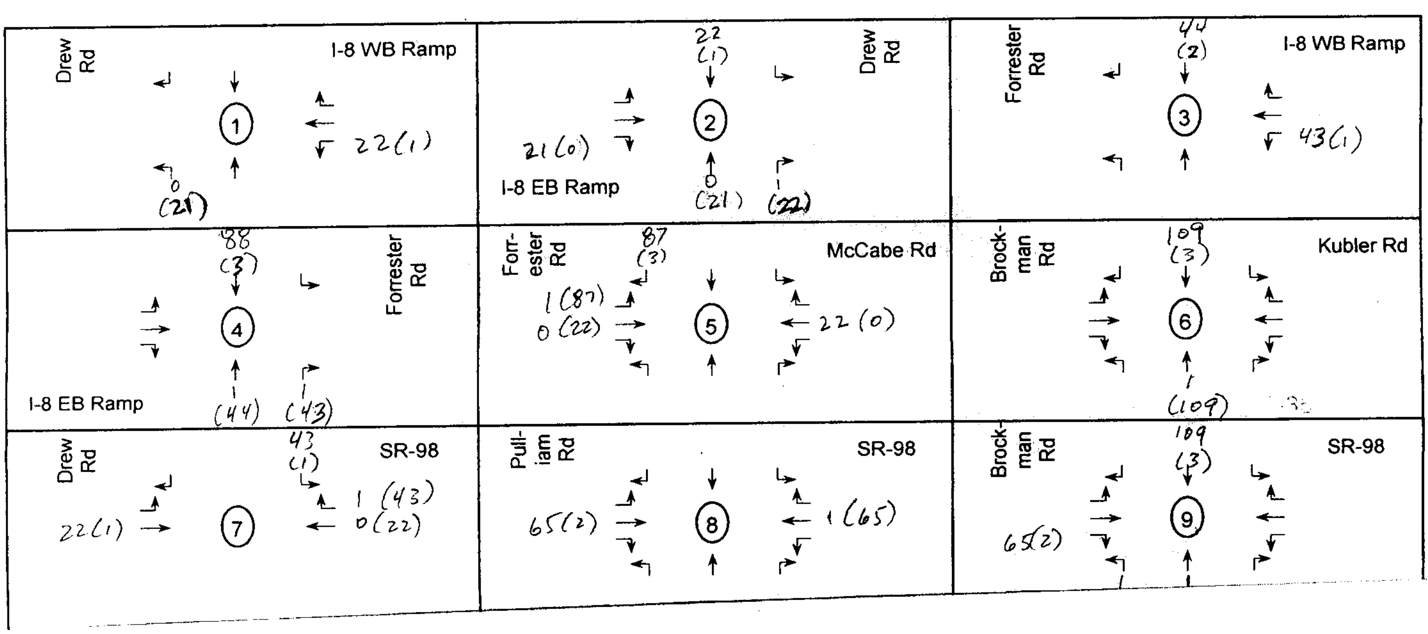
CUMULATIVE PROJECT #19 .... ACORN GREENWORKS



CUMULATIVE PROJECTS 20-23 (EIR [12-15]): CALEXICO I-A, I-B, II-A, & II-B (SOLAR FARMS)



CUMULATIVE PROJECTS 20-23 (EIR [12-15]): CALEXICO I-A, I-B, II-A, & II-B (SOLAR FARMS)



Solar Farm Average Traffic Generation Rates

Several cumualtive projects did not have techincal studies and therefore did not have reported cumulative project traffic generation. Therefore, an average traffic generation rate from other existing solar farm projects was calculated based on the number of megawatts (MW). The following tables listes the traffic generation assocaited with each cumulative project and the associated MW.

Project	MegaWatts	ADT	ADT/MW	AM IN	AM IN/MW	AM OUT	AM OUT/MW	PM IN	PM IN/MW	PM OUT	PM OUT/MW
Mount Signal Solar Farm I	200	522	2.61	162	0.81	0	0.00	0	0.00	162	0.81
Imperial Solar South	200	680	3.40	265	1.33	6	0.03	15	0.08	265	1.33
Imperial Solar West	250	750	3.00	300	1.20	6	0.02	15	0.06	300	1.20
Imperial Valley Solar (SES Solar II)	750	1736	2.31	772	1.03	0	0.00	0	0.00	772	1.03
Average Rates			**2.83**		**1.09**		**0.01**		**0.03**		**1.09**

The above rates were used to calcualted the traffic associated with the following cumualtive projects.

PROPOSED CUMULATIVE PROJECTS		ADT	IN	OUT	IN	OUT
4) SDG&E Photovoltaic Solar Field [D]	14	40	15	0	0	15
8) Solar Reserve Imperial Valley [H]	100	283	109	1	3	109
14) USS Mount Signal [5]	250	708	273	3	8	273
15) Mayflower Solar Farm Project [7]	50	142	55	1	2	55
16) Arkansas [8]	50	142	55	1	2	55
17) Sonora [9]	50	142	55	1	2	55
18) Alhambra [10]	50	142	55	1	2	55
19) Acron Greenworks [11]	150	425	164	2	5	164
20) Calexico I-A [12]	100	283	109	1	3	109
21) Calexico I-B [13]	100	283	109	1	3	109
22) Calexico II-A [14]	100	283	109	1	3	109
23) Calexico II-B [15]	100	283	109	1	3	109

Notes: [ ] indicates reference in EIR

Power Line Construction and Delivery Traffic Estimation

The following traffic generation is based on detailed estimates of the required construction workers, deliveries by truck, and equipment identified for the Centinela project (detailes attached). These estimates are used for the cumulative projects that do not have traffic generation information provided.

Estimated Power Line Construction and Deliveries	ADT	AM		PM	
		IN	OUT	IN	OUT
Power Line Construction Workers[1]	42	21	0	0	21
Power Line Deliveries and Construction Truck Trips (with PCE)[2]	198	12	12	12	12
Total Traffic During Peak Construction Period	**240**	**33**	**12**	**12**	**33**

Notes: 1) Total workers estimated at 54, which includes construction and truck drivers, thus construction only (21) has truck drivers removed (33).
2) Passenger Car Equivalent (PCE) factor of 3 applied to daily trucks (33 in and 33 out) associated with power line construction, thus ADT = 66 x 3 = 198.
The daily estimate of 33 trucks is based on the identified equipment list included on the following pages. Truck deliveries vary throughout the day, thus 33 truck divided by 8 hours to equal 4 trucks (in and out) during a peak hour, which equals 12 PCE.

TABLE C-3. EQUIPMENT LIST FOR GEN-TIE LINE CONSTRUCTION (Month 6)

Equipment Description	Quantity	Horsepower	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Weight (pounds)	Vehicle Miles (VMT) per Day on Unpaved Surface	Estimated Workforce for this Activity
Steel (Hauling, Shake-Out, Assembly and Erection)							
Crane, Hydraulic, 150/300 Ton	1	250	Diesel	1.8	135,000 lbs	5	35
Crane, Hydraulic, Rough Terrain, 35 Ton	1	125	Diesel	1.8	65,500 lbs	5	
Truck, Flatbed w/Boom, 5 Ton	2	235	Diesel	1.0	51,800 lbs	10	
Truck, Crew Cab, Flatbed, 1 Ton	7	180	Gas	1.1	12,000 lbs	10	
Truck, Semi, Tractor	1	310	Diesel	6.0	20,000 lbs	10	
Trailer, Flatbed, 40'	3	N/A	N/A		10,000 lbs	10	
Water Truck	1	175	Diesel	4.5	N/A	N/A	
Motor, Auxillary Power	2	5	Gas	1.0	150 lbs	0	
Compressor, Air	3	75	Gas	2.0	1,500 lbs	15	

TABLE C-3. EQUIPMENT LIST FOR GEN-TIE LINE CONSTRUCTION (Month 6)

Equipment Description	Quantity	Horsepower	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Weight (pounds)	Vehicle Miles (VMT) per Day on Unpaved Surface	Estimated Workforce for this Activity
Conductor / Shield Wire / OPGW (Stringing, Sagging, Deadending and Clipping)							
Truck, Flatbed, w/ Bucket, 5 Ton	3	235	Diesel	3.0	51,800 lbs	15	15
Tension Machine, Conductor	1	135	Diesel	1.5	42,000 lbs	1	
Tension Machine, Static	1	135	Diesel	0.2	32,000 lbs	1	
Truck, Sock Line, Puller, 3 Drum	1	310	Diesel	2.3	55,000 lbs	1	
Truck, Wire Puller, 1 Drum	1	310	Diesel	2.3	72,000 lbs	1	
Truck, Semi, Tractor	2	310	Diesel	6.0	20,000 lbs	10	
Water Truck	1	175	Diesel	4.5	N/A	N/A	
Crawler, Track Type, Sagging (D8 type)	1	305	Diesel	0.8	84,850 lbs	1	
Truck, Crew Cab, Flatbed, 1 Ton	5	180	Gas	1.4	12,000 lbs	10	
Back Hoe, w/ Bucket	1	85	Diesel	3.0	15,770 lbs	1	
Truck, Mechanics, 1 - 2 Ton	1	260	Diesel	3.0	18,000 lbs	15	
Crane, Hydraulic, Rough Terrain, 35 Ton	2	125	Diesel	1.0	65,500 lbs	10	
Helicopter	1	600	Jet Fuel	4.0	N/A	N/A	
Motor, Auxillary Power	2	5	Gas	2.3	N/A	N/A	

TABLE C-3. EQUIPMENT LIST FOR GEN-TIE LINE CONSTRUCTION (Month 6)

Equipment Description	Quantity	Horsepower	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Weight (pounds)	Vehicle Miles (VMT) per Day on Unpaved Surface	Estimated Workforce for this Activity
Cleanup & Restoration							
Truck, Flatbed, w/ Bucket, 5 Ton	1	235	Diesel	2.0	51,800 lbs	5	4
Excavator, Bucket Type	1	165	Diesel	4.5	41,000 lbs	5	
Truck, Semi, Tractor	1	310	Diesel	4.5	20,000 lbs	10	
Digger, Transmission Type, Truck Mount	1	190	Diesel	2.0	34,500 lbs	5	
Truck, Dump, 10 Ton	1	235	Diesel	3.0	30,000 lbs	10	
Motor Grader	1	110	Diesel	8.0	32,460 lbs	20	
Truck, Flatbed, 1 Ton	1	210	Diesel	2.1	12,000 lbs	10	
Truck, Pick-Up	1	210	Diesel	2.1	5,300 lbs	10	
Motor, Auxillary Power	1	5	Gas	0.5	N/A	N/A	

Appendix P

Year 2013 + Project + Cumulative Intersection LOS Calculations

AM Year 2013 + Project + Cumulative
1: Evan Hewes & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	63	45	97	251	3	75	12	22	6	24	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	68	49	105	273	3	82	13	24	7	26	12

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	40	83	242	140	118	45
Volume Left (vph)	5	0	105	0	82	7
Volume Right (vph)	0	49	0	3	24	12
Hadj (s)	0.10	-0.38	0.25	0.02	0.05	-0.10
Departure Headway (s)	5.4	5.0	5.3	5.1	5.2	5.1
Degree Utilization, x	0.06	0.11	0.36	0.20	0.17	0.06
Capacity (veh/h)	633	689	655	686	649	636
Control Delay (s)	7.6	7.4	10.1	8.1	9.2	8.5
Approach Delay (s)	7.5		9.3		9.2	8.5
Approach LOS	A		A		A	A

Intersection Summary			
Delay	8.9		
HCM Level of Service	A		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project + Cumulative
2: I-8 WB Ramp & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	403	0	59	44	30	0	0	105	47
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	438	0	64	48	33	0	0	114	51
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	300	268	140	268	293	33	165			33		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	300	268	140	268	293	33	165			33		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	34	100	94	97			100		
cM capacity (veh/h)	596	616	908	667	597	1041	1413			1579		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	502	80	165
Volume Left	438	48	0
Volume Right	64	0	51
cSH	743	1413	1700
Volume to Capacity	0.68	0.03	0.10
Queue Length 95th (ft)	133	3	0
Control Delay (s)	19.3	4.6	0.0
Lane LOS	C	A	
Approach Delay (s)	19.3	4.6	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	13.5		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project + Cumulative
3: I-8 EB Ramp & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	163	0	0	0	0	71	66	39	468	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	177	0	0	0	0	77	72	42	509	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	707	742	509	795	707	113	509			149		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	707	742	509	795	707	113	509			149		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	69	100	100	100	100			97		
cM capacity (veh/h)	342	333	564	205	350	940	1056			1433		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	185	149	551
Volume Left	8	0	42
Volume Right	177	72	0
cSH	589	1700	1433
Volume to Capacity	0.31	0.09	0.03
Queue Length 95th (ft)	33	0	2
Control Delay (s)	14.3	0.0	0.9
Lane LOS	B		A
Approach Delay (s)	14.3	0.0	0.9
Approach LOS	B		

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc.
Synchro 7 - Report

AM Year 2013 + Project + Cumulative
4: Diehl Rd & Drew Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	6	0	0	1	52	94	0	0	350	278
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	0	7	0	0	1	57	102	0	0	380	302
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	748	747	532	753	898	102	683			102		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	748	747	532	753	898	102	683			102		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	99	100	100	100	94			100		
cM capacity (veh/h)	313	320	548	307	262	953	910			1490		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	1	159	683
Volume Left	16	0	57	0
Volume Right	7	1	0	302
cSH	356	953	910	1490
Volume to Capacity	0.06	0.00	0.06	0.00
Queue Length 95th (ft)	5	0	5	0
Control Delay (s)	15.8	8.8	3.7	0.0
Lane LOS	C	A	A	
Approach Delay (s)	15.8	8.8	3.7	0.0
Approach LOS	C	A		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

LOS Engineering, Inc.
Synchro 7 - Report

5: SR-98 & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	105	56	78	103	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	114	61	85	112	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	146				239	103
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	146				239	103
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				85	100
cM capacity (veh/h)	1436				743	952

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	125	146	114
Volume Left	11	0	112
Volume Right	0	85	2
cSH	1436	1700	747
Volume to Capacity	0.01	0.09	0.15
Queue Length 95th (ft)	1	0	13
Control Delay (s)	0.7	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	0.7	0.0	10.7
Approach LOS			B

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

6: Evan Hewes & Forrester Road

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	58	8	23	250	8	14	128	16	16	282	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	1.00			0.99			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1828		1770	1854			1830			1814	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (perm)	1770	1828		1770	1854			1830			1814	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	63	9	25	272	9	15	139	17	17	307	70
RTOR Reduction (vph)	0	7	0	0	2	0	0	5	0	0	9	0
Lane Group Flow (vph)	15	65	0	25	279	0	0	166	0	0	385	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	6.1	6.1		14.2	14.2			8.9			17.5	
Effective Green, g (s)	6.1	6.1		14.2	14.2			8.9			17.5	
Actuated g/C Ratio	0.10	0.10		0.23	0.23			0.14			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	172	178		401	420			260			506	
v/s Ratio Prot	0.01	c0.04		0.01	c0.15			c0.09			c0.21	
v/s Ratio Perm												
v/c Ratio	0.09	0.36		0.06	0.67			0.64			0.76	
Uniform Delay, d1	25.8	26.5		19.0	22.1			25.4			20.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	1.3		0.1	4.0			5.1			6.7	
Delay (s)	26.0	27.8		19.1	26.0			30.4			27.4	
Level of Service	C	C		B	C			C			C	
Approach Delay (s)		27.4			25.5			30.4			27.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	27.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

AM Year 2013 + Project + Cumulative
7: I-8 WB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰	↱		↰			↱	
Volume (veh/h)	0	0	0	204	0	211	34	108	0	0	273	160
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	222	0	229	37	117	0	0	297	174
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	690	575	384	575	662	117	471			117		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	538	402	175	402	505	117	278			117		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	52	100	75	97			100		
cM capacity (veh/h)	281	437	732	459	382	935	1082			1471		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	451	154	471
Volume Left	222	37	0
Volume Right	229	0	174
cSH	933	1082	1700
Volume to Capacity	0.48	0.03	0.28
Queue Length 95th (ft)	67	3	0
Control Delay (s)	15.0	2.3	0.0
Lane LOS	B	A	
Approach Delay (s)	15.0	2.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project + Cumulative
8: I-8 EB Ramp & Forrester Road

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱					↱			↰	
Volume (veh/h)	50	0	4	0	0	0	0	90	14	96	380	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	0	4	0	0	0	0	98	15	104	413	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked												
vC, conflicting volume	727	735	413	729	727	105	413			113		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	727	735	413	729	727	105	413			113		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	100	99	100	100	100	100			93		
cM capacity (veh/h)	321	322	639	318	326	949	1146			1476		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	59	113	517
Volume Left	54	0	104
Volume Right	4	15	0
cSH	347	1700	1476
Volume to Capacity	0.17	0.07	0.07
Queue Length 95th (ft)	15	0	6
Control Delay (s)	17.9	0.0	2.1
Lane LOS	C		A
Approach Delay (s)	17.9	0.0	2.1
Approach LOS	C		

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project + Cumulative
9: Diehl Rd & Derrick Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	18	5	20	194	21	6	5	5	23	21	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	20	5	22	211	23	7	5	5	25	23	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	234			25			332	310	22	307	302	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	234			25			332	310	22	307	302	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	99	99	96	96	97
cM capacity (veh/h)	1334			1589			579	594	1055	629	600	817

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	255	17	70
Volume Left	5	22	7	25
Volume Right	5	23	5	22
cSH	1334	1589	680	666
Volume to Capacity	0.00	0.01	0.03	0.10
Queue Length 95th (ft)	0	1	2	9
Control Delay (s)	1.4	0.7	10.4	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	1.4	0.7	10.4	11.0
Approach LOS			B	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

AM Year 2013 + Project + Cumulative
10: Evan Hewes & Westside Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	61	7	3	426	1	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	8	3	463	1	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			74		540	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			74		540	70
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1526		502	993

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	74	466	4
Volume Left	0	3	1
Volume Right	8	0	3
cSH	1700	1526	798
Volume to Capacity	0.04	0.00	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.5
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	63	1	14	292	1	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	1	15	317	1	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			70		417	69
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			70		417	69
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1531		587	994

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	70	333	7
Volume Left	0	15	1
Volume Right	1	0	5
cSH	1700	1531	891
Volume to Capacity	0.04	0.01	0.01
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	0.4	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	0.4	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project + Cumulative
1: Evan Hewes & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	283	99	19	36	20	51	25	73	15	11	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	308	108	21	39	22	55	27	79	16	12	14

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	163	261	40	41	162	42
Volume Left (vph)	9	0	21	0	55	16
Volume Right (vph)	0	108	0	22	79	14
Hadj (s)	0.06	-0.25	0.29	-0.33	-0.19	-0.09
Departure Headway (s)	5.2	4.9	5.8	5.1	4.9	5.2
Degree Utilization, x	0.23	0.35	0.06	0.06	0.22	0.06
Capacity (veh/h)	675	716	588	658	691	634
Control Delay (s)	8.6	9.3	8.0	7.3	9.2	8.5
Approach Delay (s)	9.0		7.6		9.2	8.5
Approach LOS	A		A		A	A

Intersection Summary			
Delay	8.9		
HCM Level of Service	A		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project + Cumulative
2: I-8 WB Ramp & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	55	0	39	163	100	0	0	95	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	60	0	42	177	109	0	0	103	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	591	570	107	570	574	109	111			109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	591	570	107	570	574	109	111			109		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	85	100	96	88			100		
cM capacity (veh/h)	363	380	947	393	378	945	1479			1482		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	102	286	111
Volume Left	60	177	0
Volume Right	42	0	8
cSH	671	1479	1700
Volume to Capacity	0.15	0.12	0.07
Queue Length 95th (ft)	13	10	0
Control Delay (s)	13.0	5.2	0.0
Lane LOS	B	A	
Approach Delay (s)	13.0	5.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	37	0	43	0	0	0	0	226	409	62	81	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	0	47	0	0	0	0	246	445	67	88	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	691	913	88	714	691	468	88			690		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	691	913	88	714	691	468	88			690		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	95	100	100	100	100			93		
cM capacity (veh/h)	339	253	970	311	340	595	1508			904		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	87	690	155
Volume Left	40	0	67
Volume Right	47	445	0
cSH	732	1700	904
Volume to Capacity	0.12	0.41	0.07
Queue Length 95th (ft)	10	0	6
Control Delay (s)	12.7	0.0	4.4
Lane LOS	B		A
Approach Delay (s)	12.7	0.0	4.4
Approach LOS	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	274	0	51	0	0	0	1	346	0	0	97	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	298	0	55	0	0	0	1	376	0	0	105	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	491	491	112	546	498	376	120			376		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	491	491	112	546	498	376	120			376		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	39	100	94	100	100	100	100			100		
cM capacity (veh/h)	488	478	940	422	474	670	1468			1182		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	353	0	377	120
Volume Left	298	0	1	0
Volume Right	55	0	0	14
cSH	528	1700	1468	1182
Volume to Capacity	0.67	0.00	0.00	0.00
Queue Length 95th (ft)	124	0	0	0
Control Delay (s)	24.6	0.0	0.0	0.0
Lane LOS	C	A	A	
Approach Delay (s)	24.6	0.0	0.0	0.0
Approach LOS	C	A		

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project + Cumulative
5: SR-98 & Drew Rd

HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	100	132	107	81	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	109	143	116	88	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	260				315	202
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	260				315	202
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				87	99
cM capacity (veh/h)	1305				677	839

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	111	260	99
Volume Left	2	0	88
Volume Right	0	116	11
cSH	1305	1700	692
Volume to Capacity	0.00	0.15	0.14
Queue Length 95th (ft)	0	0	12
Control Delay (s)	0.2	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.1
Approach LOS			B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		

PM Year 2013 + Project + Cumulative
6: Evan Hewes & Forrester Road

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	323	16	25	104	14	8	335	29	21	174	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.98			0.99			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1850		1770	1830			1841			1835	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (perm)	1770	1850		1770	1830			1841			1835	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	351	17	27	113	15	9	364	32	23	189	17
RTOR Reduction (vph)	0	2	0	0	5	0	0	4	0	0	3	0
Lane Group Flow (vph)	85	366	0	27	123	0	0	401	0	0	226	0
Turn Type	Split			Split			Split			Split		
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	18.9	18.9		8.9	8.9			21.1			14.0	
Effective Green, g (s)	18.9	18.9		8.9	8.9			21.1			14.0	
Actuated g/C Ratio	0.24	0.24		0.11	0.11			0.27			0.18	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	424	443		200	206			492			326	
v/s Ratio Prot	0.05	c0.20		0.02	c0.07			c0.22			c0.12	
v/s Ratio Perm												
v/c Ratio	0.20	0.83		0.14	0.60			0.82			0.69	
Uniform Delay, d1	24.0	28.5		31.5	33.3			27.1			30.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	12.0		0.3	4.6			10.1			6.2	
Delay (s)	24.2	40.5		31.8	37.9			37.1			36.7	
Level of Service	C	D		C	D			D			D	
Approach Delay (s)		37.4			36.8			37.1			36.7	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	37.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	20	0	169	1	323	0	0	307	66
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	22	0	184	1	351	0	0	334	72
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											656	
pX, platoon unblocked	0.91	0.91	0.91	0.91	0.91		0.91					
vC, conflicting volume	815	723	370	723	759	351	405			351		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	748	647	259	647	686	351	298			351		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	94	100	73	100			100		
cM capacity (veh/h)	220	355	710	350	337	692	1150			1208		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	205	352	405
Volume Left	22	1	0
Volume Right	184	0	72
cSH	774	1150	1700
Volume to Capacity	0.27	0.00	0.24
Queue Length 95th (ft)	27	0	0
Control Delay (s)	12.5	0.0	0.0
Lane LOS	B	A	
Approach Delay (s)	12.5	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	181	1	33	0	0	0	0	187	198	245	80	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	1	36	0	0	0	0	203	215	266	87	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1040	
pX, platoon unblocked	0.99	0.99	0.99	0.99	0.99		0.99					
vC, conflicting volume	930	1038	87	949	930	311	87			418		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	923	1032	67	941	923	311	67			418		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	3	99	96	100	100	100	100			77		
cM capacity (veh/h)	203	176	982	189	204	729	1513			1141		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	234	418	353
Volume Left	197	0	266
Volume Right	36	215	0
cSH	233	1700	1141
Volume to Capacity	1.00	0.25	0.23
Queue Length 95th (ft)	235	0	23
Control Delay (s)	104.7	0.0	7.4
Lane LOS	F		A
Approach Delay (s)	104.7	0.0	7.4
Approach LOS	F		

Intersection Summary			
Average Delay	26.9		
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

PM Year 2013 + Project + Cumulative
9: Diehl Rd & Derrick Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	189	21	5	12	5	21	20	20	7	6	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	205	23	5	13	5	23	22	22	8	7	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	18			228			296	290	217	320	298	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			228			296	290	217	320	298	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			96	96	97	99	99	99
cM capacity (veh/h)	1598			1340			639	610	823	592	603	1064

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	250	24	66	20
Volume Left	22	5	23	8
Volume Right	23	5	22	5
cSH	1598	1340	678	680
Volume to Capacity	0.01	0.00	0.10	0.03
Queue Length 95th (ft)	1	0	8	2
Control Delay (s)	0.7	1.8	10.9	10.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.7	1.8	10.9	10.5
Approach LOS			B	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

PM Year 2013 + Project + Cumulative
10: Evan Hewes & Westside Rd
HCM Unsignalized Intersection Capacity Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	328	0	0	26	7	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	357	0	0	28	8	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			357		385	357
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			357		385	357
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1202		618	688

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	357	28	13
Volume Left	0	0	8
Volume Right	0	0	5
cSH	1700	1202	645
Volume to Capacity	0.21	0.00	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.0	10.7
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.7
Approach LOS			B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

LOS Engineering, Inc. Synchro 7 - Report

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	356	0	4	55	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	387	0	4	60	0	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			387		455	387
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			387		455	387
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	98
cM capacity (veh/h)			1172		561	661

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	387	64	15
Volume Left	0	4	0
Volume Right	0	0	15
cSH	1700	1172	661
Volume to Capacity	0.23	0.00	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.6	10.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.6	10.6
Approach LOS			B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix Q

ITE Turn Lane Warrants

TRAFFIC ENGINEERING HANDBOOK

Fifth Edition

James L. Pline
Editor

Institute of Transportation Engineers

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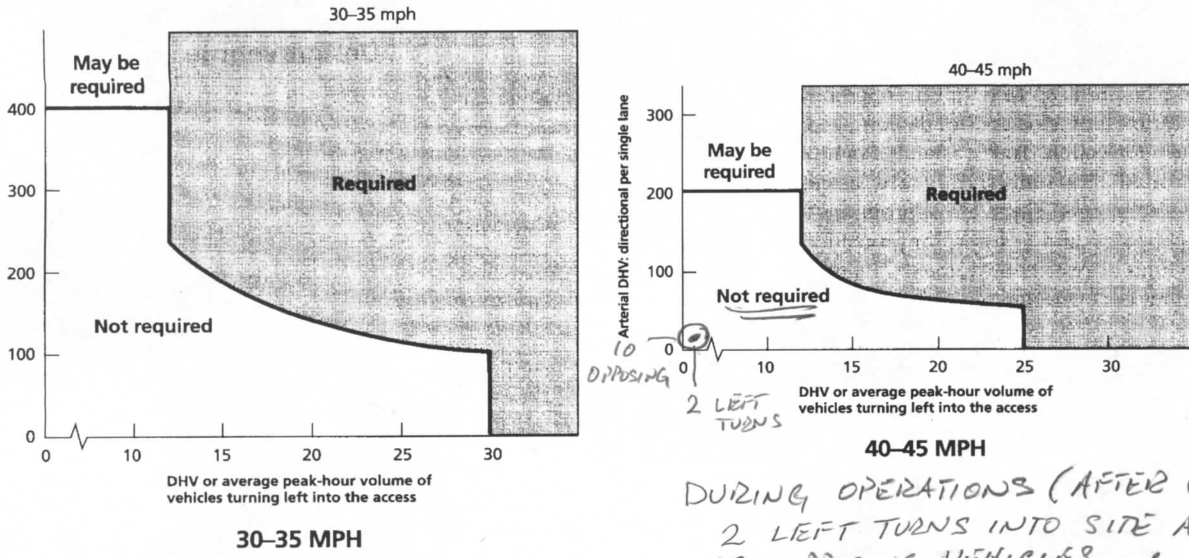

DURING OPERATIONS (AFTER CONSTRUCTION)
2 LEFT TURNS INTO SITE AGAINST
12 OPPOSING VEHICLES. ∴ LEFT-TURN
LANE NOT REQUIRED

Figure 11–22(a) Left-Turn Lane Warrants

Source: *Access Management Guidelines for Activity Centers*, NCHRP Report 348.

Corner Radius Design

Corner radius design should be based on the selected design vehicle. Care should be taken to select an appropriate vehicle. Over-designing an intersection using a very large semitrailer, which may never or rarely ever use the intersection, can be costly and may create problems in executing a desired channelization plan; and it may even create a more difficult environment for pedestrians. Under-designing an intersection creates potential safety and operational problems. Table 11–17 shows guidelines for selection of an appropriate design vehicle.

Design of the corner radius itself can take a variety of forms. Simple circular radius designs are common for low-speed, residential, collector, and downtown streets. Higher-speed designs and radii for very large semitrailers are most efficiently accomplished using multicentered curves. These best replicate the turning paths of design vehicles.

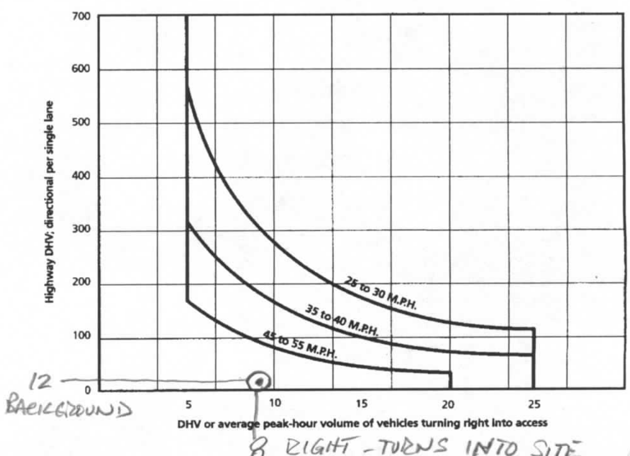

Figure 11–22(b) Right-Turn Lane Warrants

Source: State Highway Access Code, Colorado Department of Transportation, 1985.

DURING OPERATIONS (AFTER CONSTRUCTION)
8 RIGHT TURNS INTO SITE ALONG SIDE 12
SB THROUGH VEHICLES. ∴ RIGHT-TURN
LANE NOT REQUIRED.

Turning Roadway Widths

Widths of turning roadways are based on the turning paths of design vehicles. AASHTO policy gives designers a choice of three cases for which turning roadway width can be designed, as shown in Figure 11–23. Designers should take care to not over-design the turning roadway for too great a width. This can create a design that is difficult to drain, difficult for pedestrians to cross, and that may reduce or eliminate an island desired for traffic control devices or other uses.

Appendix R

Existing + Cumulative + Project Mitigation LOS and Fair Share Calculations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	0	4	0	0	0	0	90	14	96	380	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0			4.0	
Lane Util. Factor		1.00	1.00					1.00			1.00	
Frt		1.00	0.85					0.98			1.00	
Flt Protected		0.95	1.00					1.00			0.99	
Satd. Flow (prot)		1770	1583					1829			1844	
Flt Permitted		0.95	1.00					1.00			0.99	
Satd. Flow (perm)		1770	1583					1829			1844	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	0	4	0	0	0	0	98	15	104	413	0
RTOR Reduction (vph)	0	0	4	0	0	0	0	10	0	0	0	0
Lane Group Flow (vph)	0	54	0	0	0	0	0	103	0	0	517	0
Turn Type	Perm		Perm							Split		
Protected Phases		4						2		6	6	
Permitted Phases	4		4									
Actuated Green, G (s)		2.6	2.6					7.7			16.7	
Effective Green, g (s)		2.6	2.6					7.7			16.7	
Actuated g/C Ratio		0.07	0.07					0.20			0.43	
Clearance Time (s)		4.0	4.0					4.0			4.0	
Vehicle Extension (s)		3.0	3.0					3.0			3.0	
Lane Grp Cap (vph)		118	106					361			790	
v/s Ratio Prot								c0.06			c0.28	
v/s Ratio Perm		0.03	0.00									
v/c Ratio		0.46	0.00					0.28			0.65	
Uniform Delay, d1		17.5	17.0					13.3			8.9	
Progression Factor		1.00	1.00					1.00			1.00	
Incremental Delay, d2		2.8	0.0					0.4			2.0	
Delay (s)		20.3	17.0					13.7			10.8	
Level of Service		C	B					B			B	
Approach Delay (s)		20.1			0.0			13.7			10.8	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	39.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	181	1	33	0	0	0	0	187	198	245	80	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0			4.0	
Lane Util. Factor		1.00	1.00					1.00			1.00	
Frt		1.00	0.85					0.93			1.00	
Flt Protected		0.95	1.00					1.00			0.96	
Satd. Flow (prot)		1774	1583					1733			1795	
Flt Permitted		0.95	1.00					1.00			0.96	
Satd. Flow (perm)		1774	1583					1733			1795	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	1	36	0	0	0	0	203	215	266	87	0
RTOR Reduction (vph)	0	0	30	0	0	0	0	62	0	0	0	0
Lane Group Flow (vph)	0	198	6	0	0	0	0	356	0	0	353	0
Turn Type	Perm		Perm							Split		
Protected Phases		4						2		6	6	
Permitted Phases	4		4									
Actuated Green, G (s)		8.8	8.8					14.4			14.4	
Effective Green, g (s)		8.8	8.8					14.4			14.4	
Actuated g/C Ratio		0.18	0.18					0.29			0.29	
Clearance Time (s)		4.0	4.0					4.0			4.0	
Vehicle Extension (s)		3.0	3.0					3.0			3.0	
Lane Grp Cap (vph)		315	281					503			521	
v/s Ratio Prot								c0.21			c0.20	
v/s Ratio Perm		0.11	0.00									
v/c Ratio		0.63	0.02					0.71			0.68	
Uniform Delay, d1		18.9	16.8					15.7			15.5	
Progression Factor		1.00	1.00					1.00			1.00	
Incremental Delay, d2		3.9	0.0					4.5			3.5	
Delay (s)		22.8	16.9					20.3			19.0	
Level of Service		C	B					C			B	
Approach Delay (s)		21.9			0.0			20.3			19.0	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM Average Control Delay	20.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	49.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Fair Share Calculations

8) Forrester/I-8 EB Ramp			
Cumulative AM =	409	Fairshare Calculation	
Project Construction Traffic AM =	7	Project / (Cumulative + Project) =	1.7%
Cumulative PM =	(470)	Fairshare Calculation	
Project Construction Traffic PM =	(56)	Project / (Cumulative + Project) =	10.6%
		Average of AM and PM peak (based on Construction Traffic) =	**6.2%**
Cumulative AM =	409	Fairshare Calculation	
Project Operaion Traffic AM =	2	Project / (Cumulative + Project) =	0.5%
Cumulative PM =	(470)	Fairshare Calculation	
Project Operaion Traffic PM =	(2)	Project / (Cumulative + Project) =	0.4%
		Average of AM and PM peak (based on Operations Traffic) =	**0.5%**

APPENDIX C

AIR QUALITY ASSESSMENT

AIR QUALITY ASSESSMENT

Campo Verde Solar
County of Imperial

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March 15, 2012

Project: 1151-06 Campo Verde Solar Air Quality Study

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EXECUTIVE SUMMARY

This air quality analysis has been completed to determine impacts, which may be associated with the construction and operation of the proposed Campo Verde Solar Energy Project (Project). The Project site is made up of agricultural lots totaling 1,990 acres. The Project consists of installing solar panels and ancillary equipment throughout the entire project site.

During construction, the proposed Project would be expected to produce impacts for both Particulate Matter and Oxides of Nitrogen or PM_{10} and NO_x. These impacts were found to be fully mitigated through the implementation of the required Imperial County Air Pollution Control Districts (ICAPCD) mitigation measures and regulations under the California Environmental Quality Act (CEQA). No CO or ROG impacts are expected during this period.

PM_{10} impacts were found to be reduced to levels considered less than significant primarily through the following methods.

1. *Apply water during grading/grubbing activities to all active disturbed areas at least twice daily.*
2. *Apply water to all onsite roadways at least three times daily or use of magnesium chloride or other County approved dust suppression additives and apply water one-time daily.*
3. *Reduce all construction related traffic speeds onsite to below 15 Miles per Hour (MPH).*

NOx emissions would be reduced below significance through the implementation of ICAPCD required mitigation measures and would not be expected to exceed the 100 lb/day threshold of significance established by the ICAPCD as required by ICAPCD and CEQA. The primary reduction measures required are shown below and it should be noted that the required reduction measures are part of ICAPCDs typical mitigation measures:

1. *Use Diesel Oxidation Catalyst on all diesel equipment*

Additionally, a screening-level health risk assessment was conducted to determine the potential for the Project to result in a significant impact on nearby sensitive receptors during short-term construction activities. For purposes of this analysis, the primary pollutant of concern is diesel particulate matter (DPM) which is emitted by the operation of heavy diesel equipment during construction activities. The health risk assessment indicates that the proposed Project would not result in a significant impact to either existing or future sensitive receptors. However, because the health risk assessment determined that the Project would increase cancer risk between 1 and 10 per million, T-BACT approved technologies would need to be implemented. But it should be noted that mitigation requirements for NOx reductions would be considered T-BACT and would be acceptable under CEQA. Also, it was found that the worst case emission plume could extend out to 2,000 meters.

Cumulatively, the Project would not be expected to incrementally add emissions to any Reasonably Foreseeable (RF) projects as the RF projects are either not going to be under peak construction simultaneous during the proposed Project's peak emission period or the RF projects' estimated worst-case construction emissions would not overlap with the proposed Project's worst-case estimated construction emissions. In other words, no significant RF Project peak construction is either going to coincide simultaneously or be within a 4,000-meter radius of the proposed Project. Therefore, no cumulative health risk impacts are expected and no mitigation for cancer risk would be necessary.

The Project does not have any unmitagable impacts with respect to ozone precursors or PM10 as compared to County standards during the daily construction activities and since the other RF projects are either not going to be under construction simultaneously or are considerably distant from the project. Therefore, cumulative impacts would not be expected from the daily construction activities.

Finally, the proposed Project would not be expected to generate operational impacts offsite either during construction or during post construction operations. Additionally, the project would not be expected to generate offensive objective odors during these periods as well.

1.0 INTRODUCTION

The purpose of this Air Quality study is to determine whether potential air quality impacts are significant under the California Environmental Quality Act (CEQA) and Imperial County Air Pollution Control District (ICAPCD), if any, that may be created during the construction or operation of the proposed Campo Verde Solar Project. The Project site is spread out and encompasses various agricultural lots totaling 1,990 acres. The Project is within the County of Imperial west of the City of Calexico. Additionally, portions of the Gen-Tie line would traverse through federal lands under the control of the Bureau of Land Management (BLM.)

1.1 Project Location

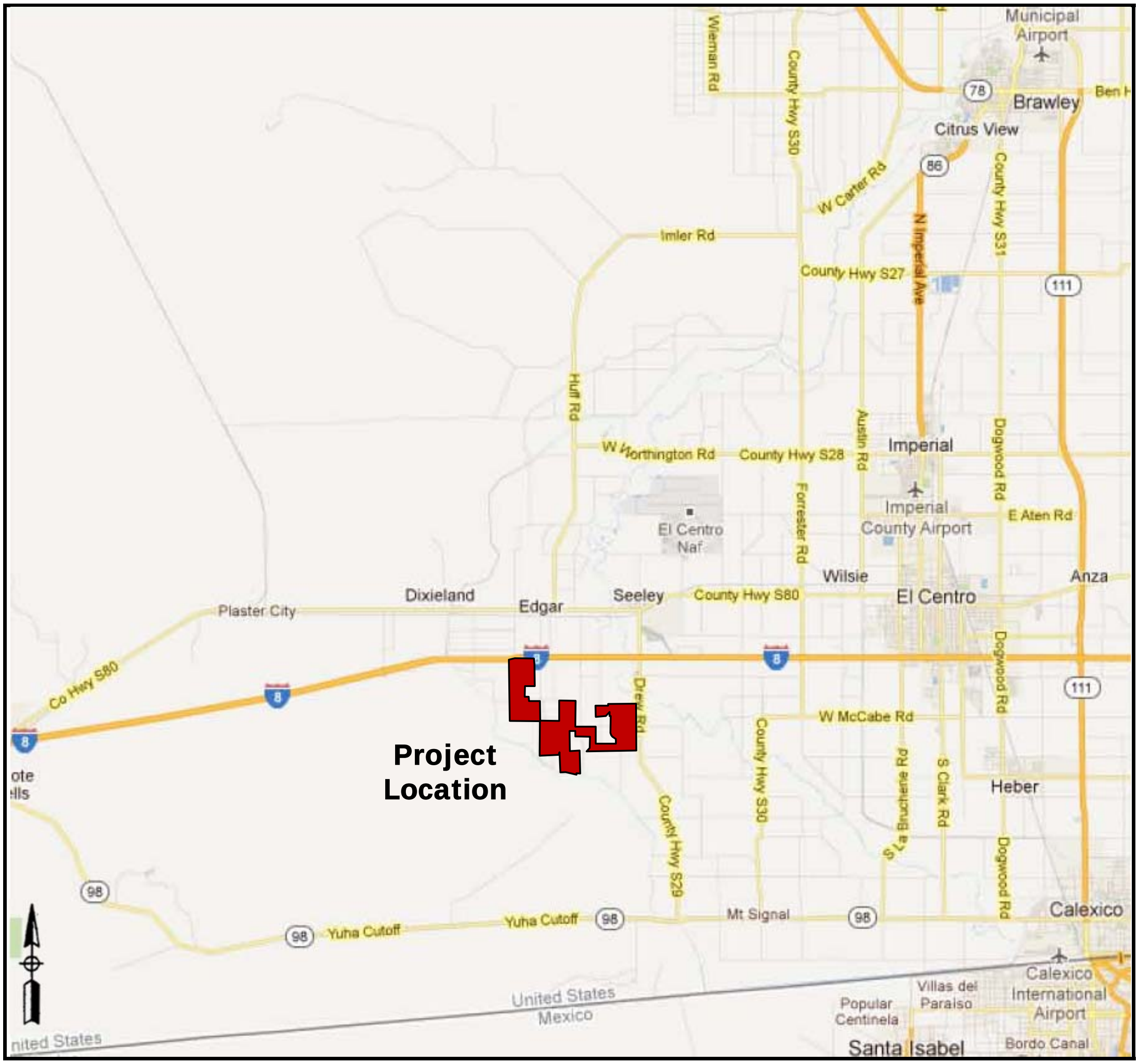
The Project is a proposed solar photovoltaic (PV) energy-generating facility located in the County approximately 7 miles southwest of the community of El Centro, California. The Project site is south of I-8 and west of Drew Road and northeast of Westside Main Canal. The Project site is located in the Salton Sea Air Basin (SSAB). The general location of the Project is shown below in Figure 1-A. The Project site includes several parcels which total approximately 1,990 acres of private lands that have been used for agriculture. A Project overview and layout is provided in Figure 1-B below.

1.2 Project Description

The Project is being developed to sell its electricity and all renewable and environmental attributes to an electric utility purchaser under a long-term contract to help meet California renewable goals. The applicant has a long-term Power Purchase Agreement (PPA) with San Diego Gas and Electric (SDG&E) to purchase output from the Project.

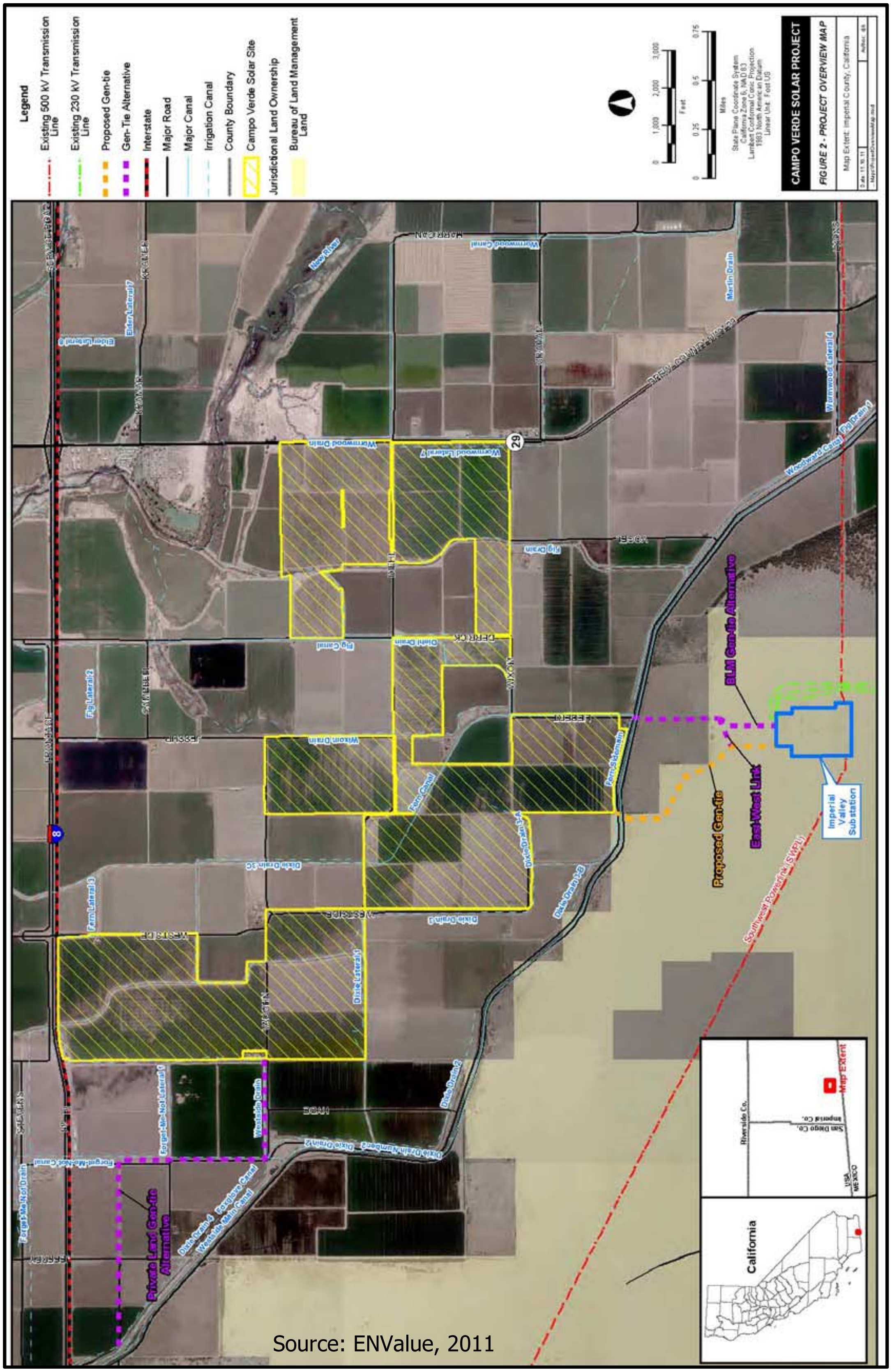
The Project would use First Solar PV modules that are generally non-reflective and convert sunlight into direct current (DC) electricity. The DC output of multiple rows of PV modules is collected through one or more combiner boxes and directed to an inverter that converts the DC electricity to alternating current (AC) electricity. From the inverter, the generated energy flows to a transformer where it is stepped up to distribution level voltage (approximately 34.5 kV). Multiple transformers are connected in parallel via 34.5 kV lines to the Project substation, where the power will be stepped up to 230 kV.

Figure 1-A: Project Vicinity Map and Project Footprint



Source: Google Maps, 12/11

Figure 1-B: Project Area Overview Map



Source: ENValue, 2011

The main components of the Project are:

- The installation of PV Panels
- Power Conversion Stations (PCS)
- 1000V DC collection system comprised of underground cabling and combiner boxes
- Medium voltage (12 kV and/or 34.5 kV) collection system
- Photovoltaic Combining Switchgear (PVCS)
- A Project Substation with 34.5 kV to 230kV/220kV step-up transformer(s) and switchyard
- Meteorological stations
- O&M buildings with parking and other associated facilities
- Telecommunications equipment

Construction of the Project includes site preparation, foundation construction, erection of equipment and structures, installation of electrical systems, control systems, and start-up/testing. These construction activities are expected to require approximately 12 to 24 months. The applicant anticipates construction to start in the second quarter of 2012 following approval of a Conditional Use Permit (CUP) by the County. According to the applicant, the construction workforce is expected to reach a peak during month number seven (7), anticipated to occur during the 1st quarter of 2013, with a peak of up to 325 daily vehicles for construction workers and 50 daily truck deliveries.

During operations and maintenance, the Project will primarily operate during daylight hours and will require (on average) less than 10 fulltime personnel for operations and maintenance. Operations personnel include employees running the facility, security, and any other work associated with the operations. Maintenance personnel include employees addressing maintenance on a daily basis. On average, the operations and maintenance trip generation is estimated at about 20 daily trips with approximately 10 AM and 10 PM peak hour trips but on occasion could reach 50 trips.

During operations, all PV modules at the site will require washing at an estimated frequency of one to four times each year. Washing the modules is estimated to require up to 10 daily water trucks over approximately 15 business days. During the washing period, the total project daily traffic may increase to 40 or 50 daily trips over a 15 business day period.

Since the operations and maintenance traffic generation is significantly less than the construction traffic generation, the higher and more conservative construction trip generation is used to determine potential Project transportation related impacts. In other words, the construction phase was used for the analysis because it is calculated to generate significantly higher traffic than the Project operations and maintenance.

2.0 EXISTING ENVIRONMENTAL SETTING

2.1 Existing Setting

All of the parcels that comprise the Solar Facility site are used as agricultural lands. Most of the 1,990 acres are in active agricultural production of non-food crops (predominantly forage crops such as Bermuda grass and alfalfa). The project site is also transected by irrigation canals, ditches and public roads. The Gen-the line will traverse through federal lands managed by the Bureau of Land Management (BLM). Overall, the Project site is relatively flat with elevations ranging from 20 to 25 feet below sea level.

Existing operations on these properties is mainly for agriculture where operations typically include heavy agricultural equipment to till the soil, fertilizers, maintenance of the crops. Harvest periods and in some cases agricultural burns to remove excess plant matter occur on an annual basis, which are known to produce high levels of PM emissions through dust.

2.2 Climate and Meteorology

Climate within the SSAB experiences mild and dry winters with daytime temperatures ranging from 65 to 75 ºF, extremely hot summers with daytime temperatures ranging from 104 to 115 ºF, and very little rain. Imperial County usually receives approximately three inches of rain per year mostly occurring in late summer or midwinter. Summer weather patterns are dominated by intense heat induction low-pressure areas over the interior desert. The flat terrain of the Imperial Valley and the strong temperature differentials created by intense solar heating produce moderate winds and deep thermal convection.

The general wind speeds in the area are less than 10 mph, but occasionally experience winds speeds of greater than 30 mph during the months of April and May. Statistics reveal that prevailing winds blow from the northwest-northeast; a secondary trend of wind direction from the southeast is also evident.

2.3 Regulatory Standards

2.3.1 Federal Standards and Definitions

The Federal Air Quality Standards were developed per the requirements of the federal Clean Air Act, which was passed in 1970 and amended in 1990. This law provides the basis for the national air pollution control effort. The Clean Air Act established two types of air quality standards; primary and secondary standards. ***Primary Standards*** define limits for the intention of protecting public health, which includes sensitive populations such as asthmatics, children and the elderly. ***Secondary Standards*** define limits to protect public welfare which includes protection against decreased visibility, damage to animals, crops, vegetation and buildings.

The Environmental Protection Agency (EPA) Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards (NAAQS) for "criteria" pollutants which are defined below:

1. ***Carbon Monoxide (CO):*** *is a colorless, odorless, and tasteless gas and is produced from the partial combustion of carbon-containing compounds, notably in internal-combustion engines. CO usually forms when there is a reduced availability of oxygen present during the combustion process. Exposure to CO near the levels of the ambient air quality standards can lead to fatigue, headaches, confusion, and dizziness. CO interferes with the blood's ability to carry oxygen.*
2. ***Lead (Pb):*** *is a potent neurotoxin that accumulates in soft tissues and bone over time. The major sources of lead emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. Because lead is only slowly excreted, exposures to small amounts of lead from a variety of sources can accumulate to harmful levels. Effects from inhalation of lead near the level of the ambient air quality standard include impaired blood formation and nerve conduction. Lead can adversely affect the nervous, reproductive, digestive, immune, and blood-forming systems. Symptoms can include fatigue, anxiety, short-term memory loss, depression, weakness in the extremities, and learning disabilities in children.*
3. ***Nitrogen Dioxide (NO_2):*** *is a reactive, oxidizing gas capable of damaging cells lining the respiratory tract and is one of the nitrogen oxides emitted from high-temperature combustion, such as those occurring in trucks, cars, power plants, home heaters, and gas stoves. In the presence of other air contaminants,* NO_2 *is usually visible as a reddish-brown air layer over urban areas.* NO_2 *along with other traffic-related pollutants is associated with respiratory symptoms, respiratory illness and respiratory impairment. Studies in animals have reported biochemical, structural, and cellular changes in the lung when exposed to* NO_2 *above the level of the current state air quality standard.*

Clinical studies of human subjects suggest that NO_2 exposure to levels near the current standard may worsen the effect of allergens.

4. ***Particulate Matter (P_{M10} or $P_{M2.5}$):*** *is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary in shape, size and chemical composition, and can be made up of multiple materials such as metal, soot, soil, and dust. P_{M10} particles are 10 microns (µm) or less and $P_{M2.5}$ particles are 2.5 (µm) or less Exposure to PM levels exceeding current air quality standards increases the risk of allergies such as asthma and respiratory illness.*
5. ***Ozone (O_3)****: is a highly oxidative unstable gas capable of damaging the linings of the respiratory tract. This pollutant forms in the atmosphere through reactions between chemicals directly emitted from vehicles, industrial plants, and many other sources. Exposure to ozone above ambient air quality standards can lead to human health effects such as lung inflammation, tissue damage and impaired lung functioning.*
6. ***Sulfur Dioxide (SO_2)****: is a gaseous compound of sulfur and oxygen and is formed when sulfur-containing fuel is burned by mobile sources, such as locomotives, ships, and off-road diesel equipment. SO_2 is also emitted from several industrial processes, such as petroleum refining and metal processing. Effects from SO_2 exposures at levels near the one-hour standard include bronchoconstriction accompanied by symptoms, which may include wheezing, shortness of breath and chest tightness, especially during exercise or physical activity. Continued exposure at elevated levels of SO_2 results in increased incidence of pulmonary symptoms and disease, decreased pulmonary function, and increased risk of mortality.*

2.3.2 State Standards and Definitions

The State of California Air Resources Board (ARB) sets the laws and regulations for air quality on the state level. ARB has established the California Ambient Air Quality Standards (CAAQS), which include the six federal criteria air pollutants identified as well as the following four air pollutants. The CAAQS are either the same as or more restrictive than the NAAQS. Table 2.1 on the following page identifies both the NAAQS and CAAQS.

1. ***Visibility Reducing Particles****: particles in the air that obstruct visibility.*
2. ***Sulfates****: are salts of Sulfuric Acid. Sulfates occur as microscopic particles (aerosols) resulting from fossil fuel and biomass combustion. They increase the acidity of the atmosphere and form acid rain.*
3. ***Hydrogen Sulfide (H_2S)****: is a colorless, toxic and flammable gas with a recognizable smell of rotten eggs or flatulence. Usually, H_2S is formed from bacterial breakdown of organic matter. Exposure to low concentrations of hydrogen sulfide may cause irritation to the eyes, nose, or throat.*
4. ***Vinyl Chloride****: is also known as chloroethene and is a toxic, carcinogenic, colorless gas with a sweet odor. It is an industrial chemical mainly used to produce its polymer, polyvinyl chloride (PVC).*

Table 2.1: Ambient Air Quality Standards

Ambient Air Quality Standards						
Pollutant	**Average Time**	**California Standards[1]**		**Federal Standards[2]**		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)	1 Hour	0.09 ppm (180 μg/m3)	Ultraviolet Photometry	-	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 μg/m3)		0.075 ppm (147 μg/m3)		
Respirable Particulate Matter (PM10)	24 Hour	50 μg/m3	Gravimetric or Beta Attenuation	150 μg/m3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m3		-		
Fine Particulate Matter PM2.5	24 Hour	No Separate State Standard		35 μg/m3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m3	Gravimetric or Beta Attenuation	15 μg/m3		
Carbon Monoxide (CO)	8 hour	9.0 ppm (10mg/m3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m3)	None	Non-Dispersive Infrared Photometry
	1 hour	20 ppm (23 mg/m3)		35 ppm (40 mg/m3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m3)		-	-	-
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 μg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 μg/m3)[8]	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 μg/m3)		0.100 ppm[8]	None	
Sulfur Dioxide (SO_2)	24 Hour	0.04 ppm (105 μg/m3)	Ultraviolet Fluorescence	-	-	Ultraviolet Flourescence; Spectrophotometry (Pararoosaniline Method)[9]
	3 Hour	-		-	0.5 ppm (1300 μg/m3)	
	1 Hour	0.25 ppm (655 μg/m3)		75 ppb (196 μg/m3) (See Footnote 9)	-	
Lead[10]	30 Day Average	1.5 μg/m3	Atomic Absorption	-		-
	Calendar Quarter			1.5 μg/m3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average			0.15 μg/m3		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer - visibility of ten miles or more (0.07 -30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape				
Sulfates	24 Hour	25 μg/m3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m3)	Ultraviolet Fluorescence			
Vinyl Chloride[10]	24 Hour	0.01 ppm (26 μg/m3)	Gas Chromatography			

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing articles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010). Note that the EPA standards are in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national standards to the California standards the units can be converted from ppb to ppm. In this case, the national standards of 53 ppb and 100 ppb are identical to 0.053 ppm and 0.100 ppm, respectively.
9. On June 2, 2010, the U.S. EPA established a new 1-hour SO2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. EPA also proposed a new automated Federal Reference Method (FRM) using ultraviolet technology, but will retain the older pararosaniline methods until the new FRM have adequately permeated State monitoring networks. The EPA also revoked both the existing 24-hour SO2 standard of 0.14 ppm and the annual primary SO2 standard of 0.030 ppm, effective August 23, 2010. The secondary SO2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by EPA. Note that the new standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the new primary national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
10. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
11. National lead standard, rolling 3-month average: final rule signed October 15, 2008.

Source: California Air Resources Board (9/8/10)

2.3.3 Regional Standards

The State of California has 35 specific air districts, which are each responsible for ensuring that the criteria pollutants are below the NAAQS and CAAQS. Air basins that exceed either the NAAQS or the CAAQS for any criteria pollutants are designated as "non-attainment areas" for that pollutant. Currently, there are 15 non-attainment areas for the federal ozone standard and two non-attainment areas for the PM2.5 standard. The state therefore created the California State Implementation Plan (SIP), which is designed to provide control measures needed for California Air basins to attain ambient air quality standards.

The Imperial County Air Pollution Control District (ICAPCD) is the government agency which regulates stationary sources of air pollution within Imperial County and the SSAB. Currently, the SSAB is in "non-attainment" status for O_3 and serious non-attainment of PM10. Therefore, the ICAPCD developed an Ambient Air Quality Plan (AAQP) to provide control measures to try to achieve attainment status. The AAQP was adopted in 1991. A new NAAQS for ozone was adopted by EPA in 1997 and required modified strategies to decrease higher ozone concentrations. In order to guide non-attainment areas closer to NAAQS requirements an 8-hr Ozone Air Quality Management Plan (AQMP) was approved by ICAPCD in 2009 and was accepted by the EPA in 2010. Similarly, in 2009 the County revised there SIP to address the serious non-attainment status of PM 10. The purpose of the SIP is to outline a plan that would provide attainment status as expeditiously as possible and require a 5% yearly reduction of emissions. The criteria pollutant standards are generally attained when each monitor within the region that has had no exceedances during the previous three calendar years.

2.4 California Environmental Quality Act (CEQA) Significance Thresholds

The California Environmental Quality Act has provided a checklist to identify the significance of air quality impacts. These guidelines are found in Appendix G of the CEQA Guidelines. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:

A: Conflict with or obstruct implementation of the applicable air quality plan?

B: Violate any air quality standard or contribute substantially to an existing or project air quality violation?

C: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

D: Expose sensitive receptors to substantial pollutant concentrations?

E: Create objectionable odors affecting a substantial number of people?

2.5 ICAPCD Air Quality Impact Assessment Screening Thresholds (CEQA)

The ICAPCD has established significance thresholds in the 2007 ICAPCD CEQA Handbook for the preparation of Air Quality Impact Assessments (AQIA). The screening criteria within this handbook can be used to determine whether a project's total emissions would result in a significant impact as defined by CEQA. Should emissions be found to exceed these thresholds, additional modeling is required to demonstrate that the project's total air quality impacts are below the state and federal ambient air quality standards. These screening thresholds for construction and daily operations are shown in Table 2.2 below.

Table 2.2: Screening Threshold for Criteria Pollutants

Pollutant	Total Emissions (Pounds per Day)	
Construction Emissions		
Respirable Particulate Matter (PM_{10} and $PM_{2.5}$)	150	
Nitrogen Oxide (NO_x)	100	
Carbon Monoxide (CO)	550	
Reactive Organic Gases (ROG)	75	
Operational Emissions		
Pollutant	Tier 1 (Pounds per Day)	Tier 2 (Pounds per Day)
PM_{10} and Sulfur Oxide (SO_x)	< 150	150 or greater
NO_x and ROG	< 55	55 or greater
CO	< 550	550 or greater
Level of Significance:	Less Than Significant	Significant Impact
Level of Analysis:	Initial Study	Comprehensive Air Quality Analysis Report
Environmental Document:	Negative Declaration	Mitigated ND or EIR
Source: ICAPCD-CEQA Air Quality Handbook (11/2007)		

The CEQA handbook further states that any proposed project with a potential to emit less than the Tier 1 thresholds during operations may potentially still have adverse impacts on the local air quality and would be required to develop an Initial Study to help the Lead Agency determine whether the project would have a less than significant impact. On the other hand, if the proposed project's operational development fits within the Tier II classification, it is considered to have a significant impact on regional and local air quality. Therefore, Tier II projects are required to implement **all** standard mitigation measures as well as all feasible discretionary mitigation measures.

Additionally, ICAPCD defined standard mitigation measures for construction equipment and fugitive PM_{10} must be implemented at all construction sites. The implementation of mitigation measures discretionary, as listed in the ICAPCD CEQA handbook, apply to those construction sites which are 5 acres or more for non-residential developments such as the proposed Project. Additionally, in an effort to reduce PM_{10} or Fugitive Dust from ambient air, the Project would be required to develop a dust management plan consistent with Rule 801 of ICAPCD's Rules and Regulations.

Should the project be sufficiently large enough that operational mitigation measures simply cannot reduce pollutant levels below thresholds of significance, pollutant levels the ICAPCD has adopted the Operation Development Fee as was adopted under Rule 310 which provides the ICAPCD with a sound method for mitigating the emissions produced from the operation of new commercial and residential development projects. Projects immitigable through standard procedures are assessed a one-time fee for either Ozone Precursors or PM_{10} impacts, which is based upon either the square footage of the commercial development or the number of residential units. Operational impacts are not anticipated given that the project creates renewable energy and only is expected to add a peak of 50 daily traffic trips or less.

Furthermore, to be consistent with the California Air Resource Board, ICAPCD requires PM_{10} emitted by diesel powered construction equipment (DPM) to be analyzed. DPM can potentially increase the cancer risk for nearby residential receptors if any. Generally, sites increasing the cancer risk between one and ten in one million need to implement toxics best available control technology or impose effective emission limitations, emission control devices or control techniques to reduce the cancer risk. Finally, at no time shall the project increase the cancer risk to over 10 in one million.

2.6 Local Air Quality

Criteria pollutants are measured continuously throughout the County of Imperial and the data is used to track ambient air quality patterns throughout the County. As mentioned earlier, this data is also used to determine attainment status when compared to the NAAQS and CAAQS. The ICAPCD is responsible for monitoring and reporting monitoring data and operates 10 monitoring sites, which collect data on criteria pollutants. Four additional sites collect meteorological data, which is used by the ICAPCD to assist with pollutant forecasting, data analysis and characterization of pollutant transport.

The monitoring stations that are closest to the proposed Project are the Grant Street and Ethel Street monitoring stations in Calexico, which are approximately 13 and 14 miles from the project site, respectively. Table 2.3 provides the criteria pollutant levels monitored at these two stations for 2008, 2009 and 2010, which is the most current data at this time. The criteria pollutants monitored closest to the Project [Ambient data was obtained from the California Environmental Protection Agency's Air Resources Board Website (Source: http://www.arb.ca.gov/adam)]. Figure 2-A below shows the relative locations of the ambient air quality monitoring sites.

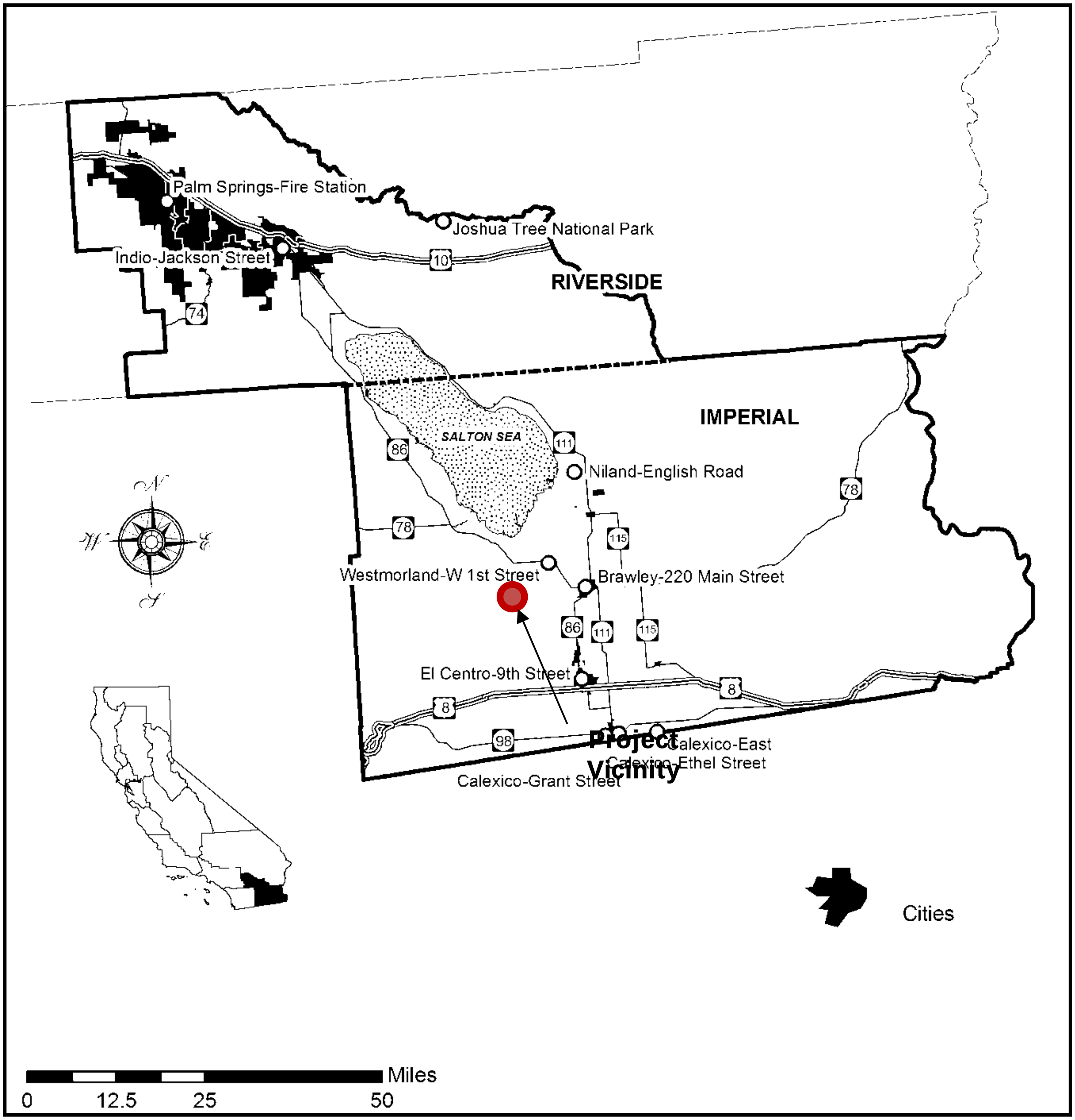
Based on review of the ambient data, Both Ozone and PM emissions exceed AAQS and therefore are in non-attainment status. The 8 hour Ozone non-Attainment is considered moderate Non-Attainment while the 24-Hour PM10 is considered "Serious" Non-Attainment. Therefore, to comply with the ICAPCDs SIP and AAQP, the project must implement Best Available Control Measure (BACM) and BACT as outlined in Section 2.5 of this report above.

Table 2.3: Latest Three-Year Ambient Air Quality data near Project Site

Pollutant	Closest Recorded Ambient Monitoring Site	Averaging Time	CAAQS	NAAQS	2008	2009	2010
O3 (ppm)	Calexico Ethel Street	1 Hour	0.09 ppm	-	**0.128**	**0.104**	**0.102**
	Calexico Ethel Street	8 Hour	0.070 ppm	0.075 ppm	**0.093**	**0.083**	**0.082**
PM10 (µg/m3)	Calexico Ethel Street	24 Hour	50 µg/m3	150 µg/m3	**110.5**	**275.9**	**112.6**
PM2.5 (µg/m3)	Calexico Ethel Street	24 Hour	-	35 µg/m3	**37.12**	**45.0**	**50.9**
	Calexico Ethel Street	Annual Arithmetic Mean	12 µg/m3	15 µg/m3	**N/A**	**18.7**	**12.7**
NO2 (ppm)	Calexico Ethel Street	Annual Arithmetic Mean	0.030 ppm	0.053 ppm	0.015	0.014	0.014
	Calexico Ethel Street	1 Hour	0.18 ppm	-	0.146	0.102	0.080
CO	Calexico Ethel Street	8 Hour	9 ppm	9 ppm	6.34	7.46	4.46

ppm=Parts per Million
N/A=Not Available for give year
2010 data is the latest data as of 1-13-2012

FIGURE 2-A: Ambient Air Quality Monitoring Stations (SSAB – ARB)



3.0 METHODOLOGY

3.1 Construction Emissions Calculations

Air quality impacts related to construction were calculated using the latest URBEMIS2007 air quality model, which was developed by CARB. URBEMIS2007 has been approved by ICAPCD and the County for construction emission calculations. URBEMIS incorporates emission factors from the EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions. Default settings were used within the model.

Cancer Risk will be determined for Diesel Particulate Matter (DPM) at the point of maximum exposure which is determined through dispersion modeling. The SCREEN3 dispersion model can be used to determine the maximum concentration for air pollutants at a calculated maximum radius from the project centroid. Ldn Consulting utilized the worst case exhaust emissions generated from the Project from construction equipment as calculated within the URBEMIS2007 model. The worst case cancer risk if exposed to a DPM dose for 70 years is defined as:

$$CR_{DPM} = C_{DPM} \times URF_{DPM}$$

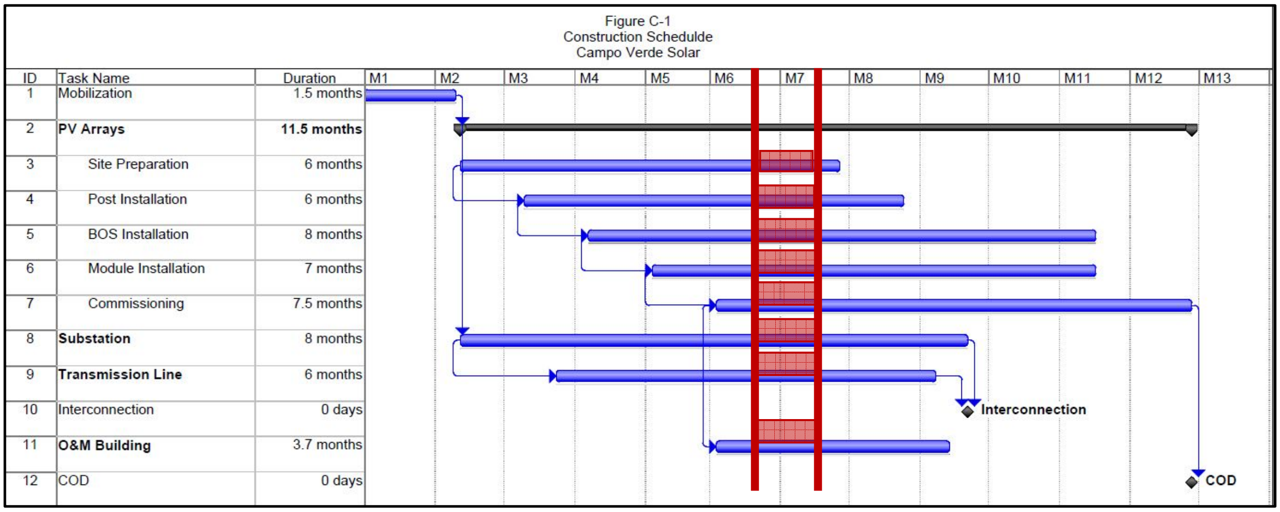
Where, CR_{DPM} = Cancer risk from diesel particulate matter (DPM) (probability on an individual developing Cancer)
C_{DPM} = Annual average DPM concentration in µg/m3
URF_{DPM} = Unit risk factor is 0.0003 per continuous exposure of 1 $\mu g/m^3$ of DPM over 70-year period per person)
Source: Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling emissions for CEQA Air Quality Analysis (August 2003)

3.2 Construction Assumptions

Project construction activities are expected to require approximately 12 to 24 months. The applicant anticipates construction to start in the second quarter of 2012 following County approval of a Conditional Use Permit (CUP). According to the applicant, the construction workforce is expected to reach a peak during month number seven (7), which is anticipated to occur during the 1st quarter of 2013.

Ldn Consulting utilized the project engineer’s worst case schedule which assumes that simultaneous construction activities may occur with PV Array and facility installations along transmission line installation. Again, this peak construction activity would occur during month seven of the project construction schedule (See Table 3.1 below) and would also be expected to generate 375 ADT from construction workers, deliveries and vendors.

Table 3.1: Expected Worst-Case Construction Period (Month 7)



The URBEMIS 2007 Model does not differentiate between phases other than Demolition, Mass Grading, Fine Grading, Trenching, Building Construction, Architectural Coating and Paving. During month seven, there will be Building Construction, Mass Grading, and Trenching and all modeled phases would be simultaneous as would be worst case for this project. All tasks identified within the month seven construction schedule were classified into these three construction emission sources for the model which are shown in Table 3.2 below. Demolition activities are not scheduled during this period and are not analyzed given demolition activities are scheduled during less intensive construction stages.

3.3 Operational Impacts

Daily operations of the project will involve primarily periodic maintenance and worker trips only and although emissions are expected, they would be minimal given the project only expects to add 15 to 20 ADT daily and on occasion (up to four times annually) the project could add up to 50 ADT during periodic PV module cleaning periods. With this being said, for purposes of a worst case analysis, Ldn Consulting is modeling the daily trips with respect to construction (375 ADT) and reporting it as operations.

Table 3.2: Phase I Construction Equipment and Durations as Modeled

Equipment Identification	Proposed Dates	Quantity	Hours per day
Building Construction	1/01/2013 – 1/31/2013		
Rough Terrain Forklifts		15	1.7
Other Equipment		6	4
Cranes		4	7
Other General Industrial Equipment		3	4
Air Compressors		2	2
Forklifts		1	3.8
Aerial Lifts		1	1
Generator Sets		1	8
Tractors/Loaders/Backhoes		1	5
Welder			
Mass Grading	1/01/2013 – 1/31/2013		
Graders		2	6.8
Rubber Tired Dozers		2	6.8
Water Trucks		4	6.8
Other Equipment		3	8
Rollers		2	6.8
Tractors/Loaders/Backhoes		2	6.8
Rough Terrain Forklifts		2	1.7
Trenching	1/01/2013 – 1/31/2013		
Other General Industrial Equipment		2	8
Tractors/Loaders/Backhoes		2	6.8
Trenchers		2	4.1
Excavators		1	4.5
Generator Sets		1	0.5
This equipment list is based upon equipment inventory within URBEMIS2007. The quantity and types are based upon assumptions from projects of similar size and scope.			

4.0 FINDINGS

4.1 Construction Findings

Air quality impacts related to construction will be calculated using the latest URBEMIS2007 air quality model, which was developed by ARB. URBEMIS2007 has been approved by ICAPCD and the County for construction emission calculations. URBEMIS incorporates emission factors from the EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions.

Construction during the seventh month of the Project is considered worst-case. A summary of the construction emissions including construction worker trips is shown in Table 4.1 below and the URBEMIS model outputs are provided as ***Attachment A*** of this report which shows detailed emission breakdowns for Off Road Diesel, Vendor and Worker trips to and from the construction site. These emissions are used to compare both Project related unmitigated and mitigated emissions with ICAPCD's significance thresholds as required by CEQA.

Table 4.1: Expected Construction Emissions Summary (Pounds per Day)

Year	ROG	NO_x	CO	PM_{10} (Dust)	PM_{10} (Exhaust)	PM_{10} (Total)	$PM_{2.5}$ (Dust)	$PM_{2.5}$ (Exhaust)	$PM_{2.5}$ (Total)
2012 (lb/day) Unmitigated	17.92	130.31	99.92	198.28	7.59	205.87	41.44	6.98	48.42
Significance Threshold (lb/day)	75	100	550	-	-	150	-	-	150
ICAPCD Impact?	No	**YES**	No	-	-	**Yes**	-	-	No
2012 (lb/day) Mitigated	17.92	93.59	99.92	14.25	7.59	21.84	3.01	6.98	9.99
ICAPCD Impact?	No	**NO**	No	-	-	**No**	-	-	No

Given the findings identified in Table 4.1, NO_x and PM_{10} emissions would exceed ICAPCD air quality standards of 100 and 150 lbs/day respectively and would require mitigation to comply. It should be noted that ICAPCD requires the use of all standard mitigation measures identified within the CEQA Air Quality Handbook which are shown later in this report. However, the following discretionary mitigation measures were found (through modeling) to reduce impacts for these pollutants to a level below significance under CEQA:

- PM_{10} impact mitigation required to reduce emission generation to below significance:

    1. *Apply water during grading/grubbing activities to all active disturbed areas at least twice daily.*
    2. *Apply water to all onsite roadways at least three times daily or use of magnesium chloride or other County approved dust suppression additives and apply water one-time daily.*
    3. *Reduce all construction related traffic speeds onsite to below 15 Miles per Hour (MPH).*

The above mitigation recommendations are based on control efficiencies established by SCAQMD CEQA air quality handbook and recommended within the URBEMIS 2007 air quality model and are accepted by ICAPCD. The CEQA handbook states that watering twice daily can reduce PM10 from 34-68% however; Ldn Consulting utilized an average 55% as recommended by URBEMIS.

- [NO_x] impact mitigation required to reduce emission generation to below significance:

    1. *Use Diesel Oxidation Catalyst on all diesel equipment*

The above mitigation recommendations are based on typical control efficiencies used in industry. Ldn Consulting utilized an average NO_x reduction up to 40% for using Diesel Oxidation Catalyst. These reductions would only be used on construction equipment not on vehicles registered to drive on public highways.

Additionally, the Project would be required to follow Rule 801 of Imperial County's Rules and Regulations for Construction and Earthmoving Activities. A dust control plan should be developed for approval by the County. The dust control plan should be kept onsite. The plan should indicate how mitigation measures will be implemented with start and completion dates. The plan should indicate specific treatments and control measures as identified within this report. The dust control plan should be updated daily as ICAPCD will show up at various times randomly to verify that compliance with the plan.

4.2 Construction Health Risk from Diesel Particulate Matter (Exhaust Only)

Based upon this air quality modeling, we find that worst-case PM_{10} from exhaust could be as high 7.59 lbs per construction day (10-hours) or 0.0955 grams per second DPM during the construction day. Averaging this emission rate over the project site area gives us the average emission rate for the project area. Converting pounds (lbs) per day to grams per second is shown below:

$$\frac{7.59\frac{lb}{day}*453\frac{grams}{lb}}{36{,}000\frac{seconds}{Constructionday}}=0.0955\frac{grams}{second}$$

The average emission rate over the grading area is $7.551x10^{-9}$ g/m²/s, which was calculated as follows:

$$\frac{0.0955\frac{grams}{second}}{1990acres*4{,}046\frac{meters^2}{acre}}=1.186*10^{-8}\frac{\frac{grams}{meters^2}}{second}$$

Utilizing the SCREEN3 dispersion model, we find that the peak maximum 1-hr concentration is 2.414 µg/m³ during grading at a distance of roughly 2,000 meters from the centroid of the Project site. The SCREEN3 dispersion model outputs are provided as ***Attachment B*** to this report. This concentration would be lowered at any other distance from the project site. Utilizing the risk equation identified in Chapter 3 we calculate that the cancer risk over a 70-year continuous dose would be:

$$CR_{DPM\text{-}70yr\ dose} = 0.0003 \times 2.414 = 7.242 \times 10^{-4}$$

Based on these calculations, the project is expected to generate maximum DPM during the heaviest construction period of the Project. This period would be for one month and assuming a worst case construction day of 10 hours for a period of six days per week. The project could be operational 260 hours during that month. There are 25,550 days within a 70 year period so it would be expected that the CR_{DPM} would be 10.83-24 hour periods in 70 years or 10.83 days/25,550 days or 0.000424 times the CR_{DPM}. If one million people were exposed to the maximum DPM for the duration of grading at 2,000 meters from the project site, the estimated increased cancer risk for month seven could be:

0.000424 x .0007242 x 1,000,000 = 0.307 individuals per million

To estimate emissions during the entire project and for purposes of this health risk assessment only, if we assume worst-case diesel emissions within month seven were generated during the entire construction period of the project (12 months) the estimate would be off by a factor as high as 12. Multiplying the worst-case risk by 12 we would expect that the risk would at no time exceed **3.68** individuals per million exposed for the entire construction duration over a 70 year period. Therefore, because the project could increase the risk to more than one person per million the Project would be required to utilize equipment meeting requirements of T-BACT such as using diesel particulate filters, catalytic converters and or selective catalytic reduction technologies.

Furthermore, because the risk is less than 10 in one million at the worst case contour of 2,000 meters, no sensitive receptors either adjacent to the project or beyond the project would be exposed to significant cancer causing DPM. In other words, though there are sensitive receptors in the area, they will not be exposed to emissions that would increase their risk to above 10 in one million.

For example, the Westside School site is located approximately 84-meaters from the closest boundary of the project and would be considered the nearest sensitive receptor. Utilizing SCREEN3 we determine that the emissions could have concentrations as high as 1.747 $\mu g/m^3$ at the school site which would have a cancer risk dose of:

$$CR_{DPM\text{-}70yr\ dose} = 0.0003 \times 1.747 = 5.24 \times 10^{-4}$$

With a corresponding monthly Cancer Risk of:

0.00043 x .000524 x 1,000,000 = 0.222 individuals per million

And Multiplying the worst-case risk by 12 we would expect that the risk would at no time exceed 2.664 individuals per million which is lower than the 3.68 individuals per million project related maximum as calculated above. Therefore no DPM cancer risks would be expected. The SCREEN3 dispersion model output for the discrete modeling of the Westside School is also provided in ***Attachment B*** to this report.

Finally, it should be noted that potential NOx impacts and mitigation measures identified in Section 4.1 of this report would also be classified as T-BACT reduction measures. Therefore, because the project will be utilizing T-BACT technologies per ICAPCD protocols, all health risks would be considered reduced to less than significant.

4.3 Odor Impacts

The project by nature is a renewable energy solar generation facility. The project is not expected to generate impactive odors and would not be considered an impact.

4.4 Cumulative Construction Impacts

The County provided the environmental team with the latest cumulative projects list for the County and the list was reviewed to determine cumulative "reasonably foreseeable" (termed in this report as RF projects) for simultaneous construction of the proposed project. Many of the projects on the list were either speculative, put on hold indefinitely or were already built, so a large portion of projects were removed. Additionally, it should be noted that there were multiple solar projects that recently submitted project applications and have started the environmental review process. Although the applications came in subsequent to issuance of the NOP, because of their proximity to the project site as well as the fact that they were "reasonably foreseeable" they were considered as RF within the confines of this analysis.

Without specific emission outputs and coordination of project schedules, it's difficult to quantify cumulative emissions but making worst-case assumptions simplifies the assessment. Given our already overly conservative approach to health risk analysis we found that our worst case DPM emission plume is greatest at 2,000 meters from the center of the construction activities. Also given that we assumed emissions generated during the worst-case seventh month construction operation and were projected over the entire construction period we found that cancer risk was still less than ten in one million as shown in Section 4.2 above.

Similarly, if we assume every other RF project has an equal worst-case DPM emission radius extended out 2,000 meters and they are under construction at the same time, there could be a cumulative impact if the two contours coincide. This would be simplified by extending the radius of the project out 4,000 meters and verifying that either no RF projects are within the contour or if the RF projects are within the contour that both projects peak construction will not occur simultaneously. If this verification can be made, then no cumulative health risk impacts would be expected and no mitigation for cancer risk would be necessary.

The RF project list as taken from the Project's Traffic Study is shown below:

1) *"S" Line Upgrade 230-kV Transmission Line Project* – a power line project of approximately 18 miles extending from approximately 10 miles southwest of the City of El Centro near Libert Road and Wixom Road along I-8 and SR-86. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction. EIR reference [A].
2) *Imperial Valley Solar Project (Formerly SES Solar Two)* – an electric generating facility capable of producing approximately 750 megawatts of electricity on approximately 6,500 acres generally located west of Dunaway Road and north of I-8. The construction phase of the project is calculated to generate 1,736 ADT with 772 AM peak hour trips and 772 PM peak hour trips. EIR reference [B].
3) *Sunrise 500-kV Line IV West Solar Farm Interconnection to Imperial Valley Substation* – a power line project extending from Imperial Valley to Penasquitos in the City of San Diego. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction. EIR reference [C].
4) *SDG&E Photovoltaic Solar Field* – a photovoltaic solar facility capable of producing approximately 14 megawatts of electricity on approximately 100 acres located adjacent to the SDG&E Imperial Valley Substation. The construction phase of the project is calculated to generate approximately 40 ADT with 15 AM peak hour trips and 15 PM peak hour trips.
5) *SDG&E Geotechnical Investigation* – an exploratory analysis to determine the quality and compaction of the soil around the SDG&E Imperial Valley substation. Limited construction traffic is anticipated to last no longer than one week in September 2011.
6) *North Gila to Imperial Valley #2* - a power line project of approximately 75 miles extending from the SDG&E Imperial Valley substation to Yuma County, Arizona. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction.
7) *Dixieland Connection to Imperial Irrigation District Transmission System* – a power line project connecting the Imperial Irrigation District's "S" line from the Imperial Irrigation District substation to the Imperial Valley substation. The construction and delivery traffic associated with a transmission line moves along the project corridor as work progresses; therefore, an estimate of 240 ADT with 45 AM peak hour trips and 45 PM peak hour trips is for the segment or work area under construction.

8) *Solar Reserve Imperial Valley* – a 100 megawatt solar power tower generally located approximately 35 miles east of the Imperial Valley substation. The construction phase of the project is calculated to generate approximately 283 ADT with 110 AM peak hour trips and 112 PM peak hour trips.

9) *Linda Vista* – A mixed use project of 182 single family homes and a 6 acre commercial lot generally located on the west side of Clark Road between I-8 and McCabe Road. The traffic generation for this cumulative project is calculated at 7,175 ADT with 252 AM and 676 PM peak hour trips.

10) *County Center II Expansion* – a mixed use project of a commercial center, expansion of the Imperial County Office of Education, a Joint-Use Teacher Training and Conference Center, Judicial Center, County Park, Jail expansion, County Administrative Complex, Public Works Administration, and a County Administrative Complex located on the southwest corner of McCabe Road and Clark Road. The total project is calculated to generate 24,069 ADT with 2,581 AM peak hour trips and 2,242 PM peak hour trips.

11) *Imperial Solar Energy Center West* – a photovoltaic solar facility capable of producing approximately 250 megawatts of electricity on approximately 1,130 acres generally located east of Dunaway Road and located both north and south of I-8. The construction phase of the project is calculated to generate 750 ADT with 306 AM peak hour trips and 315 PM peak hour trips.

12) *Imperial Solar Energy Center South* – a photovoltaic solar facility capable of producing approximately 200 megawatts of electricity on approximately 950 acres generally located south of SR-98 and east of Drew Road. The construction phase of the project is calculated to generate 680 ADT with 271 AM peak hour trips and 280 PM peak hour trips.

13) *Mount Signal Solar Farm I* – a photovoltaic solar facility capable of producing approximately 200 megawatts of electricity on approximately 1,375 acres generally located south of SR-98 between Pulliam Road and Ferrell Road. The construction phase of the project is calculated to generate 522 ADT with 162 AM peak hour trips and 162 PM peak hour trips.

14) *Mayflower Solar Farm Project* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 482 acres generally located 5.5 miles southeast of the town of Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

15) *Arkansas* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 481 acres generally located 2.5 miles east of the town of Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

16) *Sonora* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 488 acres generally located 4.5 miles northeast of the town of Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

17) *Alhambra* - a photovoltaic solar facility capable of producing approximately 50 megawatts of electricity on approximately 482 acres generally located 3.5 miles south of the town of Calipatria. The construction phase is calculated to generate 142 daily trips with 56 AM peak hour trips and 57 PM peak hour trips.

18) *Acorn Greenworks* - a photovoltaic solar facility capable of producing approximately 150 megawatts of electricity on approximately 693 acres generally located 10 miles southwest of the City of El Centro. The construction phase is calculated to generate 425 daily trips with 166 AM peak hour trips and 169 PM peak hour trips.

19) *Calexico I-A* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 666 acres generally located 6 miles west of the City of Calexico. The

construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

20) *Calexico I-B* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 666 acres generally located 6 miles west of the City of Calexico. The construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

21) *Calexico II-A* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 733 acres generally located 6 miles west of the City of Calexico. The construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

22) *Calexico II-B* - a photovoltaic solar facility capable of producing approximately 100 megawatts of electricity on approximately 732 acres generally located 6 miles west of the City of Calexico. The construction phase is calculated to generate 283 daily trips with 110 AM peak hour trips and 112 PM peak hour trips.

23) *Centinella Solar Park* - a 2000+ acre photovoltaic solar facility capable of producing approximately 275 megawatts of electricity on approximately 2,067 acres generally located 9 miles west of the City of Calexico and approximately 9,000 Meters from the proposed Campo Verde Project. The construction phase is calculated to generate 1,260 daily trips.

24) Silverleaf Solar Energy – a photovoltaic solar facility capable of producing approximately 160 megawatts of electricity generally located west of Drew Road and south of I-8 (adjacent to the proposed Campo Verde project). According to the County of Imperial staff, the Silverleaf project is estimated to start construction approximately one year after the proposed Campo Verde project. This means the Silverleaf peak construction will occur in 2014, which is one year after the proposed Campo Verde construction peak of early 2013. Since the construction peaks do not coincide, the Silverleaf project is noted as a cumulative project, but the Silverleaf construction peak is not added to the cumulative peak construction or traffic volumes.

Furthermore, the Project does not have any unmitagable impacts with respect to ozone precursors or PM_{10} per County standards during the construction activities as shown in Section 4.1 above. Since the other RF projects are either not going to be under construction simultaneously or are considerably distant from the project cumulative impacts would not be expected from the daily construction activities.

4.5 Operational Emissions

Daily operations of the project will involve primarily periodic maintenance and worker trips only and although emissions are expected, they are almost insignificant given the project would only add up to 50 ADT during a worst case project traffic generation day and 375 ADT during construction. For purposes of this analysis, LDN Consulting utilized the 375 ADT that would be expected during project construction and reported the values emission predictions as calculated within URBEMIS 2007 in Table 4.2 below. Given that the 375 ADT input is greater than the operational years after construction is complete. If no impacts are found using the 375 ADT further analysis of the expected post construction operation of 50 ADT would not be warranted. Therefore, Table 4.2 represents construction trips only but again should demonstrate compliance of post construction operations as projected trips are significantly less.

Table 4.2: Expected Daily Pollutant Generation

	ROG	NO_x	CO	SO_x	PM_{10}
Summer Scenario					
Operational Vehicle Emissions (Lb/Day)	4.52	5.49	43.68	0.03	4.48
SCAQMD Thresholds	55	55	550	150	150
Significant?	No	No	No	No	No
Winter Scenario					
Operational Vehicle Emissions (Lb/Day)	4.52	5.49	43.68	0.03	4.48
SCAQMD Thresholds	75	250	550	250	100
Significant?	No	No	No	No	No
Daily pollutant generation assumes trip distances within URBEMIS 2007					

The URBEMIS output for all potential pollutant emissions was below significance as set forth in Rule 310 of ICAPCD Regulations and would therefore not require additional measures to comply with CEQA. As mentioned previously, the URBEMIS 2007 output is shown in ***Attachment A*** to this report.

4.6 Conclusion of Findings

Based upon our analysis of operational activities no significant operational air quality impacts would be expected. However, based upon our analysis of worst-case construction activities, significant but mitagable construction-related PM_{10} and NO_x impacts would be expected. The following mitigation measures would reduce expected construction related PM_{10} impacts to a level below significance:

1. *Apply water during grading/grubbing activities to all active disturbed areas at least three times daily.*
2. *Apply water to all onsite roadways at least three times daily or use of magnesium chloride or other County approved dust suppression additives and apply water one-time daily.*

3. *Reduce all construction related traffic speeds onsite to below 15 Miles per Hour (MPH).*

NO_x impacts would be reduced to less than significant by implementing the following mitigation requirements:

1. *Use Diesel Oxidation Catalyst on all diesel equipment*

Based upon guidance within ICAPCD's Air Quality Handbook; construction sites in excess of 5 Acres must implement all standard mitigation measures as well as the abovementioned discretionary mitigation measures. These standard mitigation measures are identified below:

<u>Standard Mitigation Measures for Fugitive PM_{10} Control</u>

a. All disturbed areas, including Bulk Material storage which is not being actively utilized, shall be effectively stabilized and visible emissions shall be limited to no greater than 20% opacity for dust emissions by using water, chemical stabilizers, dust suppressants, tarps or other suitable material such as vegetative ground cover.
b. All on site and off site unpaved roads will be effectively stabilized and visible emissions shall be limited to no greater than 20% opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
c. All unpaved traffic areas one (1) acre or more with 75 or more average vehicle trips per day will be effectively stabilized and visible emission shall be limited to no greater than 20% opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
d. The transport of Bulk Materials shall be completely covered unless six inches of freeboard space from the top of the container is maintained with no spillage and loss of Bulk Material. In addition, the cargo compartment of all Haul Trucks is to be cleaned and/or washed at delivery site after removal of Bulk Material.
e. All Track-Out or Carry-Out will be cleaned at the end of each workday or immediately when mud or dirt extends a cumulative distance of 50 linear feet or more onto a paved road within an urban area.
f. Movement of Bulk Material handling or transfer shall be stabilized prior to handling or at points of transfer with application of sufficient water, chemical stabilizers or by sheltering or enclosing the operation and transfer line.

g. The construction of any new Unpaved Road is prohibited within any area with a population of 500 or more unless the road meets the definition of a Temporary Unpaved Road. Any temporary unpaved road shall be effectively stabilized and visible emissions shall be limited to no greater than 20% opacity for dust emission by paving, chemical stabilizers, dust suppressants and/or watering.

Standard Mitigation Measures for Construction Combustion Equipment

a. Use of alternative fueled or catalyst equipped diesel construction equipment, including all off-road and portable diesel powered equipment.
b. Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes as a maximum.
c. Limit, to the extent feasible, the hours of operation of heavy duty equipment and/or the amount of equipment in use.
d. Replace fossil fueled equipment with electrically driven equivalents (provided they are not run via a portable generator set).

Because the Project could increase the risk to more than one person per million, the Project would be required to utilize equipment meeting requirements of T-BACT such as using diesel particulate filters, catalytic converters and/or selective catalytic reduction technologies. It should be noted that mitigation measures to reduce NO_x impacts would also be classified as T-BACT reduction measures for PM_{10} DPM reductions as well. Therefore because the Project will be utilizing T-BACT technologies per ICAPCD protocols, all health risks will be reduced to below significance. Additionally, no cumulative health risk impacts are expected and no mitigation for cancer risk would be necessary. Again, since the other RF projects are either not going to be under construction simultaneously or are considerably distant from the project cumulative impacts would not be expected from the daily construction activities.

5.0 CERTIFICATIONS

The contents of this report represent an accurate depiction of the air quality environment and impacts within and surrounding the Campo Verde Solar Energy Project. The information contained in this report was based on the best available data at the time of preparation.

DRAFT

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Date March 15, 2012

ATTACHMENT A

URBEMIS 2007 MODEL DAILY EMISSIONS

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Jeremy 1-1-12\Campo Verde Air\Sample with no aquious fuel 3-14-12.urb924

Project Name: Campo Verde

Project Location: Imperial County APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (tons/year unmitigated)	2.80	20.39	15.64	0.01	31.03	1.19	32.22	6.49	1.09	7.58	2,940.83
2013 TOTALS (tons/year mitigated)	2.80	14.65	15.64	0.01	2.23	1.19	3.42	0.47	1.09	1.56	2,940.83
Percent Reduction	0.00	28.18	0.00	0.00	92.81	0.00	89.39	92.73	0.00	79.37	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.83	1.00	7.97	0.01	0.82	0.17	507.23

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.83	1.00	7.97	0.01	0.82	0.17	507.23

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

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	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013	2.80	20.39	15.64	0.01	31.03	1.19	32.22	6.49	1.09	7.58	2,940.83
Building 01/01/2013-12/31/2013	1.13	8.84	7.49	0.01	0.04	0.42	0.46	0.01	0.38	0.40	1,642.27
Building Off Road Diesel	0.76	5.26	2.55	0.00	0.00	0.28	0.28	0.00	0.26	0.26	597.04
Building Vendor Trips	0.29	3.48	3.26	0.01	0.04	0.14	0.17	0.01	0.12	0.14	952.79
Building Worker Trips	0.08	0.10	1.69	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.45
Mass Grading 01/01/2013-12/31/2013	1.21	8.73	5.83	0.00	30.99	0.53	31.52	6.47	0.49	6.96	998.02
Mass Grading Dust	0.00	0.00	0.00	0.00	30.99	0.00	30.99	6.47	0.00	6.47	0.00
Mass Grading Off Road Diesel	1.17	8.68	4.97	0.00	0.00	0.53	0.53	0.00	0.49	0.49	951.24
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.04	0.05	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.77
Trenching 01/01/2013-12/31/2013	0.46	2.83	2.32	0.00	0.00	0.24	0.24	0.00	0.22	0.22	300.54
Trenching Off Road Diesel	0.45	2.80	1.92	0.00	0.00	0.24	0.24	0.00	0.22	0.22	278.53
Trenching Worker Trips	0.02	0.02	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.01

Phase Assumptions

Phase: Mass Grading 1/1/2013 - 12/31/2013 - Month 7 Mass Grading

Total Acres Disturbed: 1990

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 1000 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Graders (174 hp) operating at a 0.55 load factor for 6.8 hours per day

3 Other Equipment (80 hp) operating at a 0.62 load factor for 8 hours per day

2 Rollers (120 hp) operating at a 0.56 load factor for 6.8 hours per day

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2 Rough Terrain Forklifts (75 hp) operating at a 0.5 load factor for 1.7 hours per day

2 Rubber Tired Dozers (175 hp) operating at a 0.55 load factor for 6.8 hours per day

2 Tractors/Loaders/Backhoes (120 hp) operating at a 0.55 load factor for 6.8 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 6.8 hours per day

Phase: Trenching 1/1/2013 - 12/31/2013 - Month 7 Various Trenching Activities

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4.5 hours per day

1 Generator Sets (5 hp) operating at a 0.74 load factor for 0.5 hours per day

2 Other General Industrial Equipment (100 hp) operating at a 0.51 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (100 hp) operating at a 0.55 load factor for 6.8 hours per day

2 Trenchers (75 hp) operating at a 0.75 load factor for 4.1 hours per day

Phase: Building Construction 1/1/2013 - 12/31/2013 - Month 7 Building Construction

Off-Road Equipment:

1 Aerial Lifts (110 hp) operating at a 0.46 load factor for 1 hours per day

2 Air Compressors (75 hp) operating at a 0.48 load factor for 2 hours per day

4 Cranes (200 hp) operating at a 0.43 load factor for 7 hours per day

1 Forklifts (75 hp) operating at a 0.3 load factor for 3.8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

6 Other Equipment (40 hp) operating at a 0.4 load factor for 4 hours per day

3 Other General Industrial Equipment (200 hp) operating at a 0.51 load factor for 4 hours per day

15 Rough Terrain Forklifts (75 hp) operating at a 0.4 load factor for 1.7 hours per day

1 Tractors/Loaders/Backhoes (235 hp) operating at a 0.55 load factor for 5 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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2013	2.80	14.65	15.64	0.01	2.23	1.19	3.42	0.47	1.09	1.56	2,940.83
Building 01/01/2013-12/31/2013	1.13	7.34	7.49	0.01	0.04	0.42	0.46	0.01	0.38	0.40	1,642.27
Building Off Road Diesel	0.76	3.75	2.55	0.00	0.00	0.28	0.28	0.00	0.26	0.26	597.04
Building Vendor Trips	0.29	3.48	3.26	0.01	0.04	0.14	0.17	0.01	0.12	0.14	952.79
Building Worker Trips	0.08	0.10	1.69	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.45
Mass Grading 01/01/2013-12/31/2013	1.21	5.61	5.83	0.00	2.19	0.53	2.72	0.46	0.49	0.95	998.02
Mass Grading Dust	0.00	0.00	0.00	0.00	2.19	0.00	2.19	0.46	0.00	0.46	0.00
Mass Grading Off Road Diesel	1.17	5.56	4.97	0.00	0.00	0.53	0.53	0.00	0.49	0.49	951.24
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.04	0.05	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.77
Trenching 01/01/2013-12/31/2013	0.46	1.71	2.32	0.00	0.00	0.24	0.24	0.00	0.22	0.22	300.54
Trenching Off Road Diesel	0.45	1.68	1.92	0.00	0.00	0.24	0.24	0.00	0.22	0.22	278.53
Trenching Worker Trips	0.02	0.02	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.01

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 1/1/2013 - 12/31/2013 - Month 7 Mass Grading

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

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For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rollers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:

NOX: 15%

For Other Equipment, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:

NOX: 15%

The following mitigation measures apply to Phase: Trenching 1/1/2013 - 12/31/2013 - Month 7 Various Trenching Activities

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Trenchers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Building Construction 1/1/2013 - 12/31/2013 - Month 7 Building Construction

For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

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For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Aerial Lifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Air Compressors, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.83	1.00	7.97	0.01	0.82	0.17	507.23
TOTALS (tons/year, unmitigated)	0.83	1.00	7.97	0.01	0.82	0.17	507.23

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		3.75	1000 sq ft	100.00	375.00	2,559.37
					375.00	2,559.37

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	43.7	0.9	98.9	0.2
Light Truck < 3750 lbs	15.6	1.9	93.6	4.5
Light Truck 3751-5750 lbs	19.9	1.0	98.5	0.5
Med Truck 5751-8500 lbs	9.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.4	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.7	0.0	57.1	42.9
Med-Heavy Truck 14,001-33,000 lbs	1.2	8.3	25.0	66.7
Heavy-Heavy Truck 33,001-60,000 lbs	4.0	0.0	2.5	97.5
Other Bus	0.1	0.0	100.0	0.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.1	58.1	41.9	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	11.1	77.8	11.1

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.3	3.3	3.7	6.7	8.9	5.0

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	10.2	11.7	8.1	16.4	11.9	9.5
Trip speeds (mph)	40.0	40.0	40.0	45.0	45.0	40.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

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Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Jeremy 1-1-12\Campo Verde Air\Sample with no aquious fuel 3-14-12.urb924

Project Name: Campo Verde

Project Location: Imperial County APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (lbs/day unmitigated)	17.92	130.31	99.92	0.07	198.28	7.59	205.87	41.44	6.98	48.42	18,791.23
2013 TOTALS (lbs/day mitigated)	17.92	93.59	99.92	0.07	14.25	7.59	21.84	3.01	6.98	9.99	18,791.23

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

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	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
Time Slice 1/1/2013-12/31/2013 Active Days: 313	**17.92**	**130.31**	**99.92**	**0.07**	**198.28**	**7.59**	**205.87**	**41.44**	**6.98**	**48.42**	**18,791.23**
Building 01/01/2013-12/31/2013	7.22	56.49	47.88	0.06	0.26	2.67	2.92	0.09	2.44	2.53	10,493.77
Building Off Road Diesel	4.87	33.60	16.29	0.00	0.00	1.78	1.78	0.00	1.64	1.64	3,814.93
Building Vendor Trips	1.86	22.26	20.83	0.06	0.23	0.87	1.10	0.08	0.79	0.87	6,088.11
Building Worker Trips	0.49	0.63	10.77	0.01	0.03	0.02	0.05	0.01	0.01	0.02	590.73
Mass Grading 01/01/2013-12/31/2013	7.73	55.76	37.23	0.00	198.01	3.42	201.43	41.36	3.14	44.50	6,377.10
Mass Grading Dust	0.00	0.00	0.00	0.00	198.00	0.00	198.00	41.35	0.00	41.35	0.00
Mass Grading Off Road Diesel	7.49	55.44	31.78	0.00	0.00	3.41	3.41	0.00	3.13	3.13	6,078.22
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.25	0.32	5.45	0.00	0.01	0.01	0.02	0.01	0.01	0.01	298.88
Trenching 01/01/2013-12/31/2013	2.97	18.06	14.80	0.00	0.01	1.51	1.52	0.00	1.39	1.39	1,920.36
Trenching Off Road Diesel	2.85	17.91	12.24	0.00	0.00	1.51	1.51	0.00	1.39	1.39	1,779.72
Trenching Worker Trips	0.12	0.15	2.56	0.00	0.01	0.00	0.01	0.00	0.00	0.01	140.65

Phase Assumptions

Phase: Mass Grading 1/1/2013 - 12/31/2013 - Month 7 Mass Grading

Total Acres Disturbed: 1990

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 1000 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Graders (174 hp) operating at a 0.55 load factor for 6.8 hours per day

3 Other Equipment (80 hp) operating at a 0.62 load factor for 8 hours per day

2 Rollers (120 hp) operating at a 0.56 load factor for 6.8 hours per day

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2 Rough Terrain Forklifts (75 hp) operating at a 0.5 load factor for 1.7 hours per day

2 Rubber Tired Dozers (175 hp) operating at a 0.55 load factor for 6.8 hours per day

2 Tractors/Loaders/Backhoes (120 hp) operating at a 0.55 load factor for 6.8 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 6.8 hours per day

Phase: Trenching 1/1/2013 - 12/31/2013 - Month 7 Various Trenching Activities

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4.5 hours per day

1 Generator Sets (5 hp) operating at a 0.74 load factor for 0.5 hours per day

2 Other General Industrial Equipment (100 hp) operating at a 0.51 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (100 hp) operating at a 0.55 load factor for 6.8 hours per day

2 Trenchers (75 hp) operating at a 0.75 load factor for 4.1 hours per day

Phase: Building Construction 1/1/2013 - 12/31/2013 - Month 7 Building Construction

Off-Road Equipment:

1 Aerial Lifts (110 hp) operating at a 0.46 load factor for 1 hours per day

2 Air Compressors (75 hp) operating at a 0.48 load factor for 2 hours per day

4 Cranes (200 hp) operating at a 0.43 load factor for 7 hours per day

1 Forklifts (75 hp) operating at a 0.3 load factor for 3.8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

6 Other Equipment (40 hp) operating at a 0.4 load factor for 4 hours per day

3 Other General Industrial Equipment (200 hp) operating at a 0.51 load factor for 4 hours per day

15 Rough Terrain Forklifts (75 hp) operating at a 0.4 load factor for 1.7 hours per day

1 Tractors/Loaders/Backhoes (235 hp) operating at a 0.55 load factor for 5 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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Time Slice 1/1/2013-12/31/2013 Active Days: 313	**17.92**	93.59	**99.92**	**0.07**	14.25	**7.59**	21.84	3.01	**6.98**	9.99	**18,791.23**
Building 01/01/2013-12/31/2013	7.22	46.88	47.88	0.06	0.26	2.67	2.92	0.09	2.44	2.53	10,493.77
Building Off Road Diesel	4.87	23.99	16.29	0.00	0.00	1.78	1.78	0.00	1.64	1.64	3,814.93
Building Vendor Trips	1.86	22.26	20.83	0.06	0.23	0.87	1.10	0.08	0.79	0.87	6,088.11
Building Worker Trips	0.49	0.63	10.77	0.01	0.03	0.02	0.05	0.01	0.01	0.02	590.73
Mass Grading 01/01/2013-12/31/2013	7.73	35.82	37.23	0.00	13.98	3.42	17.40	2.92	3.14	6.06	6,377.10
Mass Grading Dust	0.00	0.00	0.00	0.00	13.97	0.00	13.97	2.92	0.00	2.92	0.00
Mass Grading Off Road Diesel	7.49	35.50	31.78	0.00	0.00	3.41	3.41	0.00	3.13	3.13	6,078.22
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.25	0.32	5.45	0.00	0.01	0.01	0.02	0.01	0.01	0.01	298.88
Trenching 01/01/2013-12/31/2013	2.97	10.89	14.80	0.00	0.01	1.51	1.52	0.00	1.39	1.39	1,920.36
Trenching Off Road Diesel	2.85	10.75	12.24	0.00	0.00	1.51	1.51	0.00	1.39	1.39	1,779.72
Trenching Worker Trips	0.12	0.15	2.56	0.00	0.01	0.00	0.01	0.00	0.00	0.01	140.65

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 1/1/2013 - 12/31/2013 - Month 7 Mass Grading

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

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For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rollers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:

NOX: 15%

For Other Equipment, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:

NOX: 15%

The following mitigation measures apply to Phase: Trenching 1/1/2013 - 12/31/2013 - Month 7 Various Trenching Activities

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Trenchers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Building Construction 1/1/2013 - 12/31/2013 - Month 7 Building Construction

For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

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For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Aerial Lifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Air Compressors, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37
TOTALS (lbs/day, unmitigated)	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Temperature (F): 90 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		3.75	1000 sq ft	100.00	375.00	2,559.37
					375.00	2,559.37

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	43.7	0.9	98.9	0.2
Light Truck < 3750 lbs	15.6	1.9	93.6	4.5
Light Truck 3751-5750 lbs	19.9	1.0	98.5	0.5
Med Truck 5751-8500 lbs	9.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.4	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.7	0.0	57.1	42.9
Med-Heavy Truck 14,001-33,000 lbs	1.2	8.3	25.0	66.7
Heavy-Heavy Truck 33,001-60,000 lbs	4.0	0.0	2.5	97.5
Other Bus	0.1	0.0	100.0	0.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.1	58.1	41.9	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	11.1	77.8	11.1

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.3	3.3	3.7	6.7	8.9	5.0

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	10.2	11.7	8.1	16.4	11.9	9.5
Trip speeds (mph)	40.0	40.0	40.0	45.0	45.0	40.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

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Urbemis 2007 Version 9.2.4

Combined Winter Emissions Reports (Pounds/Day)

File Name: C:\Jeremy 1-1-12\Campo Verde Air\Sample with no aquious fuel 3-14-12.urb924

Project Name: Campo Verde

Project Location: Imperial County APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (lbs/day unmitigated)	17.92	130.31	99.92	0.07	198.28	7.59	205.87	41.44	6.98	48.42	18,791.23
2013 TOTALS (lbs/day mitigated)	17.92	93.59	99.92	0.07	14.25	7.59	21.84	3.01	6.98	9.99	18,791.23

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

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	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
Time Slice 1/1/2013-12/31/2013 Active Days: 313	**17.92**	**130.31**	**99.92**	**0.07**	**198.28**	**7.59**	**205.87**	**41.44**	**6.98**	**48.42**	**18,791.23**
Building 01/01/2013-12/31/2013	7.22	56.49	47.88	0.06	0.26	2.67	2.92	0.09	2.44	2.53	10,493.77
Building Off Road Diesel	4.87	33.60	16.29	0.00	0.00	1.78	1.78	0.00	1.64	1.64	3,814.93
Building Vendor Trips	1.86	22.26	20.83	0.06	0.23	0.87	1.10	0.08	0.79	0.87	6,088.11
Building Worker Trips	0.49	0.63	10.77	0.01	0.03	0.02	0.05	0.01	0.01	0.02	590.73
Mass Grading 01/01/2013-12/31/2013	7.73	55.76	37.23	0.00	198.01	3.42	201.43	41.36	3.14	44.50	6,377.10
Mass Grading Dust	0.00	0.00	0.00	0.00	198.00	0.00	198.00	41.35	0.00	41.35	0.00
Mass Grading Off Road Diesel	7.49	55.44	31.78	0.00	0.00	3.41	3.41	0.00	3.13	3.13	6,078.22
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.25	0.32	5.45	0.00	0.01	0.01	0.02	0.01	0.01	0.01	298.88
Trenching 01/01/2013-12/31/2013	2.97	18.06	14.80	0.00	0.01	1.51	1.52	0.00	1.39	1.39	1,920.36
Trenching Off Road Diesel	2.85	17.91	12.24	0.00	0.00	1.51	1.51	0.00	1.39	1.39	1,779.72
Trenching Worker Trips	0.12	0.15	2.56	0.00	0.01	0.00	0.01	0.00	0.00	0.01	140.65

Phase Assumptions

Phase: Mass Grading 1/1/2013 - 12/31/2013 - Month 7 Mass Grading

Total Acres Disturbed: 1990

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 1000 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Graders (174 hp) operating at a 0.55 load factor for 6.8 hours per day

3 Other Equipment (80 hp) operating at a 0.62 load factor for 8 hours per day

2 Rollers (120 hp) operating at a 0.56 load factor for 6.8 hours per day

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2 Rough Terrain Forklifts (75 hp) operating at a 0.5 load factor for 1.7 hours per day

2 Rubber Tired Dozers (175 hp) operating at a 0.55 load factor for 6.8 hours per day

2 Tractors/Loaders/Backhoes (120 hp) operating at a 0.55 load factor for 6.8 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 6.8 hours per day

Phase: Trenching 1/1/2013 - 12/31/2013 - Month 7 Various Trenching Activities

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4.5 hours per day

1 Generator Sets (5 hp) operating at a 0.74 load factor for 0.5 hours per day

2 Other General Industrial Equipment (100 hp) operating at a 0.51 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (100 hp) operating at a 0.55 load factor for 6.8 hours per day

2 Trenchers (75 hp) operating at a 0.75 load factor for 4.1 hours per day

Phase: Building Construction 1/1/2013 - 12/31/2013 - Month 7 Building Construction

Off-Road Equipment:

1 Aerial Lifts (110 hp) operating at a 0.46 load factor for 1 hours per day

2 Air Compressors (75 hp) operating at a 0.48 load factor for 2 hours per day

4 Cranes (200 hp) operating at a 0.43 load factor for 7 hours per day

1 Forklifts (75 hp) operating at a 0.3 load factor for 3.8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

6 Other Equipment (40 hp) operating at a 0.4 load factor for 4 hours per day

3 Other General Industrial Equipment (200 hp) operating at a 0.51 load factor for 4 hours per day

15 Rough Terrain Forklifts (75 hp) operating at a 0.4 load factor for 1.7 hours per day

1 Tractors/Loaders/Backhoes (235 hp) operating at a 0.55 load factor for 5 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Winter Pounds Per Day, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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Time Slice 1/1/2013-12/31/2013 Active Days: 313	**17.92**	93.59	**99.92**	**0.07**	14.25	**7.59**	21.84	3.01	**6.98**	9.99	**18,791.23**
Building 01/01/2013-12/31/2013	7.22	46.88	47.88	0.06	0.26	2.67	2.92	0.09	2.44	2.53	10,493.77
Building Off Road Diesel	4.87	23.99	16.29	0.00	0.00	1.78	1.78	0.00	1.64	1.64	3,814.93
Building Vendor Trips	1.86	22.26	20.83	0.06	0.23	0.87	1.10	0.08	0.79	0.87	6,088.11
Building Worker Trips	0.49	0.63	10.77	0.01	0.03	0.02	0.05	0.01	0.01	0.02	590.73
Mass Grading 01/01/2013-12/31/2013	7.73	35.82	37.23	0.00	13.98	3.42	17.40	2.92	3.14	6.06	6,377.10
Mass Grading Dust	0.00	0.00	0.00	0.00	13.97	0.00	13.97	2.92	0.00	2.92	0.00
Mass Grading Off Road Diesel	7.49	35.50	31.78	0.00	0.00	3.41	3.41	0.00	3.13	3.13	6,078.22
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.25	0.32	5.45	0.00	0.01	0.01	0.02	0.01	0.01	0.01	298.88
Trenching 01/01/2013-12/31/2013	2.97	10.89	14.80	0.00	0.01	1.51	1.52	0.00	1.39	1.39	1,920.36
Trenching Off Road Diesel	2.85	10.75	12.24	0.00	0.00	1.51	1.51	0.00	1.39	1.39	1,779.72
Trenching Worker Trips	0.12	0.15	2.56	0.00	0.01	0.00	0.01	0.00	0.00	0.01	140.65

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 1/1/2013 - 12/31/2013 - Month 7 Mass Grading

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

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For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rollers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:

NOX: 15%

For Other Equipment, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:

NOX: 15%

The following mitigation measures apply to Phase: Trenching 1/1/2013 - 12/31/2013 - Month 7 Various Trenching Activities

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Trenchers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Building Construction 1/1/2013 - 12/31/2013 - Month 7 Building Construction

For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

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For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Aerial Lifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Air Compressors, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37
TOTALS (lbs/day, unmitigated)	4.52	5.49	43.68	0.03	4.48	0.91	2,779.37

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Temperature (F): 55 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		3.75	1000 sq ft	100.00	375.00	2,559.37
					375.00	2,559.37

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	43.7	0.9	98.9	0.2
Light Truck < 3750 lbs	15.6	1.9	93.6	4.5
Light Truck 3751-5750 lbs	19.9	1.0	98.5	0.5
Med Truck 5751-8500 lbs	9.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.4	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.7	0.0	57.1	42.9
Med-Heavy Truck 14,001-33,000 lbs	1.2	8.3	25.0	66.7
Heavy-Heavy Truck 33,001-60,000 lbs	4.0	0.0	2.5	97.5
Other Bus	0.1	0.0	100.0	0.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.1	58.1	41.9	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	11.1	77.8	11.1

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.3	3.3	3.7	6.7	8.9	5.0

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	10.2	11.7	8.1	16.4	11.9	9.5
Trip speeds (mph)	40.0	40.0	40.0	45.0	45.0	40.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

ATTACHMENT B

SCREEN3 Model

03/15/12
22:23:00

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Campo Verde

SIMPLE TERRAIN INPUTS:
SOURCE TYPE = AREA
EMISSION RATE (G/(S-M**2)) = .118600E-07
SOURCE HEIGHT (M) = 3.0000
LENGTH OF LARGER SIDE (M) = 2837.0000
LENGTH OF SMALLER SIDE (M) = 2837.0000
RECEPTOR HEIGHT (M) = 2.0000
URBAN/RURAL OPTION = RURAL
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
10.	1.715	6	1.0	1.0	10000.0	3.00	45.
100.	1.754	6	1.0	1.0	10000.0	3.00	45.
200.	1.796	6	1.0	1.0	10000.0	3.00	45.
300.	1.836	6	1.0	1.0	10000.0	3.00	45.
400.	1.875	6	1.0	1.0	10000.0	3.00	45.
500.	1.913	6	1.0	1.0	10000.0	3.00	45.
600.	1.950	6	1.0	1.0	10000.0	3.00	45.
700.	1.987	6	1.0	1.0	10000.0	3.00	45.
800.	2.013	6	1.0	1.0	10000.0	3.00	45.
900.	2.050	6	1.0	1.0	10000.0	3.00	45.
1000.	2.086	6	1.0	1.0	10000.0	3.00	45.
1100.	2.121	6	1.0	1.0	10000.0	3.00	45.
1200.	2.155	6	1.0	1.0	10000.0	3.00	45.
1300.	2.189	6	1.0	1.0	10000.0	3.00	45.
1400.	2.223	6	1.0	1.0	10000.0	3.00	45.
1500.	2.256	6	1.0	1.0	10000.0	3.00	45.
1600.	2.288	6	1.0	1.0	10000.0	3.00	45.
1700.	2.320	6	1.0	1.0	10000.0	3.00	45.
1800.	2.352	6	1.0	1.0	10000.0	3.00	45.
1900.	2.383	6	1.0	1.0	10000.0	3.00	45.
2000.	2.414	6	1.0	1.0	10000.0	3.00	45.
2100.	2.223	6	1.0	1.0	10000.0	3.00	45.
2200.	2.062	6	1.0	1.0	10000.0	3.00	45.
2300.	1.934	6	1.0	1.0	10000.0	3.00	45.
2400.	1.831	6	1.0	1.0	10000.0	3.00	45.
2500.	1.749	6	1.0	1.0	10000.0	3.00	45.
2600.	1.678	6	1.0	1.0	10000.0	3.00	45.
2700.	1.619	6	1.0	1.0	10000.0	3.00	45.
2800.	1.567	6	1.0	1.0	10000.0	3.00	45.

2900.	1.521	6	1.0	1.0	10000.0	3.00	45.
3000.	1.480	6	1.0	1.0	10000.0	3.00	45.
3500.	1.320	6	1.0	1.0	10000.0	3.00	45.
4000.	1.211	6	1.0	1.0	10000.0	3.00	45.
4500.	1.128	6	1.0	1.0	10000.0	3.00	45.
5000.	1.063	6	1.0	1.0	10000.0	3.00	45.
5500.	1.008	6	1.0	1.0	10000.0	3.00	45.
6000.	.9606	6	1.0	1.0	10000.0	3.00	45.
6500.	.9196	6	1.0	1.0	10000.0	3.00	45.
7000.	.8835	6	1.0	1.0	10000.0	3.00	45.
7500.	.8514	6	1.0	1.0	10000.0	3.00	45.
8000.	.8227	6	1.0	1.0	10000.0	3.00	45.
8500.	.7969	6	1.0	1.0	10000.0	3.00	45.
9000.	.7735	6	1.0	1.0	10000.0	3.00	45.
9500.	.7519	6	1.0	1.0	10000.0	3.00	45.
10000.	.7318	6	1.0	1.0	10000.0	3.00	45.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 10. M:

2000.	2.414	6	1.0	1.0	10000.0	3.00	45.

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
84.	1.747	6	1.0	1.0	10000.0	3.00	45.

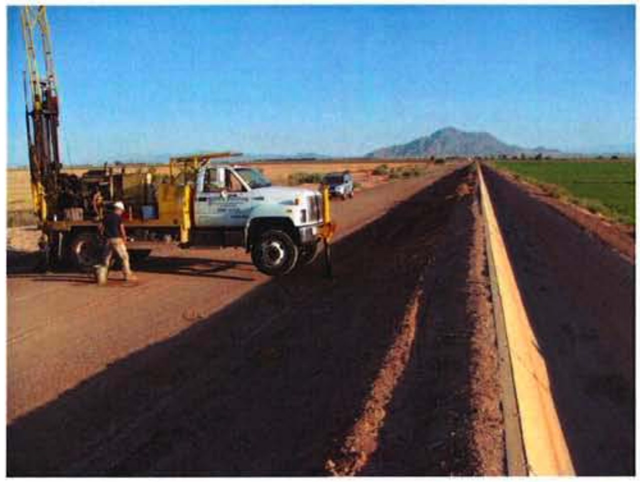
****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	2.414	2000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

APPENDIX D

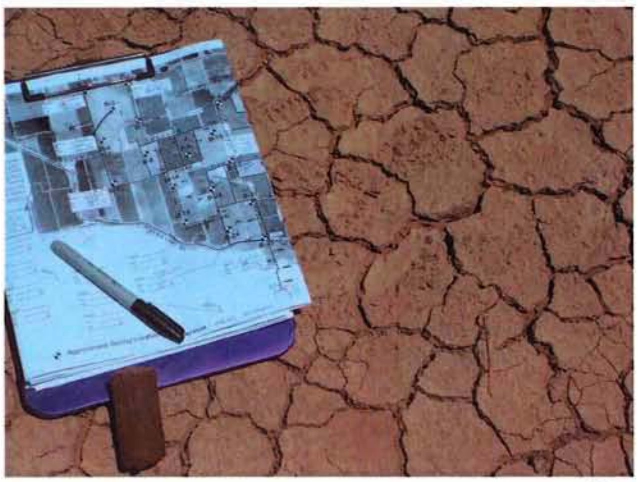
PRELIMINARY GEOTECHNICAL INVESTIGATION



PRELIMINARY GEOTECHNICAL INVESTIGATION:
PROPOSED MOUNT SIGNAL SOLAR FARM AND ASSOCIATED STRUCTURES
WEST OF DREW ROAD AND SOUTH OF INTERSTATE 8
IMPERIAL COUNTY, CALIFORNIA

Presented to:

US SOLAR HOLDINGS, INC.
6111 Severin Drive
La Mesa, CA 91942



Prepared by:

EGA consultants
engineering geotechnical applications

375-C Monte Vista Avenue
Costa Mesa, CA 92627
(949) 642-9309

June, 2011
Project No. TS646.1

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applications

June 16, 2011
Project No. TS646.1

Site: PROPOSED MT. SIGNAL SOLAR FARM
SEELEY, CALIFORNIA

Executive Summary (page 1 of 3)

Based on our preliminary geotechnical study of the site, our review of available reports and literature and our experience, it is our opinion that the proposed solar farm and associated construction is feasible from a geotechnical standpoint. There appear to be no significant geotechnical constraints on-site that cannot be mitigated by proper planning, design, and utilization of sound construction practices.

Our scope of work included the excavation and sampling of twenty-five (25) exploratory borings to a maximum depth of 50 feet below existing grade.

The following key elements are conclusions confirmed from this investigation:

- The study area is part of the low-lying Salton Trough and is uniformly underlain by 1 to 2 feet of crop/road surficial fill which is underlain by firm to stiff lacustrine clays with traces of silts and sands (CL). The clays have a low permeability: 10^{-7} cm/sec.
- The site study area is located approximately 35 feet below mean sea level.
- The depth to groundwater across the site predominantly ranges from 10 to 15 feet.
- Laboratory results indicate that the subgrade earth materials possess an Expansion Index ranging from very low to medium.
- Based on both soils lab and field resistivity surveys by HDR/Schiff, the soils are considered to be severely corrosive toward ferrous metals. We recommend the pier, pipe and cable designs include the corrosion mitigation measures included in Appendix C, herein.

SEISMICITY

The Imperial Fault, which is located about 20 km east of the study area is the governing fault with an average slip rate of 20 mm/yr and a maximum magnitude of 7.0 (ref: 2003 CDMG).

Seismic Values (B-15, site centroid):	
Site Longitude (Decimal Degrees)	-115.716
Site Latitude (Decimal Degrees)	32.7491
Site Class Definition (Table 1613.5.2)	D
Mapped Spectral Response Acceleration at 0.2s Period, S_s	1.445
Mapped Spectral Response Acceleration at 1s Period, S_1	0.566
Short Period Site Coefficient at 0.2 Period, F_a	1.0
Long Period Site Coefficient at 1s Period, F_v	1.5
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	1.445
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}	0.849
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	0.964
Design Spectral Response Acceleration at 1s Period, S_{D1}	0.566

SUMMARY OF RECOMMENDATIONS

Underpinning of the solar module arrays is recommended using galvanized steel piles (W6X9 wide flange beams) or helical anchors. The following Geotechnical Parameters may be used in the design of the underpinning:

June 16, 2011
Project No. TS646.1

Site: PROPOSED MT. SIGNAL SOLAR FARM
SEELEY, CALIFORNIA

Executive Summary, continued *(page 2 of 3)*

Design Item	Recommendations
End Bearing Pressure	2,000 psf for lacustrine deposits
Passive Lateral Resistence	300 psf per foot
Coefficient of Friction	0.35
Allowable Skin Friction	500 psf between piles and lacustrine deposits
Uplift Forces	80 percent of the allowable capacity

Coefficients	
Active	Ka=0.30
Passive	Kp=3.60
At Rest	Ko=0.50

The anchors/piers shall be driven a minimum depth of 6 feet below grade.

For design purposes the upper 1 foot of soils shall not be considered for skin friction values.

Pile/anchor fixity may be taken at the crop/road fill - competent lacustrine deposit transition at 1 feet b.g..

A representative sample of the piles/anchors should be lateral load- and pull-tested prior to construction. These tests shall be performed by a qualified testing firm using calibrated equipment and an industry-recognized testing procedure. The in situ load test results will provide empirical data for point-specific actual embedment depths.

The wind pressure threshold value shall be determined by the project design engineer. For comparative analysis, velocity values of 115 mph and 85 mph are provided herein.

Pile Capacities

When considering an H-Pile with 4-inch flanges and a 6-inch web:

Ult. Capacity: = 4.2 kips
Allow Capacity: 4.0 / SF = 2.1 kips [Factor of Safety = 2.0]

Layer	Depth (ft)	Soil Type	Effective Unit Weight (pcf)	Cohesion (psf)	Adhesion (psf)	Phi (degrees)
1	0 - 1	Crops Topsoil (ML/CL)	110	460	460	28
2	1 - 12	Stiff Clay w/o free water (CL)	110	500	500	28
3	12 - 50	Silty Sand and Sand in perched groundwater (SM/SP)	120	NA	NA	32

Anchor spacing and dimensions should be determined by the structural engineer.

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Site: PROPOSED MT. SIGNAL SOLAR FARM
SEELEY, CALIFORNIA

The following Geotechnical Parameters may be used in the design of the conventional foundation construction for the inverter pads and/or associated structures:

Mat Slab Foundation

For the inverter pads and associated structures, if applicable, a mat slab foundation system is recommended due to the presence of heavy loads and expansive soils. The actual design of the foundation and slabs should be completed by the structural engineer.

Min. Design Item	Recommendations
Mat Foundations:	
Allowable Bearing Pressure:	2,000 psf
Passive Lateral Resistence:	300 psf per foot
Mat Slab Thickness:	min. 18 inches with thickened edges (+ 6 inches)
Steel Reinforcement:	No. 6 bars @ 12" o.c. each way, top and bottom
Coefficient of Friction:	0.35
Soil Sulfate Content	Negligible to Severe
	Note: As an alternative to the above-referenced mat slab, manufactured pre-cast pads may be considered by the project structural engineer.
Ground Level Invertor Pad Removals:	min. 3 ft. overexcavation, with 2 ft. envelope. Remove and re-compact to min. 90 % relative compaction (based on ASTM: D 1557). We recommend that fill soils be placed at moisture contents at least 4 percent over optimum for cohesive soils and at least 2 percent over optimum for granular soils.

Sulfate Content and Cement Type

The results of our laboratory testing indicates that the soluble sulfate content of the on-site soils likely to come in contact with concrete/steel is negligible to severe, based on the UBC classification. As a conservative approach, type V cement and a concrete strength f'c of 4,500 psi is therefore recommended for use in concrete in contact with the on-site soils.

Site Preparation

Site preparation includes removal of deleterious materials, existing structures, or other improvements from areas to be subjected to fill or structural loads. Deleterious materials, including vegetation, trash, construction debris, and contaminated soils, should be removed from the site. Existing subsurface utilities that are to be abandoned should be removed and the excavations back filled and compacted. For the solar arrays we recommend plowing or discing the upper 10 inches and re-compacting via tractor/loaders, or vibratory rollers, making a minimum single pass. Placement of engineered fill is not required for anchored arrays.

375-C Monte Vista Avenue • Costa Mesa, CA 92627 • (949) 642-9309 • FAX (949) 642-1290

June 16, 2011
Project No. TS646.1

PRELIMINARY GEOTECHNICAL INVESTIGATION
(PROPOSED MT. SIGNAL SOLAR FARM)
AT APPROX. 2000-ACRE SITE LOCATED
WEST OF DREW ROAD AND SOUTH OF INTERSTATE 8
SEELEY, CALIFORNIA

TABLE OF CONTENTS

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applications

June 16, 2011
Project No. TS646.1

US SOLAR HOLDINGS, INC.
6111 Severin Drive
La Mesa, CA 91942

Attention: Tommy Nelson, Project Engineer

Subject: **PRELIMINARY GEOTECHNICAL INVESTIGATION**
PROPOSED ***MT. SIGNAL SOLAR FARM***
AT APPROX. 2000-ACRE SITE LOCATED
WEST OF DREW ROAD AND SOUTH OF INTERSTATE 8
SEELEY, CALIFORNIA

Dear Mr. Nelson,

In accordance with your request we have completed our Preliminary Geotechnical Investigation for the above referenced photovoltaic solar project. This investigation was performed to determine the site soil conditions and to provide geotechnical parameters for the proposed construction.

It is our understanding that underpinning/anchoring of solar arrays are contemplated. Our investigation consisted of site-specific document review, subsurface exploration, laboratory testing, field resistivity surveys, corrosivity analysis, photographic documentation, geotechnical analysis of field and laboratory data, and the preparation of this report including pier/anchor specifications and minimum embedment depths.

Additionally, specifications for the associated improvements including the proposed inverter pads, are included in this report.

This opportunity to be of service is appreciated. If you have any questions, please call.

Very truly yours,

EGA Consultants, LLC

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June 16, 2011
Project No. TS646.1

PRELIMINARY GEOTECHNICAL INVESTIGATION
(PROPOSED MT. SIGNAL SOLAR FARM)
AT APPROX. 2000-ACRE SITE LOCATED
WEST OF DREW ROAD AND SOUTH OF INTERSTATE 8
SEELEY, CALIFORNIA

INTRODUCTION

In response to your request we have completed a preliminary geotechnical investigation for the proposed Mt. Signal Solar Farm project in the City of Seeley, County of Imperial, California (see Site Location Map, Figure 1). The purpose of our investigation was to evaluate the existing geotechnical conditions at the subject site and provide recommendations and geotechnical parameters for the proposed solar farm re-development.

The approximate 2000 acre, low-lying study area is situated within the southwestern portion of Imperial County and is delineated in Figures 1 and 2 herein.

This report presents the results of our findings, as well as our conclusions and recommendations.

SCOPE OF STUDY

The scope of our investigation included the following tasks:

- Review of readily available published and unpublished literature and documents;
- Geologic reconnaissance and mapping;
- Excavation and sampling of twenty-five (25) exploratory borings, to a maximum depth of 50 feet below existing grade (b.g.);
- Geotechnical laboratory testing of representative soil samples obtained from the exploratory borings;
- Field Resistivity Surveys and corrosivity testing by HDR/Schiff and Associates of Claremont, California;
- Soil Thermal testing of undisturbed soils by Geothermal USA of Dublin, California.

- Seismicity, Engineering and geologic analysis including seismicity coefficients in accordance with the 2010 CBC;
- Liquefaction analysis, engineering and geologic analysis including soil parameters for recommended pile underpinning for the solar arrays;
- Preparation of this report presenting our findings, conclusions, and recommendations.

GENERAL SITE CONDITIONS

With the exception of the Westside Elementary School at 2294 Vaughn Road, the site is currently under agricultural use. A few residential ranch homes, fallow lots, flood irrigation canals/drains, and alfalfa crops are currently used on the subject site.

The study area is bound to the north by Interstate 8, to the east by Drew Road, to the west generally by Hyde Road and to the south by Mandrapa Road. The Westside Main canal and vacant desert lands are located south and adjacent to Mandrapa Road (see Figures 1 and 2, herein).

A majority of the lots are currently used for alfalfa crops which are flood-irrigated using a system of canals, drain tiles, and lined "V" ditches. The alfalfa plants yield a low density root mass, and hence are typically farmed in low permeable clayey soils.

PHOTOGRAPHS

Photographs were taken of the observed site conditions and drilling operations at the time of our investigation. The original photographs are available in our files for review.

SUBSURFACE EXPLORATION

Our subsurface exploration consisted of the excavation of twenty-five (25) exploratory borings (B-1 through B-25) to a maximum depth of 50 feet below grade (b.g.). Representative bulk and relatively undisturbed soil samples were obtained for laboratory testing. Geologic logs of the soil borings are included in Appendix A.

The borings were continuously logged by a representative of our firm who obtained soil samples for geotechnical laboratory analysis. The approximate locations of the borings are shown on Figure 2, Site Plan.

Geotechnical soil samples were obtained using a modified California sampler filled with 2 ⅜ inch diameter, 1-inch tall brass rings. Additionally, Standard Penetrometer Tests (SPT) and pocket penetrometer tests were generally performed at 5 ft. intervals in the majority of the borings. The SPT samplers were driven 18 inches into the soil by a 140-pound hammer falling 30 inches. The number of blows required to penetrate the last 12 inches is shown in the attached boring logs. Bulk samples were obtained by collecting representative bore hole cuttings. Locations of geotechnical samples and other data are presented on the boring logs in Appendix A.

The soils were visually classified according to the Unified Soil Classification System. Classifications are shown on the boring logs included in Appendix A.

LABORATORY TESTING

Laboratory testing was performed on representative soil samples obtained during our subsurface exploration. The following tests were performed:

* Soil Classification
  (ASTM: D 2487)
* Dry Density and Moisture Content
  (ASTM: D 2216)
* Maximum Dry Density and Optimum Moisture Content
  (ASTM: D 1557)
* Direct Shear
  (ASTM: D 3080)
* Sulfate Content
  (CA 417)
* Expansion Index
  (UBC 18-2, ASTM: D 4829)
* Grain Size Analysis
  (ASTM: D 422)
* Atterberg Limits
  (ASTM D 4318)
* Resistivity (ohm-cm) Full Suite - pH, sulfate, chloride, calcium, nitrates, etc.
  (ASTM G 57)
* Consolidation
  (ASTM D 2435)

* Thermal Resistivity
  (ASTM D 5334)

Geotechnical test results are shown in Appendix B of this report.

SOIL AND GEOLOGIC CONDITIONS

The site soil and geologic conditions are as follows:

Geologic Setting

According to a United States Geological Survey (USGS) Map of the Mt. Signal Quadrangle the site is approximately 35 feet below Mean Sea Level (-35 ft. MSL). The site is located within the Salton Trough, a topographic and structural depression bound to the north by the Coachella Valley and to the south by the Gulf of California. The Salton Trough is a region of transition from the extensional tectonics of the East Pacific Rise to the transform tectonic environment of the San Andreas system. The Salton Trough is an actively growing rift valley associated with late Cenozoic extension which formed the Gulf of California. As rifting continued the Colorado River delta filled the trough and conditions gradually changed from marine, to deltaic to subaerial river and lake deposits.

The site is located in an area that has been covered by lakes during the Quaternary time. The Imperial valley is directly underlain by lacustrine (lake) deposits, which consist of interbedded lenticular and tabular silt, sand, and clay.

A Geologic Map is presented in Figure 5, herein.

The Late Pleistocene to Holocene lake deposits are generally between 15 to 50 feet thick and derived from periodic flooding of the Colorado river which formed an ancient fresh water lake (Lake Cahuilla). Records indicated approximately 300 years ago the shorelines of Lake Cahuilla raised as high as 40 feet above MSL (see Figure 5). Older deposits in the region consist of Miocene to Pleistocene non-marine and marine sediments deposited during intrusions of the Gulf of California and are located to the west of the site. Basement rock consisting of Mesozoic granite and Paleozoic metamorphic rocks are estimated to exist at depths between 15,000-20,000 feet near the center of the basin (Theilig et al., 1978, and Elders, 1979).

Deposits to the west of the project site consist of the Pliocene Palm Spring and Imperial Formations. The Palm Spring Formation consists of non-marine sandstones and claystones. The Imperial Formation consists of fossiliferous marine sediments.

Faulting and Surface Rupture

A review of available geologic records indicates that no active faults cross the subject property (reference No. 5). A fault zone map is included herein (see Figure 4).

Surface rupture is the result of movement on an active fault reaching the surface. The site is not located within an Alquist-Priolo Earthquake Fault Zone, and no evidence of active faulting was found during our investigation. Consequently, surface rupture is not considered to be a substantial geologic hazard at the site.

Seismicity

The effects of seismic shaking can be mitigated by adhering to the 2010 Uniform Building Code or the standards of care established by the Structural Engineers Association of California.

Based on our review of the "Seismic Zone Map," published by the California Department of Mines and Geology in conjunction with Special Publication 117, there are no earthquake landslide zones on or adjacent to the site. Figure 4 shows the location of the site in relation to regional faults and seismicity.

The proposed development shall be designed in accordance with seismic considerations contained in the 2010 CBC and the County of Imperial requirements.

Based on Chapter 16 of the 2010 CBC and on Maps of Known Active Near-Source Zones in California and Adjacent Portions of Nevada (ASCE 7 Standard), the following parameters may be considered:

2010 CBC Seismic Design Parameters

Mt. Signal Solar, Seeley, CA (Centroid Boring B-15)

Site Longitude (Decimal Degrees)	-115.716
Site Latitude (Decimal Degrees)	32.7491
Site Class Definition	D
Mapped Spectral Response Acceleration at 0.2s Period, S_S	1.445
Mapped Spectral Response Acceleration at 1s Period, S_1	0.566
Short Period Site Coefficient at 0.2 Period, Fa	1.00
Long Period Site Coefficient at 1s Period, Fv	1.50
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	1.445

Adjusted Spectral Response Acceleration at 1s Period, S_{M1}	0.849
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	0.964
Design Spectral Response Acceleration at 1s Period S_{D1}	0.566

Liquefaction

Liquefaction of soils can be caused by strong vibratory motion in response to earthquakes. Both research and historical data indicate that loose, granular soils are susceptible to liquefaction, while cohesive clays are not adversely affected by vibratory motion. Liquefaction is generally known to occur only in saturated or near saturated granular soils at depths shallower than approximately 50 feet. The soils which predominantly underlie the site are lean, stiff, clays. Liquefaction is not considered to be a hazard in clays.

Our analysis indicated that sandy zones underlying the lacustrine clays, down to 50 feet in depth may liquefy given the Design Basis Earthquake. Assuming a groundwater level of 5 feet, the total post-liquefaction settlement is estimated to vary from roughly 0 to ½ inch at the site. According to state guidelines, a differential settlement equal to about one-half of the anticipated total liquefaction settlement may be conservatively assumed for structural design (SCES, 1999). Consequently, we may estimate that ¼ inch post-liquefaction differential settlement may occur across the length of the proposed arrays.

Tsunamis, Seiches

The site is located within the Salton Trough approximately 35 feet below sea level. This suggests that the potential may exist for inundation in the event of a tsunami generated from the Gulf of California (from Mexico to the south). However, the configuration of the Gulf of California, and the higher ground surface elevation near Calexico, has historically provided an obstruction from such events. There are no records which indicate that tsunamis have impacted the Imperial Valley in the last several hundred years.

The great distance between the subject site and the Gulf of California most likely precludes damage due to seismically induced waves (tsunamis). However, it is possible that a seiche could occur within one of the shallow reservoirs adjacent to the proposed arrays. This could result in limited earthquake induced flooding at the site.

Other Geologic Hazards

Other geologic hazards such as landsliding do not appear to be evident at the subject or adjacent sites. There is not sufficient topography for soil landslides, soil creep, or lateral spreading.

FINDINGS

Seepage and Groundwater

Irrigation water is supplied to the site from the West Side Main Canal (WSM) which forms the southern property boundary. At the time of our study, a majority of the lots were used for alfalfa crops which are flood-irrigated using a system of canals, drain tiles, and lined "V" ditches. The alfalfa plants yield a low density root mass, and hence are typically farmed in low permeable clayey soils.

Groundwater was encountered in our test excavations generally between 10 to 15 feet below grade (b.g). A depth-to-groundwater contour map is presented as Figure 3, herein. The contours are based on measurements of static groundwater level during the drilling operations in April, 2011. Perched levels are expected to fluctuate with changes in seasons (rainfall), canal flow, and irrigation. The mapped groundwater levels should not be interpreted to represent a permanent condition.

Subsurface Soils

As encountered in our test borings, the site is underlain by fill/crop, lacustrine clays, and alluvial soils as follows:

Fill/Crop Soils

Fill and/or crop soils were encountered in the upper 1 to 2 feet in each test boring (B-1 through B-25). The fill soils consist generally of gray and olive brown, moist to very moist, soft to firm, sandy silty clay and clayey silts (Unified Soil Classification System Symbol CL/ML) with mica grains and rootlets. The fill/crop soils are similar in consistency to the surficial lake deposits from which they were derived.

Lacustrine Deposits (Ql)

The fill/crop soils are underlain by lacustrine deposits associated with the ancient lakes in the area. The lacustrine deposits generally consisted of lean clay (CL) with a few thin beds of sandy silt (ML). The lacustrine deposits were generally moist to saturated, and firm to very stiff in consistency. The average dry density of the saturated lacustrine clays was 93.4 pcf (18 tests), with an average moisture content of 23.1 percent (89 tests).

Alluvium (Qal)

The lacustrine deposits are underlain by medium dense to dense, saturated, fine-grained silty sands and sands.

The average moisture content of the alluvial soils was 26.9 percent (38 tests).

RECOMMENDATIONS and Geotechnical Parameters

Based on our discussions with the project engineers, H-piles are planned to support the solar arrays. The advantage of this underpinning method, as opposed to cast-in-place caissons, is less soil disturbance, less concrete, limited access, shorter construction time and target load capacity of a representative sample of the piles are verified in the field. Additionally, adjustable brackets and lifting bolts allow for future elevation corrections.

Underpinning of the solar module arrays is recommended using galvanized steel H-piles (W6X9 wide flange beams) or helical anchors. The following Geotechnical Parameters may be used in the design of the underpinning:

Design Item	Recommendations
End Bearing Pressure	2,000 psf for lacustrine deposits
Passive Lateral Resistence	300 psf per foot
Coefficient of Friction	0.35
Allowable Skin Friction	500 psf between piles and lacustrine deposits
Uplift Forces	80 percent of the allowable capacity

Coefficients	
Active	Ka = 0.30
Passive	Kp = 3.60
At Rest	Ko = 0.50

Prior to driving or pushing piles, a check should be made for underground utilities.

Pile Capacities

For piles in cohesive clayey soils, the pile capacity is based on adhesion, and is a function of soil cohesion, circumference of pile, and pile length.

When considering an H-Pile with 4-inch flanges and a 6-inch web, a circumference of 20 inches (1.67 ft.) may be considered and used for the "$2 * \pi * L * R$" value in the equations. For a 6 ft. pile length, (Z = 6), and 500 psf cohesion (CA/C = 1), pile capacities of 2.1 kips may be assumed (reference: NAVFAC Design Manual 7.02, 1986).

Ult. Capacity: 1.67 x 5 (ft.) x 500 = 4.2 kips

Allow Capacity: 4.0 / SF = 2.1 kips [Using a Factor of Safety = 2.0]

Layer	**Depth** (ft)	**Soil Type**	**Effective Unit** Weight (pcf)	**Cohesion** (psf)	**Adhesion** (psf)	**Phi** (degrees)
1	0 - 1	Topsoil Crops (ML/CL)	110	460	460	28
2	1 - 12	Stiff Clay w/o free water (CL)	110	500	500	28
3	12 - 50	Silty Sand and Sand in perched groundwater (SM/SP)	120	NA	NA	32

The anchors/piles shall be driven a minimum depth of 6 feet below grade.

For design purposes the upper 1 foot of soils shall not be considered for skin friction values.

Pile/anchor fixity may be taken at the crop/road fill - competent lacustrine deposit transition at 1 feet b.g..

With respect to uplift capacities, ultimate loads in compression and tension would be the same, as end bearing is not included in design. However, it would be prudent to provide some reduction in capacity for uplift.

It is our understanding that lateral load- and pull-tests are planned throughout the study area prior to construction. These tests shall be performed by a qualified testing firm using calibrated equipment and an industry-recognized testing procedure. The in situ test results will provide empirical data for point-specific actual embedment depths.

Pile spacing and dimensions should be determined by the structural engineer.

Seismic Loading

Note that the allowable gross axial pile capacities incorporate a safety factor of approximately 2.0. A one-third increase in the pile capacity may be used when considering short-term wind and seismic loads. The compressive strength of the pile section should be verified by the project structural engineer.

Pile foundations do not reduce dynamic settlement. We estimate that a total dynamic settlement of up to ½ inch may occur at the site. Current design philosophies suggest that such settlement will not decrease the axial pile capacity. Instead, the pile may experience increased internal stress and undergo a small fraction of the total dynamic settlement. The axial capacities presented above were not reduced to reflect dragload.

Design for High Winds

The wind pressure threshold value shall be determined by the project design engineer. However, high wind values of 115 mph and 85 mph are considered for design of the solar arrays as follows:

Example A: 115 mph Velocity:

Lateral Movement can be Tolerated at Ground Level = 0.5 inches
115 mph 3 Sec Gust = 25 psf Wind Pressure
Modules @ 45 Degrees to Wind, Pressure = 25 x 12 x 6 x 0.7 = 1260 psf
Modules @ 30 Degrees to Wind, Pressure = 25 x 12 x 6 x 0.5 = 900 psf
Seismic Lateral Loading Factor Approx = 0.20 Gives 160 lbs lateral demand per panel/module

We recommend the solar modules be constructed with an automatic safety feature. Hence, modules retract and return to stow position when wind pressures (velocity) reach a pre-established percentage of maximum.

Example B: 85 mph Velocity:

In comparison to 115 mph:
At 85 mph design wind speed, the reduction ratio = 18.5/34 =.544

Therefore, multiply each value by .544

1260 psf is reduced to 686 psf

900 psf is reduced to 490 psf

Therefore, at a design wind speed of 85 mph, and 3 sec gust, there is no requirement to retract the array.

The following Geotechnical Parameters may be used in the design of the conventional foundation construction for the inverter pads and/or associated structures:

Mat Slab Foundation

For the inverter pads and associated structures, if applicable, a mat slab foundation system is recommended due to the presence of heavy loads and expansive soils. Mat slabs founded in fill materials may be designed for an allowable bearing value of 2000 psf (for dead-plus-live load). These values may be increased by one-third for loads of short duration, including wind or seismic forces. The actual design of the foundation and slabs should be completed by the structural engineer.

Min. Design Item	**Recommendations**
Mat Foundations:	
Allowable Bearing Pressure:	2,000 psf
Passive Lateral Resistence:	300 psf per foot
Mat Slab Thickness:	min. 18 inches with thickened edges (+ 6 inches)
Steel Reinforcement:	No. 6 bars @ 12" o.c. each way, top and bottom
Coefficient of Friction:	0.35

Reinforcement requirements may be increased if recommended by the project structural engineer. In no case should they be decreased from the previous recommendations.

Note: As an alternative to the above-referenced mat slab, manufactured pre-cast pads may be considered by the project structural engineer.

Sulfate Content and Cement Type

The results of our laboratory testing indicates that the soluble sulfate content of the on-site soils likely to come in contact with concrete is negligible to severe, based on the UBC classification. As a conservative approach, type V cement and a concrete strength f'c of 4,500 psi is therefore recommended for use in concrete in contact with the on-site soils. The maximum water to cement ratio, by weight shall be 0.45 (reference: 2010 UBC, Volume 2).

ACI 318 BUILDING CODE (Table 4.3.1)
Requirements for Concrete Exposed to Sulfate-containing Solutions

Sulfate Exposure	Water soluble sulfate (SO_4) in soil percent by weight	Sulfate (SO_4) in water, ppm	Cement Type	Maximum water-cementitious material ratio, by weight, normal weight concrete	Minimum fc', normal-weight and light weight concrete, psi
Negligible	$0.00 \leq SO_4 < 0.10$	$0 \leq SO_4 < 150$	------	-----	-----
Moderate	$0.10 < SO_4 < 0.20$	$150 < SO_4 < 1500$	II,IP(MS), IS(MS),P(MS) I(PM)(MS), I(SM)(MS)	0.50	4000
Severe	$0.20 \leq SO_4 < 2.00$	$1500 < SO_4 < 10{,}000$	V	0.45	4500
Very Severe	$SO_4 > 2.00$	$SO_4 > 10{,}000$	V plus pozzalan	0.45	4500

Field Resistivity Survey

Field resistivity surveys were conducted by HDR/Schiff of Claremont, California. The resistivity tests were performed in the field using the Wenner Four Pin Method. This procedure gives the average resistivity from the surface to a depth equal to the pin spacing. Pin spacings of 2.5, 5, 20, and 50 feet were used so that variations with depth were evaluated.

Based on the report by HDR/Schiff, the soils are considered to be severely corrosive toward ferrous metals. Accordingly, protection of buried cast iron or ductile utility pipes/cables shall be provided based on the corrosion mitigation measures included in the HDR/ Schiff report (see Appendix C, herein).

The results and recommendations are presented in Appendix C.

Soil Corrosivity Testing

In-situ soil corrosivity testing was conducted by HDR/Schiff of Claremont, California. The laboratory results correlate with the field resistivity survey, and hence, the soils are considered to be severely corrosive toward ferrous metals.

The results and recommendations are presented in Appendix C.

Thermal Resistivity Testing

In-situ earth and thermal resistivity testing was conducted by Geothermal USA of Dublin, California. The thermal test of the site undisturbed soil was performed in accordance with IEEE standards 81, 442 and ASTM D 5334. The results (including the thermal dry-out curve) are presented in Appendix C.

Settlement

Utilizing the design recommendations presented herein, we anticipate that the majority of any settlement will occur during construction activities. We estimate that the total settlement for the proposed piles, arrays and mat foundations will be on the order of 1 inch. Differential settlement is not expected to exceed ½ inch across the length of the structures. In addition to the static settlement estimates, mat foundations may experience dynamic differential settlements on the order of 1/4 inch

The estimated seismic induced settlement will be mitigated/reduced by the proposed pile system which is expected to undergo settlement not greater than ½ inch total and 1/8 inch differential between adjacent piles.

These settlement values are expected to be within tolerable limits for properly designed and constructed piles/foundations.

Lateral Load Resistance

Piles/mat foundations founded in competent lacustrine soils or fill materials may be designed for a passive lateral bearing pressure of 300 pounds per square foot per foot of depth. A coefficient of friction against sliding between concrete and soil of 0.35 may be assumed.

Site Preparation

Site preparation includes removal of deleterious materials, existing structures, or other improvements from areas to be subjected to fill or structural loads. Deleterious materials, including vegetation, trash, construction debris, and contaminated soils, should be removed from the site. Existing subsurface utilities that are to be abandoned should be removed and the excavations back filled and compacted.

* For the solar arrays we recommend plowing or discing the upper 10 inches and re-compacting via tractor/loaders, or vibratory rollers, making a minimum single pass. The arrays shall be anchored by piles and hence, the placement of engineered fill is not required.

* For the ground level Invertor pads we recommend a min. 3 ft. overexcavation, with a 2 ft. envelope. We recommend re-compaction to a min. 90 % relative compaction (based on ASTM: D 1557). We recommend that fill soils be placed at moisture contents at least 4 percent over optimum for cohesive soils and at least 2 percent over optimum for granular soils. Removals should expose competent lacustrine sediments as determined by personnel during grading.

Structural Fills (outside of arrays)

If applicable, after removal of any loose, compressible soils, all areas to receive fill and/or other surface improvements should be scarified to a minimum depth of 12 inches and compacted to at least 90 percent relative compaction (based on ASTM: D 1557).

Lift thicknesses will be dependent on the size and type of equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches. Placement and compaction of fill should be in accordance with local grading ordinances under the observation and testing of the geotechnical consultant.

We recommend that fill soils be placed at moisture contents at least 4 percent over optimum for cohesive soils and at least 2 percent overt optimum for granular soils (based on ASTM: D 1557).

We recommend that oversize materials (materials over 8 inches) should they be encountered, be stockpiled and removed from the site.

Construction operations described herein should be performed by a qualified, licensed subcontractor in compliance with governing regulations and appropriate construction materials. To verify compliance with guidelines provided in this report, a consultant should review the proposed plans and recommendations prior to the onset of construction. The consultant should also observe and evaluate ongoing construction operations.

LIMITATIONS

The geotechnical services described herein have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession practicing contemporaneously under similar conditions in the subject locality. Under no circumstance is any warranty, expressed or implied, made in connection with the providing of services described herein. Data, interpretations, and recommendations presented herein are based solely on information available to this office at the time work was performed. *EGA Consultants, LLC* will not be responsible for other parties' interpretations or use of the information developed in this report.

We do not direct the contractor's operations, and we cannot be responsible for the safety of others. The contractor should notify the owner if he considers any of the recommended actions presented herein to be unsafe.

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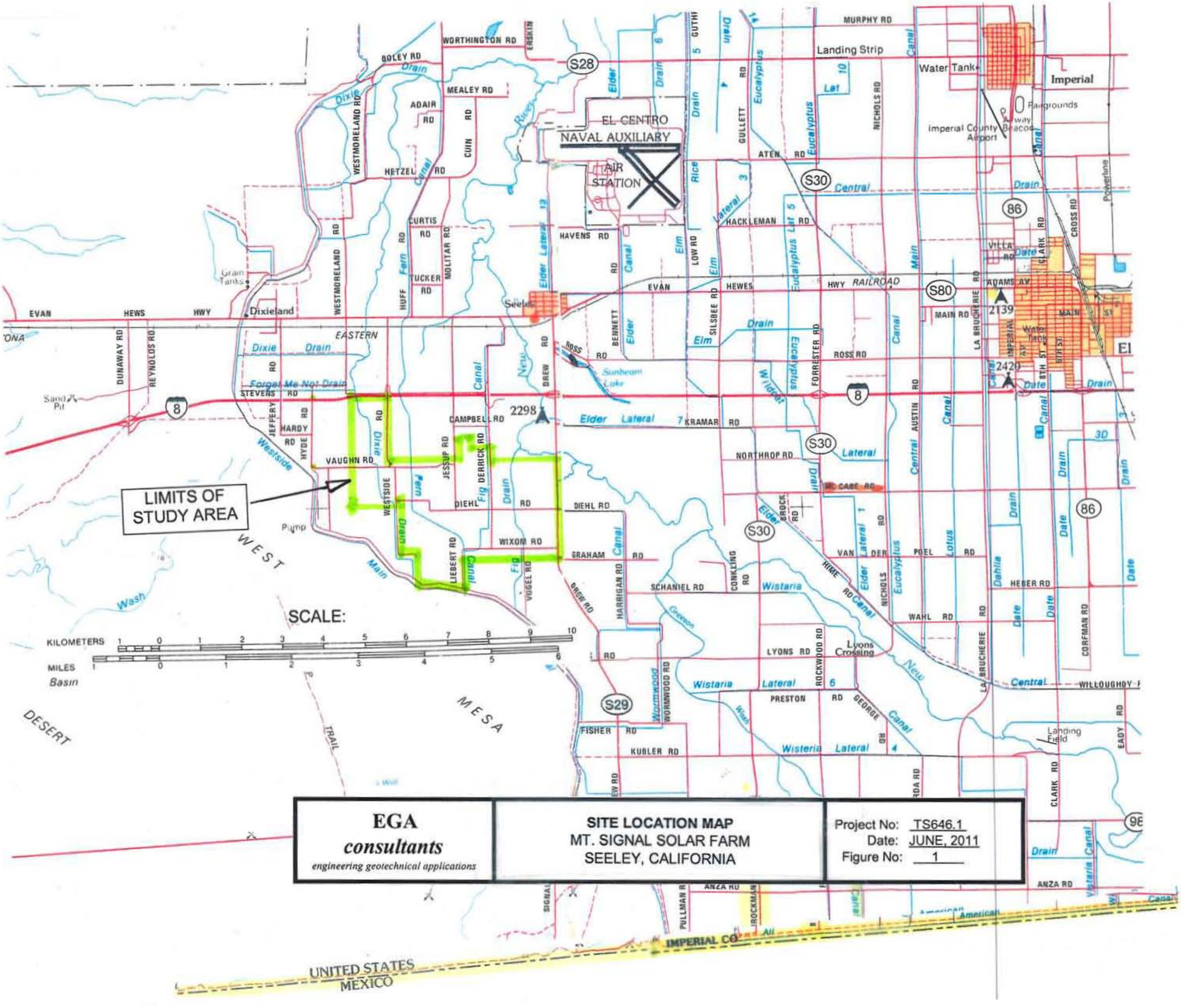
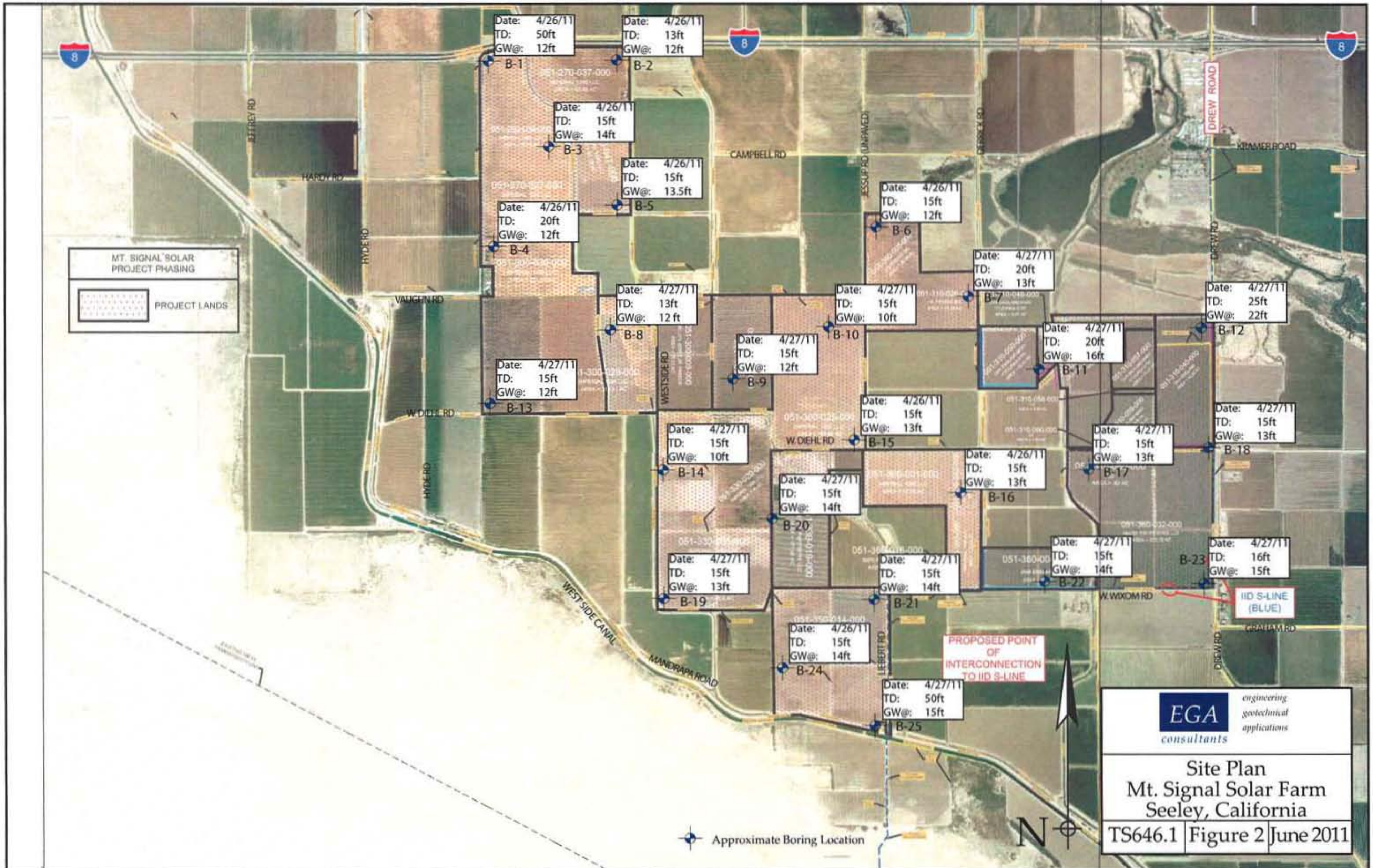
26. "Liquefaction Resistance of Soils : Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils" by Youd,T.L. et al dated 2001.



EGA *consultants* *engineering geotechnical applications*	**SITE LOCATION MAP** MT. SIGNAL SOLAR FARM SEELEY, CALIFORNIA	Project No: TS646.1 Date: JUNE, 2011 Figure No: 1


MT. SIGNAL SOLAR PROJECT PHASING
PROJECT LANDS
Date: 4/26/11 TD: 50ft GW@: 12ft B-1
Date: 4/26/11 TD: 13ft GW@: 12ft B-2
Date: 4/26/11 TD: 15ft GW@: 14ft B-3
Date: 4/26/11 TD: 20ft GW@: 12ft B-4
Date: 4/26/11 TD: 15ft GW@: 13.5ft B-5
Date: 4/26/11 TD: 15ft GW@: 12ft B-6
Date: 4/27/11 TD: 20ft GW@: 13ft B-7
Date: 4/27/11 TD: 13ft GW@: 12 ft B-8
Date: 4/27/11 TD: 15ft GW@: 12ft B-9
Date: 4/27/11 TD: 15ft GW@: 10ft B-10
Date: 4/27/11 TD: 20ft GW@: 16ft B-11
Date: 4/27/11 TD: 25ft GW@: 22ft B-12
Date: 4/27/11 TD: 15ft GW@: 12ft B-13
Date: 4/27/11 TD: 15ft GW@: 10ft B-14
Date: 4/26/11 TD: 15ft GW@: 13ft B-15
Date: 4/26/11 TD: 15ft GW@: 13ft B-16
Date: 4/27/11 TD: 15ft GW@: 13ft B-17
Date: 4/27/11 TD: 15ft GW@: 13ft B-18
Date: 4/27/11 TD: 15ft GW@: 13ft B-19
Date: 4/27/11 TD: 15ft GW@: 14ft B-20
Date: 4/27/11 TD: 15ft GW@: 14ft B-21
Date: 4/27/11 TD: 15ft GW@: 14ft B-22
Date: 4/27/11 TD: 16ft GW@: 15ft B-23
Date: 4/26/11 TD: 15ft GW@: 14ft B-24
Date: 4/27/11 TD: 50ft GW@: 15ft B-25
8
CAMPBELL RD
HARDY RD
JEFFREY RD
HYDE RD
VAUGHN RD
W. DIEHL RD
WESTSIDE RD
JESSUP RD (UNPAVED)
DERRICK RD
DREW ROAD
KRAMER ROAD
DREW RD
W. WIXOM RD
GRAHAM RD
LIEBERT RD
WEST SIDE CANAL
MANDRAPA ROAD
IID S-LINE (BLUE)
PROPOSED POINT OF INTERCONNECTION TO IID S-LINE
Approximate Boring Location
N
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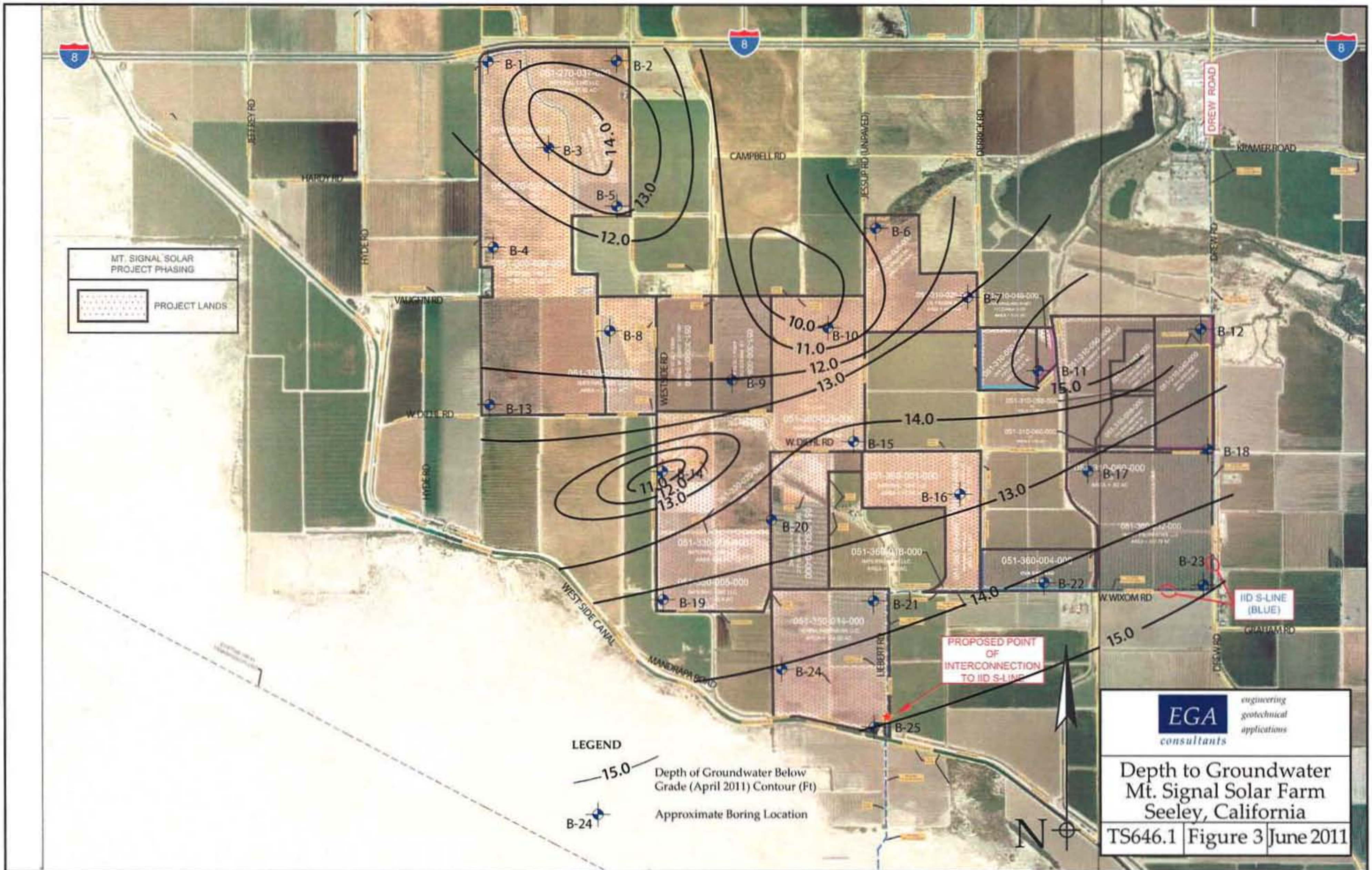
engineering geotechnical applications
Site Plan
Mt. Signal Solar Farm
Seeley, California
TS646.1
Figure 2
June 2011


MT. SIGNAL SOLAR PROJECT PHASING
PROJECT LANDS
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-15
B-16
B-17
B-18
B-19
B-20
B-21
B-22
B-23
B-24
B-25
14.0
13.0
12.0
11.0
10.0
15.0
CAMPBELL RD
JESSUP RD (UNPAVED)
DERRICK RD
DREW ROAD
KRAMER ROAD
HARDY RD
HYDE RD
VAUGHN RD
W. DIEHL RD
WESTSIDE RD
W. WIXOM RD
GRAHAM RD
LIEBERT RD
WEST SIDE CANAL
MANDRAPA ROAD
IID S-LINE (BLUE)
PROPOSED POINT OF INTERCONNECTION TO IID S-LINE
LEGEND
Depth of Groundwater Below Grade (April 2011) Contour (Ft)
Approximate Boring Location
N
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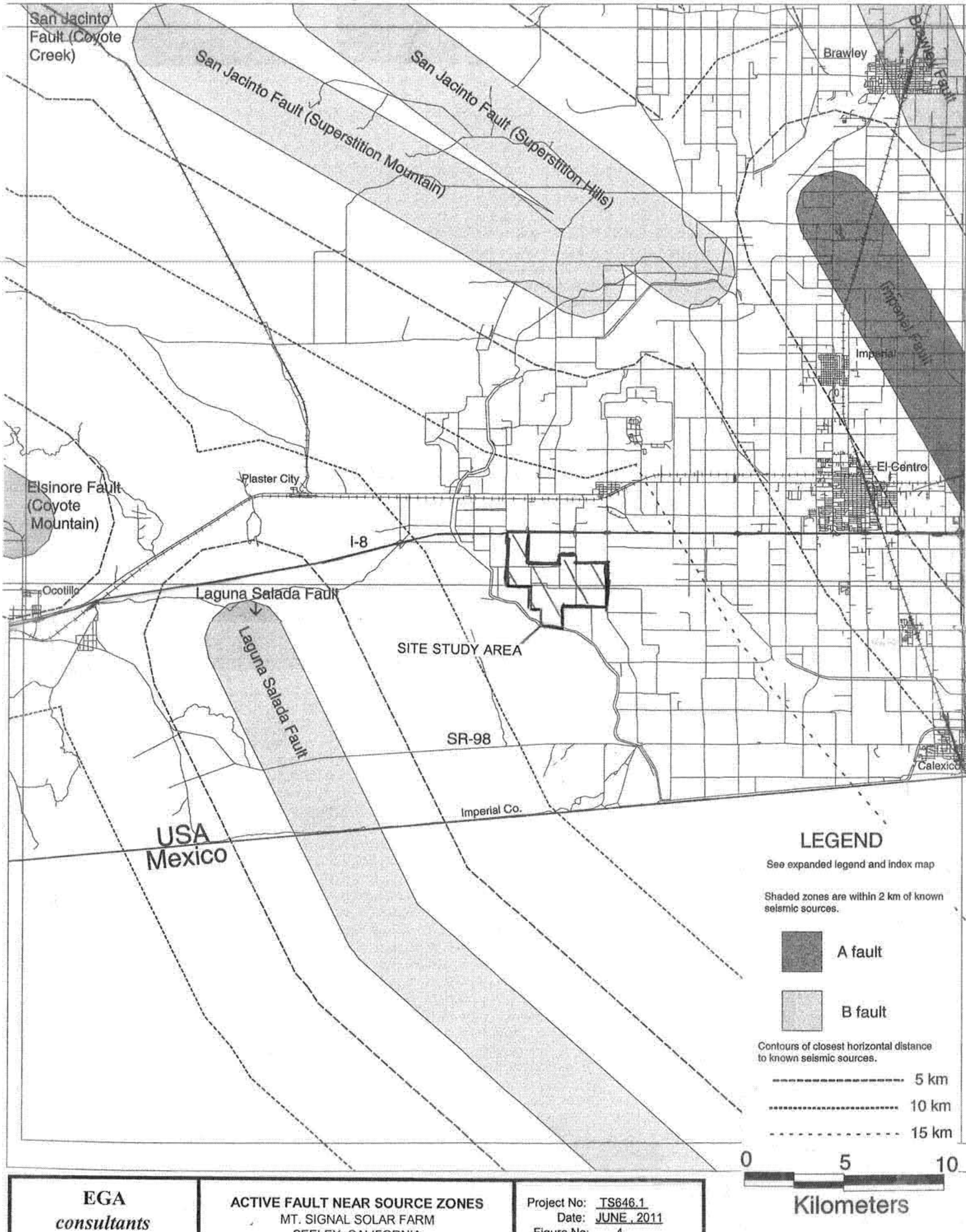
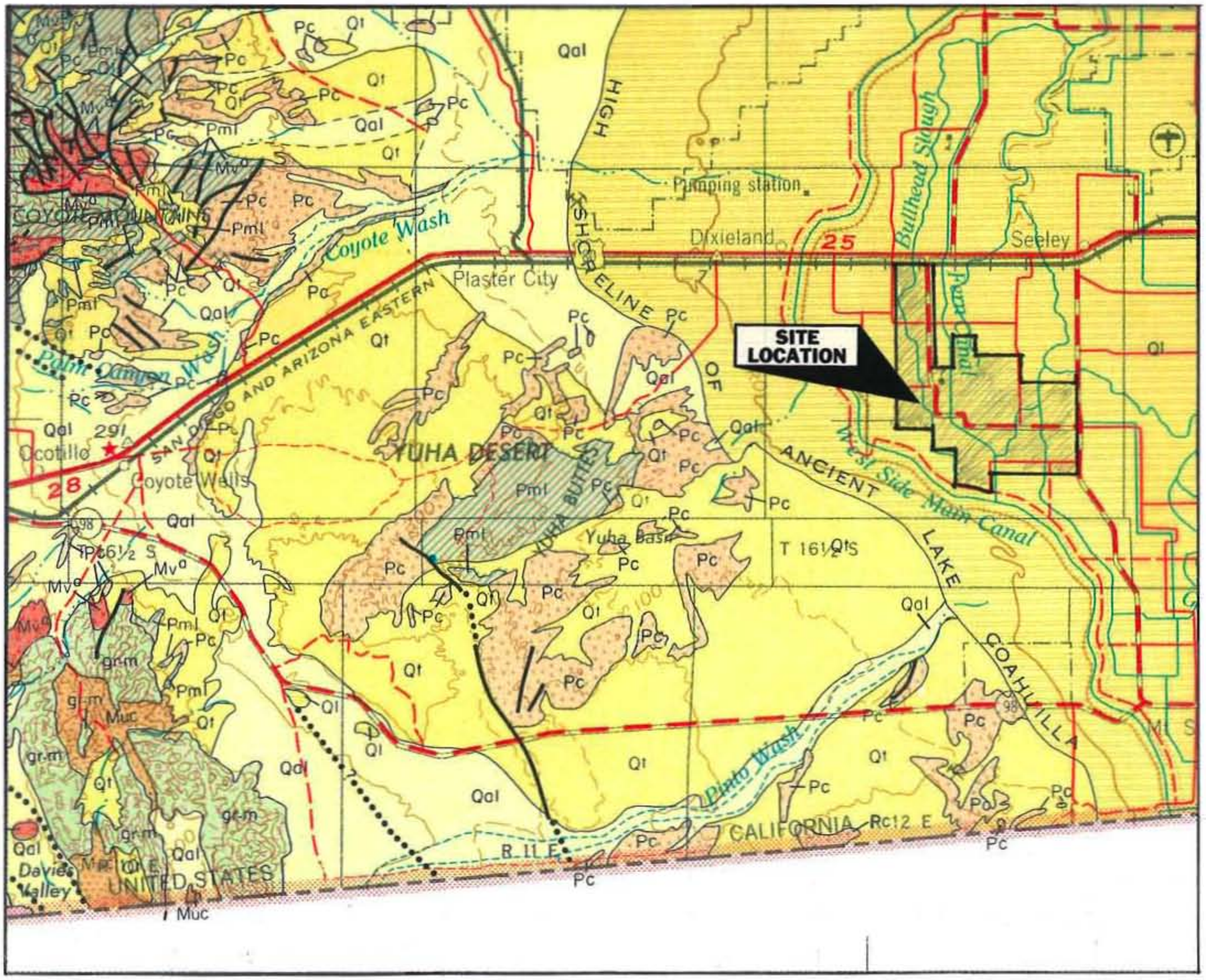
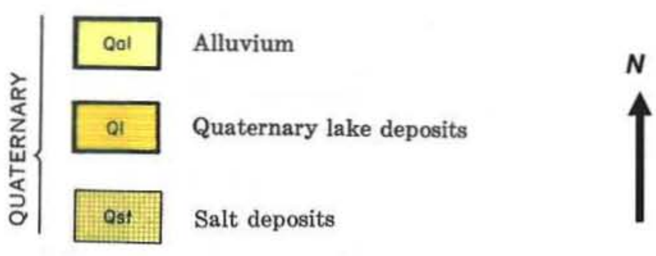
Depth to Groundwater
Mt. Signal Solar Farm
Seeley, California
TS646.1
Figure 3
June 2011



EGA *consultants* *engineering geotechnical applications*	**ACTIVE FAULT NEAR SOURCE ZONES** MT. SIGNAL SOLAR FARM SEELEY, CALIFORNIA	Project No: TS646.1 Date: JUNE, 2011 Figure No: 4



OBTAINED FROM " GEOLOGIC MAP OF CALIFORNIA - OLAF P. JENKINS EDITION" SAN DIEGO - EL CENTRO SHEET. DIVISION OF MINES AND GEOLOGY FOURTH PRINTING DATED 1993.



EGA *consultants* *engineering geotechnical applications*	**GEOLOGIC MAP** MT. SIGNAL SOLAR FARM SEELEY, CALIFORNIA	Project No: TS646.1 Date: JUNE, 2011 Figure No: 5

APPENDIX A:

GEOLOGIC LOGS

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BORING LOG LEGEND

SPT - Standard Penetration Split Barrel (1.5"IDx18"Length, with liners), ASTM D1586

SB - Split Barrel Sampler (2.5"ID x 18" length, with liners), ASTM D 1586

TW - Thin Wall Tube (Shelby) Sampler, ASTM D1587

SC - Sand Cone Compaction Test, ASTM D 1556

Nspt- Result of Standard Penetration Test. N represents the number of blows with a 140 lb. hammer falling 30" to drive a **SPT** sampler 12" into insitu material.

Neq - Approximately equivalent to Nspt but is based upon the number of blows with a 140 lb. hammer falling 30" to drive a **SB** sampler 12" into insitu material and calculating an equivalent standard penetration blow count, after R. H. Karol, *Soils and Soils Engineering*, Pretenice - Hall, Inc. 4/64 Page 23 .

▽ - Indicates elevation of free water surface encountered

USCS- Unified Soil Classification System - Method of defining soil types

USCS - MAJOR DIVISION		Group Symbol	DESCRIPTION
Gravely Soils With Over 50% of The Coarse Fraction Larger Than No. 4 Sieve Size	Clean Gravley Soils With Little or No Fines	GW	Well Graded Gravels
		GP	Poorly Graded Gravels
	Sandy Gravely With Fines	GM	Silty Gravels Well or Poorly Graded Gravel-Sand-Silt Mixtures
		GC	Clayey Gravels Well or Poorly Graded Gravel-Sand-Clay Mixtures
Sandy Soils With Over 50% of the Coarse Fraction Smaller Than No. 4 Sieve Size	Clean Sandy Soils With Little or No Fines	SW	Well Graded Sands
		SP	Poorly Graded Sands
	Sandy Soils With Fines	SM	Sand-Silt, Silty Sands Well or Poorly Graded Sand-Silt Mixtures
		SC	Clayey Sands Well or Poorly Graded Sand-Clay Mixtures
Silty and Clayey Soils Liquid Limit Less Than 50%		ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands, or Clayey Silts with Slight Plasticity
		CL	Inorganic Clays of Low to Medium Plasticity, Gravely Clays, Sandy Clays, Silty Clays or Lean Clays
		OL	Organic Clays or Organic Silty Clays of Low Plasticity
Silty and Clayey Soils Liquid Limit Greater Than 50%		MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, or Elastic Silts
		CH	Inorganic Clays of High Plasticity, or Fat Clays
		OH	Organic Clays of Medium to High Plasticity, or Organic silts
Highly Organic Soils		PT	Peat or Other Highly Organic Soil

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-1**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Sample Type: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear φ°	Direct Shear C psf	% Passing #200 Sieve
1	ML/ CL	Fill/Crop Soil: dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.	22							
	CL	Native Lacustrine Deposits: At 1 ft. becomes light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine		12.0	88.8		1.5			79
			20							
5		sands and fine mica grains.		20.1			4.0			
		at 7.5 ft. becomes reddish and olive brown, very moist, stiff silty clay.	23	26.0			2.5			73.8
10		at 10 ft Becomes wet olive brown fine silty sand with clay. Groundwater at 12 ft.	15	25.5			2.5			
15	SM/ SC	Native Alluvium Deposits: at 12 ft. becomes gray, med. dense to dense, saturated fine silty sand with trace clay, porous.	17	23.5			0.75			
20	SC	same as above.	26	17.2			1.5			
25			26	26.9			2.0			
	SM	at 25.5 ft. becomes grayish brown, wet, dense, fine-grained silty sand.								30.1
30	SP	at 30 ft. becomes olive brown, dense, saturated, fine-grained sand, porous.	60	21.1			2.75			
35	SP	same as above.	38.0	21.7			2.5			
40		***CONTINUES -***	40.0	21.2			2.75			

LOG OF EXPLORATORY BORING

Job Number:	TS646.1	Boring No:	**B-1**
Project:	Mt. Signal Solar Farm Seeley, CA	Boring Location:	See Figure 2
Date Started:	4/26/2011	Rig:	Mob. CME55 w/8" augers
Date Completed:	4/26/2011	Grnd Elev.	-35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen., tsf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
40	SP	Standard Split Spoon	Bulk	Olive gray, dense, saturated, fine silty sand, micaceous.	40	21.2			2.75			
45		Standard Split Spoon	Bulk	same as above.	43	22.2			2.0			
		Standard Split Spoon	Bulk	same as above.	40	18.8			2.5			
50												
				Total Depth: 50 ft. Groundwater at 12 ft. No Caving Backfilled and Compacted 4/26/2011								
55												
60												
65												
70												
75												
80												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-2**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear φ°	Direct Shear C psf	% Passing #200 Sieve
1	ML/ CL		Bulk	Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas,								
	CL	2.5" Ring		Native Lacustrine Deposits: At 1 ft. Becomes light Olive brown, moist to very moist, firm to very		20.5	102.9	43	2.25	28	258	
5			Bulk	stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains.		19.8						
			Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.		22.2						
10	SM SC			at 10 ft Becomes wet olive brown fine silty sand with clay. Groundwater at 12 ft.								
		Static Water Table	Bulk	Saturated, dense, fine sand with silt and clay.		35.0						

Total Depth: 13 ft.
Groundwater at 12 ft.
No Caving
Backfilled and Compacted 4/26/2011

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-3**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL		Bulk	Fill/Crop Soil: dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.	22							
5	CL	Thin Wall Tube; 2.5" Ring	Bulk	Native Lacustrine Deposits: at 1 ft. becomes light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains.	17	23.5	93.8		2.0			
		Standard Split Spoon	Bulk	at 7.5 ft. becomes reddish and olive brown, very moist, stiff silty clay.	17	28.5			1.75			
10	SM	Standard Split Spoon	Bulk	at 10 ft Becomes wet olive brown fine silty sand with clay. Groundwater at 14 ft.	13	31.8			2.0			
15	SP/ SC	2.5" Ring; Static Water Table; Standard Split Spoon	Bulk	Native Alluvium Deposits: at 12 ft. becomes gray, med. dense to dense, saturated fine silty sand with trace clay, porous.	26	24.8			2.25			

Depth scale: 1, 5, 10, 15, 20, 25, 30, 35, 40

Total Depth: 15 ft.
Groundwater at 14 ft.
No Caving
Backfilled and Compacted 4/26/2011

Note: Undisturbed Sample in brass sleeve obtained at 1.5 ft. for Thermal Testing.

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-4**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/CL		Bulk	Fill/Crop Soil: dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL	Split Spoon		Native Lacustrine Deposits: at 1 ft. becomes light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains.	11	18.9			0.75			
5		Split Spoon	Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.	12	20.5			1.75			
10	SM	Ring	Bulk	at 11 ft Becomes wet olive brown fine silty sand with lean clays. Groundwater at 12 ft.	20	21.5	99.0		1.75			
	SP/SC			Native Alluvium Deposits: at 12 ft. becomes gray, med. dense to dense, saturated fine silty sand with trace clay, porous.								
15		Split Spoon	Bulk		14	27.1			2.25			
		Split Spoon	Bulk		20	24.5			2.5			
20												

Total Depth: 20 ft.
Groundwater at 12 ft.
No Caving
Backfilled and Compacted 4/26/2011

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-5**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL		Bulk	Fill/Crop Soil: Light Brown, dry to moist, loose to soft, silty clay with trace fine-grained sand, fine micas,	9	23.0	98.8		1.0			
5	CL	2.5" Ring	Bulk	Native Lacustrine Deposits: Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains.	17	24.7	96.2		2.25			
		Standard Split Spoon	Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty lean clay. at 10.5 ft Becomes olive brown fine silty sand with lean clays, very moist.	14	25.0			2.5			
10	SM	Standard Split Spoon	Bulk		17	27.4			3.0			
15	SP/ SC	Static Water Table; Standard Split Spoon	Bulk	Native Alluvium Deposits: at 11 ft. becomes med. gray, med. dense to dense, saturated fine silty sand with trace clay.	17	24.5			2.5			

Total Depth: 15 ft.
Groundwater at 13.5 ft.
No Caving
Backfilled and Compacted 4/26/2011

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-6**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Sample Type legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Light Brown, dry to moist, loose to soft, silty clay with trace fine-grained sand, fine micas,								
	CL			Native Lacustrine Deposits: Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine								
5		2.5" Ring Sample	Bulk Sample	sands and fine mica grains.	15	20.2	94.5		2.0			
				at 7 ft. becomes reddish and olive brown, very moist, stiff silty lean clay.								
10	CL/ SM	Standard Split Spoon Sample	Bulk Sample	at 10 ft Becomes olive brown, wet, fine silty sand with lean clays.	14	30.4			2.5			
	SP/ SC	Static Water Table		Native Alluvium Deposits: at 11 ft. becomes med. gray, med. dense to dense, wet to saturated fine silty sand with trace clay.	15	31.4			2.75			
15		Standard Split Spoon Sample	Bulk Sample									
20				Total Depth: 15 ft. Groundwater at 12 ft. No Caving Backfilled and Compacted 4/26/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-7**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
0–1	CL			Fill/Crop Soil: Light brown, dry to moist, soft, clay and silty clay with trace fine-grained sand, fine mica.								
1–5	CL			Native Lacustrine Deposits: at 1 ft. becomes light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains.								
5		Standard Split Spoon	Bulk	at 6 ft. becomes reddish and olive brown, very moist, stiff silty clay.	17	26.9			2.25			
10		Standard Split Spoon	Bulk	at 11 ft Becomes wet olive brown fine silty sand with lean clays.	19	26.4			2.75			
13	SM	Static Water Table		Groundwater at 13 ft.								
13–15	SC/ SP/	Standard Split Spoon	Bulk	Native Alluvium Deposits: at 13 ft. becomes gray, med. dense to dense, saturated fine silty sand with trace clay, porous.	28	24.1			3.0			
19		Standard Split Spoon	Bulk	No sample recovery.	44							
20				Total Depth: 20 ft. Groundwater at 13 ft. No Caving Backfilled and Compacted 4/27/2011								

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-8**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL		Bulk	Native Lacustrine Deposits: Light Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands. Cohesive. Low porosity.		29.0						
5						27.4						
			Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.								
						29.7						
10	SM SC			at 11 ft Becomes wet olive brown fine silty sand with clay.								
		Static Water Table	Bulk	Groundwater at 12 ft. Saturated, dense, fine sand with silt and clay.								
15				Total Depth: 13 ft. Groundwater at 12 ft. No Caving Backfilled and Compacted 4/27/2011								
20												
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-9**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL			Native Lacustrine Deposits: at 1 ft. becomes Light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands. Cohesive. Low porosity.								
5			Bulk			22.6						
			Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.		31.9						
10	SM SC		Bulk	at 11 ft Becomes wet olive brown fine silty sand with clay.								
		Static Water Table		Groundwater at 12 ft.		28.7						
			Bulk	12 ft. Saturated, dense, fine sand with silt and clay (Alluvium).		35.0						
				at 14.5 ft becomes more sandy (Alluvium)								
15												
20				Total Depth: 15 ft. Groundwater at 12 ft. No Caving Backfilled and Compacted 4/27/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number:	TS646.1	Boring No:	**B-10**
Project:	Mt. Signal Solar Farm Seeley, CA	Boring Location:	See Figure 2
		Drive Wt:	140 lbs. 30" drop
Date Started:	4/27/2011	Rig:	Mob. CME55 w/8" augers
Date Completed:	4/27/2011	Grnd Elev.	-35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: dry, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL			Native Lacustrine Deposits:								
		Standard Split Spoon	Bulk	Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine	18							
5		Standard Split Spoon	Bulk	sands and fine mica grains. Cohesive.	21	12.7			2.0			
				at 7.5 ft. becomes reddish and olive brown, very								
		2.5" Ring		moist, stiff silty clay. No sample recovered.	22							
	SM	Static Water Table		at 9.5 ft Becomes wet olive brown fine silty sand								
10				with lean clays, med. Dense to dense, micaceous.								
		Standard Split Spoon	Bulk	No sample recovered.	27							
	SP/ SC			Native Alluvium Deposits: at 12 ft. becomes gray, med. dense to dense,								
				saturated fine silty sand with trace clay, porous.	39	18.8			3.0			
15		Standard Split Spoon	Bulk									
20				Total Depth: 15 ft. Groundwater at 10 ft. No Caving Backfilled and Compacted 4/27/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number:	TS646.1	Boring No: **B-11**	
Project:	Mt. Signal Solar Farm	Boring Location: See Figure 2	
	Seeley, CA	Drive Wt: 140 lbs. 30" drop	
Date Started:	4/27/2011	Rig: Mob. CME55 w/8" augers	
Date Completed:	4/27/2011	Grnd Elev. -35 ft. below MSL	

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear φ°	Direct Shear C psf	% Passing #200 Sieve
1	ML/SC		Bulk	Fill/Crop Soil: Light brown, dry to moist, soft, clay and silt with ine-grained sand, fine micas.								
	CL		Bulk	Native Lacustrine Deposits: At 1 ft becomes light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains.								
5		Standard Split Spoon	Bulk		24	24.7			2.75			
				at 6 ft. becomes reddish and olive brown, very moist, stiff silty clay.								
10		2.5" Ring		at 11.5 ft Becomes wet olive brown fine silty sand	25	28.5	92.2		3.75			
	SM			with lean clays.								
	SC/			Native Alluvium Deposits:								
15	SP/	Standard Split Spoon	Bulk	at 13 ft. becomes gray, med. dense to dense, saturated fine silty sand with trace clay, porous.	21	27.4			4.0			
	SM	Static Water Table		Groundwater at 16 ft., more granular.								
		Standard Split Spoon	Bulk	No sample recovery.	29				3.0			
20												
				Total Depth: 20 ft. Groundwater at 16 ft. No Caving Backfilled and Compacted 4/27/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-12**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -30 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear φ°	Direct Shear C psf	% Passing #200 Sieve
1	CL		Bulk	Fill/Crop Soil: Light brown, dry to moist, soft, clay and silty clay with trace fine-grained sand, fine micas.								
5	CL	2.5" Ring	Bulk	Native Lacustrine Deposits: Light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains. Cohesive.	26	22.2	88.3		1.0	22	288	
				at 6.5 ft. becomes reddish and olive brown, very moist, stiff silty clay.								
10	CL	Split Spoon	Bulk	at 11.5 ft Becomes firm, very moist olive brown lean clays with trace fine sands.	17	16.4			2.5			
15		Split Spoon	Bulk		25	27.7			2.5			
20	SC/ SP/	Split Spoon	Bulk	Native Alluvium Deposits: at 16 ft. becomes gray, med. dense to dense, saturated fine silty sand with trace clay, porous.	17	29.5			2.25			
	SM	Static Water Table		Groundwater at 22 ft., more granular.								
25				No sample recovery.								
30				Total Depth: 22 ft. Groundwater at 25 ft. No Caving Backfilled and Compacted 4/27/2011								
35												
40												

LOG OF EXPLORATORY BORING

Job Number:	TS646.1	Boring No:	**B-13**
Project:	Mt. Signal Solar Farm Seeley, CA	Boring Location:	See Figure 2
		Drive Wt:	140 lbs. 30" drop
Date Started:	4/27/2011	Rig:	Mob. CME55 w/8" augers
Date Completed:	4/27/2011	Grnd Elev.	-35 ft. below MSL

Sample Type legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear φ°	Direct Shear C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Light Brown, dry to moist, loose to soft, silty clay with trace fine-grained sand, fine micas,								
	CL	2.5" Ring Sample		Native Lacustrine Deposits: Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine	21		89.9		2.25			
5		Standard Split Spoon	Bulk	sands and fine mica grains. Low permeability.	21	24.5			2.5			
		Standard Split Spoon	Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty lean clay.	21	23.3			3.0			
10	CL/ SM	Standard Split Spoon	Bulk	at 10 ft Becomes olive brown, wet, fine silty sand with lean clays.	17	29.0			2.5			
		Static Water Table										
15	SC	Standard Split Spoon	Bulk	Native Alluvium Deposits: at 14 ft. med. gray, med med. dense to dense, silty sand with trace clay.	22	28.2			2.0			
20				Total Depth: 15 ft. Groundwater at 12 ft. No Caving Backfilled and Compacted 4/27/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-14**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ °	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Light Brown, dry to moist, loose to soft, silty clay with trace fine-grained sand, fine micas.								
5	CL	2.5" Ring Sample		Native Lacustrine Deposits: at 1 ft. becomes Light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains. Low permeability. at 7 ft. becomes reddish and olive brown, very moist, stiff silty lean clay.	20	21.1	97.8		2.5			
10	CL/ SM	Standard Split Spoon Sample; Static Water Table	Bulk Sample	at 10 ft Becomes olive brown, fine silty sand with lean clays, saturated (groundwater).	20	26.6			3.0			
15	SC	Standard Split Spoon Sample	Bulk Sample	Native Alluvium Deposits: at 11 ft. med. gray, med. med. dense to dense, silty sand with trace clay.	22	26.3			2.25			

Total Depth: 15 ft.
Groundwater at 10 ft.
No Caving
Backfilled and Compacted 4/27/2011

Depth scale: 20, 25, 30, 35, 40

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm, Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-15**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	OTHER TESTS
1	ML/ CL		Bulk	Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.		18.8						OPT 8.50%
	CL		Bulk	Native Lacustrine Deposits: Light Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands. Cohesive. Low porosity.		23.8						MAX 125.0
5			Bulk			23.0						
			Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.		25.9						
10	SM		Bulk	at 11 ft Becomes wet olive brown fine silty sand with clay.		24.4						
	CL	Static Water Table	Bulk	Groundwater at 12 ft. 12 ft. Saturated, stiff, fine sand with silt and clay. (Alluvium).		25.9						
15			Bulk	at 14.5 ft becomes more sandy (Alluvium)		29.2						
20				Total Depth: 15 ft. Groundwater at 12 ft. No Caving Backfilled and Compacted 4/26/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-16**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	OTHER TESTS
1	ML/ CL			Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL			Native Lacustrine Deposits: Light Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands. Cohesive. Low porosity.		29.9						
5			Bulk	at 6 ft. becomes reddish and olive brown, very moist, stiff silty clay.		29.7						
			Bulk			27.9						
10	SM SC		Bulk	at 10 ft Becomes wet olive brown fine silty sand with clay. Groundwater at 13 ft.								
		Static Water Table	Bulk	12 ft. Saturated, stiff, fine sand with silt and clay (Alluvium). at 14.5 ft becomes more sandy (Alluvium)		32.3						
15												
20				Total Depth: 15 ft. Groundwater at 13 ft. No Caving Backfilled and Compacted 4/26/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number:	TS646.1	Boring No:	**B-17**
Project:	Mt. Signal Solar Farm	Boring Location:	See Figure 2
	Seeley, CA	Drive Wt:	40 lbs. 30" drop
Date Started:	4/27/2011	Rig:	Mob. w/4" augers
Date Completed:	4/27/2011	Grnd Elev.	-35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	OTHER TESTS
1	ML/CL			Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL		Bulk	Native Lacustrine Deposits: Light Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands. Cohesive. Low porosity.		25.8						
5			Bulk			23.8						
				at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.								
			Bulk			25.9						
10	SM SC			at 11 ft Becomes wet olive brown fine silty sand with clay. Groundwater at 13 ft.								
		Static Water Table	Bulk	12 ft. Saturated, dense, fine sand with silt and clay (Alluvium).		28.7						
				at 14.5 ft becomes more sandy (Alluvium)								
15												
20				Total Depth: 15 ft. Groundwater at 13 ft. No Caving Backfilled and Compacted 4/27/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-18**
Boring Location: See Figure 2
Drive Wt: 140 lbs. 30" drop
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear φ°	Direct Shear C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Light Brown, dry to moist, loose to soft, silty clay with trace fine-grained sand, fine micas,								
	CL	Split Spoon	Bulk	Native Lacustrine Deposits: Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine	15	19.3			2.0			
5		Ring	Bulk	sands and fine mica grains.	23	26.1	85.2		3.0			
				at 7 ft. becomes reddish and olive brown, very moist, stiff silty lean clay.								
10	CL/ SM	Split Spoon	Bulk	at 10 ft Becomes olive brown, wet, fine silty sand with lean clays.	4.0	26.4			4.0			
	SP/ SC	Static Water Table		Native Alluvium Deposits: at 11 ft. becomes med. gray, med. dense to dense, wet to saturated fine silty sand with trace clay.								
15		Split Spoon	Bulk		17	34.2			3.0			

Total Depth: 15 ft.
Groundwater at 13 ft.
No Caving
Backfilled and Compacted 4/27/2011

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-19**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	OTHER TESTS
	ML/			Fill/Crop Soil: Dry, loose to soft, clayey silt	13				1.5			
1	CL	Split Spoon	Bulk	and silty clay with trace fine-grained sand, fine micas.		15.7						
				Native Lacustrine Deposits:								
		Ring		Light Olive brown, moist to very moist, firm to very	18	24.4	91.5		2.25			
	CL			stiff lean to fat clay and clayey silt with trace fine								
5		Split Spoon	Bulk	sands. Cohesive. Low porosity.	22	25.5			3.0			
				at 7 ft. becomes reddish and olive brown, very	28	29.5			3.25			
		Split Spoon	Bulk	moist, stiff silty clay.								
		Split Spoon	Bulk		32	32.1			3.0			
10	SM			at 11 ft Becomes wet olive brown fine silty sand with clay.								
	SC			Groundwater at 13 ft.								
				12 ft. Saturated, dense, fine sand with silt and clay (Alluvium).								
		Static Water Table										
	SM			at 14.5 ft becomes more sandy (Alluvium)								
15												
20				Total Depth: 15 ft. Groundwater at 13 ft. No Caving Backfilled and Compacted 4/27/2011								
25												
30												
35												
40												

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-20**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	OTHER TESTS
1	ML/CL		Bulk	Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.				0				
		Ring		Native Lacustrine Deposits:		12.4	112.7		3.0			
5	CL		Bulk	Light Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands. Cohesive. Low porosity.		12.5						
			Bulk	at 7.5 ft. becomes reddish and olive brown, very moist, stiff silty clay.		20.8						
						20.9						
10	SM		Bulk	at 11 ft Becomes wet olive brown fine silty sand with clay.								
	SC			Groundwater at 14 ft.		25.8						
			Bulk	12 ft. Saturated, dense, fine sand with silt and clay (Alluvium).								
	SP	Static Water Table		at 14.5 ft becomes more sandy (Alluvium)								
15												

Total Depth: 15 ft.
Groundwater at 14 ft.
No Caving
Backfilled and Compacted 4/27/2011

LOG OF EXPLORATORY BORING

Job Number:	TS646.1	Boring No:	**B-21**
Project:	Mt. Signal Solar Farm Seeley, CA	Boring Location:	See Figure 2
		Drive Wt:	40 lbs. 30" drop
Date Started:	4/27/2011	Rig:	Mob. w/4" augers
Date Completed:	4/27/2011	Grnd Elev.	-35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	OTHER TESTS
1	ML/ CL			Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL	Ring		Native Lacustrine Deposits: At 1.0 ft. becomes light Olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands. Cohesive. Low porosity.		12.1	103.9		3.0			
5			Bulk			11.5						
				at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.		15.9						
			Bulk			24.7						
10	SM SC		Bulk	at 11 ft Becomes wet olive brown gray, fine silty sand with clay, firm to dense.		31.6						
			Bulk	13 ft. Saturated, dense, fine sand with silt and clay. (Alluvium).								
	SP	Static Water Table		at 14.5 ft becomes more sandy (Alluvium).								
15												

Total Depth: 15 ft.
Groundwater at 14 ft.
No Caving
Backfilled and Compacted 4/27/2011

Depth scale: 20, 25, 30, 35, 40

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm, Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-22**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ °	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
		2.5" Ring		Native Lacustrine Deposits: At 1 ft. Becomes light olive brown, moist to very moist, firm to very		14.0	75.4		2.25			
	CL			stiff lean to fat clay and clayey silt with trace fine								
5			Bulk	sands and fine mica grains. Cohesive, low permeable clay.		18.5						
			Bulk			23.8						
				at 8 ft. becomes reddish and olive brown, very moist, stiff silty clay.		17.5						
10	SM SC		Bulk	at 10 ft Becomes wet olive brown fine silty sand with clay.		19.3						
			Bulk	Wet, firm to dense, fine sand with silt and clay.		20.2						
		Static Water Table	Bulk	Groundwater at 14 ft.		20.5						
15												

Total Depth: 15 ft.
Groundwater at 14 ft.
No Caving
Backfilled and Compacted 4/27/2011

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-23**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ °	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL		Bulk	Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.		8.1						
	CL	2.5" Ring		Native Lacustrine Deposits: At 1 ft. Becomes light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains. Cohesive, low permeable clay.		17.0	71.2		2.0			
5			Bulk			21.8						
			Bulk	at 7 ft. becomes reddish and olive brown, very moist, stiff silty clay.		27.6						
						25.6						
10	SM SC		Bulk	at 10 ft Becomes wet, gray brown fine silty sand with clay.		28.5						
			Bulk			27.7						
15		Static Water Table	Bulk	Wet, gray, firm to dense, fine sand with silt and clay. Groundwater at 15 ft.		28.4						

Total Depth: 16 ft.
Groundwater at 15 ft.
No Caving
Backfilled and Compacted 4/26/2011

Depth scale: 20, 25, 30, 35, 40

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/26/2011
Date Completed: 4/26/2011

Boring No: **B-24**
Boring Location: See Figure 2
Drive Wt: 40 lbs. 30" drop
Rig: Mob. w/4" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	ML/ CL			Fill/Crop Soil: Dry to moist, loose to soft, clayey silt and silty clay with trace fine-grained sand, fine micas.								
	CL		Bulk	Native Lacustrine Deposits: At 1 ft. Becomes light olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains. Cohesive,		10.0						
5		Ring		low permeable clay.		21.7	99.5		3.0			
			Bulk	at 7.5 ft. becomes reddish and olive brown, very moist, stiff silty clay.		28.9						
10	SM SC		Bulk	at 10 ft Becomes wet, gray brown fine silty sand with clay.		17.2						
			Bulk			21.5						
			Bulk	Wet, gray, firm to dense, fine sand with silt and clay.								
		Static Water Table		Groundwater at 14 ft.		21.5						
15			Bulk	Becomes more granular (Alluvium)		28.2						

Total Depth: 15 ft.
Groundwater at 14 ft.
No Caving
Backfilled and Compacted 4/26/2011

Depth scale: 20, 25, 30, 35, 40

LOG OF EXPLORATORY BORING

Job Number:	TS646.1	Boring No:	**B-25**
Project:	Mt. Signal Solar Farm Seeley, CA	Boring Location:	See Figure 2
		Drive Wt:	140 lbs. 30" drop
Date Started:	4/27/2011	Rig:	Mob. CME55 w/8" augers
Date Completed:	4/27/2011	Grnd Elev.	-35 ft. below MSL

Sample Type legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen, tsf	Direct Shear: φ°	Direct Shear: C psf	% Passing #200 Sieve
1	SM SC		Bulk	Fill/Crop Soil: Gray, dry to moist, loose to med. Dense fine silty sand and clay with trace fine micas.								9.5
	CL	2.5" Ring	Bulk	Native Lacustrine Deposits: At 1 ft. Becomes gray and olive brown, moist to very moist, firm to very stiff lean to fat clay and clayey silt with trace fine sands and fine mica grains.	22				2.0			
5	SC	Split Spoon	Bulk	at 6 ft. becomes reddish brown, very moist, firm sandy clay.	23	15.1			2.25			
		Split Spoon	Bulk		22	22.7			2.5			
10		Split Spoon	Bulk	at 10 ft Becomes gray and brown fine silty sand and clay.	22	22.2			4.25			
	SM/ SC	Static Water Table		Groundwater at 15 ft.								
15	SM/ SC	Split Spoon	Bulk	Native Alluvium Deposits: at 15 ft. becomes gray, med. dense to dense, saturated fine silty sand with trace clay, porous.	31	25.5			3.75			
20		Split Spoon	Bulk	same as above.	32	25.3			3.0			
25	SM	Split Spoon	Bulk	at 25 ft. becomes grayish brown, wet, dense, fine-grained silty sand.	36	30.4			2.0			
30	SP/ SC	Split Spoon	Bulk	at 30 ft. becomes gray, dense to firm, saturated, fine-grained silty sand and clay.	23	25.0			2.5			
35		Split Spoon	Bulk	Less clayey, more dense (sand interbedding).	47	24.5			2.75			
40		Split Spoon	Bulk		30	26.9			2.5			

CONTINUES -

LOG OF EXPLORATORY BORING

Job Number: TS646.1
Project: Mt. Signal Solar Farm
Seeley, CA
Date Started: 4/27/2011
Date Completed: 4/27/2011

Boring No: **B-25**
Boring Location: See Figure 2
Rig: Mob. CME55 w/8" augers
Grnd Elev. -35 ft. below MSL

Legend: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Pocket Pen., tsf	Direct Shear: φ °	Direct Shear: C psf	Other Tests
40	SM	Standard Split Spoon	Bulk	Grayish brown, dense, saturated, fine silty sand, with trace clays, micaceous.	30	26.9			2.5			
45		Standard Split Spoon	Bulk	No sample recovery.	35				2.5			
		Standard Split Spoon	Bulk	same as above.	36	26.1			3.0			
50												

Total Depth: 50 ft.
Groundwater at 15 ft.
No Caving
Backfilled and Compacted 4/27/2011

Depth scale: 55, 60, 65, 70, 75, 80

APPENDIX B:

GEOTECHNICAL LABORATORY TEST RESULTS

By SoilWorks

SoilWorks
Earth Sciences Group
3130 Airway Avenue
Costa Mesa, CA 92626
T: 888-544-4164
www.soilworksinc.com

EGA Consultants
375-C Monte Vista Avenue
Costa Mesa, California 92627

June 7, 2011
Project No.114-057-10

Attention: Mr. David Worthington, C.E.G.

Subject: Laboratory Test Results
Mt. Signal Solar
Seeley, California

Dear Mr. Worthington:

SoilWorks, Inc. performed the requested laboratory tests on soil specimens delivered to our office for the subject project. The results of these tests are included as an attachment to this report.

We appreciate the opportunity of providing our services to you on this project. Should you have any questions, please contact the undersigned.

Sincerely,

SOILWORKS, INC.

REGISTERED PROFESSIONAL ENGINEER
DANIEL J. MORIKAWA
No. GE2726
Exp. 9-30-12
GEOTECHNICAL
STATE OF CALIFORNIA

By: ____________________
Daniel J. Morikawa, PE, GE
RGE 2726, Reg. Expires 9/30/12

Attachment: Laboratory Test Results
Distribution: Addressee (2 copies)

File: 114-057-10 Mt. Signal Solar, Seeley, CA.doc

LABORATORY TEST RESULTS

Summarized below are the results of requested laboratory testing on samples submitted to our office.

Dry Density and Moisture Content

Tabulated on Plate A, attached, are the requested results of field dry density and moisture contents of undisturbed soils samples retained in 2 3/8–inch inside diameter by one-inch height rings. Moisture only results were obtained from small bulk samples.

Soil Classification

Requested soil samples were classified using ASTM D2487 as a guideline and are based on visual and textural methods only. These classifications are shown below:

Sample Identification	Soil Description	Group Symbol
B-1 @ 5.0'	Silty Clay – Olive brown	CL
B-1 @ 7.5'	Silty Clay – Olive brown	CL
B-1 @ 10.0'	Silty Fine Sand –Olive brown	SM
B-1 @ 15.0'	Silty Fine Sand – Olive brown, with clay	SM
B-1 @ 20.0'	Clayey fine Sand – Olive brown	SC
B-1 @ 25.0'	Silty Fine Sand – Olive brown	SM
B-1 @ 30.0'	Fine Sand – Olive brown	SP
B-1 @ 35.0'	Fine Sand – Olive brown	SP
B-1 @ 40.0'	Fine Sand – Olive gray brown	SP
B-1 @ 45.0'	Fine Sand –Olive gray	SP
B-1 @ 50.0'	Fine Sand –Olive gray	SP

Direct Shear

Direct shear tests were performed on relatively undisturbed ring samples, identified as B-2 @ 2.5' and B-12 @ 5.0', with a direct shear machine of the strain-controlled type. The controlled rate of strain is 0.005 inch per minute. The samples were soaked in a confined state prior to shearing. Then the samples were sheared under varied loads ranging from 1.0 ksf to 4.0 ksf. The test results are plotted on Plate B-1 and B-2.

Sulfate Content

Selected bulk samples were tested for soluble sulfate content in accordance with Hach procedure. The test results are shown below:

Sample Identification	Water Soluble Sulfate In Soil (Percentage by weight (%))	Sulfate Exposure (UBC Table 19-A-4)
B-5 @ 0-4'	0.056	Negligible
B-22 @ 0-3'	0.051	Negligible

Expansion Index:

Bulk soil samples were tested for expansion potential following the ASTM D-4829 Test Procedure. Test results are presented below:

Sample Identification	Expansion Index	Expansion Potential (UBC 18-1-B)
B-2 @ 0-3'	43	Low
B-20 @ 0-3'	0	Very Low

Maximum Dry Density and Optimum Moisture Content

A maximum dry density and optimum moisture content test was performed on the requested bulk soil sample in accordance with ASTM: D 1557. The results are shown below:

Sample Identification	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-15 @ 0-3'	125.0	8.5

Consolidation

A consolidation test was performed on a relatively undisturbed sample of the soils identified as B-11 @ 10' to determine the compressibility characteristics. The sample was soaked during the test to simulate possible adverse field conditions. The test results are presented on Plate B-3.

Atterberg Limits Test

The results of Atterberg Limits test on the designated sample are shown below. These tests were performed in accordance with ASTM: D 4318.

Sample Identification	Liquid Limit %	Plastic Limit %	Plasticity Index %	Classification
B-2 @ 2.5'	41.8	13.2	28.6	CL

200 Wash Sieve

The following samples were tested in accordance with ASTM D: 1140 to determine the amount material finer than the No. 200 sieve by washing as an aid in classification of soil types. The test result is shown below.

Sample Location	Percent Passing
B-1 @ 0-4'	79.0
B-1 @ 6-11'	73.8
B-1 @ 25-35'	30.1
B-25 @ 0-5'	9.5

Particle Size Analysis

Soil samples were tested in accordance with ASTM: D 442 test procedure to determine soil particle size as an aid in classification of soil types. The test results are shown graphically on Plates B-4 through B-6.

PLATE A
LABORATORY MOISTURE / DENSITY TEST RESULTS

Boring	Depth	Dry Density, pcf	Moisture, %
B-1	2.5	88.8	12.0
B-1	5.0	*	20.1
B-1	7.5	*	26.0
B-1	10.0	*	25.5
B-1	15.0	*	23.5
B-1	20.0	*	17.2
B-1	25.0	*	26.9
B-1	30.0	*	21.1
B-1	35.0	*	21.7
B-1	40.0	*	21.2
B-1	45.0	*	22.2
B-1	50.0	*	18.8
B-2	2.5	102.9	20.5
B-2	3.5	*	19.8
B-2	6.0	*	22.2
B-2	10.0	*	35.0
B-3	4.0	93.8	23.5
B-3	7.5	*	28.5
B-3	10.0	*	31.8
B-3	15.0	*	24.8
B-4	2.5	*	18.9
B-4	5.0	*	20.5
B-4	10.0	99.0	21.5
B-4	15.0	*	27.1
B-4	20.0	*	24.5
B-5	2.5	98.8	23.0
B-5	5.0	96.2	24.7
B-5	7.5	*	25.0
B-5	7.5		
B-5	10.0	*	27.4

PLATE A
LABORATORY MOISTURE / DENSITY TEST RESULTS

Boring	Depth	Dry Density, pcf	Moisture, %
B-5	15.0	*	24.5
B-6	5.0	94.5	20.2
B-6	10.0	*	30.4
B-6	15.0	*	31.4
B-7	5.0	*	26.9
B-7	10.0	*	26.4
B-7	15.0	*	24.1
B-8	3.0	*	29.0
B-8	6.0	*	27.4
B-8	8.0	*	29.7
B-9	5.0	*	22.6
B-9	7.0	*	31.9
B-9	9.0	*	28.7
B-9	11.0	*	35.0
B-10	5.0	*	12.7
B-10	15.0	*	18.8
B-11	5.0	*	24.7
B-11	10.0	92.2	28.5
B-11	15.0	*	27.4
B-12	5.0	88.3	22.2
B-12	10.0	*	16.4
B-12	15.0	*	27.7
B-12	20.0	*	29.5
B-13	2.5	89.9	5.5
B-13	5.0	*	24.5
B-13	7.5	*	23.3
B-13	10.0	*	29.0
B-13	15.0	*	28.2

PLATE A
LABORATORY MOISTURE / DENSITY TEST RESULTS

Boring	Depth	Dry Density, pcf	Moisture, %
B-14	5.0	97.8	21.1
B-14	10.0	*	26.6
B-14	15.0	*	26.3
B-15	1.0	*	18.8
B-15	2.5	*	23.8
B-15	4.0	*	23.0
B-15	6.0	*	25.9
B-15	9.0	*	24.4
B-15	12.0	*	25.9
B-15	15.0	*	29.2
B-16	3.0	*	29.9
B-16	6.0	*	29.7
B-16	9.0	*	27.9
B-16	12.0	*	32.3
B-17	3.0	*	25.8
B-17	6.0	*	23.8
B-17	9.0	*	25.9
B-17	12.0	*	28.7
B-18	2.5	*	19.3
B-18	5.0	85.2	26.1
B-18	10.0	*	26.4
B-18	15.0	*	34.2
B-19	1.0	*	15.7
B-19	2.5	91.5	24.4
B-19	5.0	*	25.5
B-19	7.0	*	29.5
B-19	9.0	*	32.1
B-20	2.5	112.7	12.4
B-20	5.0	*	12.5
B-20	7.0	*	20.8
B-20	9.0	*	20.9

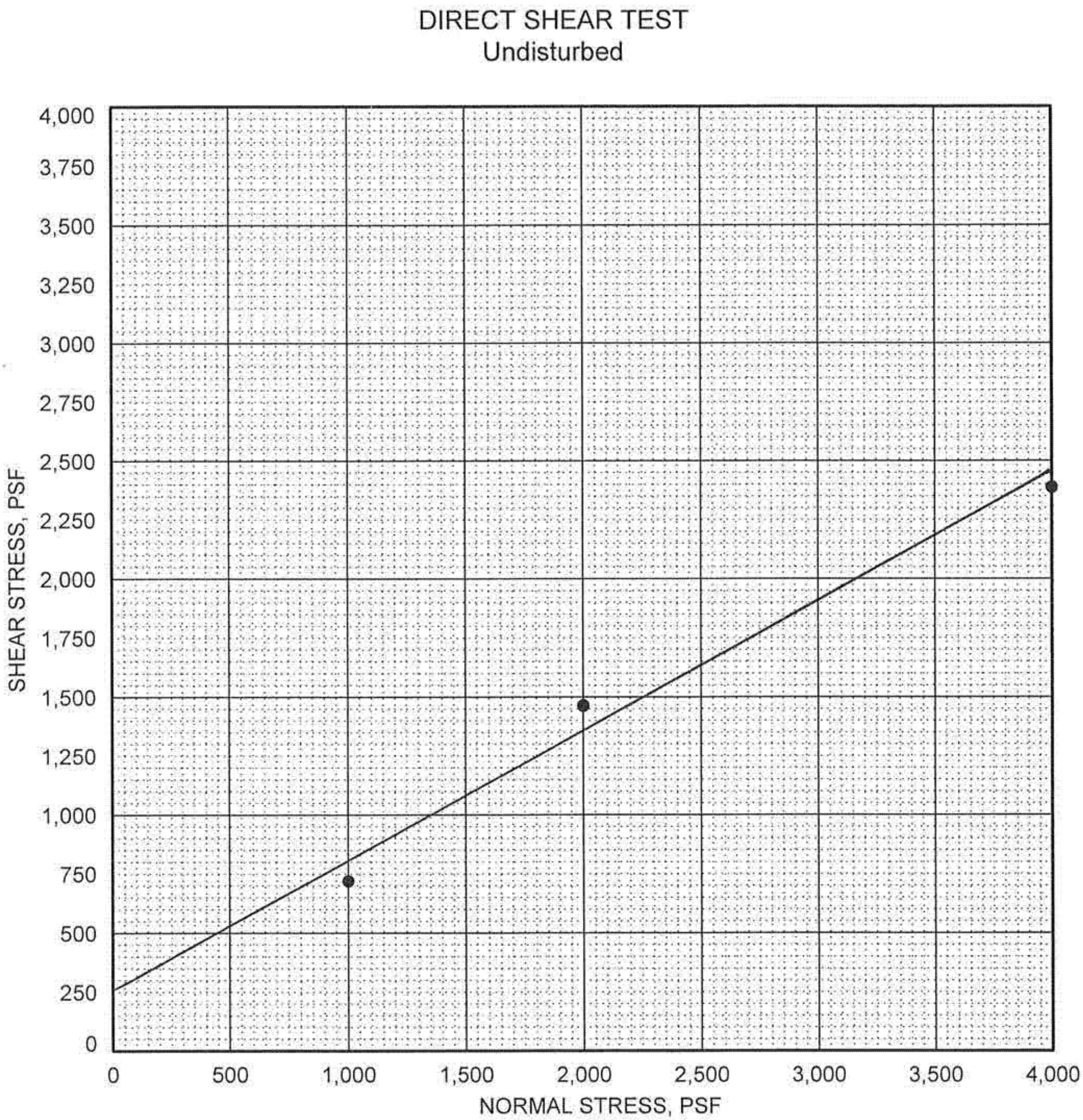
PLATE A
LABORATORY MOISTURE / DENSITY TEST RESULTS

Boring	Depth	Dry Density, pcf	Moisture, %
B-20	11.0	*	25.8
B-21	2.5	103.9	12.1
B-21	5.0	*	11.5
B-21	7.0	*	15.9
B-21	9.0	*	24.7
B-21	11.0	*	31.6
B-21	13.0	*	29.4
B-22	2.5	75.4	14.0
B-22	5.0	*	18.5
B-22	7.0	*	23.8
B-22	9.0	*	17.5
B-22	11.0	*	19.3
B-22	13.0	*	20.2
B-22	15.0	*	20.5
B-23	1.0	*	8.1
B-23	2.5	71.2	17.0
B-23	5.0	*	21.8
B-23	7.0	*	27.6
B-23	9.0	*	25.6
B-23	11.0	*	28.5
B-23	13.0	*	27.7
B-23	15.0	*	28.4
B-24	2.5	*	10.0
B-24	5.0	99.5	21.7
B-24	7.0	*	28.9
B-24	9.0	*	17.2
B-24	11.0	*	21.5
B-24	13.0	*	21.5
B-24	15.0	*	28.2
B-25	5.0	*	15.1
B-25	7.5	*	22.7
B-25	10.0	*	22.2

PLATE A
LABORATORY MOISTURE / DENSITY TEST RESULTS

Boring	Depth	Dry Density, pcf	Moisture, %
B-25	15.0	*	25.5
B-25	20.0	*	25.3
B-25	25.0	*	30.4
B-25	30.0	*	25.0
B-25	35.0	*	24.5
B-25	40.0	*	26.9
B-25	50.0	*	26.1

Note (*): Small bulk soil samples for moisture determination only



Mt. Signal Solar, Seeley, CA	COHESION	258	psf.
	FRICTION ANGLE	28.0	degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-2	2.5			

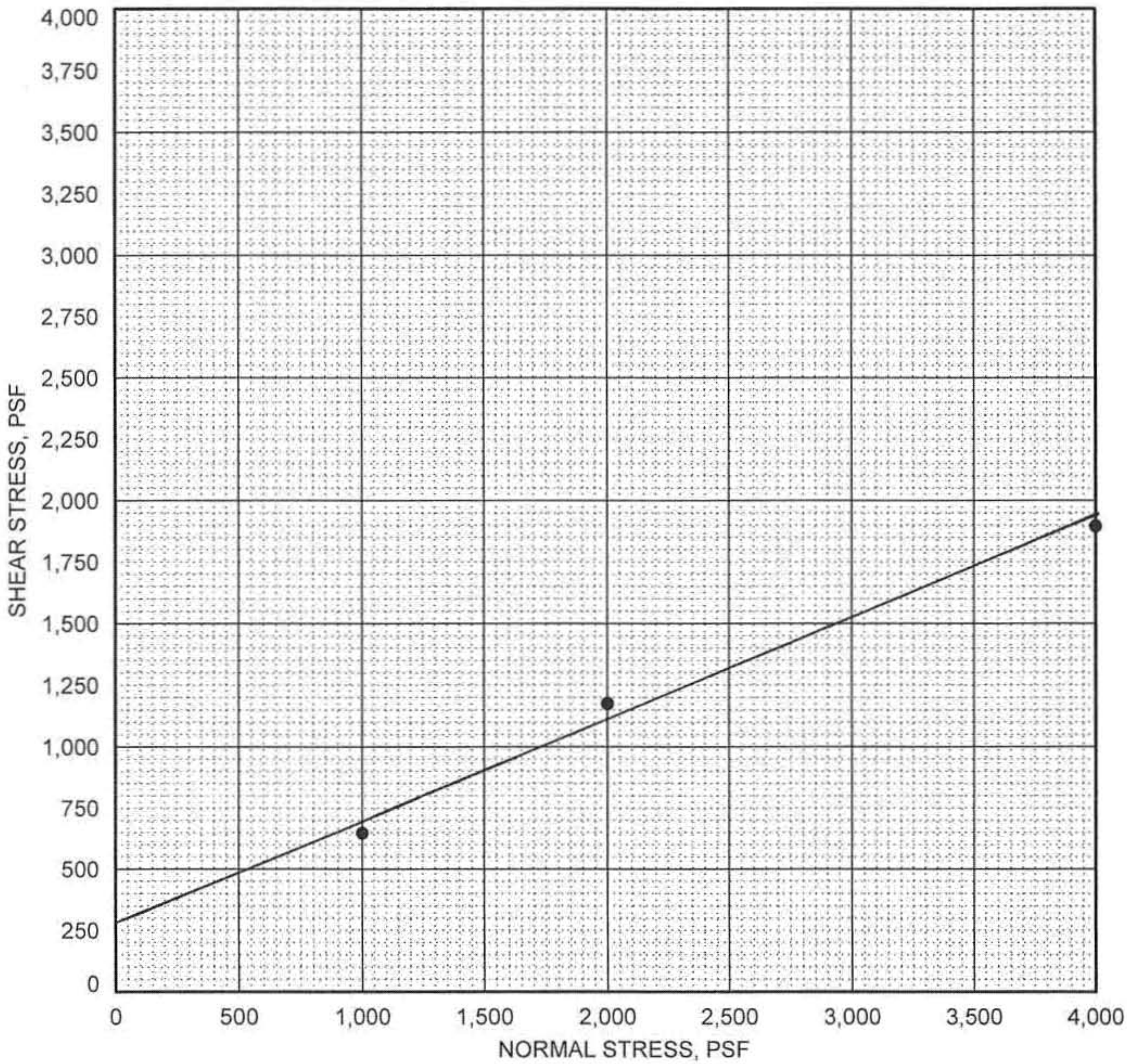
DIRECT SHEAR TEST

SoilWorks, Inc.
3130 Airway Avenue
Costa Mesa, CA 92626 714-668-5600

P.N. 114-057-10 **DATE 6/7/11**

PLATE B-1

DIRECT SHEAR TEST
Undisturbed



Mt. Signal Solar, Seeley, CA	COHESION 288 psf.
	FRICTION ANGLE 22.0 degrees

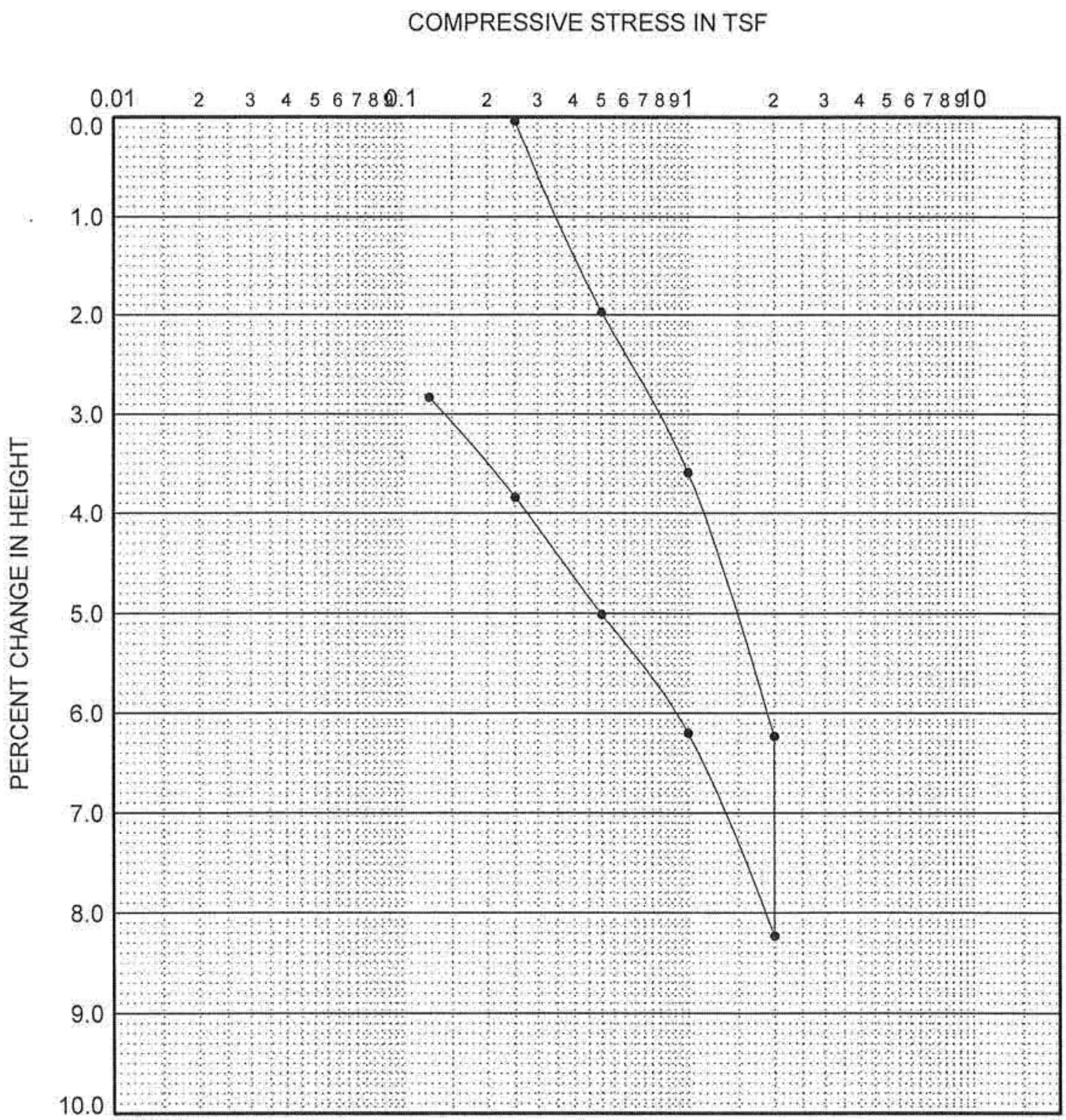
symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-12	5.0			

DIRECT SHEAR TEST

SoilWorks, Inc.
3130 Airway Avenue
Costa Mesa, CA 92626 714-668-5600

P.N. 114-057-10 **DATE 6/7/11**

PLATE B-2



Boring	Depth(ft.)	Dry Density	in situ Moist.	-200 sieve	Group Symbol	Soil Description
B-11	10.0					Mt. Signal Solar, Seeley, CA

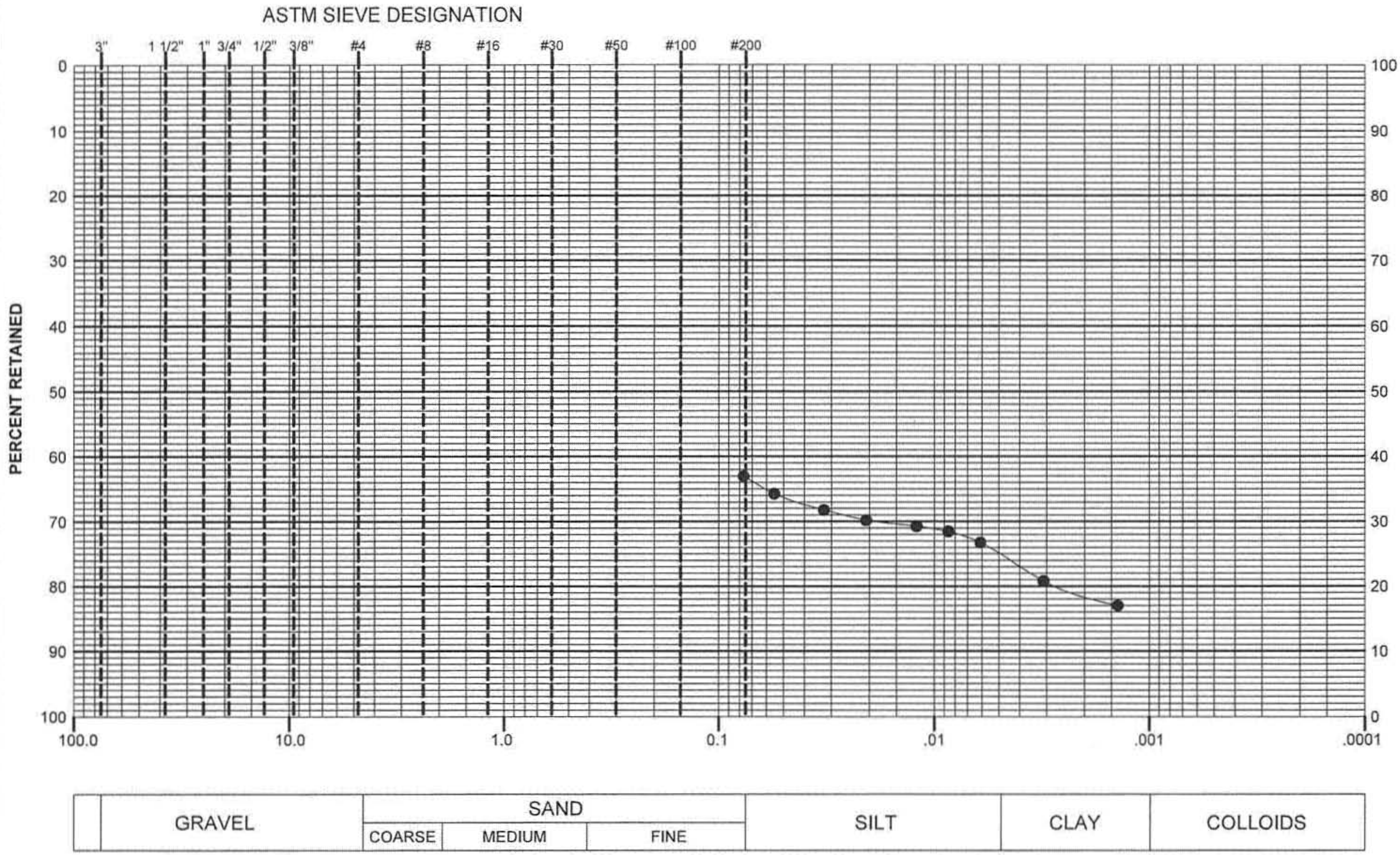
WATER ADDED AT 2 TSF.

CONSOLIDATION CURVE

SoilWorks, Inc.
3130 Airway Avenue
Costa Mesa, CA 92626
714-668-5600

PN 114-057-10 **DATE 6/7/11**

PLATE B-3



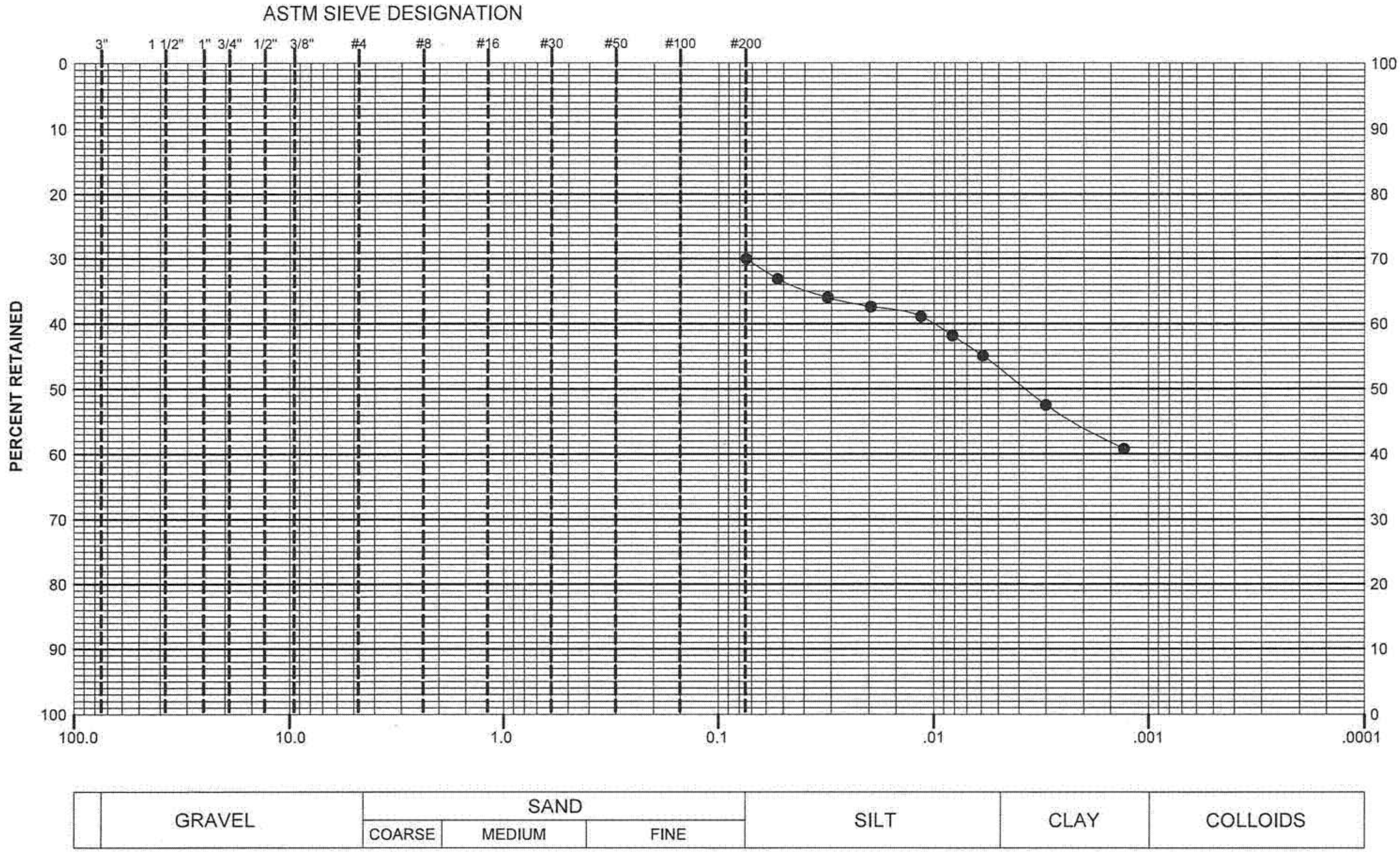
Symbol	Boring or Trench	Depth (ft.)	L.L.	P.L.	P.I.	% Passing #200 sieve	Group Symbol	Typical Names
●	B-1	0 - 4						

GRAIN SIZE DISTRIBUTION

SoilWorks, Inc.
3130 Airway Avenue
Costa Mesa, CA 92626 714-668-5600

P.N. 114-057-10 **DATE 6/7/11**

PLATE B-4



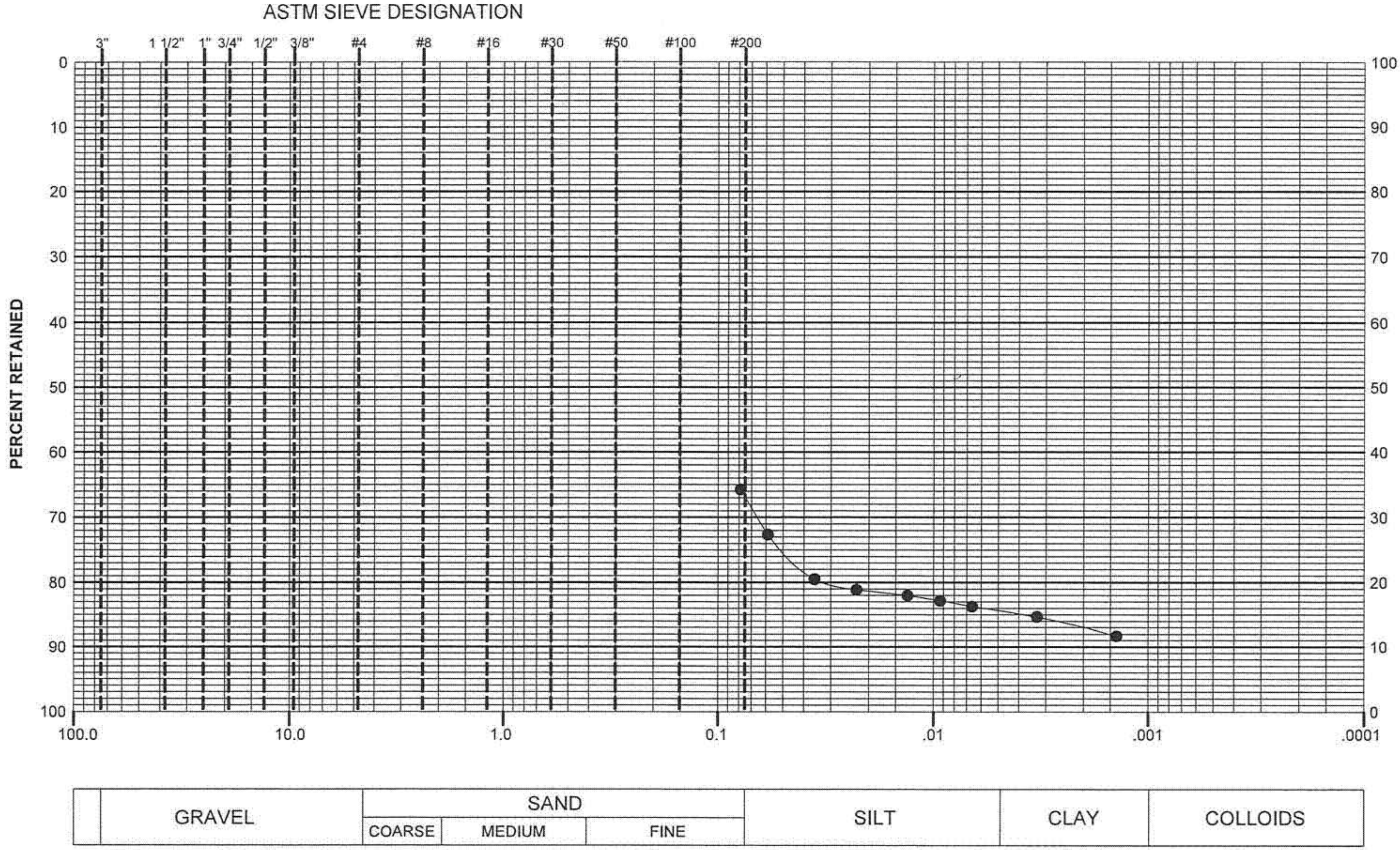
Symbol	Boring or Trench	Depth (ft.)	L.L.	P.L.	P.I.	% Passing #200 sieve	Group Symbol	Typical Names
●	B-1	6-10						

GRAIN SIZE DISTRIBUTION

SoilWorks, Inc.
3130 Airway Avenue
Costa Mesa, CA 92626 714-668-5600

P.N. 114-057-10 **DATE 6/7/11**

PLATE B-5



Symbol	Boring or Trench	Depth (ft.)	L.L.	P.L.	P.I.	% Passing #200 sieve	Group Symbol	Typical Names
●	B-1	25-35						

GRAIN SIZE DISTRIBUTION

SoilWorks, Inc.
3130 Airway Avenue
Costa Mesa, CA 92626 714-668-5600

P.N. 114-057-10 **DATE 6/7/11**

APPENDIX C:

TEST RESULTS

Corrosivity by HDR/Schiff
Thermal Resistivity by Geothermal USA

June 14, 2011 via email: Worthy10@aol.com

EGA CONSULTANTS, LLC.
375-C Monte Vista Avenue
Costa Mesa, CA 92627

Attention: Mr. David A. Worthington, C.E.G.

Re: Soil Corrosivity Study
Mt. Signal Solar
Seeley, California
HDR|Schiff #11-0424SCS

INTRODUCTION

Field and laboratory tests have been completed for the subject project. The proposed construction consists of a solar power plant located in Seeley, California. Perched groundwater was generally encountered by the consultant during the drilling of 25 borings in April of 2011between 10-15 below grade.

Laboratory tests have been completed on two soil samples provided by EGA Consultants. The purpose of these tests was to determine the electrical resistivity of the soil for grounding design and to determine if the soil might have deleterious effects on underground utility piping and concrete structures.

For grounding design, soil electrical resistivity values are provided as 'data only' in order to aid other engineers in their design.

The scope of this study is limited to a determination of soil corrosivity and general corrosion control recommendations for materials likely to be used for construction. Our recommendations do not constitute, and are not meant as a substitute for, design documents for the purpose of construction. If the architects and/or engineers desire more specific information, designs, specifications, or review of design, HDR|Schiff will be happy to work with them as a separate phase of this project.

TEST PROCEDURES

The electrical resistivity of the soil was measured in place at five locations using the Wenner Four Pin Method per ASTM G57. This procedure gives the average resistivity to a depth equal to the spacing between the pins. Approximate pin spacings of 2.5, 5, 20, and 50 feet were used so that variations with depth could be evaluated. Strata resistivities were calculated from resistance data using the Barnes Procedure. Test results are shown in Table 1. The boring location map provided by EGA Consultants is included. HDR|Schiff performed Wenner pin tests adjacent to boring locations B-3 and B-24 (see figure attached). HDR|Schiff performed the two Wenner Four pin tests.

The electrical resistivity of each sample was measured in a soil box per ASTM G187 in its as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. Thc pII of the saturated samples was measured per ASTM G51. A 5:1 water:soil extract from each sample was chemically analyzed for the major soluble salts commonly found in soil per ASTM D4327, D6919, and D513. Test results are shown in Table 2.

SOIL CORROSIVITY

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:[1]

Soil Resistivity in ohm-centimeters	Corrosivity Category
Greater than 10,000	Mildly Corrosive
2,000 to 10,000	Moderately Corrosive
1,000 to 2,000	Corrosive
0 to 1,000	Severely Corrosive

Other soil characteristics that may influence corrosivity towards metals are pH, soluble salt content, soil types, aeration, anaerobic conditions, and site drainage.

The average resistivities and stratum resistivities measured in the field were in the mildly to severely corrosive categories.

Electrical resistivities measured in the laboratory were in the mildly corrosive category with as-received moisture. When saturated, the resistivities were in the moderately to severely corrosive categories. The resistivities dropped considerably with added moisture because the samples were dry as-received.

Soil pH values varied from 7.6 to 8.1. This range is mildly to moderately alkaline.[2] These values do not particularly increase soil corrosivity.

---

[1] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, pp. 166–167.*

[2] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, p. 8.*

The soluble salt content of the samples ranged from low to very high. The soluble salt content was very high in the sample from boring B-3 @ 0-4' and less in the other. Chloride and sulfate salts were the predominant constituents. Chloride is particularly corrosive to ferrous metals, and in the higher concentrations measured in the soil samples, chloride can overcome the corrosion inhibiting effect of concrete on reinforcing steel. High concentrations of sulfate, as was measured in the soil samples, can react with components in concrete to cause degradation and reduced strength in a mechanism known as sulfate attack.

The ammonium and nitrate concentration was high enough to be aggressive to copper.

Tests were not made for sulfide and negative oxidation-reduction (redox) potential because these samples did not exhibit characteristics typically associated with anaerobic conditions.

This soil is classified as severely corrosive to ferrous metals, aggressive to copper, severe for sulfate attack on concrete, and aggressive with respect to exposure of reinforcing steel to the migration of chloride.

CORROSION CONTROL RECOMMENDATIONS

The life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc., in addition to soil corrosivity, and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

The following recommendations are based on the soil conditions discussed in the Soil Corrosivity section above. Unless otherwise indicated, these recommendations apply to the entire site or alignment.

Steel Pipe

Implement *all* the following measures:

1. Underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints should be bonded for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.
2. Install corrosion monitoring test stations to facilitate corrosion monitoring and the application of cathodic protection:
    a. At each end of the pipeline.
    b. At each end of all casings.
    c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.
3. To prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection, electrically isolate each buried steel pipeline per NACE Standard SP0286 from:
    a. Dissimilar metals.

   b. Dissimilarly coated piping (cement-mortar vs. dielectric).
   c. Above ground steel pipe.
   d. All existing piping.
4. Apply a suitable dielectric coating intended for underground use such as:
   a. Polyurethane per AWWA C222 *or*
   b. Extruded polyethylene per AWWA C215 *or*
   c. A tape coating system per AWWA C214 *or*
   d. Hot applied coal tar enamel per AWWA C203 *or*
   e. Fusion bonded epoxy per AWWA C213.
5. Apply cathodic protection to steel piping as per NACE Standard SP0169.

NOTE: Some steel piping systems, such as for oil, gas, and high-pressure piping systems, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Iron Pipe

Implement *all* the following measures:

1. Electrically insulate underground iron pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE Standard SP0286.
2. Bond all nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.
3. Install corrosion monitoring test stations to facilitate corrosion monitoring and the application of cathodic protection:
   a. At each end of the pipeline.
   b. At each end of any casings.
   c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.
4. Apply a suitable coating intended for underground use such as:
   a. Polyethylene encasement per AWWA C105; *or*
   b. Epoxy coating; *or*
   c. Polyurethane; *or*
   d. Wax tape.

   NOTE: The thin factory-applied asphaltic coating applied to ductile iron pipe for transportation and aesthetic purposes does not constitute a corrosion control coating.
5. Apply cathodic protection to cast and ductile iron piping as per NACE Standard SP0169.

Copper Tubing

Protect buried copper tubing by *one* of the following measures:

1. Prevention of soil contact. Soil contact may be prevented by placing the tubing above ground or encasing the tubing using PVC pipe with solvent-welded joints.
2. Installation of a factory-coated copper pipe with a minimum 25-mil thickness such as Kamco's Aqua Shield™, Mueller's Streamline Protec™, or equal. The coating must be continuous with no cuts or defects.

3. Installation of 12-mil polyethylene pipe wrapping tape with butyl rubber mastic over a suitable primer. Protect wrapped copper tubing by applying cathodic protection per NACE Standard SP0169.

Plastic and Vitrified Clay Pipe

1. No special precautions are required for plastic and vitrified clay piping placed underground from a corrosion viewpoint.
2. Protect all metallic fittings and valves with wax tape per AWWA C217 or epoxy.

All Pipe

1. On all pipes, appurtenances, and fittings not protected by cathodic protection, coat bare metal such as valves, bolts, flange joints, joint harnesses, and flexible couplings with wax tape per AWWA C217 after assembly.
2. Where metallic pipelines penetrate concrete structures such as building floors, vault walls, and thrust blocks use plastic sleeves, rubber seals, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

Concrete

1. Protect concrete structures and pipe from sulfate attack in soil with a severe sulfate concentration, 0.2 to 2.0 percent. Use Type V cement, a maximum water/cement ratio of 0.45, and minimum strength of 4500 psi per applicable code.[3,4,5,6]
2. Chloride levels were measured at levels[7] where additional protective measures are required for concrete. Protect steel and iron embedded in concrete structures and pipe from chloride

[3] *1997 Uniform Building Code (UBC) Table 19-A-4*

[4] *2006 International Building Code (IBC) which refers to American Concrete Institute (ACI-318) Table 4.3.1*

[5] *2006 International Residential Code (IRC) which refers to American Concrete Institute (ACI-318) Table 4.3.1*

[6] *2007 California Building Code (CBC) which refers to American Concrete Institute (ACI-318) Table 4.3.1*

attack. This applies to such items as reinforcing steel and anchor bolts but not post-tensioning strands and anchors. The protection could be one or a combination of the following:

a. Protective Concrete - A concrete mix designed to protect embedded steel and iron that should be based on the following parameters: 1) a chloride content of 3,600 ppm in the soil; 2) the desired service life; and 3) concrete cover. A protective concrete mix may include a corrosion inhibitor admixture and/or silica fume admixture.

b. Waterproof Concrete - Waterproofing for concrete could be a gravel capillary break under the concrete, a waterproof membrane, and/or a liquid applied waterproof barrier coating such as Grace PrePrufe® product. Visqueen, similar rolled barriers, or bentonite-based membranes are not viable waterproofing systems, from a corrosion standpoint.

c. Coat Embedded Metal - A coating for embedded steel and iron could be an epoxy coating applied to the metal. Purple fusion bonded epoxy (FBE) (ASTM A934) intended for prefabricated reinforcing steel reinforcing steel is suitable. The green flexible FBE (ASTM A775) is not recommended.

d. Cathodic Protection - Cathodic protection is most practical for pipelines and must be designed for each application. The amount of cathodic protection current needed can be minimized by coating the steel or iron.

3. Due to the high perched ground water encountered at this site, cyclical or continual wetting may be an issue. Any contact between concrete structures and ground water should be prevented. Contact can be prevented with an impermeable waterproofing system.

Resistivity for Electrical Grounding System

1. Refer to Table 1 for average soil resistivity values to depth for design of electrical ground grids and ground rods for the proposed site.

Steel Piles

1. Steel piles are most susceptible to corrosion in disturbed soil where oxygen is available. Further, a dissimilar environment corrosion cell would exist between the steel embedded in concrete, such as pile caps and the steel in the soil. In the cell, the steel in the soil is the anode (corroding metal), and the steel in concrete is the cathode (protected metal). This cell can be minimized by coating the part of the steel piles that will be embedded in concrete to prevent contact with concrete and reinforcing steel.

---

[7] *Design Manual 303: Concrete Cylinder Pipe. Ameron. p.65*

Alternative 1: Coated Piles

Coat the piles with coal tar epoxy or polyurethane recommended by the manufacturer for the steel piles; apply to 25 mil thickness per manufacturer's recommendations.

Alternative 2: Coat Upper Portion of Pile

Coat the piles from the top to 10 feet below the water table. For the remainder use a corrosion allowance of 0.05 inches.

Alternative 3: Bare Piles

Corrosion rates in disturbed soil, such as fill and loose native soil, and/or within 3 feet of the water table are estimated to be 0.006 inches per year for single side corrosion or 0.167 inches per year for double sided based upon soil similarities to published data.[8] Therefore, for a twenty-five year design life provide a corrosion allowance of 0.42 inches above what is required for structural capacity for H-piles and 0.21 inches for pipe piles with sealed bottoms. In undisturbed soil use a corrosion allowance of 0.05 inches.

All Steel Piles

1. After driving, cutoff, and welding any steel to be welded to the piles, coat exposed steel in the piles and bare steel welded to the piles to prevent pile/concrete contact and to prevent electrical contact between the piles and bare steel such as reinforcing steel and anchor bolts. Abrasive blast and use at least 8 mils dry film thickness of polyurethane or coal tar epoxy intended for underground use or coat with mastic such as Polyken 900 12-mil tape wrap with a 1027 primer or equivalent. Irregular shaped surfaces that can't be coated with the tape wrap can be coated with wax tape per AWWA C217. The coating should be allowed to cure at least hard enough to prevent damage by the placement of reinforcing steel and concrete before those materials are placed.

2. Steel pipe pile interiors may be protected by filling them with concrete or hermetically sealing the ends.

[8] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, pp. 19–20, 110.*

CLOSURE

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,
SCHIFF ASSOCIATES

Leobardo Solis

Steven R. Fox, P.E.

REGISTERED PROFESSIONAL ENGINEER
STEVEN R. FOX
CR 1137
EXP 3/31/13
CORROSION
STATE OF CALIFORNIA

Enc: Table 1-Soil Electrical Resistivity Field Tests
Table 2-Laboratory Tests on Soil Samples
Boring Map

Table 1 - Soil Resistivity Field Tests

EGA Consultants, LLC
Mt. Signal Solar
HDR|Schiff #11-0424SCS
17-May-11

LOCATION	DEPTH (feet)	MEASURED RESISTANCE (ohms)	AVERAGE RESISTIVITY TO DEPTH (ohm-cm)	STRATUM RESISTIVITY (ohm-cm)
				239
B-3 North/South Direction	2.5	0.50	239	
				305
	5.0	0.28	268	
				1,609
	10.0	0.24	460	
				328
	20	0.10	383	
				2,298
	50	0.08	766	
				196
B-3 East/West Direction	2.5	0.41	196	
				307
	5.0	0.25	239	
				1,755
	10	0.22	421	
				421
	20	0.11	421	
				527
	50	0.05	479	
				1,628
B-24 North/South Direction	2.5	3.4	1,628	
				2,325
	5.0	2.0	1,915	
				7,660
	10	1.6	3,064	
				6,741
	20	1.1	4,213	
				5,076
	50	0.49	4,692	

CORROSIVITY LEGEND (FERROUS METALS)			
Mildly	Moderately	Corrosive	Severely

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

www.hdrinc.com
Corrosion Control and Condition Assessment (C3A) Department

Table 1 - Soil Resistivity Field Tests

EGA Consultants, LLC
Mt. Signal Solar
HDR|Schiff #11-0424SCS
17-May-11

LOCATION	DEPTH (feet)	MEASURED RESISTANCE (ohms)	AVERAGE RESISTIVITY TO DEPTH (ohm-cm)	STRATUM RESISTIVITY (ohm-cm)
B-24 East/West Direction	2.5	4.1	1,963	1,963
	5.0	2.6	2,490	3,402
	10	1.5	2,873	3,395
	20	0.9	3,256	3,756
	50	0.52	4,979	7,695

CORROSIVITY LEGEND (FERROUS METALS)			
Mildly	Moderately	Corrosive	Severely

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

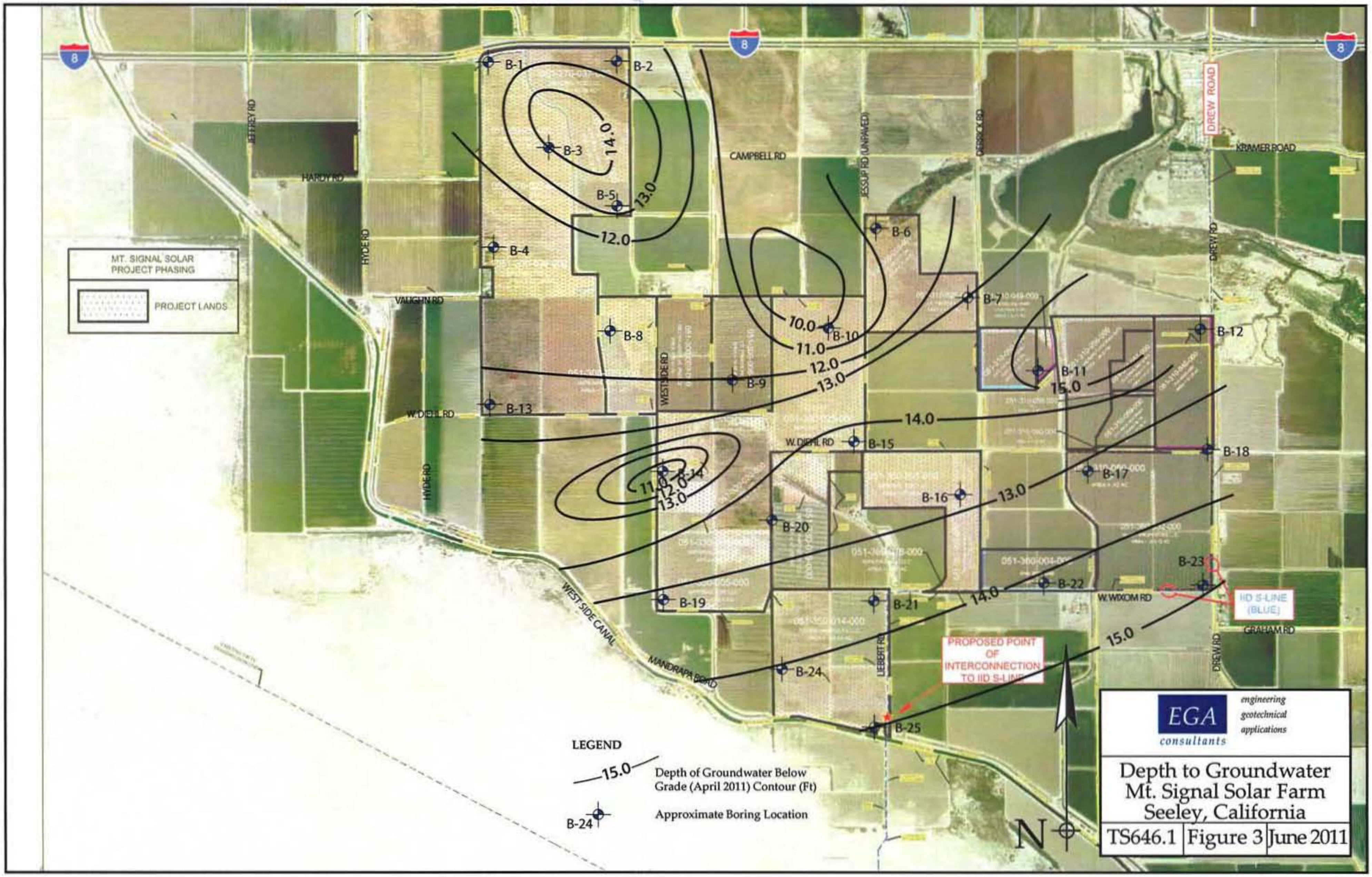
Table 2 - Laboratory Tests on Soil Sample(s)

EGA Consultants, LLC
Mt. Signal Solar
Your #TS646.1, HDR|Schiff #11-0424SCS
11-May-11

Sample ID			B-3 @ 0'-4' ML/CL	B-24 @ 0'-3' ML/CL
Resistivity		**Units**		
as-received		ohm-cm	27,600	72,000
minimum		ohm-cm	141	2,990
pH			7.6	8.1
Electrical Conductivity		mS/cm	5.34	0.11
Chemical Analyses				
Cations				
calcium	Ca^{2+}	mg/kg	2,295	57
magnesium	Mg^{2+}	mg/kg	305	11
sodium	Na^{1+}	mg/kg	4,005	63
potassium	K^{1+}	mg/kg	154	13
Anions				
carbonate	CO_3^{2-}	mg/kg	ND	24
bicarbonate	HCO_3^{1-}	mg/kg	98	55
fluoride	F^{1-}	mg/kg	1.1	0.5
chloride	Cl^{1-}	mg/kg	3,541	21
sulfate	SO_4^{2-}	mg/kg	8,573	87
phosphate	PO_4^{3-}	mg/kg	ND	2.3
Other Tests				
ammonium	NH_4^{1+}	mg/kg	32	1.1
nitrate	NO_3^{1-}	mg/kg	115	19
sulfide	S^{2-}	qual	na	na
Redox		mV	na	na

Minimum resistivity per CTM 643, Chlorides per CTM 422, Sulfates per CTM 417

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed



Depth to Groundwater
Mt. Signal Solar Farm
Seeley, California

TS646.1	Figure 3	June 2011

GeothermUSA

http://www.geotherm.net

6354 Clark Ave.
Dublin, CA 94568
Tel: 925-999-9232
Fax: 925-999-8837
info@geothermusa.com

May 10, 2011

EGA Consultants
375-C Monte Vista Ave
Costa Mesa, CA 92627
Attn: David A. Worthington, PEG

Re: Thermal Analysis of Native Soil Sample
El Centro Solar Project – El Centro, CA

The following is the report of thermal dryout characterization tests conducted on one (1) undisturbed tube sample of native soil.

Thermal Resistivity Tests: A laboratory type thermal probe with a thermistor type temperature sensor was installed in the sample. A series of thermal resistivity measurements were made to establish the thermal dryout characteristics. The tests were conducted in accordance with IEEE Standard using our Thermal Property Analyzer Model TPA-2000. The thermal dryout curve is presented in **Figure 1**.

Test Results:

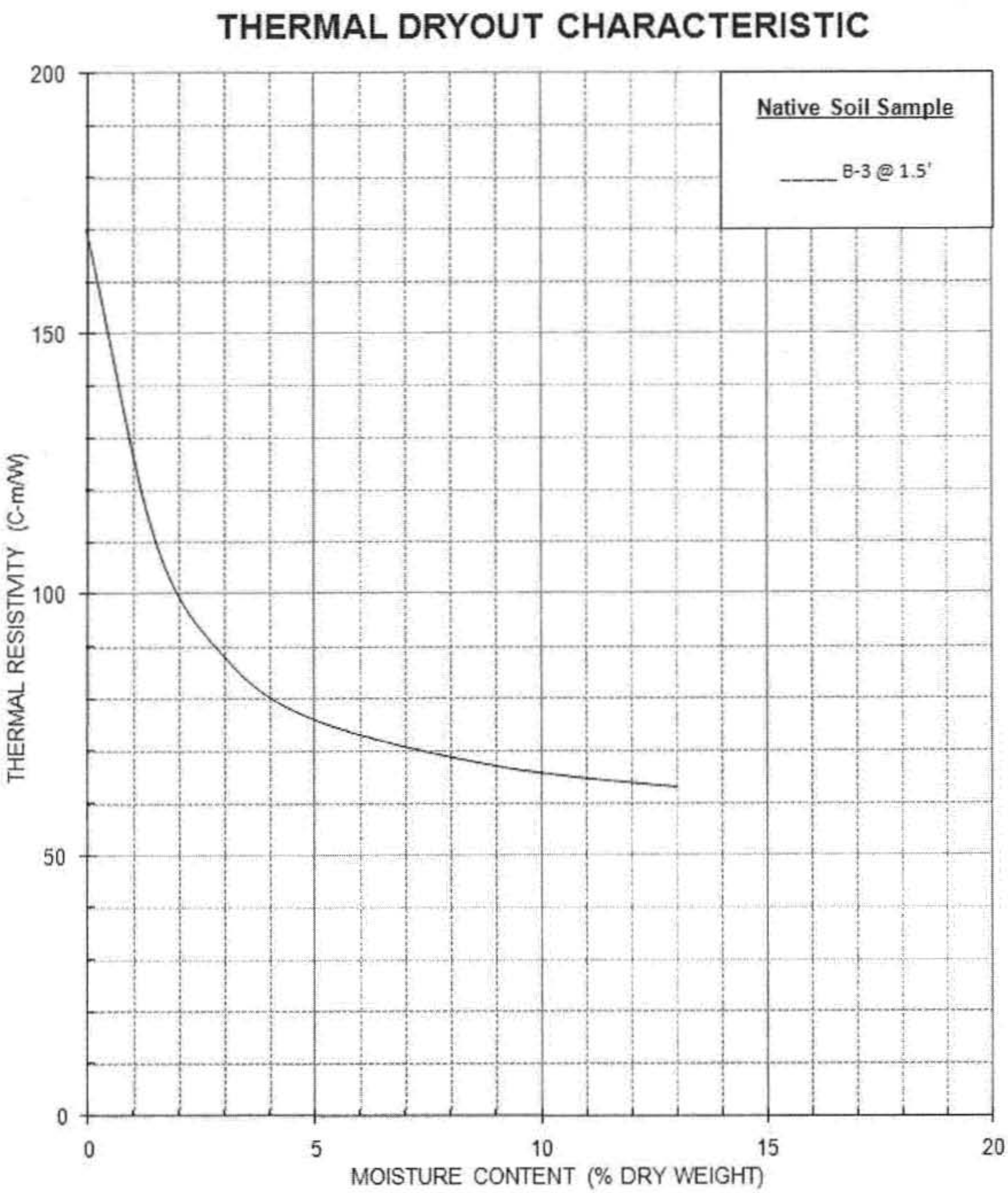
Sample ID	Visual Description	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		Wet	Dry		
B-3 @ 1.5'	Red Brown Silty Clay/Clayey SILT with trace micaceous fine sand	63	170	13	94

Comments: The thermal characteristic depicted in Figure 1 applies for the material at the test dry density reported above.

Geotherm USA

Nimesh Patel

Please Note: All samples will be disposed of after 5 days from date of report.



EGA Consultants

Thermal Analysis of Native Soil

El Centro Solar Project - El Centro, CA

May 2011 **Figure 1**

(1) RE: NATIVE SOIL SAMPLE (UNDISTURBED - BRASS TUBE) FOR THERMAL ANALYSIS (THERMAL RESISTIVITY, W/ THERMAL DRY-OUT CURVES, ASTM D5334).

GEOTHERM USA

Chain Of Custody Form

shipped 4/29/11 VIA FED EX ($60.00)

Please include this form in a Ziploc bag for each sample submitted:

Shipper -Company Name: EGA CONSULTANTS

Shipper -Contact Name: DAVID WORTHINGTON

Project Name: EL CENTRO SOLAR

Project Location: EL CENTRO, CA

Sample Location/ID: B-3 @ 1.5'

Sample Collection Date: 4/26/11 Sample Depth: 1.5'

Soil Description: RED. BRN. SILTY CLAY / CLAYEY SILT (ML/CL) W/ TRACE MICACEOUS FINE SAND.

Does the sample require recompaction: __Yes? ✓No?

- If the sample requires recompaction:

1. What is the % compaction required?

    a. _____ (85%, 90%, 95% or specific density)

2. What is the starting moisture content?

    a. ____ As Received/In-situ?

    b. ____ Optimum?

EGA consultants
engineering geotechnical applications

David A. Worthington
Principal Engineering Geologist
CEG 2124

375-C Monte Vista Avenue • Costa Mesa, CA 92627
Direct Line: (949) 642-9309 Fax: (949) 642-1290
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APPENDIX E

CULTURAL RESOURCES REPORTS

CULTURAL RESOURCES REPORT

INVENTORY REPORT OF THE CULTURAL RESOURCES RECORDED WITHIN THE CAMPO VERDE SOLAR PROJECT, IMPERIAL COUNTY, CALIFORNIA

Prepared for:

First Solar, Inc.
350 West Washington St, Ste 600
Tempe, AZ, 85281-1496

Prepared by:

Patricia T. Mitchell, M.A., RPA

kp environmental, LLC.
2387 Montgomery Avenue
Cardiff By The Sea, California 92007

December 30, 2011

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LIST OF ACRONYMS

AC	Alternating Current
ADI	Area of Direct Impacts
AMS	Accelerator Mass Spectrometry
APE	Area of Potential Effects
CEQA	California Environment Quality Act
CCR	California Code of Regulations
CRHR	California Register of Historical Resources
DC	Direct Current
EPG	EPG, Inc.
ESA	Environmentally Sensitive Area
Gen-tie	Generation-tie line
GPS	Global Positioning Systems
HPMP	Historic Properties Management Plan
HPTP	Historic Properties Treatment Plan
KPE	kp environmental, LLC
kV	kilovolts
NAGPRA	Native American Graves Protection and Repatriation Act
NEMA	National Electric Manufacturers Association
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
O&M	Operations and Maintenance
PCS	Power Conversion Stations
PPA	Power Purchase Agreement
PV	Photovoltaic
PVCS	Photovoltaic Combining Switchgear
ROW	Right-of-Way
RPS	Renewable Portfolio Standard
SCADA	Supervisory Control and Data Acquisition
SCC	Site Communication Center
SDG&E	San Diego Gas & Electric
SHPO	State Historic Preservation Officer
UPS	Uninterruptible Power Supply
USDI	U.S. Department of the Interior

DEFINITIONS

Area of potential effects (APE) means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR §800.16(d)).

California Register (CRHR) means the California Register of Historical Resources maintained by the State Historic Preservation Officer.

Environmentally Sensitive Areas (ESA) are locations of identified resources within a project APE that are to be protected by avoidance or restrictions on construction activities.

National Historic Preservation Act (NHPA) (Public Law 89-665; 16 USC 470 et seq.) became law in 1966 and consists of legislation creating the National Register of Historic Places (NRHP), the list of National Historic Landmarks and the posts of State Historic Preservation Officers (SHPO) with the intent of preserving historical and archaeological sites.

National Register (NRHP) means the National Register of Historic Places maintained by the Secretary of the Interior (36 CFR §800.16(q)).

Section 106 of the National Historic Preservation Act (Section 106) set forth national policy for recognizing and protecting historic properties. It established the National Register of Historic Places (NRHP), State Historic Preservation Officers (SHPO) and programs, and the Advisory Council on Historic Preservation (ACHP).

Undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval (36 CFR §800.16(y)).

NATIONAL ARCHAEOLOGICAL DATABASE (NADB) TITLE PAGE

Author: Patricia T. Mitchell

Company: kp environmental, LLC, 2387 Montgomery Avenue, Cardiff By The Sea, CA 92007, 619.241.3330

Report Date: December 30, 2011

Report Title: Inventory Report of the Cultural Resources Recorded within the Campo Verde Solar Project, Imperial County, California

Submitted by: kp environmental, LLC, 2387 Montgomery Avenue, Cardiff By The Sea, CA 92007

Prepared for: First Solar, Inc.

USGS Quadrangles: Mt. Signal, Seeley, Plaster City

Field Survey: approximately 1,990 acres

Project Type: Intensive Pedestrian Field Survey and Cultural Resource Inventory

Key Words: Pedestrian survey, cultural resource inventory, 1,990 acres, Mt Signal quad, Seeley quad, Plaster City quad, Section 3, Section 19, Section 20, Section 21, Section 22, Section 26, Section 27, Section 28, Section 29, Section 33, Section 34, Section 35, Section 41, Section 46, Section 47, Section 51, Section 54, Section 81, Section 82, Section 83, Section 107, Section 295, Township 16 South, Range 12 East, Township 16 1/2 South, Range 12 East, Township 17 South, Range 12 East, Cahuilla, Cocopah, Kamia/Kumeyaay, Quechan, prehistoric, historic, isolates, pottery, buffware, kaolinite pipe stem, Westside Main Canal (CA-IMP-7834), Foxglove Canal (CA-IMP-8821), Wormwood Canal (P-13-008983), Dixie Drains 2, 3, & 4, Dixie Lateral 1 (P-13-012688), Fern Canal and Fern Drain (P-13-012689), Forget-Me-Not Canal, (P-13-012690), Fig Canal (P-13-012693), Diehl Drain (P-13-013747), Fig Drain (P-13-013748), Westside Drain (P-13-013760), Wixom Drain (P-13-013761), CA-IMP-1403, CA-IMP-3176, CA-IMP-5297, CA-IMP-5298, P-13-013749, P-13-013750, P-13-013751, P-13-013752, P-13-013753, P-13-013754/CA-IMP-11758, P-13-013755, P-13-013756, P-13-013757, P-13-013759, modern memorial.

MANAGEMENT SUMMARY

The Campo Verde Solar Project is a proposed solar photovoltaic energy-generating facility located in Imperial County approximately 7 miles southwest of the community of El Centro, California. The Project Site is south of I-8 and west of Drew Road and northeast of the Westside Main Canal. The Campo Verde Solar Project site includes parcels that total approximately 1,990 acres of private lands that have been used for agriculture.

The PV modules will produce the electricity generated by the Project by converting sunlight directly into electricity. The major equipment in the solar field includes the following:

- First Solar PV modules
- Arrays
- Single-axis trackers or fixed-tilt supports
- Power Conversion Stations (PCS)
- 1000V DC collection system comprised of underground cabling and combiner boxes
- Medium voltage (12 kV and/or 34.5 kV) collection system
- Photovoltaic Combining Switchgear (PVCS)
- A Project Substation with 34.5 kV to 230kV/220kV step-up transformer(s) and switchyard
- Meteorological stations
- O&M buildings with parking and other associated facilities
- Telecommunications equipment

The Project will be interconnected to the regional transmission system via a new line constructed to the Imperial Valley Substation. This interconnection will be accomplished via one of three potential options – two requiring rights-of-way across public lands managed by the Bureau of Land Management and one located totally on private lands. The Non-BLM option being considered is to develop a single-circuit 230 kV line originating from the western side of the Project site. It would cross approximately 1.75 miles of private lands to the west and would utilize available capacity on a line that has an approved right-of-way to the Imperial Valley Substation is analyzed in this CEQA document.

The survey area encompasses approximately 1,015 acres, and included an intensive 100 percent pedestrian survey and inventory of cultural resources on private lands. Existing record search, literature review and previous Class III inventory data already generated for the Campo Verde Solar Project was relied upon to the extent applicable. All work was consistent with BLM policy as per BLM Manual Section 8100 for identifying and recording cultural resources.

Based on the inventory results, 12 sites and 9 isolates are recorded within the Proposed Project Area or project components. Nine isolates and nine irrigation sites are recommended not eligible for the NRHP/CRHR. Even though the nine irrigation sites are recommended not eligible no

impacts to drains or canals are expected. Some may be spanned by transmission lines, but are not expected to be affected, and they would continue to operate.

The Westside Main Canal (CA-IMP-7834) and Westside Drain (P-13-013760) are recommended eligible for the NRHP/CRHR under Criteria A/1 (Davis et al. 2011); however, no impacts to drains or canals are expected. Some may be spanned by transmission lines, but are not expected to be affected, and they would continue to operate.

CA- IMP-7834 and P-13-013760 are recorded within the Proposed Project, and both are also recorded within the Non-BLM Gen-Tie alternative.

If P-13-013754 cannot be avoided through project design, the historic trash scatter site requires additional analysis to determine CRHR eligibility. P-13-013754 is located within the Project APE.

In addition, there is also one non-archaeological cultural feature present within the exterior boundaries of Proposed Campo Verde Solar Project area. The memorial for Margarito Hernandez is not a recorded archaeological or historic site; however, it is a modern cultural feature. If this feature might be impacted by the Proposed Campo Verde Solar Project, management will be coordinating with the landowner for the appropriate treatment for the memorial.

The author also wishes to acknowledge and thank Seth Mallios, Ph.D. from San Diego State University Department of Anthropology for his help with the identification of the 19th century kaolinite pipe stem fragment from site P-13-013754.

1. INTRODUCTION

This report describes the goals, methods, and results of the archaeological survey completed by kp environmental, LLC (KPE) in support of the Campo Verde Solar Project (Project) located on privately held property in an unincorporated area of Imperial County, California (Figure 1, Appendix A). This introductory section presents a description of the Project, the regulatory framework under which the archaeological surveys were conducted, and an introduction to the archaeological investigations pertinent to the Project.

1.1 Project Description

The Project is a proposed solar photovoltaic (PV) energy-generating facility located in Imperial County approximately 7 miles southwest of the community of El Centro, California. Figure 1 (Appendix A) shows the general location of the Project.

The Project is being developed to sell its electricity and all renewable and environmental attributes to an electric utility purchaser under a long-term contract to help meet California Renewable Portfolio Standard (RPS) goals. The applicant has a long-term Power Purchase Agreement (PPA) with San Diego Gas and Electric (SDG&E) to purchase output from the Project.

The Project Site is south of I-8 and west of Drew Road and northeast of the Westside Main Canal. Figure 2 (Appendix A) shows the boundary of the Project Site and the included parcels which total approximately 1,990 acres of private lands that have been used for agriculture.

The Project would use First Solar PV modules that are generally non-reflective and convert sunlight into direct current (DC) electricity. The DC output of multiple rows of PV modules is collected through one or more combiner boxes and directed to an inverter that converts the DC electricity to alternating current (AC) electricity. From the inverter, the generated energy flows to a transformer where it is stepped up to distribution level voltage (approximately 34.5 kilovolts or kV). Multiple transformers are connected in parallel via 34.5 kV lines to the Project substation, where the power will be stepped up to 230 kV. This substation will be located at the southern end of the properties adjacent to Liebert Road. At the Project substation, the Project will interconnect to the grid via a new line constructed from this location to the Imperial Valley Substation approximately 0.75 to 1.00 miles to the south. In addition, the Project may interconnect temporarily to the IID S-Line that traverses the site (Figure 3, Appendix A).

The Project will utilize First Solar's thin-film PV modules in order to produce clean, renewable energy. The PV panels will be mounted either on fixed-tilt supports or on single axis trackers. If mounted on fixed tilt structures, the panels would be arranged into east-west oriented rows throughout the site with panels mounted facing south at angle that optimizes the amount of direct sunlight hitting the panels. Using single-axis horizontal trackers, the panels will be oriented in north-south rows with the panels moving to track the sun as it moves across the sky during the day. The trackers include low voltage electric drive motors, controller equipment, backup power supply, and anemometer towers.

The Project's overall annual availability is expected to be in the range of 99 percent of daylight hours.

A portion of the proposed Project was previously surveyed in 2008 by EPG, Inc (EPG) (Rowe 2008), and the remainder has been surveyed by KPE. This inventory report is a combined effort of both surveys. The EPG survey area encompasses 975 acres in Township 16 South, Range 12 East, Sections 22, 26, 27, 28, 33, 34, 35, 54, and 295 of the Mount Signal quadrangle; and Township 16 ½ South, Range 12 East, Section 3 of the Mount Signal quadrangle (San Bernardino Baseline and Meridian). The KPE survey area encompasses approximately 1,015 acres in Township 16 South Range 12 East, Sections 26, 27, 28, 34, of the Mount Signal quadrangle; Sections 20, 21, 28, 29, 41, 46, 47, 51, 54, 81, 82, 83, and 107 of the Seeley quadrangle; and Sections 19, 20, 19 and 107 of the Plaster City quadrangle (San Bernardino Baseline and Meridian).

1.2 Proposed Project

At full build-out, most of the Project Site will be disturbed by construction of the Project. Temporary construction lay down, construction trailers and parking areas will be provided within the Project Site. Due to the size of the Project Site, the solar field lay down areas will be relocated periodically within the solar field acreage as the solar field is built out.

In addition to the structures associated with the solar field described below, the Project would include one or more operations and maintenance (O&M) buildings. During operations, the O&M buildings would have potable water delivered to the site and a septic system. The design and construction of the buildings, solar arrays (panels, etc.) will be consistent with County building standards.

Solar Project

The PV modules will produce the electricity generated by the Project by converting sunlight directly into electricity. The major equipment in the solar field includes the following:

- First Solar PV modules
- Arrays
- Single-axis trackers or fixed-tilt supports
- Power Conversion Stations (PCS)
- 1000V DC collection system comprised of underground cabling and combiner boxes
- Medium voltage (12 kV and/or 34.5 kV) collection system

- Photovoltaic Combining Switchgear (PVCS)
- A Project Substation with 34.5 kV to 230kV/220kV step-up transformer(s) and switchyard
- Meteorological stations
- O&M buildings with parking and other associated facilities
- Telecommunications equipment

Photovoltaic Solar Modules

Photovoltaic modules will produce all of the electricity generated by the Project facilities. PV panels are non-reflective and convert sunlight directly into DC electricity, therefore consuming no fossil fuels and emitting no pollutants during operations. The Project will utilize First Solar's proprietary thin-film PV technology mounted on tracker units or fixed tilt supports. The principal materials incorporated into the PV modules include glass, steel, and various semiconductor metals. The PV modules absorb over 90 percent of the light received. First Solar is a leading manufacturer of PV modules, headquartered in Tempe, Arizona with offices in California. First Solar's industry-leading pre-funded module collection and recycling program ensures that PV materials stay in the production cycle and out of municipal landfills.

Typical Array

Arrays consist of rows of PV modules on fixed or tracker structures and one PCS. A typical array would be sectioned into quadrants by two 20-foot-wide access corridors, one running north to south, the other east to west. Each array may produce 1.0 to 2.5 MWac. Arrays are repeated to reach the full plant capacity. The PV modules would be electrically connected by wiring harnesses running along the bottom of each table to combiner boxes that collect power from several rows of modules. The combiner boxes would feed DC power from the modules to the PCS via underground cables.

Fixed-Tilt and Tracker Structures

The First Solar PV panels can be mounted on fixed-tilt or horizontal tracking support structures and the Project may utilize one or both systems. Each of these technologies is described below.

Tracker Units

Using horizontal tracker systems, the PV modules are mounted horizontally and are not tilted to the south. The tracker units are arranged in north-south oriented rows and drive motors rotate the solar panels from east to west to follow the sun (on a single axis) throughout the day. The tracker frame will be supported by driven steel posts. The highest point for a tracker is achieved during the morning and evening hours when the trackers are tilted at their maximum angle. When solar modules are roughly parallel to the ground, the overall height of the tracker is a maximum of 11 feet off ground surface. Each tracker unit is approximately 60 feet long and powered by a low voltage, approximately 0.5 horsepower electric drive motor. The motors and actuator are mounted to one of the driven posts and do not require separate foundations for mounting. Hydraulic drive systems will not be used. The motors are only operated periodically during daylight conditions to move the panels. The sound from the tracker motors is less than 65 dB(A) at 3 feet. Within each tracker array, a 33-foot-tall weather station is centrally mounted to monitor wind speed and communicate with the tracker units. This allows for the trackers to rotate to a safe position during high wind activity. The weather station tower is made up of a steel lattice. The lattice structure of the tower reduces the visual impact. Each tower requires a small concrete foundation 3 feet by 3 feet (depending on soil conditions). Each PCS Shelter is equipped with communication equipment to wirelessly communicate with the tracker units to control operation and detect anomalous conditions. The PCS Shelter is also equipped with emergency backup power required to rotate the tracker units if there is a loss of the primary electrical connection from the transmission system. The emergency backup power system may include batteries or a backup generator.

Fixed-Tilt Units

Fixed-tilt arrays are constructed in east-west oriented rows. The modules are positioned at a fixed angle to receive optimal solar energy. The approximate angle would be 25 degrees, which could change slightly during final design. The fixed tilt frame is supported by driven steel posts.

The highest point of fixed tilt modules could be as high as approximately 7 feet off the ground surface. PCS and PVCS: The PV modules are electrically connected by wire harnesses and combiner boxes that collect power from several rows of modules via underground DC cables. These DC cables are then feed to a PCS, comprised of DC to AC inverters and a medium voltage transformer. Two to four inverters and other electrical and communication equipment will be located in a pre-fabricated protective electrical equipment enclosure with adjacent transformer to step up to 34.5 kV. Each enclosure will be approximately 12 feet wide and 10 to 12 feet in height. Each PCS will be connected to one or two transformers to support each array. The enclosure may be air-conditioned. The enclosure and transformer will be shipped to site on skid that will be installed on precast concrete foundation. The inverter and transformer sizes will be selected based on the cost and market availability of these units. The enclosure will have exterior light with motion sensor and fire alarm. It may also include data acquisition and communication equipment, step-down transformers to 120V/480V for tracker motor, laptop or other equipment, and uninterruptible power supply (UPS) batteries. Equipment may be outside, within exterior rated cabinets, or within a structure.

Electrical Collection System

The DC output of multiple rows of PV modules is collected through one or more combiner boxes, and associated electrical wiring which would deliver 1000 V DC power along an underground trench (approximately 3 feet deep and 3 feet wide) to a PCS. Each PCS will be connected by overhead and/or underground lines to PVCS. Each PVCS will collect and combine the medium voltage power from multiple PCSs for transmission to the Project substation. he medium-voltage collection system (34.5 kV) transmitting power and communication from each PCS to the PCVS may be buried underground and/or connected on overhead lines, The PVCS enclosures will be supported by precast concrete vault and would be located in pre-fabricated protective electrical equipment enclosures, each approximately 12 feet in height, dispersed among the arrays. Medium voltage collection system lines connect the power output and communication from the PVCS to the Project substation via overhead and/or underground circuits. Preliminary locations of the electrical collection system are shown on the site plan. This system would include crossing of Imperial County roads and IID facilities which will require encroachment permits.

Substation and Switchyard

An onsite substation with 34.5kV to 230/220 kV step-up transformer(s), breakers, buswork, protective relaying, SCADA (supervisory control and data acquisition) and associated substation equipment will be constructed on the south side of the site. The communication system may include above or below ground fiber optic cable or microwave tower. The Project will be interconnected to the regional transmission system from this on-site substation/switchyard via the gen-tie interconnections described later.

Operations and Maintenance Building

An O&M building may contain administrative offices, parts storage, a maintenance shop, plant security systems, and plant monitoring equipment. The O&M building will likely consist of one or more single story prefabricated building set on a concrete slab-on-grade. The building maximum height will be approximately 18 feet. A specific design for the O&M building has not yet been selected. The building will have exterior lighting on motion sensors and will have fire and security alarms. The building would be located on a graded area with adjacent worker parking. A septic system and leach field adjacent to the building will serve the Project's sanitary wastewater treatment needs. An above-ground water storage tank may be installed.

Grading and Drainage

The Project is located on property previously used for irrigated agricultural production. Little new grading would be done on the Project Site because the current topography is suitable for the placement of PV panels with little site preparation. The soil surface will be smoothed and compacted to prepare the Site for installation of the solar panels. The site will be disked with conventional farming equipment with limited use of scrapers to perform micrograding where needed. Existing agricultural drains may be removed. The solar field may be coated with a permeable dust suppressant and the roadways within and around the solar field will be compacted native soil. Gravel may be installed at construction entrance and construction areas where needed.

Most of the Project Site will be drained by sheet flow to on- and off-site drainages as it is currently configured. Local containment will be provided around the high-voltage transformers within the Project substation to prevent any associated hazardous materials from leaving the site.

Site Access / Traffic and Circulation
Access to the Project Site will be via I-8 to Drew Road as well as other roads in the area. Access to components of the solar field will be controlled through security gates at the main entrances. Access points would be used during construction and operation. Secondary access would be provided if needed. There is currently little traffic on any of the roads bordering or in the immediate vicinity of the project. The use on these roads is associated with the surrounding agriculture and to provide access to the small number of residences in the area. Because of the relatively small amounts of traffic, there are no traffic signals in the area.

Construction of the Project is expected to take up to 24 months. Daily trip generation during construction of the project would be generated by delivery of equipment and supplies and the commuting of the construction workforce. The number of workers expected on the site during construction of the Project would vary over the construction period and is expected to average up to approximately 250 each day, generating about 100 daily round trips. Deliveries of equipment and supplies to the site would also vary over the construction period but are expected to average about 5 to 40 daily trips. All project related parking will be onsite during construction, moving within the solar field as it is developed or as needed on public roads between Project parcels. Based on the expected trips generated, traffic on the local roads would increase during construction but impacts to current traffic patterns would be minimal. No impact to current traffic patterns would result during operation of the Project. Operation of the site would be expected to generate only 2 to 4 trips per day from maintenance and security personnel. Trips for water trucks to deliver water to the site to clean the panels could also occur but would be relatively infrequent as the panels could be cleaned only once or twice a year. There could also be other deliveries of supplies or equipment that could occur to support operations and maintenance. This would result in a daily trip maximum of up to 10 (during washing events) and more commonly 5 or less during the operational phase of the project. This small number of trips generated during operations would result in less than significant impacts to local traffic patterns.

<u>Project Support Systems</u>
The following project systems control, protect, and support the Project and its operation. These include distributed control system, communications, lighting and a cathodic protection system as described in the following paragraphs.

Security
The Project site will be fenced with a chain-link security fence approximately 8 feet high with 3 strands of smooth wire or barbed-wire (where required by code) on the top. Site security may be

provided with small guard stations provided at the gated access points. Security cameras may be deployed throughout the site and monitored at the guard station and remotely by a security service at night. Lights, triggered by motion sensors and powered by station power with backup battery power, will also be installed at each entry gate and at each PCS enclosure.

Perimeter signage will also be provided and installed at intervals along the perimeter fence stating, in both English and Spanish, the following: “Danger, Keep Out!,” and “Hazardous Voltage Inside.”

Control System
A microprocessor-based site communication center (SCC) will provide control, monitoring, alarm, and data storage functions for plant systems as well as communication with the solar field SCADA system. Redundant capability will be provided for critical components so that no single component failure will cause a facility outage. All field instruments and controls will be hard-wired to local electrical panels. Local panels will be hardwired to the system. Wireless technology will be reviewed as a potential alternative during final Project design.

Electric Service
Permanent electric service may be obtained for the O&M building and for substation backfeed power. Service would be provided by IID. Temporary electric service will be obtained for main construction logistics area. Generator power may be utilized for temporary portable construction trailer(s) and for commissioning.

Lighting System
The Project’s lighting system will provide operation and maintenance personnel with illumination for both normal and emergency conditions near the main entrance and the Project substation. Lighting will be designed to provide the minimum illumination needed to achieve safety and security objectives and will be downward facing and shielded to focus illumination on the desired areas only. Permanent lighting will be provided at the O&M buildings, substation, and entrances.

The PCS enclosures will have exterior lights on motion sensors. Therefore, light trespass on surrounding properties will be minimal. If lighting at individual solar panels or other equipment is needed for night construction or maintenance, portable lighting will be used.

Proposed Sewer System
During the operational phase of the Project, the O&M buildings will include septic systems. During construction, temporary septic systems or holding tanks will be provided for the construction trailers and portable toilets will be used throughout the construction area to provide needed sanitary facilities for workers on site.

Water System

The Project will use relatively small amounts of water during construction and operation. The source of water for Project operation will be IID canals located adjacent to the Project and trucked in as needed. This water source will supply water for construction, fire protection and operational water use. One permanent, approximately 10,000 gallon, above-ground water storage tank will be installed adjacent to the O&M building. The above-ground storage tank will be sized to supply sufficient fire suppression water during operations. If needed, an on-site water treatment system (e.g., a package unit), or a water storage tank for potable water deliveries may be installed to meet the Project operational potable water needs.

Fire System

As a PV solar project, the Project will pose a very small fire risk as all vegetation will be maintained and the solar field does not incorporate any significant flammable materials. After construction, invasive / weedy species will be controlled and any vegetation that re-establishes on site will be maintained to a height of less than 18 inches within the solar field. The PCS enclosures will be either metal or concrete designed to meet National Electric Manufacturers Association (NEMA) 1 or NEMA 3R IP 44 standards for electrical enclosures. A Fire Management Plan will be prepared and the final site plan would be designed in accordance with Fire Department requirements for access and would not impact the ability to provide emergency access to the site. The Project also would not hinder the ability to access nearby properties.

Communication System

The Project will utilize telephone and internet services that will be provided via overhead or underground lines or via cellular system by a local service provider.

Employees

The Project would generate employment opportunities during construction and operation. During construction, workers would be employed by the construction contractors with the number of workers on the site expected to vary over the construction period. During the 18 to 24 month construction time frame, the average number of construction workers on site would be expected to average up to approximately 250 each day with a peak of 500. Typical construction work hours may be 6:00 am to 4:00 pm. Two shifts could be utilized possibly running from 5:00 am to 3:00 pm and 9:00 pm to 5:00 am. Additional hours including weekends may be necessary to make up schedule deficiencies or to complete critical construction activities. Any night work would be conducted on focused areas of the site. Approximately 4 to 8 full-time workers would be employed during operation of the Project. These personnel would perform maintenance and security functions.

Construction Schedule
As mentioned above, the Project is expected to be built over an up to 24-month timeframe.

Temporary Construction Facilities
During construction, temporary facilities will be developed on-site to facilitate the construction process. These facilities may include construction trailers, a temporary septic system or holding tank, parking areas, material receiving / storage areas, water storage ponds, construction power service, recycling / waste handling areas, and others. These facilities will be located at the construction areas designated on the final site plans.

Decommissioning Plan
The Project would operate at a minimum for the life of its PPA. It is likely, because much of the needed electrical infrastructure will have been developed, the Project Site would continue to be upgraded and used to generate solar energy even beyond the term of the initial PPA. Therefore, it is possible that the Site would remain in solar energy production for the foreseeable future. If the Project were ever to be decommissioned, the First Solar modules would be collected and recycled under First Solar's pre-funded recycling program. The support structures, electrical equipment, and other materials / equipment would be removed from the Site and it would be returned to agriculture.

Gen-Tie
The Project will be interconnected to the regional transmission system via a 230kV double-circuit transmission line from the Project to the Imperial Valley Substation. The proposed Gen-Tie would originate at the Project substation/switchyard at the southern end of the Project site and would go across BLM land for about 0.9 miles BLM to the Imperial Valley Substation. The Gen-Tie is located entirely within a BLM-designated utility corridor.

1.3 Alternatives

The project considered several Gen-Tie alternatives to provide the needed interconnection to the Imperial Valley Substation. In addition to the proposed Gen-Tie, route alternatives were developed to minimize impacts by co-locating with existing linear facilities.

Eastern BLM Gen-Tie Alternative
The Eastern BLM Gen-Tie Alternative would follow the existing IID S-line and associated access road. It would cross about 0.4 miles of BLM land and 0.4 miles of private lands.

Non-BLM ROW Gen-Tie Alternative
The Non-BLM ROW Alternative would originate from the western side of the Project site and would cross approximately 1.75 miles of private lands to the west. It would follow existing field roads and ditches to the C-Solar West Project site. From there, available capacity would be

utilized on that project's gen-tie line that has an approved right-of-way to the Imperial Valley Substation.

Figure 3 (Appendix A) shows the locations of the various gen-tie alternatives described above.

In addition to any of the long-term interconnection solutions described above, a short-term electrical interconnection solution may be implemented that would involve an interconnection to IID's S Line that crosses the site. If this solution is utilized, it would provide temporary interconnection to the grid and would be replaced by the permanent interconnection into the Imperial Valley Substation when completed.

1.4 Regulatory Framework

This section reviews the most relevant State, Federal, and County laws, ordinances and regulations for the protection of cultural resources and for which this study provides initial baseline data for agency assessments of impacts to cultural resources.

State of California

<u>The California Environmental Quality Act (CEQA; PRC §21002(b), 21083.2, and 21084.1)</u>
Historical resources are recognized as part of the environment under CEQA. The California Register of Historical Resources is an authoritative guide to the state's historical resources and to which properties are considered significant for purposes of CEQA. The California Register includes resources listed in or formally determined eligible for listing in the NRHP, as well as some California State Landmarks and Points of Historical Interest. Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or have been identified in a local historical resources inventory may be eligible for listing in the California Register and are presumed to be significant resources for purposes of CEQA unless a preponderance of evidence indicates otherwise (PRC § 5024.1, 14 CCR § 4850).

<u>Health and Safety Code Section 7050.5</u>
This code section requires that further excavation or disturbance of land, upon discovery of human remains outside of a dedicated cemetery, cease until a county coroner makes a report. It requires a county coroner to contact the Native American Heritage Commission (NAHC) within 48 hours if the coroner determines that the remains are not subject to his or her authority and if the coroner recognizes the remains to be those of a Native American.

<u>Health and Safety Code (Section 7052)</u>
Section 7052 of the Health and Safety Code establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

<u>Penal Code (Section 622.5)</u>
Penal Code Section 622.5 provides misdemeanor penalties for injuring or destroying objects of historical or archaeological interest located on public or private lands, but specifically excludes the landowner.

Public Resources Code (Section 5097.5)
The unauthorized disturbance or removal of archaeological, historical or paleontological resources located on public lands is defined as a misdemeanor by Public Resources Code Section 5097.5.

Public Resources Code Section 5097.98
If a county coroner notifies the NAHC that human remains are Native American and outside the coroner's jurisdiction per Health and Safety Code Section 7050.5, the NAHC must determine and notify a Most Likely Descendent (MLD). The MLD shall complete the inspection of the site within 24 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

Federal

The National Historic Preservation Act (NHPA; Title 16 U.S. Code, Sections 470w-6)
Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings, licensed or executed by the agency, on historic properties listed or eligible for listing in the NRHP, and affords the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings (16 U.S.C. 470f). The Section 106 process of the NHPA seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the Agency Official and other parties with an interest in the effects of the undertaking on historic properties, commencing at the early stages of project planning.

The Section 106 process includes the following steps:

1. Identify and evaluate the NRHP eligibility of historic properties;
2. Assess the effects of proposed action on any historic properties;
3. Consult with the State Historic Preservation Officer (SHPO), interested parties, and when appropriate, the ACHP;
4. Treat impacts, as necessary; and
5. Proceed with the action.

As amended May 18, 1999 and finalized January 11, 2001, 36 CFR Part 800; 65 FR 77698-77739:

1. clarifies the roles of SHPOs, THPOs, and Tribes;
2. provide more flexibility for involving groups of applicants;
3. clarifies an undertaking to include only an action that has the potential to affect historic properties;
4. reinforces a federal agency's responsibility to identify historic properties;
5. revises the role of invited signatories to Memorandums of Agreement (MOAs);
6. clarifies the actions a federal agency must take in mitigating adverse effects stated in EIRs;
7. redefines the role of the Advisory Council for improving Section 106 operations;
8. modifies documentation standards to be limited to an agency's legal authority and available funds;

9. adds requirements for agencies to provide information on NRHP eligibility of post-review discoveries;
10. provides for a routine prototype programmatic agreements;
11. improves stakeholder and public views on proposed exemptions; and
12. re-emphasizes agency obligations for Native American consultation while acknowledging agency responsibility for determining the method of consultation.

The Section 106 process has also been streamlined through a protocol between the California BLM and the SHPO. It allows BLM to forgo SHPO consultation for routine compliance proceedings.

American Indian Religious Freedom Act (Title 42, U.S. Code, Section 1996)
This act establishes policy of respect and protection of Native American religious practices. There are specific provisions for providing Native American access to religious sites.

Executive Orders

Executive Order 13007 (*Federal Register* Volume 61, No. 104, pp. 26771-26772) requires federal agencies with land management responsibilities to allow access and use of Native American sacred sites on public lands, and to avoid adversely affecting these sites.

Executive Order 13084 (*Federal Register* Volume 63, No. 96, pp. 27655-27657) reaffirms federal agency obligations to conduct government-to-government consultations and directs the agencies to establish procedures to that effect.

County

County of Imperial General Plan (1993)
Conservation & Open Space Element
The Conservation Element and Open Space Element provides detailed plans and measures for the preservation and management of biological and cultural resources, soils, minerals, energy, regional aesthetics, air quality, and open space. The purpose of the Conservation and Open Space Element is to promote the protection, maintenance, and use of the County's natural resources with particular emphasis on scarce resources, and to prevent wasteful exploitation, destruction, and neglect of the State's natural resources. Additionally, the purpose of this Element is to recognize that natural resources must be maintained for their ecological value for the direct benefit to the public, protect open space for the preservation of natural resources, the managed production of resources, outdoor recreation, and for public health and safety.

Significance Criteria

Cultural resources studies for the Project are carried out in compliance with California Environmental Quality Act (CEQA), Section 106 of the National Historic Preservation Act of 1966 (NHPA), and other applicable state, federal, or local laws, ordinances, rules, regulations, and policies. Section 106 is applicable to federal undertakings, including projects financed or permitted by federal agencies, regardless of whether the activities occur on land that is managed by federal agencies, other governmental agencies, or private landowners. In practice, the National Register of Historic Places (NRHP) criteria for significance applied under Section 106 are generally in conformity with California Register of Historical Resources (CRHR) criteria, with some slight variances. Therefore, all cultural resources within the survey area are evaluated for eligibility to be listed on the NRHP and the CRHR.

National Register Criteria for Evaluation

The National Register criteria are designed to guide federal agencies and others in evaluating whether a property is eligible for inclusion on the NRHP. To be eligible for listing in the NRHP, a cultural resource must meet one of the four criteria defined by Title 36, Part 60, of the Code of Federal Regulations (36 CFR 60), which reads as follows:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association; and:

> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
> (b) that are associated with the lives of persons significant in our past; or
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> (d) that has yielded, or may be likely to yield, information important in prehistory or history.

In addition to these four criteria, there is a general stipulation that the property be 50 years old or older (for exceptions, see 36 CFR 60.4, Criteria Considerations). The importance of information that a property may yield is measured by its relevance to identified research questions that can be addressed through the analysis of particular property types. In addition to research potential, the cultural resources of Native Americans, Euroamericans, and other ethnic communities may possess public and ethnic value. Finally, cultural resources may also have broader public significance, such as serving to educate the public about important aspects of national, state, and local history and prehistory.

CEQA and the California Register Criteria for Evaluation

The California Environmental Quality Act (CEQA) requires that all private and public activities not specifically exempted be evaluated against the potential for environmental damage, including effects to historical resources. It defines historical resources as “any object, building, structure, site, area, or place which is historically significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California," as cited in Division I, Public Resources Code, Section 5021.1[b].

Lead agencies have a responsibility to evaluate historical resources against the CRHR criteria prior to making a finding as to a proposed project's impacts to historical resources. The CRHR is used in the consideration of historic resources relative to significance for purposes of CEQA. The CRHR includes resources listed in, or formally determined eligible for listing in, the NRHP, as well as some California State Landmarks and Points of Historical Interest. Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts), or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be significant resources for purposes of CEQA unless a preponderance of evidence indicates otherwise.

To be eligible for listing in the California Register, the criteria are similar to the National Register but have been modified for state use in order to include a range of historical resources which better reflect the history of California" (CCR §4852). A cultural resource must meet one of the four following criteria as per PRC §5024.1(c):

> (1) is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
> (2) is associated with the lives of persons important in our past.
> (3) embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possess high artistic values.
> (4) has yielded, or may be likely to yield, information important in prehistory or history.

Significance Evaluation during the Present Study

Preliminary assessments of the significance of cultural resources identified during the present study are included as part of this inventory to the extent possible, in order to provide recommendations for avoidance of project impacts to resources that are likely to be significant.

1.5 Archaeological Investigations

The strategy for the Project's cultural resources analysis includes 100 percent coverage of the Project area to be evaluated in the EIR on private land. The KPE archaeological survey included an intensive 100 percent pedestrian survey and inventory of cultural resources within the survey area but did not cover areas previously surveyed by EPG as part of the current project (Rowe 2008). The 2011 archaeological survey was performed by KPE, under the direction of Senior Project Archaeologist Patricia T. Mitchell, M.A. RPA.

Existing record search, literature review and previous Class III inventory data already generated for the Project (Rowe 2008) were relied upon to the extent applicable. All work was completed, consistent with BLM policy, as per BLM Manual Section 8100 for identifying and recording cultural resources.

This report consists of an introduction that includes the project description and background (Chapter 1); the archaeological context of the survey area, including the environmental history and cultural history (Chapter 2); previous archaeological research (Chapter 3); research design (Chapter 4); survey methods (Chapter 5); report of findings (Chapter 6); analysis of site eligibility (Chapter 7); discussion of reported sites (Chapter 8); management considerations (Chapter 9); references (Chapter 10); and appendices. All key project personnel met the *Secretary of the Interior*'s Qualification Standards for their respective roles in the project. Table 1 summarizes the key Class III survey personnel and their roles. The archaeological personnel resumes are attached as Appendix B. Non-confidential report maps are provided in Appendix A. All site location information and Native American correspondence is attached as separate, confidential appendices to this report (Appendices C through F).

Table 1. Campo Verde Solar Project Personnel.

Role	Individual
Principal Investigator / Project Archaeologist	Patricia T. Mitchell, M.A., RPA
Safety Officer	Shannon Bottenberg
Archaeological Crew Chief / Field Director	Heather Thomson
Archaeological Field Personnel	Marina Adame

2. ARCHAEOLOGICAL CONTEXT

This chapter reviews the environmental setting of the survey area, and includes the prehistoric, ethnohistoric, and historic settings. Previous archaeological research conducted in the area is also included. The discussion that follows is a summary describing how relevant investigations in the general region have contributed to the current understanding of past cultural history.

2.1 Environmental Setting

This section describes the natural and cultural setting of the area surrounding the Project Area. The area is within the western portion of the Colorado Desert, which is also part of the larger Sonoran Desert. The area is located between the Colorado River on the east, the Yuha Desert on the west, the Salton Sea to the north, and the U.S.-Mexico International Border to the south. Three Native American groups are associated with this area and include the Quechan, Cocopah, and Kumeyaay. Euro-American occupation of the area has also altered the cultural landscape through processes of travel, settlement, mining, and military operations.

The area surrounding the Project Area is located in the Western Colorado Desert Region, which is a southwestern sub-region within the larger Sonoran Desert. The current climatic conditions for the Colorado Desert includes dry, mild winters and dry, hot summers. Mean winter lows of 44°F and a mean summer temperature of 104°F are typical, with record highs of 120°F. Summer storms are not unusual, but most precipitation falls in mid-winter. The Colorado River was the most reliable and abundant source of water in the area; however, in the past the River changed course and discharged into the Borrego sink and formed a freshwater lake today known as Ancient Lake Cahuilla with high stands of 40 feet (12 m) AMSL (Noah and Gallegos 2008). Other water sources would have included the New River and the Alamo River, both of which flow from the Mexicali Valley in Baja California, into the Salton Sea in California. These river courses as they run today were created in 1904; however, there is reference to the New River in Garcés' diary of the Anza 1775 expedition (Gifford 1931:2), as well as both rivers as sloughs off of the Colorado River by which, water entered the valley (Gifford 1931:4). Some minor water sources included major washes, sandy aquifers that produced perennial springs (Schaefer et al. 1987), and desert pans that may potentially have provided a short-term water source following rains.

The topography in the Project Area is relatively flat, and in open desert is crossed by a series of braided washes. The Gen-tie Line alternatives traverse habitats with vegetation that includes creosote, ocotillo, brittle bush, ephedra, and white bursage as well as other native annuals and grasses. A late June 1904 account by Dutch botanist Hugo de Vries describes the Imperial Valley desert in the early 20th century as appearing level to the eye (van der Pas 1976). Far to the east of Imperial he had observed rows of sand dunes, and he described them as separated from the fertile silt deposits by a white, sandy plain, not unlike a former beach. He described the original desert soil as hard clay, covered by a hard crust. He also found that where the crust has been broken and crushed by carts or footsteps, the clay is very fine and will blow away in the wind. Much of his botanical information was gathered near and at the New River prior to its current configuration, which changed in the autumn of 1904 just months after his visit. De Vries notes that the plain was not completely bare as he observed saltbushes on either sides of the river. He identified three species of *Atriplex* (*A. lentiformis*, *A. polycarpa*, *A. cansescens*), as well as mesquite (*Prosopis juliflora* var. *glandulosa*) a short distance away. He mentions that creosote bushes (*Larrea tridentata*) increase in number near the "rivulet" (New River). On the floor of the canyon of the New River there were remnants of a rich vegetation of small annuals, half dry grasses and many dry stems of Peppergrass (*Lepidium lasiocarpum*), a late specimen of a "desert heliotrope", and Chinese Pusley (*Heliotropum curassavicum*). Close to the New River there were many green plants, erect and with vertical branches, silver-white Chachimilla or Arrow-root (*Pluchea serica*) and a red flowering species of *Baccharis*. All these plants had narrow and long leaves of equal size and, if they had not carried flowers, he would have called all of them willows (van der Pas 1976).

The plants de Vries observed along the canals included wild purslane (*Sesamum portulacastrum*), a few tender alkali grasses (*Leptochloa imbricata*), specimens of *Carex* and *Cyperus* of the Common Cockle bur (*Xanthium commune*), *Blitum* (*Chenopodium?*), Milk thistle, and many others, apparently imported as contaminations of agricultural seeds. In the canals, he noticed cat-tails (*Typha latifolia* and *T. angustifolia*), some of them so numerous that they narrowed the canals (van der Pas 1976).

2.2 Archaeological Setting

The history of archaeological research in the Colorado Desert goes back to the 1930s and the works of Malcolm Rogers. The culture history of the area is largely based on his work in many parts of the Colorado and Sonoran deserts, but it often relied on sites that were marginal to the main occupation on the Colorado River (Rogers 1939, 1945, 1966). Rogers established the first systematic culture history and artifact typologies of the Colorado Desert during the course of more than 40 years of field investigations. His investigations of San Dieguito and Archaic flaked stone tools and settlement patterns (Rogers 1929, 1939, 1958, 1966) and of Yuman ceramics and culture history (Rogers 1936, 1945) have been built upon over the years but they remain the foundation of current archaeological research in the area. Also included in this early period of basic archaeological research is Schroeder's examination of lower Colorado River sites (Schroeder 1952, 1979). Schroeder developed a cultural sequence that emphasized the similarities of the Colorado River assemblages with the upland areas of western and central Arizona, lumping a number of cultural patterns into the concept of the Hakataya, an expanded version of what Rogers referred to as Yuman (Schroeder 1979).

The majority of research has occurred over the last 30 years and has been from projects sponsored by government agencies for compliance with state and federal antiquities laws or CEQA compliance on private developments. Independent research has also been conducted at the Imperial Valley College, and at the University of California, Riverside for doctoral dissertations. Numerous syntheses (Weide 1974, E. Warren et al. 1981, McGuire and Schiffer 1982) have also been prepared to address the question of settlement patterns of the Colorado Desert region.

Cultural Periods and Patterns

The archaeological record has provided evidence of six successive periods that may be defined for the Colorado Desert, extending back in time over a period of at least 12,000 years. They are: (1) Early Man (Malpais); (2) Paleoindian (San Dieguito); (3) Archaic (Pinto and Amargosa); (4) Late Prehistoric (Patayan); (5) Ethnohistoric and Historic Native American occupation; and (6) Historic Euro-American occupation.

Early Man (Malpais) Period (50,000-12,000 years B.P.)

The Malpais Pattern is represented by a complex of archaeological material hypothesized to date from 50,000 to 12,000 years B.P. (Begole 1973, 1976; Davis et al. 1980; Hayden 1976). This term was originally used by Malcolm Rogers (1939, 1966) for ancient-looking cleared circles, tools, and rock alignments. He later classified this period as San Dieguito I. The term continued to be applied to heavily varnished choppers and scrapers found on desert pavements of the Colorado, Mojave, and Sonoran deserts that were thought to predate the Paleoindian period of projectile point makers. Dating methods remain extremely subjective and evidence for this period has been attacked on numerous grounds (McGuire and Schiffer 1982:160-164). Early settlement of the Colorado Desert is further questioned by the redating of the "Yuha Man." Originally dated to over 20,000 years B.P. based on radiocarbon analysis of caliche deposits, more reliable dates of actual bone fragments based on the accelerator mass spectrometer (AMS) method now place the burial at about 5,000 years B.P. (Taylor et al. 1985).

Paleoindian Period (San Dieguito) (12,000-7,000 years B.P.)

Most of the non-ceramic lithic assemblages, rock features, and cleared circles in the general region have been assigned to the San Dieguito complex, Phase III. In fact, many of the sites in the entire Colorado Desert are assumed to be San Dieguito. Malcolm Rogers first defined the San Dieguito complex based on surface surveys in the Colorado and Sonoran deserts, but later refined his constructs with excavated material from the C. W. Harris site, a few kilometers up the San Dieguito River from the Pacific coast in San Diego County, California (Rogers 1939, 1966). Current concepts defining the lithic technology of the San Dieguito complex are based on percussion-flaked cores and the resulting debitage, with little or no evidence of pressure flaking during the first two phases. The San Dieguito III phase tool kit is more diverse with the introduction of fine pressure flaking. Tools include pressure-flaked blades, leaf-shaped projectile points, scraper planes, plano-convex scrapers, crescentics, and elongated bifacial knives (Rogers 1939, 1958, 1966; Warren and True 1961; Warren 1967). Various attempts have also been made to seriate cleared circles into phases but a convincing chronology has not been developed (Pendleton 1984).

The San Dieguito "culture," is a hunter-gatherer adaption consisting of small mobile bands exploiting small and large game and collecting seasonally available wild plants. The absence of milling tools from any complex had been seen as reflecting a lack of hard nuts and seeds in the diet, and as a cultural marker separating the San Dieguito culture from the later Desert Archaic culture (Moratto 1984; Rogers 1966; Warren 1967); however, portable manos and metates are now being increasingly recognized at coastal sites radiocarbon dated in excess of 8,000 B.P. and in association with late San Dieguito (III) adaptation. In addition, Pendleton (1984:68-74) notes that in the Colorado Desert, most ethnographically documented pounding equipment for processing hard seeds, wild mesquite, and screwbeans was made out of wood and does not preserve in the archaeological record. If milling and pounding tools from earlier time periods were also made from wood, they would rarely be preserved at open sites.

Archaic Period (Pinto and Amargosa) (7,000-1,500 years B.P.)

The Pinto Complex and the Amargosa Complex are considered regional specializations within the existent hunting and gathering adaptations characterizing the Archaic period (Campbell and Campbell 1935). These complexes are primarily found in the northern Great Basin, Mojave Desert, and in the Sonoran Desert east of the Colorado River. Few Pinto or Amargosa (Elko series) projectile points have been identified on the desert pavements of the Colorado Desert. It has been suggested that the environment in the California deserts was unstable during these time periods, particularly during the period between 7,000 and 4,000 years B.P. It is thought that this instability forced the mobile hunter-gatherers into more hospitable regions (Crabtree 1981; Schaefer 1994; Weide 1974). Some late Archaic sites are known to occur; however, indicating occupations along the boundary between the low desert and Peninsular Ranges and at more favored habitats at springs and tanks. Archaic period deposits have been excavated in Indian Hill Rockshelter in Anza-Borrego Desert State Park (McDonald 1992), Tahquitz Canyon near Palm Springs (Bean et al. 1995), and the north Lake Cahuilla shoreline (Love 1996).

Late Prehistoric Period (Patayan) (1,500-100 years B.P.)

The Late Prehistoric period is divided into four phases, including a pre-ceramic transitional phase from 1,500 to 1,200 years B.P. The major characteristics that distinguish this period from earlier periods are the introduction of pottery making by the paddle-and-anvil technique and bow-and-arrow technology around 1,200 years B.P. and the introduction of floodplain agriculture about the same time (Rogers 1945). Exact dating of early domesticates is lacking (Schroeder 1979). Both these technological advancements are thought to be introduced from either Mexico or through the Hohokam culture of the Gila River (McGuire and Schiffer 1982; Rogers 1945; Schroeder 1975, 1979). The flooding of Lake Cahuilla, referred to above, corresponds to Patayan II, 950-300 years B.P. Previous studies suggested that the final recession of Lake Cahuilla occurred around A.D. 1500; however, recent research provides support for a fifth in-filling between A.D. 1600 and 1700 (Laylander 1997; Schaefer 1994). Between A.D. 1000 and 1700, there appears to be a shift in focus from the Colorado River floodplains to a more mobile, diversified resource procurement pattern with increased travel between the

Colorado River and Lake Cahuilla (Pendleton 1984). Long-range travel to special resource collecting zones and ceremonial locales, trading expeditions, and possibly some warfare are reflected by the numerous trail systems throughout the Colorado Desert. Sites associated with these trails include pot drops and trail-side shrines (McCarthy 1982, 1993).

Native American Ethnohistoric and Historic Occupation (450-100 years B.P.)

Syntheses have been prepared for the ethnohistorically documented tribes including the Quechan (Bee 1981, 1983, 1989; Forbes 1965; Forde 1931), the Cocopah, and the Kamia-Kumeyaay. An important and detailed discussion of Yuman ethnobotany, agriculture, and land use patterns has been compiled by Castetter and Bell (1951), with additional summaries by Pendleton (1984) and Woods (1982), and a summary of Colorado Desert ethnographies by Knack (1981). Quechan oral history also establishes their residence in this location since a migration after the beginning of creation. The Imperial Valley was shared among several tribes long before non-Natives arrived on this continent, and the prehistory of socio-political relationships between those tribes are difficult to read. Modern researchers rely upon the oral histories of tribes to get a glimpse of those relationships and try to reconstruct some of the socio-political dynamics of the valley if we are fortunate enough to get an interview to hear the oral history.

Until very recently (late 2007) anthropologists have argued the Bering Strait “multiple waves” migration hypothesis, which put modern Native American tribes in North America anywhere between 17,500 to 6,000 years ago. There has not been any definitive evidence to link the Paleoindian Tradition occupants to the later inhabitants of the Colorado Desert area, hence, the San Dieguito “culture” and periods and complexes based on artifactual materials; however, recent DNA evidence has now added support for a single migration and population of North and South American as early as 30,000 years ago (PLoS 2007). It is notable that archaeological and anthropological theory, and tribal oral histories that place ethnohistoric tribes in the area is currently supported with DNA evidence.

The Kamia and Kumeyaay

The Kamia were also known as the Kamya, Comeya or Quemaya (Kroeber 1925). Gifford (1931) places their territory in Imperial Valley, where they resided sometimes on the west bank of the Colorado River in Yuma Territory (near Algodones and Dieguenos, Lower California). Both Kroeber (1925) and Gifford (1931) agree on the ethnohistoric description of Kamia territory as described by Garcés in 1775: “…began at the mountains, in latitude 33°08’, some 100 miles to the northwest of the mouth of the New River in northeastern Lower California, and extended as far as San Diego.” Again, both Kroeber (1925) and Gifford (1931) appear to be in agreement regarding Kamia settlement patterns and socio-political relationships in the valley. The Kamia residing closer to the river bank and sloughs closely resembled the Yuma in that they farmed (Kroeber 1925). They had no permanent settlements, but would move from settlement to settlement. They would plant crops in one place and gather wild vegetables and plants in another (Gifford 1931). The Kamia residing further west of the river more closely resembled the Diegueno in settlement and non-agricultural subsistence patterns (Kroeber 1925, Gifford 1931).

Prior to European settlement Kumeyaay territory extended from the Colorado Desert to the Pacific Ocean, north to Warner Springs and south to Ensenada in Baja California (Pico 2000). According to Carrico (1985), the Indian population was approximately 20,000 in San Diego at the time of Spanish arrival in 1769. By Kroeber's (1925) standard this figure is considered high; however, the archaeological and early historical records gives supporting evidence that the Kumeyaay were not "simple or typical hunters and gatherers" (Carrico 2008). The early historical records provided documentation how they controlled the vegetation through fire management; and they moved from one environmental zone to another on a regular seasonal basis in order to collect large and varied quantities of food.

The Yuman-speaking Kumeyaay people were autonomous, self-governing bands or clans and had clearly defined territories that included individual and collectively owned properties. According to Pico (2000), a band's territory extended anywhere from 10 to 30 miles, along a stream and tributaries. It included trails, shared hunting, religious, ceremonial and common gathering areas. The Kumeyaay united in defense of their territory and communicated by foot couriers. Throughout this vast area trails were forged by the Kumeyaay through the mountains, deserts and river valleys for trading, gathering for funerals, marriages and competitive games with each other and neighboring nations.

<u>The Colorado River Peoples: The Quechan and Cocopah</u>

The first historic accounts of the traditional inhabitants of the lower Colorado River were made by Spanish and, later, American explorers. These groups were successful in keeping Spanish missionaries out of their territory and their relative spatial and cultural isolation from Euro-Americans for a long period, allowed them to maintained their language, religion, and cultural practices to a much greater degree than most coastal California groups. The early ethnographers in the period between 1900 and 1950 were able to record a rich oral literature and reconstruct pre-contact lifeways to a considerable degree. The Lower Colorado River area was one of shifting tribal territory and tribal boundaries in ethnohistoric times due to inter-tribal warfare (Forbes 1965). When Díaz and Alarcón sailed up the lower Colorado River in 1540 the scene he observed was one of incessant warfare.

The focus on riverine subsistence resources encouraged a mixed foraging way of life for the river Yumans; small-scale agricultural practices supplemented foods procured by seasonal rounds of hunting, fishing, and gathering. According to Bee (1983), the Mohave relied more heavily on agriculture than did the Cocopah or the Quechan. In their study of Yuman agricultural strategies, Castetter and Bell (1951) estimated that about half of the Mohave diet derived from farming. They estimated that the Cocopah, by contrast, derived only about 30 percent of their diet from agriculture because of greater access to a diversity of habitats; the Quechan (and presumably Halchidhoma) diet was somewhere between the two groups (Bee 1983). Cultivated crops included maize, beans, squash, melon, and various semi-wild grasses. The river Yumans used more than 75 wild plant foods as food sources, the most important being mesquite and screwbean. The primary source of dietary protein came from fish caught in the Colorado River.

Among the more important species were the humpbacked sucker and Colorado pike minnow. Regularly hunted game included small mammals such as rabbits, squirrels, and pack rats. Larger game included deer and bighorn sheep.

Historic Euro-American Periods

The following includes a summary of extensive historical research conducted by Van Wormer (2008). It discusses the last two centuries of Euro-American history and focuses on those periods where cultural resources are likely to be found in the survey area and include various types of historic activities that have occurred within the study area including exploration and transportation, and farming.

Exploration and Transportation

The area was visited as early as 1540 by Hernando de Alarcon, discoverer of the Colorado River. The next Spaniard to enter the desert area in vicinity of the Survey area was Lt. Pedro Fages of the San Diego Presidio. He traveled east with three soldiers on October 29, 1772, in pursuit of army deserters. They followed Native American trails across the Cuyamaca Mountains and the desert via Oriflamme Canyon, Mason Valley, and the Carrizo wash. Fages would travel this route two more times, in 1782 and 1785. He discovered many of the points along the Carrizo Corridor that would later become landmarks on the overland trail, including the marshes and springs at Carrizo Creek, Palm Springs, and Vallecito. Continuing southeast into the desert, Fages' route joined the Anza Trail, established in 1776 between Sonora and San Gabriel Mission (Ives 1975; Lindsay 2001; Rensch 1955).

The first Anza expedition through present-day Imperial and eastern San Diego counties was the path finding and colonizing journey led by Juan Bautista de Anza. The journey began in the spring of 1774. Their first camp in present-day Imperial Valley was made on March 8, 1774, at Santa Rosa de las Lajas, located approximately seven miles south of present-day Plaster City near Yuha Spring (Lindsay 1973; Pourade 1960). Located 17 miles west of El Centro, California, Plaster City is an unincorporated community with a large gypsum quarry and plant owned and operated by United States Gypsum. The next camp was made the following night in an area approximately five miles north of the current location of Plaster City. On March 10, the party arrived at San Sebastian, a large marsh located on San Felipe Wash, near its junction with Carrizo Creek near present-day Harper's Well. The group continued northwest, crossing the course of current Highway 78, four miles east of the present community of Ocotillo Wells. They continued to follow San Felipe Creek, then rounded Borrego Mountain and camped near an alkali sink to the west of the mountain below the Borrego Badlands at a place Anza named San Gregorio (Lindsay 1973; Pourade 1960). After resting for a day the party continued their northwesterly trek, crossing Borrego Valley and entering Coyote Canyon where they found a spring christened Santa Caterina. The expedition followed the canyon out of the desert through San Carlos Pass, and continued on to the San Gabriel Mission (Lindsay 1973; Pourade 1960).

The following year Anza was ordered to take a group of colonists overland to California, and this second Anza expedition included 240 members (30 soldiers [29 of which were accompanied by their wives], four additional families, and 115 children). The expedition included herders, interpreters, muleteers, servants, 20 army recruits, 140 pack mules carrying clothing, food and four casks of brandy, 450 saddle horses and riding mules, and 355 cattle. Missionary Pedro Font chronicled the journey (Bolton 1930).

The Southern Overland or Gila Trail became a major thoroughfare for emigrants and livestock herds from 1848 through the mid-1870s. Beginning with the Mexican-American War of 1846-1848, until the completion of the Southern Pacific and Santa Fe Railroads in the mid-1870s, the San Felipe and San José Valleys became part of a major corridor for overland migration and communication along the Gila River route to California. It was initially used for military expeditions and followed earlier trails established by Spanish and Mexican explorers and Santa Fe traders. Invading American armies marching to California establishing the overland trail through Arizona along the Gila River to where it joined the Colorado River at present-day Yuma, Arizona (Trafzer 1980). From the junction of the Gila and Colorado Rivers, the trail followed an already well-established route across the Colorado Desert and northward along the east side of the peninsular range through the San Felipe Valley, Warner's Pass, and San José Valley. The route became well used by traders and trappers who journeyed between California and Sonora in the 1830s. During the 1840s and 1850s, invading American armies followed the route to California during the Mexican-American War, followed by thousands of Gold Rush immigrants. Then, in 1857, overland mail service was established along the trail. It was the First Transcontinental Overland Mail Route, originally the James E. Birch route (1857), from El Paso to Yuma. This stage was to run twice a month with stops in the San Diego region that included Old Town San Diego, Mission San Diego, the Ames Ranch at Flinn Springs, the Williams Ranch near Alpine, Julian Sandoval's ranch near Descanso, Lassator Ranch near Green Valley, and through the Cuyamaca Mountains to Vallecito (HCFDL 1988:21-23). Birch met an untimely death at sea and the route was taken over by John Butterfield the same year, and in 1858 he began running weekly stage routes that continued until 1861 as the Los Angeles, San Diego, and San Antonio Mail Line or as we casually call the Butterfield Stage Route (Mitchell 2010). Stage routes were later followed by the Plank Road in 1912 that ran west to San Diego County, Highway 80, and the Lee Highway.

Farming

As early as 1890, settlers began to enter the Imperial Valley of California. Prior to this, many settlers and travelers passed through the valley on their way to San Diego or Los Angeles from Ft. Yuma on the Colorado River. People viewed the Imperial Valley as a barren waste-land that was subject to instant flooding and plagues of insects in addition to arid land and scorching heat throughout the year (Bates 1970). A few settlers started the town of Imperial, and by 1900 many more settlers entered the valley and began to farm the land; however, no real development took place until water was brought into the area in 1901. This occurred with the construction of the

Alamo Canal, which was a 4 mile-long waterway that connected the Colorado River to the head of the Alamo River. The canal was constructed in 1901 to provide irrigation to the Imperial Valley. A small portion of the canal was located in the United States but the majority of the canal was located in Mexico. The Alamo Canal is also known as the Imperial Canal (Gupta 2007:208), and by 1903 hydroelectric power was being harnessed as well. By 1904 the City of Imperial was officially formed. In 1905 there were a series of floods that diverted the Colorado River into the valley and the Salton Sea was formed. Imperial County, originally part of San Diego County, was founded August 7, 1907. The same year the cities of El Centro, Brawley, and Holtville were also formed.

By the mid-1920s 500,000 acres in Imperial Valley were being irrigated. In 1934 construction began on a new irrigation canal system for the valley that would be primarily on U.S. soil, the All-American Canal, which was completed in 1940. The population by this time had grown to more than 61,000 in Imperial Valley. In the 1950s and 1960s farmers were encouraged to level and tile their fields, and install concrete ditches. In 1950 there were approximately 1,550 farmers, today there are approximately 500 farmers in Imperial Valley.

The Project Area parcels had several occupants beginning in 1911 (Table 2). Ida F. Seifert purchased 160 acres in 1911 under the Land Patent Act of 1820. The sale of public land was governed by the Land Act of 1820, and it is often called the "Cash Act" since it eliminated the previous practice of selling land on credit. Instead, parcels were sold at a set price of $1.25 per acre, payable in full at the time of purchase. Between 1910 and 1921 there was a tremendous growth in agriculture endeavors in the surrounding area. Land was purchased under the cash act, as well as the Desert Land Act of 1877 and the Homestead Act of 1862. The Desert Land Act was passed by the United States Congress on March 3, 1877 to encourage and promote the economic development of the arid and semiarid public lands of the Western United States. Through the Act, individuals could apply for a desert-land entry to reclaim, irrigate, and cultivate arid and semiarid public lands. The act offered 640 acres of land to an adult married couple who would pay $1.25 an acre and promise to irrigate the land within 3 years. A single man would only receive half of the land for the same price. The Homestead Act gave an applicant freehold title to up to 160 acres of undeveloped federal land outside the original 13 colonies. The law required three steps: file an application, improve the land, and file for deed of title. Anyone who had never taken up arms against the U.S. government, including freed slaves, could file an application and evidence of improvements to a federal land office. The occupant also had to be 18 or older and had to live on the land for five years. The original Homestead Act was signed into law by President Abraham Lincoln on May 20, 1862; however, much of the prime low-lying alluvial land along rivers had been homesteaded by the turn of the twentieth century, a major update called the Enlarged Homestead Act was passed in 1909. It targeted land suitable for dry-land farming, increasing the number of acres to 320.

The private land patents within the study area that could be traced online, excluding the Imperial Irrigation District, totaled 68 (Table 2). Four are less than 10 acres and include lands purchased through the Cash Act (George T. Edwards 1917; Harry E. Davis 1920; Irwin Rubenstein, George J. Nigro 1954), and acquired through the Homestead Act (Hulda H. Vaughn, Dennis Sullivan 1915). Three 10-20 acre parcels were acquired under the Cash Act (Robert M. Davies 1915), the Homestead Act (Gustav E. Koch, Montgomery Auble 1916), and the Desert Land Act (Moses H. Widner, Edward F. Donnelly 1919).

Eleven of the land patents range from 39.57 acres to 80 acres and include lands purchased under the Cash Act (n=7), Homestead Act (n=2), and Desert Land Act (n=2) between 1913 and 1919 (Table 2). Fourteen land patents range from 80 to 120 acres and include lands purchased under the Cash Act (n=7), Homestead Act (n=1), and Desert Land Act (n=6) between 1912 and 1953 (Table 2). Thirty-seven land patents range from 125 to 320 acres and include lands purchased under the Cash Act (n=31), Homestead Act (n=2), and Desert Land Act (n=4) between 1911 and 1950 (Table 2).

Many of the private land patents were acquired early in the first quarter of the 20th century and tapered off toward the middle of the 20th century (Table 2).

Table 2. Bureau of Land Management General Land Office Search Results

BLM Serial No.	Name	Issue Date	Acres	Aliquot Parts	Sect/Block	Authority
T16S/R12E						
CALA 0014984	Arthur E. Frampton	1/24/1914	160	Lot/Trct 98	3	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0006597	Mollie E. Edgar	1/30/1914	234.27	S½SE¼ SE¼SW¼	3	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004748	Blanche E. Edgar	10/29/1914	240	SW¼SW¼	3	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0011007	Emily Edgar	1/4/1915	40.83	Lot/Trct 10	3	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0011006	James A. Marshall	1/14/1915	144.2	Lot/Trct 296	3	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004747	Mabel Clare Edgar	1/20/1915	240	S½NW¼ NW¼SW¼	3	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CAEC 0002746	George T. Edwards	7/27/1917	8.73	Lot/Trct 2	3	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0040448	George T. Edwards	1/21/1931	157.29	Lot/Trct 1	3	May 20, 1862: Homestead EntryOriginal (12 Stat. 392)
CACA 014357	Imperial Irrigation District	8/21/1984	17.8	Lot/Trct 4	3	October 21, 1976: Sale-Public Lands-FLPMA (90 Stat. 2743)
CACAAA 000001 9G	State of California	3/2/1857	19927.98	Lot/Trct 49 Lot/Trct 81 Lot/Trct 107	21	March 3, 1853: California Enabling Act (10 Stat. 244)

BLM Serial No.	Name	Issue Date	Acres	Aliquot Parts	Sect/Block	Authority
CACAAA 016154 02	State of California	4/13/1901	1785.65	Lot/Trct 80	21	January 21,1927: Indemnity Selections (44 Stat. 1022)
CACAAA 013832 01	State of California	10/22/1910	2316.55	Lot/Trct 82	21	January 21,1927: Indemnity Selections (44 Stat. 1022)
CALA 0005086	Henry S. Jernigan, George W. Stephenson	7/17/1913	160	Lot/Trct 81	21	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001608	Milton P. Adams	2/6/1914	160	SE¼SE¼	21	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004706	Hulda H. Vaughn	10/30/1914	137.04	Lot/Trct 8 Lot/Trct 9	21	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004707	Mary Koch	12/7/1914	55.86	Lot/Trct 2 Lot/Trct 3 Lot/Trct 4 Lot/Trct 5	21	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0015248	Alva T. Vaughn	9/5/1916	103.74	SE¼SW¼ Lot/Trct 10 Lot/Trct 6 Lot/Trct 7	21	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0023445	Gustav E. Koch, Montgomery Auble	10/21/1916	13.88	Lot/Trct 1	21	May 20, 1862: Homestead EntryOriginal (12 Stat. 392)
CACAAA 020122 01	State of California	7/6/1917	1901.86	Lot/Trct 79	21	January 21,1927: Indemnity Selections (44 Stat. 1022)
CAEC 0003328	Alice Irene Wells, Edward F. Donnelly	3/1/1919	49.67	Lot/Trct 11 Lot/Trct 12 Lot/Trct 13	21	March 3, 1877: Desert Land Act (19 Stat. 377)
CAEC 0003339	Moses H. Widner, Edward F. Donnelly	6/3/1919	13.9	Lot/Trct 15	21	March 3, 1877: Desert Land Act (19 Stat. 377)
CAEC 0004146	Harry E. Davis	6/5/1920	5.65	Lot/Trct 14	21	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0000513	Ida F. Seifert	3/9/1911	160	Lot/Trct 50	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0000066	Jennie E. Scott	2/11/1913	95.31	Lot/Trct 54	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001106	George H. Woolliscroft	2/11/1913	40	Lot/Trct 52	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CACAAA 018651 02	State of California	5/14/1913	3453.79	Lot/Trct 78	22	January 21,1927: Indemnity Selections (44 Stat. 1022)
CALA 0001198	Arthur Ewens	5/19/1913	160	Lot/Trct 55	22	May 20, 1862: Homestead EntryOriginal (12 Stat. 392)
CALA 0001769	Arthur Ewens	8/28/1913	159.99	Lot/Trct 53	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001608	Milton P. Adams	2/6/1914	160	SW¼SW¼	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0006635	Eliott McMullan	2/12/1914	39.57	Lot/Trct 1	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)

Table 2. Bureau of Land Management General Land Office Search Results						
BLM Serial No.	**Name**	**Issue Date**	**Acres**	**Aliquot Parts**	**Sect/Block**	**Authority**
CALA 0018136	Peter J. Storms, Marshal S. Phillips	4/28/1914	40	Lot/Trct 56	22	May 20, 1862: Homestead EntryOriginal (12 Stat. 392)
CALA 0002130	Roy Carlisle Holbrook	6/29/1916	87.96	SW¼NW¼ Lot/Trct 3 Lot/Trct 4 Lot/Trct 5	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CACAAA 020122 01	State of California	7/6/1917	1901.86	Lot/Trct 204 Lot/Trct 79	22	January 21,1927: Indemnity Selections (44 Stat. 1022)
CAEC 0000748	Edward F. Donnelly, Barbara P. Adams	11/18/1918	86.33	NW¼SW¼ Lot/Trct 6 Lot/Trct 7	22	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0108323	Irwin Rubenstein, George J. Nigro	4/27/1954	0.43	Lot/Trct 2	22	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001769	Arthur Ewens	8/28/1913	159.99	Lot/Trct 53	26	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0014174	William Ross Wright	7/6/1914	160	Lot/Trct 51	26	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0007219	Maud Markwell, Halbert G. Littlejohn	12/7/1914	199.99	A, Lot/Trct 45 B, Lot/Trct 45 Lot/Trct 46	26	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004816	Eugene Gannon	2/8/1915	227.39	Lot/Trct 292	26	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001952	Nellie F. Minniear, Robert Barry, Daisy Calisher, Halbert G. Littlejohn	6/1/1915	40	Lot/Trct 289	26	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0000207	Robert M. Davies	6/29/1915	20	Lot/Trct 291	26	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0000208	Thomas W. Davies	6/29/1915	158.67	Lot/Trct 290	26	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004734`	David F. Harbison	1/30/1917	159.58	B, Lot/Trct 41	26	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0004735	Carrie L. Harbison	1/30/1917	177.48	Lot/Trct 47	26	March 3, 1877: Desert Land Act (19 Stat. 377)
CAEC 0000192	Judson H. Payne	1/20/1919	104.6	Lot/Trct 293	26	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0000063	Orville L. Snow, Otis Littlejohn	3/11/1912	120	E½SW¼ SW¼SE¼	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001769	Arthur Ewens	8/28/1913	159.99	Lot/Trct 53	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0011881	Lorenzo Adams	8/28/1913	120	SW¼NW¼	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0014414	Alexander Wixom	11/26/1913	125.03	SE¼SE¼ Lot/Trct 5 Lot/Trct 7	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001608	Milton P. Adams	2/6/1914	160	NW¼NW¼	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)

Table 2. Bureau of Land Management General Land Office Search Results						
BLM Serial No.	**Name**	**Issue Date**	**Acres**	**Aliquot Parts**	**Sect/Block**	**Authority**
CALA 0007219	Maud Markwell, Halbert G. Littleton	12/7/1914	199.99	B, Lot/Trct 45	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0000939	Nat R. Titus, Granville M. Boyer	1/14/1915	75.8	Lot/Trct 295	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004816	Eugene Gannon	2/8/1915	227.39	Lot/Trct 292	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0007566	Nora F. Warren	3/19/1915	80	SW¼SW¼	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0015129	Charles Schultz	6/29/1916	40	NW¼SW¼	27	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0011881	Lorenzo Adams	8/28/1913	120	SE¼NE¼ NE¼SE¼	28	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0001608	Milton P. Adams	2/6/1914	160	NE¼NE¼	28	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CACAAA 000001 9G	State of California	3/2/1857	19927.98	Lot/Trct 81 Lot/Trct 107	28	March 3, 1853: California Enabling Act (10 Stat. 244)
CALA 0039753	Alice E. Liebert	9/11/1925	80	E½SW¼	28	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0007476	Michael Liebert	6/1/1915	160	SE¼NW¼ SW¼NE¼ W½SE¼	28	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CAEC 0002292	Joseph F. Nelson	11/30/1920	120	SW¼NW¼ W½SW¼	28	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0004706	Hulda H. Vaughn	10/30/1914	137.04	NE¼NW¼ Lot/Trct 2 Lot/Trct 3	28	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0023849	Hulda H. Vaughn, Dennis Sullivan	10/27/1915	6.08	Lot/Trct 4	28	May 20, 1862: Homestead EntryOriginal (12 Stat. 392)
CALA 0007566	Nora F. Warren	3/19/1915	80	SE¼SE¼	28	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0004708	John C. Vaughn	4/22/1912	80	NE¼NE¼	33	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0000866	Versie Nelson, Eugene G. Smith	10/30/1912	80	SE¼NE¼	33	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0022900	Ernest R. Stoll, Septimus E. Dykes	9/16/1914	120	SE¼SW¼ W½SW¼	33	May 20, 1862: Homestead EntryOriginal (12 Stat. 392)
CAEC 0001310	John C. Cushman	6/27/1919	40	NW¼NE¼	33	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0004708	John C. Vaughn	4/22/1912	80	NW¼NW¼	34	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0000866	Versie Nelson, Eugene G. Smith	10/30/1912	80	SW¼NW¼	34	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CALA 0014414	Alexander Wixom	11/26/1913	125.03	NE¼NE¼	34	April 24, 1820: Sale-Cash Entry (3 Stat. 566)

Table 2. Bureau of Land Management General Land Office Search Results						
BLM Serial No.	**Name**	**Issue Date**	**Acres**	**Aliquot Parts**	**Sect/Block**	**Authority**
CALA 0039580	Ethel McArthur, Paul C. Ferrell	8/21/1928	320	SE¼NE¼ E½NW¼ NE¼SW¼ W½NE¼ N½SE¼	34	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0039059	George O. Lien	12/11/1953	80	S½SE¼	34	March 3, 1877: Desert Land Act (19 Stat. 377)
CALA 0020784	Emmitt J. Smith	12/20/1950	156.93	NE¼NE¼ Lot/Trct 1 Lot/Trct 2 Lot/Trct 3	35	April 24, 1820: Sale-Cash Entry (3 Stat. 566)
CACAAA 017563 02	State of California	12/18/1916	538.89	SE¼NE¼	35	January 21,1927: Indemnity Selections (44 Stat. 1022)
CALA 0006826	William A. McCune, Henry E. Clay	1/18/1917	280	SE¼SW¼ N½SW¼ SE¼	35	March 3, 1877: Desert Land Act (19 Stat. 377)
CACAAA 000509 02	State of California	7/23/1917	757.09	S½NW¼ SW¼NE¼	35	January 21,1927: Indemnity Selections (44 Stat. 1022)
CAEC 0002124	Cedric E. Johnson, Alexander L. Conger, William H. McCuen	3/12/1918	40	SW¼SW¼	35	May 20, 1862: Homestead EntryOriginal (12 Stat. 392)
CAEC 0000192	Judson H. Payne	1/20/1919	104.6	Lot/Trct 293	35	March 3, 1877: Desert Land Act (19 Stat. 377)

3. PREVIOUS INVESTIGATIONS

The previously recorded cultural resources and investigations conducted at the South Coastal Information Center (SCIC) and literature review in the vicinity of the survey area, and within a one mile buffer, were examined to determine if known cultural resources would be potentially impacted by the proposed Project. The records check revealed that 47 of the investigations have been conducted within one mile of the Project. Of these 47 investigations 6 of those are within or crossing the Project Area, primarily the (Table 3 – shaded).

Four of the six previous studies applicable to the Project Area were conducted between 1975 and 1980 (Ritter 1975; Gallegos 1979; Davis 1980; Wirth 1980), and are all linear projects (Figure 4, Appendix A). One study, also a linear study was conducted in 1993 for the Imperial Irrigation District East Lowline and Trifolium Interceptors Environmental Impact Report (IID 1993). The most recent study within the Project Area was the survey of a staging area for the Sunrise Powerlink Project by Gallegos and Associates (Noah and Gallegos 2008).

The records search identified a total of 139 previously recorded cultural resources within the private and public lands survey and buffer areas, 10 of which are recorded within the Project APE (Table 4 - shaded). All of the previously recorded cultural resources are historic resources. Two (CA-IMP-3404 and CA-IMP-3406) are segments of the Cross Wagon Road. The other eight historic resources are related to agriculture in the Imperial Valley, and include a portion of the Westside Main Canal (CA-IMP-7834); a portion of the Foxglove Canal (CA-IMP-8821); a portion of the Wormwood Canal (CA-IMP-8983); a portion of the Fern Canal and the Fern Drain (P-13-012689); a portion of the Forget-Me-Not Canal (P-13-012690); the Fern Check of the Westside Main Canal (P-13-012692); and a portion of the Fig Canal (P-13-012693) (Figures 5A and 5B – Confidential Appendix C).

Table 3. Previous Investigations within One Mile of the Survey Area				
NABD	**Year**	**Author**	**Project**	**Company**
1100199	1979	Walker, Bull & Von Werlhof	Jade to the Sand Hills Cultural Resource Study	RECON
1100203	1979	Gallegos	East & West Mesa Class II Cultural Resource Inventory	Westec Services
1100207	1980	Davis	East & West Mesa Class II Cultural Resource Inventory	Westec Services
1100210	1980	Von Werlhof & McNitt	Archaeological Examinations of the Republic Geothermal Field, East Mesa	Imperial Valley College Museum
1100213	1980	Bull	Proposed Imperial Valley Substation Cultural Resource Survey	RECON
1100233	1981	Walker, Bull & Von Werlhof	Jade to the Sand Hills Cultural Resource Study	RECON
1100235	1981	BLM	APS/SDG&E Interconnection Supplement to Draft Environmental Document	Bureau of Land Management
1100252	1981	Schaefer	La Rosita to Imperial Valley Interconnection Project 230 kV TL Archaeological Survey Vol. II Appendix, Phase II	Cultural Systems Research, Inc.
1100262	1982	CSRI	Proposed Imperial Valley Substation Overview & Assessment	Cultural Systems Research, Inc.
1100279	1982	Shackley	Mountain Springs (Jade) to Sand Hills Portion of the APS/SDG&E Interconnection Project 500 kV TL Archaeological Survey, Phase II	Cultural Systems Research, Inc.
1100289	1983	Foster & Greenwood	La Rosita to Imperial Valley Interconnection Project 230 kV TL Cultural Resource Inventory	Greenwood & Associates
1100301	1983	Welch	Asset Management Parcels Cultural Resource Inventory	Welch
1100307	1984	Graves Engineering	Rio Bend RV Resort Ranch Environmental Impact Report	Graves Engineering
1100311	1984	Townsend	SWPL Cultural Resources Management Plan - Vol. II	Wirth Environmental Services
1100313	1984	Townsend	SWPL Cultural Resources Management Plan - Vol. I	Wirth Environmental Services

Table 3. Previous Investigations within One Mile of the Survey Area				
NABD	**Year**	**Author**	**Project**	**Company**
1100316	1984	Shackley	SWPL Mountain Springs (Jade) to Sand Hills Segment Data Recovery - Vol. 2 Appendices	Wirth Environmental Services
1100319	1984	Shackley	Western Colorado Desert Archaeological Investigations, Vol. 1	Wirth Environmental Services
1100325	1984	Gallegos	West Mesa Cultural Resource Survey and Site Evaluation	Westec Services
1100330	1985	Schaefer	Camps and Quarries After the Lake: A Survey of 547 Acres Below the Relic Lake Cahuilla Shoreline in the Vicinity of Interstate 8 and Dunaway Road	Mooney-Lettieri and Associates
1100459	1992	REH Consultants	Rio Bend Specific Plan	REH Consultants
1100460	1992	Mooney Assoc.	Rio Bend Specific Plan Final Environmental Impact Report	Brian F. Mooney Associates
1100477	1993	Imperial Irrigation District	East Lowline and Trifolium Interceptors and Completion Projects Draft Environmental Impact Report	Imperial Irrigation District
1100536	1979	Burkendroad	APS/SDG&E Interconnection Environmental Study Cultural Resources: History, Phase 1 Regional Studies	David Burkenroad
1100537	1979	Wirth Assoc.	APS/SDG&E Interconnection Environmental Study Cultural Resources: Archaeology, Phase 1 Regional Studies	Wirth Associates, Inc.
1100538	1979	Imperial County	APS/SDG&E Transmission Interconnect Project, Miguel to Sand Hills, Sand Hills to PVNGS Proposed Workscope Phase II Cultural Resources Study	Imperial County
1100547	1982	CSRI	Mountain Springs (Jade) to Sand Hills Portion of the APS/SDG&E Interconnection Project 500 kV Transmission Line Draft Archaeological Research Design and Data Recovery Program for Cultural Resources	Cultural Systems Research, Inc.
1100595	1982	CSRI	Mountain Springs (Jade) to Sand Hills Data Recovery Preliminary Report	Cultural Systems Research, Inc.

Table 3. Previous Investigations within One Mile of the Survey Area				
NABD	**Year**	**Author**	**Project**	**Company**
1100608	1986	Schaefer	Late Prehistoric Adaptations During the Final Recessions of Lake Cahuilla: Fish Camps and Quarries on West Mesa, Imperial County, California	Mooney-Levine and Associates
1100773	1999	Wallace Roberts & Todd	County of Imperial Bicycle Master Plan	Wallace Roberts & Todd
1100906	2001	BLM	EA for Presidential Permit Applications for Baja CA Power, Inc & Sempra Energy Resources	BLM
1100960	2004	BLM	DEIS Imperial-Mexicali 230 kV TLs	BLM
1100980	2001	Berryman	230-kV Transmission Corridor Cultural Resource Survey from Imperial County, CA to the International Border with Mexico	RECON
1100993	2006	Wlodarski	Nextel Wireless Telecommunications Site CA8991C (Sunbeam:Kuhn 2) Cellular Archaeological Resource Evaluations	Wlodarski
1101072	2001	Berryman	Cultural Resource Treatment Plan: Two 230 kV TLs from Imperial Valley Substation to the International Border with Mexico	RECON
1101073	2001	Berryman	230-kV Transmission Corridor Cultural Resource Survey from Imperial County, CA to the International Border with Mexico	RECON
1101182	2001	Yost, Mirro, Rhodes, Ing & Higgins	San Diego, CA to Yuma, AZ Final Report on Cultural Resource Monitoring Along the Level (3) Long Haul Fiber Optic Running Line	TRC
1101228	2006	SWCA	Cultural Resources Final Report of Monitoring and Finding for the Qwest Network Construction Project	SWCA Environmental Consultants
1101275	1975	Ritter	An Analysis of Cultural Resources Along the Proposed Yuha Desert ORV Courses	Ritter
1101306	1980	Wirth Assoc.	APS/SDG&E Interconnection Project Environmental Study Phase II Corridor Studies - Native American Cultural Resources Appendices	Wirth Associates, Inc.

Table 3. Previous Investigations within One Mile of the Survey Area				
NABD	**Year**	**Author**	**Project**	**Company**
1101308	1983	Townsend	Southwest Powerlink Cultural Resources Management Plan (Draft)	Wirth Associates, Inc.
1101311	Various	Various	SDG&E La Rosita Line – Misc Documents	Various
1101313	1980	Wirth Assoc.	APS/SDG&E Interconnection Project (Phase II Corridor Studies) - Cultural Resources: Archaeology	Wirth Associates, Inc.
1101315	1982	Shackley	Mountain Springs (Jade) to Sand Hills Portion of the APS/SDG&E Interconnection Project 500 kV TL Vol II Confidential Technical Appendices, Phase III Archaeological Survey	Cultural Systems Research, Inc.
1101330	2008	SWCA	Sunrise Powerlink Project Final Cultural Resources Survey of Alternatives in Imperial, Orange, Riverside and San Diego Counties, CA	SWCA Environmental Consultants
1101350	2008	Noah & Gallegos	Sunrise Powerlink Project Final Class III Archaeological Inventory in San Diego and Imperial Counties, CA	Gallegos & Associates
1101388	1981	Olech	Yuha Basin Area of Critical Environmental Concern Management Plan	Bureau of Land Management
1101433	2011	Zepeda-Herman, Shultz, & Price	Class III Cultural Resources Survey for the Imperial Solar Energy Center South Project	RECON

Table 4. Previously Recorded Cultural Resources within One Mile					
Site Number	**Type**	**Age**	**Location**	**NRHP Eligibility**	**Comment**
CA-IMP-1747	Cross Indian Trail	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-1748	Cross Indian Trail		One-Mile Buffer	Insufficient Data	
CA-IMP-1749	Cross Trail	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-1750	Cross Trail	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-1751	Cross Trail	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-1752	Cross Trail	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-1753	"Indian" Wells	Prehistoric/ Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-2481	Isolate Metate Fragment	Prehistoric	One-Mile Buffer	Not Eligible	Collected & turned in to BLM (1978)
CA-IMP-3176	Temporary Camp/Lithic Isolates	Prehistoric	One-Mile Buffer	Insufficient Data	Relocated in a different location than originally recorded
CA-IMP-3402	Crossed Wagon Road (Ft Yuma-Warner Springs)	Historic	One-Mile Buffer	Not Eligible	"Most likely destroyed or covered by sand"
CA-IMP-3402	Cross Wagon Road	Historic	One-Mile Buffer	Not Eligible	Destroyed due to cultivation
CA-IMP-3403	Cross Wagon Road	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-3404	Cross Wagon Road	Historic	Proposed Project APE	Insufficient Data	
CA-IMP-3405	South Shore of Big Laguna	-	One-Mile Buffer	Insufficient Data	
CA-IMP-3406	Crossed Wagon Road, N. of W.	Historic	Proposed Project APE	Insufficient Data	
CA-IMP-3407	Wagon Road	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-3408	Cross Emigrant Trail	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-3409	Cross Wagon Road	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-3410	Cross Wagon Road to Indian Well	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-3411	Cross Wagon Road to Indian Well	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-3412	Cross Wagon Road	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-3790	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Eligible	Potential for buried deposit (rodent burrow)
CA-IMP-3791	Temporary Camp	Prehistoric	One-Mile Buffer	Insufficient Data	

Table 4. Previously Recorded Cultural Resources within One Mile					
Site Number	**Type**	**Age**	**Location**	**NRHP Eligibility**	**Comment**
CA-IMP-4503	Trash Dump	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-4510	Lithic Scatter	Prehistoric	One-Mile Buffer	Not Eligible	Not relocated in 2009 (Garcia-Herbst et al.)
CA-IMP-4518	Temporary Campsite/Lithic Scatter	Prehistoric	One-Mile Buffer	Not Eligible	Not relocated in 2010 (Zepeda-Herman et al. 2011)
CA-IMP-4536	Isolate Mano Fragment	Prehistoric	One-Mile Buffer	Not Eligible	Collected (CSRI 1981)
CA-IMP-4537	Isolate Flake	Prehistoric	One-Mile Buffer	Not Eligible	
CA-IMP-4538	Isolate Pottery Fragment	Prehistoric	One-Mile Buffer	Not Eligible	
CA-IMP-4539	Isolate Core	Prehistoric	One-Mile Buffer	Not Eligible	
CA-IMP-4540	Temporary Camp	Prehistoric	One-Mile Buffer	Insufficient Data	Not relocated in 2010 (Bowden-Renna 2010)
CA-IMP-7834	Westside Main Canal	Historic	Proposed Project & Non-BLM option APE	Recommended Eligible overall; however, some segments Not Significant	Part of the All-American Canal System
CA-IMP-8657	Lithic Scatter & Ceramic Scatter	Prehistoric	One-Mile Buffer	Insufficient Data	
CA-IMP-8699	Trash Scatter	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-8821	Fox Glove Canal	Historic	Proposed Project APE	Recommended Not Eligible (URS 2009)	
CA-IMP-8983	Wormwood Canal	Historic	Proposed Project APE	Some Segments Not Eligible	
CA-IMP-11439	Trash Scatter	Historic	One-Mile Buffer	Insufficient Data	
CA-IMP-11440	Lithic Scatter	Prehistoric	One-Mile Buffer	Insufficient Data	
CA-IMP-11443	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11444	Lithic Scatter	Prehistoric	One-Mile Buffer	Insufficient Data	
CA-IMP-11445	Lithic Scatter	Prehistoric	One-Mile Buffer	Insufficient Data	
CA-IMP-11448	Lithic Scatter	Prehistoric	One-Mile Buffer	Insufficient Data	
CA-IMP-11449	Lithic Scatter	Prehistoric	One-Mile Buffer	Insufficient Data	
CA-IMP-11450	Lithic Scatter	Prehistoric	One-Mile Buffer	Insufficient Data	

Table 4. Previously Recorded Cultural Resources within One Mile					
Site Number	**Type**	**Age**	**Location**	**NRHP Eligibility**	**Comment**
CA-IMP-11469	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11473	Lithic Scatter & Ceramic Scatter	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11476	Temporary Camp	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11479	Lithic Scatter with Fire Hearths	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11481	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Not Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11482	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Not Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11483	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Not Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11484	Lithic Scatter & Ceramic Scatter	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11488	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Not Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11489	Lithic Scatter & Ceramic Scatter	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11490	Lithic Scatter	Prehistoric	One-Mile Buffer	Recommended Not Eligible (Zepeda-Herman et al. 2011)	
CA-IMP-11494	Temporary Camp	Prehistoric	One-Mile Buffer	Recommended Eligible (Zepeda-Herman et al. 2011)	