Transportation and Traffic Assessment

for the

Longboat Solar Project

San Bernardino County, California

Prepared for:

Environmental Intelligence, LLC
1590 S. Coast Highway, Suite 17
Laguna Beach, California 92651

Prepared by:

GC Environmental, Inc.

Offices:
Anaheim, CA ● Portland, OR ●
Reno, NV ● Henderson, NV

GCE Project # 1443-3

29 April 2015

TABLE OF CONTENTS

Copyright 2015, GC Environmental, Inc.

Copyright 2015, GC Environmental, Inc.

Tables

Figures

Copyright 2015, GC Environmental, Inc.

Appendix

Appendix A: Baseline Traffic Study

Copyright 2015, GC Environmental, Inc.

EXECUTIVE SUMMARY

This Transportation and Traffic Assessment (assessment) for the proposed Longboat Solar Project (project) provides a review of the project's impacts on transportation and traffic conditions in the surrounding area. This assessment relies on the Baseline Traffic Study performed by Fehr and Peers to determine existing transportation and traffic conditions in the project vicinity (**Appendix A**).

This assessment was prepared with the intent of assessing the project's transportation and traffic impacts within the context of the California Environmental Quality Act (CEQA). CEQA is required by Section 21000 *et seq.* of the California Public Resources Code and Title 14 of the California Code of Regulations, Section 15000 *et seq*. The intent of CEQA is for the State of California and local public agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts to the extent feasible. For this project, the CEQA Lead Agency is San Bernardino County; its "action" addressed by CEQA would be the approval of a conditional use permit (CUP) authorizing construction and operation of this project. The specific transportation- and traffic-based aspects that were considered for this assessment come from Part XVI of the Transportation/Traffic Guidelines for the Implementation of California Environmental Quality Act (CEQA), Appendix G, Public Resource Code (PRC) Sections 15000–15387. These are as follows:

Would the project?

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 standards 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?*

Copyright 2015, GC Environmental, Inc.

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Findings

This assessment found that the project's construction-related impacts on transportation and traffic conditions in the surrounding area would require mitigation because of the temporary increase in the traffic volume on State Route 58 east of Lenwood Road. Development and implementation of a traffic mitigation plan will mitigate this impact to a less-than-significant level. All other transportation- and traffic-related impacts would be less-than-significant when the potential impacts of the project are considered alone. However, impacts to traffic circulation and safety arising from the cumulative effects of the project with the nearby State Route 58 Hinkley Expressway Project would require mitigation to achieve a less-than-significant level. Findings with respect to the six aspects listed above are summarized below in **Table 1**.

Copyright 2015, GC Environmental, Inc.

Table 1. Summary of assessment findings.

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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 transits 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?		X		
b.) Conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?		X		
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?				X
d.) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?		X		
e.) Result in inadequate emergency access?		X		
f.) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?		X		

Copyright 2015, GC Environmental, Inc.

1.0 INTRODUCTION

This Transportation and Traffic Assessment (assessment) presents a transportation and traffic analysis for the proposed Longboat Solar Project (project), conducted by GC Environmental, Inc. (GCE) for Environmental Intelligence, LLC (EI), on behalf of the project proponent, EDF Renewable Energy, Inc. (EDF RE). EDF RE proposes to develop and install a photovoltaic (PV) solar module installation on a project site located in a rural area near the City of Barstow and the community of Lenwood, within the unincorporated County of San Bernardino, California. This assessment of the project's anticipated transportation and traffic impacts was completed within the context of the California Environmental Quality Act (CEQA).

2.0 PROJECT DESCRIPTION

2.1 Project Summary

The Longboat Solar, LLC Project is a proposed solar energy facility that would generate up to 20 megawatts[1] (MW) of electricity using single axis tracker solar photovoltaic (PV) technology within an approximately 234.47-acre portion of 324.94 acres of previously disturbed agricultural lands. The project is located on unincorporated lands to the immediate northwest of the City of Barstow, and north of the community of Lenwood, in San Bernardino County, California. State Route 58 bounds the site to the east and north. A Site Vicinity Map and a Preliminary Site Plan are shown in Figures 1 and 2, respectively.

The project would connect to the electrical grid by way of a line tap on an existing Southern California Edison (SCE) 33kV transmission line located adjacent to the site along Community Boulevard, at which point the power generated from the project changes ownership from the project developer to SCE. SCE will undertake distribution line upgrades, repairs and modifications along the 33kV lines to SCE's Barstow Substation located in the City of Barstow approximately 4.5 miles east of the project site. SCE upgrade work will consist of eleven pole replacements, re-conductoring of 2900 feet of electrical line and several minor substation upgrades.

[1] Alternating current.

Copyright 2015, GC Environmental, Inc.

Community Boulevard bisects the north and south portions of the project site. The north and south sites will be electrically connected by underground conduit beneath Community Boulevard.

2.2 Project Location

The project is located in unincorporated San Bernardino County, approximately 1.6 miles north of the community of Lenwood and immediately northwest of the City of Barstow (see **Figure 1**). The project site is associated with County Assessor's Parcel Numbers (APNs) 0497-071-40, 0497-121-28, 0497-101-05, and 0497-101-14 (**Table 2**). The project site is located within the U.S. Geological Survey (USGS) 7.5-minute Barstow quadrangle (Township 10 North, Range 2 West, Section 33 and Township 9 North, Range 2 West, Sections 4 and 5). The site is mostly flat with the elevation only increasing slightly from 2,167 feet above mean sea level (MSL) in the eastern portion of the site to 2,185 feet above MSL in the western portion. The site is bounded to the north and east by State Route 58, Community Boulevard bounds much of the northern boundary and the south is bounded by undeveloped land adjacent to the Mojave River.

Vegetation on the site is generally disturbed and consists of fallow agriculture fields with disturbed saltbush scrub, partially stabilized dunes, tamarisk/ornamental windrows, and abandoned agriculture. Adjacent land uses include a project site landowner's rural residence, scattered rural properties and undeveloped land, light industrial use to the north, and active agriculture to the northwest.

Table 2. Identifying information for each of the four project site properties.

Assessor's Parcel Number	Gross Acreage	Owner	Address (Barstow, CA 92311)
0497-071-40	40.34	Hill's Ranch, Inc.	25749 Community Blvd
0497-101-05	77.51	Hill's Ranch, Inc.	25749 Community Blvd
0497-101-14	99.77	Soppeland Revocable Trust	25409 Community Blvd
0497-121-28	107.32	Hill's Ranch, Inc.	25749 Community Blvd

Copyright 2015, GC Environmental, Inc.

2.3 Project Construction

Project construction is anticipated to last up to 10 months. Construction would be comparable to other renewable energy projects and is anticipated to be divided into the following sequence:

1. Roads, grading, and fencing
2. Electrical infrastructure
3. PV assembly and installation
4. Substation interconnection
5. Electrical system upgrades
6. PV commissioning,
7. Project finalization.

Various elements of the project would be constructed concurrently on the property.

The project's construction sequence is expected to begin with removal of vegetation for the installation of PV module structures and security fencing. Any large vegetation and brush that currently exists on the site will be removed and the surface will be graded flat where necessary for safe construction practices. Existing low-lying vegetation will remain undisturbed where possible to provide ground cover and minimize dust generation. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.

Minimal site grading is proposed for the site. Initial grading work will include the use of excavators, graders, dump trucks, and end loaders, in addition to support pickups, water trucks, and cranes. Water from existing on-site groundwater wells will be required during construction to support concrete manufacturing, dust control, module washing, and sanitary use.

Staging areas will be required for material handling, temporary storage, and staging activities. One staging yard, proposed on the south side of Community Boulevard, would have a short term lease associated for parking and construction staging (see **Figure 2, Site Plan**). Upon the completion of construction, this temporary staging yard, approximately 3 acres in size, would not be a part of the project's pro forma boundary; all other construction staging is expected to occur on the project site. Equipment will be placed in the staging and lay-down areas. A temporary modular construction office may be placed onsite during construction. Disturbed areas, temporary roadways, and equipment laydown sites that are not required as part of the

Copyright 2015, GC Environmental, Inc.

ongoing operating of the facility will be restored in accordance with the San Bernardino County Development Code and project permits.[2,3]

A stormwater pollution prevention plan (SWPPP) incorporating best management practices (BMPs) for erosion control will be prepared and approved prior to the start of construction. During site preparation, the SWPPP will be implemented and preliminary erosion and sediment control features will be installed.

No hazardous wastes will be generated during the construction of the project. The following wastes are anticipated to be generated: common household trash, cardboard, wood pallets, copper wire, scrap metal and wood wire spools. The project applicant will recycle as much of the generated waste as feasible. Although construction is not expected to generate hazardous waste, field equipment used during construction may contain limited amounts of hazardous materials such as diesel fuel, hydraulic oil, grease, solvents, adhesives, paints, and other petroleum-based products contained in construction vehicles. Standard BMPs will be utilized to contain and dispose of these materials in accordance with applicable regulations.

The project would be constructed by several contractors specializing in renewable energy projects. Some construction employees would be expected to carpool from respective population centers such as Barstow, California, and report to the designated construction staging yards prior to the beginning of each workday. It is anticipated that the employees would utilize Community Boulevard as points of ingress/egress to the property and that, once on site, they would access various sections via the existing and improved network of gravel or compacted dirt roads.

2.4 Operation and Maintenance

The project would be operated on an autonomous, unstaffed basis and monitored remotely from an existing off-site facility. It is anticipated that maintenance requirements will be minimal as the proposed project's PV arrays will operate with limited moving parts. No full-time staffing would be required to operate the facility. One or two employees are expected to visit the site five days per week for routine maintenance and checkups. Operational activities are limited to monitoring plant performance and responding to utility needs for plant adjustment along with

[2] San Bernardino County Land Use Services. *Plant Protection and Management Handout*. April 2007. Available at <http://cms.sbcounty.gov/lus/Planning/Handouts.aspx>.
[3] San Bernardino County Land Use Services. *Temporary Structures and Uses Handout*. February 2008. Available at <http://cms.sbcounty.gov/lus/Planning/Handouts.aspx>.

Copyright 2015, GC Environmental, Inc.

preventative and unscheduled maintenance. The project would operate during daylight hours only. Periodic module cleanings and quarterly maintenance activities are anticipated to utilize six to eight workers over a one to two week period each quarter. No heavy equipment will be used during normal project operation. Operation and maintenance vehicles will include trucks (pickup, flatbed), forklifts, and loaders for routine and unscheduled maintenance, and water trucks for solar module washing. Large heavy-haul transport equipment may be brought to the site infrequently for equipment repair or replacement.

Any required maintenance will be scheduled so as to avoid peak electric load periods, with unplanned maintenance activity as needed depending on the event. Preventative maintenance kits and certain critical spare components will be stored at the project site, while all other necessary maintenance components will be available at an offsite location.

Vegetation is sparse with little potential for vegetative fuel buildup. The PV panels and ancillary equipment represent a negligible increase in fire potential. The applicant will, however, have a fire prevention plan for the project in compliance with applicable San Bernardino County regulations. The project would produce a small amount of waste associated with maintenance activities. PV solar farm wastes typically include broken and rusted metal, defective or malfunctioning modules, electrical materials, empty containers, and other miscellaneous solid materials including typical household type refuse generated by workers. These materials will be collected and recycled to the extent possible.

2.5 Decommissioning

At the end of the project site's operational term, the applicant may determine that the site should be decommissioned and deconstructed, or it may seek an extension of its CUP. When the arrays are removed after the project's lifetime, the land will be largely unaltered from its natural state. The project would utilize BMPs to ensure the collection and recycling of modules to the extent feasible. All decommissioning activities would adhere to the requirements of the appropriate governing authorities and in accordance with all applicable federal, State, and County regulations.

Copyright 2015, GC Environmental, Inc.

3.0 REGULATORY SETTING

San Bernardino County, San Bernardino Associated Governments (SANBAG), and Caltrans have regulatory authority of roads and traffic in the project vicinity. SANBAG is a council of governments and acts as the transportation planning agency for San Bernardino County. There are currently 25 member jurisdictions that, through appointed representatives, are responsible for the cooperative regional planning of local and regional roadway improvements, train and bus transportation, deployment of intelligent transportation systems, and long-term planning studies. The Congestion Management Program (CMP) in San Bernardino County was created in June 1990 as a provision of Proposition 111. Under this proposition, urbanized areas with populations of more than 50,000 would be required to undertake a congestion management program that was adopted by a designated Congestion Management Agency (CMA). SANBAG was designated as the CMA by the County Board of Supervisors. The CMP's level of service (LOS) standard requires all CMP segments to operate at LOS E or better.[4] In the Desert Region (the planning region in which the project is located), the County "shall strive to achieve Level of Service…"C" on all County roadways.[5] In addition, the San Bernardino County *Road Planning and Design Standards* document contains project planning standards and thresholds-of-significance that apply to the proposed project.[6] These thresholds-of-significance are detailed in the portions of this report that discuss potential project impacts.

In addition to ensuring compliance with the CMP, the project will be in support of the following traffic-and-transportation related goals:

Goal CI 4. The County will coordinate land use and transportation planning to ensure adequate transportation facilities to support planned land uses and ease congestion.

Goal CI 5. The County's road standards for major thoroughfares will complement the surrounding environment appropriate to each geographic region.

Because project operations will not increase traffic in the area beyond minimal maintenance activities, the project is a land use that limits congestion and is supportive of the major

[4] URS Corporation. *County of San Bernardino 2007 General Plan*. 2007 (amended 2014). Available at <http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf>.
[5] URS Corporation. *County of San Bernardino 2006 General Plan Program Final Environmental Impact Report and Appendices.* SCH #2005101038. 2007. Available at <http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FinalEIR2007.pdf>.
[6] San Bernardino County. *Road Planning and Design Standards*. 1993. Available at <http://www.sbcounty.gov/Uploads/lus/PW/ROADPLANNINGDESIGNSTANDARDS.pdf>.

Copyright 2015, GC Environmental, Inc.

thoroughfares in the area. Through adherence to all required County standards, specifications, and regulations, and implementation of a traffic management plan, the temporary construction phase of the project will present a less-than-significant impact with respect to the above goals.

3.1 Transportation Regulations/Standards Relevant to Construction Activities

The construction and decommissioning of the project will be subject to the following regulations:

- San Bernardino County General Traffic Control Notes, which largely pertain to traffic signage and pavement markings.[7]
- San Bernardino County Department of Public Works Right-of-Way Permits. Permits are required for all construction work in the County right-of-way (e.g., the right-of-way along Community Boulevard) Guidelines, provisions, and standards related to these permits will be followed.[8]
- San Bernardino County Road Planning and Design Standards. Because the proposed project does not involve facilities to which the public has access, this document is of most relevance to the project for the levels-of-significance it promulgates with respect to transportation and traffic planning. However, certain aspects that relate to traffic control and construction in the County right-of-way (among others) will apply.[9]

[7] San Bernardino County Department of Public Works. "San Bernardino County General Traffic Control Notes." Available at < http://www.sbcounty.gov/Uploads/lus/PW/generalTrafficNotes.txt>

[8] San Bernardino County Department of Public Works. *General Permit Conditions and Trench Specifications*. November 2012. This and other right-of-way provisions are available at < http://www.sbcounty.gov/dpw/operations/permits_road.asp>.

[9] San Bernardino County. *Road Planning and Design Standards*. 1993. Available at <http://www.sbcounty.gov/Uploads/lus/PW/ROADPLANNINGDESIGNSTANDARDS.pdf>.

Copyright 2015, GC Environmental, Inc.

4.0 EXISTING CONDITIONS

A comprehensive data collection effort was undertaken by Fehr and Peers to develop a detailed understanding of existing conditions in the study area. The assessment of conditions relevant to this study included an inventory of the street and highway systems, traffic volumes on these facilities, and operating conditions at key intersections and roadway segments. A description of these elements is presented in this section. The full Fehr and Peers report is provided in **Appendix A.**

4.1 Analysis Parameters

The geographic scope of the transportation study—including study intersections and roadways—along with analysis methodologies and significance criteria employed in this study, are discussed below.

Project Study Area

The major roadway within the study area is Community Boulevard. This roadway extends east to west within the study area and connects to Dixie Road and Lenwood Road. SR-58 provides regional access to and from the project site.

Project Study Intersections

Based on Fehr and Peer's review of the adjacent roadway network, the following facilities (as shown in **Figure 3**) were selected for analysis:

Intersections

1. Lenwood Road & Community Boulevard
2. Lenwood Road & SR-58
3. Dixie Road & Community Boulevard

Roadway Segments

1. Lenwood Road (SR-58 to Community Boulevard)
2. Community Boulevard (SR-58 to Lenwood Road)
3. SR-58 (west of Lenwood Road)
4. SR-58 (east of Lenwood Road)

Copyright 2015, GC Environmental, Inc.

Analysis Scenario

The analysis of existing conditions is based on traffic counts collected in January 2015. The intersections and roadway segments listed above were chosen based on potential access routes to the project. Because SR-58 is the logical regional route to the project, it is assumed that all project-related traffic will use it to reach the site. SR-58 can be accessed from both Dixie Road and Lenwood Road.

It is unlikely that project-related traffic would use other routes such as Agate Road (the first street off of Lenwood Road south of the Mojave River) or Community Blvd west of the project because SR-58 cannot be accessed from those routes.

Analysis Methodologies

Signalized Intersections

Signalized intersection operations were evaluated using methodologies provided in the Transportation Research Board's *Highway Capacity Manual* (HCM).[10] These methodologies assess average delays at the intersection and then assign a corresponding letter grade that represents the overall operation of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). Descriptions of the HCM LOS letter grades for signalized intersections are provided in **Table 3**.

[10] Transportation Research Board, *Highway Capacity Manual*, 2000.

Copyright 2015, GC Environmental, Inc.

Table 3. Signalized intersection level-of-service criteria.

Level of Service	Description	Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 15.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 15.0 to 25.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 25.0 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55.0 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80.0

Unsignalized Intersections

Unsignalized intersection operations were also evaluated using methodologies provided in the HCM.[11] These methodologies assess delays at the controlled approaches and then assign a corresponding letter grade that represents the overall condition of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). Descriptions of the LOS letter grades for unsignalized intersections are provided in **Table 4**.

[11] *Ibid.*

Copyright 2015, GC Environmental, Inc.

Table 4. Unsignalized intersection level-of-service criteria.

Level of Service	Description	Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 to 30.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 30.0 to 40.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 40.0 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 50.0

Intersection levels of service are calculated using Synchro 8.0 software, which implements HCM methodologies. Delay and the resulting LOS is based on total intersection operations.

Roadway Segments

The HCM methodology[12] was applied for analyzing roadway segments within the study area. The HCM thresholds for the roadway classifications of the study facilities are provided in **Table 5**. For example, for a major 2-lane highway, the average daily volume at which LOS A becomes LOS B is 1,200 vehicles.

[12] *Ibid.*

Copyright 2015, GC Environmental, Inc.

Table 5. Roadway segment level-of-service criteria.

Roadway Type	Level-of-Service (LOS) Average Daily Volume Thresholds				
	LOS A	LOS B	LOS C	LOS D	LOS E
Major 2-Lane Highway	1,200	2,900	7,900	16,000	20,500
2-Lane Arterial	--	--	9,700	17,600	18,700
2-Lane Collector	--	--	7,500	9,500	12,000

4.2 Roadway Facilities and Intersection Geometries

The main roadways within the study area include Community Boulevard, Lenwood Road, Dixie Road, and California State Route 58 (SR-58).

Community Boulevard is currently a two-lane roadway that extends east to west through the project site. Within the study area, the roadway has an undercrossing at SR-58, and intersects with both Dixie Road and Lenwood Road. Land along Community Boulevard near the project site is generally vacant, with a few buildings and residences along the roadway. This roadway does not have a specific street designation in the San Bernardino County General Plan.

Lenwood Road is currently a two-lane roadway that extends north to south approximately one half mile west of the project site. Within the study area, the roadway connects at an at-grade intersection to SR-58, and also intersects with Community Boulevard. Land along Lenwood Road between SR-58 and the Mojave River is generally vacant, with a residential community directly south. This roadway is designated as a Major Highway in the San Bernardino County General Plan.

Dixie Road is currently a two-lane roadway that extends north to south 1.4 miles west of the project site. Within the study area, the roadway has an at-grade intersection with SR-58, and also intersects with Community Boulevard. Land along Dixie Road is generally vacant. This roadway is not designated within the San Bernardino County General Plan.

State Route 58 is a two- to four-lane roadway which extends northeast to southwest, then turns south along the northeastern border of the study area. SR-58 provides access to Kern County. The adjacent land is generally vacant with scattered communities. This roadway is designated as a Major Highway in the San Bernardino General Plan.

Copyright 2015, GC Environmental, Inc.

4.3 Existing Traffic Volumes and Levels of Service

This subsection presents the existing peak hour turning movement and daily roadway segment traffic volumes for the analyzed intersections and segments and analyzes the resulting operating conditions at each location.

Existing Traffic Volumes

Traffic counts were collected at the aforementioned study intersections on 22 January 2015. Intersection traffic counts were collected during the morning peak period (7:00 to 9:00 AM) and the afternoon peak period (4:00 to 6:00 PM) during a typical mid-week day. Classified roadway segment counts were collected over a 24-hour period. For roadway segment volumes, Passenger Car Equivalent (PCE) factors of 1.0, 1.5, and 2.0 were applied to cars, bobtail trucks and buses, and heavy trucks, respectively. The PCE factors are applied to account for the additional wear-and-tear and impact of heavy trucks on the roadways. Traffic Count Data Sheets are provided with the full report in Appendix A.

Existing Peak Hour Level of Service

As shown below in **Table 6**, all three intersections operate at LOS C or better during the peak hours, which is considered acceptable for the study area. Detailed level of service sheets are provided with the full report in Appendix A.

Table 6. Intersection levels of service (existing conditions)

Intersection	Control	AM Peak Hour		PM Peak Hour	
		Delay[13] (sec.)	LOS	Delay[13] (sec.)	LOS
Lenwood Rd. & Community Blvd.	SSSC[14]	9.1	A	9.1	A
Lenwood Rd. & SR-58	Signalized	8.3	A	8.8	A
Dixie Rd. & Community Blvd.	SSSC[14]	8.9	A	8.5	A

[13] Delay for signalized and unsignalized intersections is based on application of 2000 Highway Capacity Manual methodology.
[14] SSSC = Side-Street-Stop-Controlled: At intersections between a main street and a side street, only traffic on the side street must stop. Community Blvd. is the main street in this case.

Copyright 2015, GC Environmental, Inc.

Roadway Segment Daily Levels of Service

As shown below in **Table 7**, all four roadway segments operate at LOS D or better over the course of a day. Detailed LOS sheets are provided with the full report in Appendix A.

Table 7. Roadway segment levels of service (existing conditions).

Roadway Segment	Roadway Type	Volume	LOS
Lenwood Rd. (SR-58 to Community Blvd.)	2-Lane Arterial	779	A
Community Blvd. (Lenwood Road to SR-58)	2-Lane Collector	539	A
SR-58 (West of Lenwood Road)	Major 2-Lane Highway	13,749	D
SR-58 (East of Lenwood Road)	Major 2-Lane Highway	15,942	D

4.4 Summary of Baseline Traffic Study

- Detailed intersection capacity and operation analyses were conducted at three intersections in the vicinity of the project site for a weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM), and at four roadway segments.

- Under existing conditions, all three study intersections and four roadway segments operate at LOS D or better.

Copyright 2015, GC Environmental, Inc.

5.0 IMPACT ANALYSIS ASSUMPTIONS

The following assumptions were used in determining the potential transportation/traffic impacts of the proposed project.[15]

- Project construction is anticipated to last up to 10 months. Construction would be comparable to other renewable energy projects and is anticipated to be divided into the following sequence:

    1. Roads, grading, and fencing
    2. Electrical infrastructure
    3. PV assembly and installation
    4. Substation interconnection
    5. Electrical system upgrades
    6. PV commissioning,
    7. Project finalization.

- Various elements of the project would be constructed concurrently on the property.

- The project construction sequence is expected to begin with removal of vegetation for installation of the PV module structures and security fencing. Any large vegetation and brush that currently exists on the site will be removed, but existing low-lying vegetation will remain undisturbed, to the extent feasible, to provide ground cover and minimize dust generation. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.

- Construction-related trip length and origin: all trips are assumed to reach the project site via SR-58 by way of Lenwood Road. Because it is assumed that all project trips will be coming to or from Barstow, Victorville, or locations farther south along Interstate 15, trips coming to the project site will be going westbound on SR-58 before turning left at Lenwood Road. They will then turn left at Community Boulevard and follow it to the project site. Trips leaving the project site will be reversing their arrival route.

[15] All assumptions are as provided by the project proponent and are the same as was used for the Air Quality/Greenhouse Gas Assessment.

Copyright 2015, GC Environmental, Inc.

- 10 percent of the project's workforce trips will live or be lodged in Barstow and have a 7-mile one-way trip length, 60 percent will originate in greater Victorville (south of the site via Interstate 15) and have a 34-mile one-way trip length, and the balance will drive to the site via Interstate 15 from the Inland Empire area or beyond. Trips in the latter category will have a one-way trip length of no less than approximately 60 miles.
- 40 percent of the project's vendor trips (concrete, sand, gravel, equipment deliveries, etc.) will originate in Barstow, 30 percent will originate in Victorville, and the balance will drive up from the Inland Empire area or beyond.
- For approximately 20 to 30 days during system installation, approximately 180 truck trips will occur for delivery of the solar PV panels to the site. Each PV-delivery trip will originate in the Greater Los Angeles area, travel to the site via Interstate 15, and have a one-way trip length of 100 miles or more. Day-to-day trip amounts will vary widely from as much as 50 to as little as one.

- Operations-related trips: as discussed previously, the project would operate on an autonomous, unstaffed basis and would be monitored remotely from an existing off-site facility. No full-time staffing would be required to operate the facility; however one or two employees are expected to visit the site five days per week for routine maintenance and check-ups. Periodic module cleanings and quarterly maintenance activities might utilize 6 to 8 full-time workers for one to two weeks per quarter, or up to 40 cumulative days per year. No heavy equipment would be used during normal project operation. Operation and maintenance vehicles will include trucks (pickup, flatbed), forklifts, and loaders for routine and unscheduled maintenance, and water trucks for solar module washing. Water for washing will be sourced from an on-site well. Large heavy-haul transport equipment may be brought to the site infrequently for equipment repair or replacement. All other assumptions (e.g. trip lengths, equipment parameters) remain the same as for the construction scenario.

- Decommissioning of the project will involve the same trips and trip characteristics as for project construction.

The modeled construction phasing and daily trip counts are indicated in **Table 8**. Several construction phases may overlap; however, the cumulative duration of construction is not expected to exceed 10 months. The trips indicated per construction phase in Table 8 do not account for phase overlap. Phase overlap is accounted for in **Table 9**. This table depicts the anticipated project's construction in terms of the type and number of equipment per month.

Copyright 2015, GC Environmental, Inc.

Trips generated during project operation are shown in **Table 10**. The trips in all three tables are round trips (i.e., each trip arrives at the project site and returns to its origin later the same day).

Copyright 2015, GC Environmental, Inc.

Table 8. Trips generated by the project during construction (per construction phase).

Phase Name/Duration	Round Trips/Day
1: Site Preparation (1 month/22 working days) Staging areas established; set access points; runoff controls, barriers, and fencing installed; minimal grading and scraping.	**Worker:** 16 **Vendor:** 0 **Total: 16**
2: Underground Work (6.5 months/141 working days) Set manholes, excavate, concrete backfill, surface restoration, pulling cable, splicing, temporary preparation work on existing utility circuit, structure installation, transfer other utilities and conductor installation, wire clipping.	**Worker:** 50 **Vendor:** 4 **Total: 54**
3: System Installation (5.5 months/119 working days) Installation of support beams, module rail assemblies, PV modules, inverters, transformers, and buried electrical cables. Concrete for footings, foundations, and pads for the transformers and inverters.	**Worker:** 115 **Vendor:** 7 **PV-Panel Delivery**: 50[16] **Total: 172**
4: Testing (1 month/22 working days) Test facility generation and connection to grid.	**Worker:** 30 **Vendor:** 0 **Total:30**
5: Clean-up/Restoration (1 month/21 working days) Removal/recycling of construction waste and debris; re-seeding as needed.	**Worker:** 20 **Vendor:** 0 **Total: 20**
Maximum Daily Trips: 226 **(Occurs during overlap of Phases 2 and 3)**	

[16] Approximate maximum daily rate. A total of approximately 180 truck trips for PV solar panel delivery are anticipated over a 20- to 30-day period. Day-to-day trip amounts will vary widely from as much as 50 to as little as one.

Copyright 2015, GC Environmental, Inc.

Table 9. Monthly construction-related trips.

Trip Type	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Total
Passenger Vehicle	902	1,050	1,150	3,465	3,465	3,795	3,465	2,530	1,595	750	**22,167**
Vendor/Delivery Vehicle	44	87	87	238	238	238	238	151	76	0	**1,397**
PV Solar Panel Delivery Truck	0	0	0	0	0	180	0	0	0	0	**180**
Total	**946**	**1,137**	**1,237**	**3,703**	**3,703**	**4,213**	**3,703**	**2,681**	**1,671**	**750**	**23,744**

Table 10. Trips generated by the project during operation.

Phase Name/Duration	Round Trips/Day
1: Daily Monitoring(five days per week)	**Worker:** 2 **Vendor:** 0 **Total: 2**
2: Routine Maintenance (quarterly, 40 days per year)	**Worker:** 8 **Vendor:** 2 **Total: 10**
Maximum Daily Trips: 12 **(The sum of Daily Monitoring and Routine Maintenance trips.)**	

Copyright 2015, GC Environmental, Inc.

6.0 PROJECT-RELATED IMPACTS

Anticipated impacts to transportation and traffic are discussed in this section. These impacts are considered with respect to the CEQA Guidelines questions presented in Table 1.

6.1 Impacts related to CEQA Guidelines Questions A and B

Would the project?

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 standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?*

Discussion

The San Bernardino County 2007 General Plan and the CMP address transportation and circulation goals within the entire County and project vicinity. The goals and policies relevant to the proposed solar facility include the regulation of all proposed new land uses that may impact the level of service (LOS) of all County roads. All CMP road segments are required to operate at LOS E. A road that is operating at LOS E is characterized by "[c]onditions of unstable flow, delays are significant, signal phase timing is general insufficient, congestion exists for extended durations throughout the peak period. Comfort and convenience levels are extremely poor."[17] In addition, per the County General Plan, the County "strives" to maintain a LOS C or better on all roadways in the Desert planning region. Solar energy facilities generate temporary increase in traffic during construction. However, once construction is complete, traffic associated with operations and maintenance is nominal.

[17] San Bernardino County. *Road Planning and Design Standards*. 1993. Available at <http://www.sbcounty.gov/Uploads/lus/PW/ROADPLANNINGDESIGNSTANDARDS.pdf>.

Copyright 2015, GC Environmental, Inc.

Non-motorized transportation is addressed in the 2011 *Non-motorized Transportation Plan*, produced by the San Bernardino Associated Governments. The roadways around the project are not designated as existing or future bicycle routes.[18]

Public transit in the area is provided by the Barstow Area Transit System (a service of the City of Barstow), which operates buses. The roadways around the project site are not included within the fixed regular routes these buses take.[19]

Fehr and Peers conducted a baseline traffic study titled *Baseline Traffic Study for the Longboat Solar Project* to document existing traffic ratings for the roads to be utilized during project construction, operation, and decommissioning (Appendix A). The report concludes that all impacted intersections and roadway segments have LOS ratings of D or better. In particular, it is only the roadway segments of SR-58 east and west of Lenwood Road that are operating at LOS D. All other intersections and roadway segments operate at LOS B or better (Tables 6 and 7).

Thresholds-of-Significance

Intersections:

According to the San Bernardino County *Road Planning and Design Standards*, a project would be considered significant if it adds the number of peak-hour trips to intersections of varying LOS ratings indicated in **Table 11**.

Table 11. Intersection thresholds-of-significance for traffic impact studies.

Level of Service	Total Project Peak Hour Trip Generation
A	500
B	250
C	150
D	50
E	30
F	15

[18] San Bernardino Associated Governments, 2011 (amended 2014). *Non-motorized Transportation Plan*. Available at <http://www.sanbag.ca.gov/planning2/plan_non-motor.html>.
[19] City of Barstow. *Barstow Area Transit Rider Guide*. 2014. Available at <http://www.barstowca.org/city-hall/city-departments/transportation/transit-schedule>.

Copyright 2015, GC Environmental, Inc.

Roadway Segments:

For roadway segments with existing LOS of C or better, the level-of-significance is that the project does not cause a decrease in the LOS to less than LOS C. This is based on the San Bernardino General Plan goal to maintain a LOS C on all roadways in the Desert planning area. For roadway segments with existing LOS of D or worse, it is reasonable to assume that a project is less-than-significant if it does not cause deterioration in the existing LOS.

The Road Planning Design Standards also considers a project's impact to traffic significant if a major street requires access that would create an unsafe situation or a new traffic signal, or if the project adds design features that may cause potential safety problems.

Level of Impact

There will be a temporary increase in traffic volumes on State Route 58, Community Blvd, and Lenwood Road during the 10-month project construction as a result of construction vehicles and workers traveling to and from the project site. All construction-related trips would arrive at the project site via SR-58 westbound by turning left at the intersection of SR-58 and Lenwood Road, driving south on Lenwood Road, turning left at the intersection of Lenwood Road and Community Boulevard, and traveling east on Community Boulevard to the project site. Trips leaving the project site would reverse the arrival procedure. Operational trips would travel to and from the project site in the same manner as for construction.

During construction, the project will generate a maximum of 226 additional round trips per day. During operation, the project will generate a maximum of 12 additional round trips per day. Anticipated project impacts are presented for intersections in **Table 12** and roadway segments in **Table 13**. Note that the intersection at Dixie Road and Community Boulevard is included in Table 12 because it was analyzed in the baseline traffic study. No project-related traffic increases are shown for that intersection because project-related traffic is not anticipated to use the intersection.

Copyright 2015, GC Environmental, Inc.

Table 12. Project impacts to intersections.

		Lenwood Rd. and SR-58	Lenwood Road and Community Blvd.	Dixie Road and Community Blvd.
AM Peak	Time	08:00-09:00	07:45-08:45	07:45-08:45
	Existing Volume	456 vehicles	81 vehicles	41 vehicles
	Volume During Project Construction/volume increase	682 vehicles; 226 veh. increase	307 vehicles; 226 veh. increase	41 vehicles; 0 veh. increase
	Volume During Project Operation/volume increase	458 vehicles; 2 veh. increase. 468 vehicles on 40 days per year during facility maintenance; 12 veh. increase	83 vehicles; 2 veh. increase. 93 vehicles on 40 days per year during facility maintenance; 12 veh. increase	41 vehicles; 0 veh. increase
	Current LOS and Threshold-of-Significance Volume (increase over current volume)[20]	A; 500 vehicles	A; 500 vehicles	A; 500 vehicles
	Project Significant?	**No (construction and operation)**	**No (construction and operation)**	**No (construction and operation)**
PM Peak	Time	16:00-17:00	16:00-17:00	16:00-17:00
	Existing Volume	675 vehicles	85 vehicles	53 vehicles
	Volume During Project Construction/volume increase	901 vehicles; 226 veh. increase	311 vehicles; 226 veh. increase	53 vehicles; 0 veh. increase
	Volume During Project Operation/volume increase	677 vehicles; 2 veh. increase. 687 vehicles on 40 days per year during facility maintenance; 12 veh. increase	87 vehicles; 2 veh. increase. 97 vehicles on 40 days per year during facility maintenance; 12 veh. increase	53 vehicles; 0 veh. increase
	Current LOS and Threshold-of-Significance Volume (increase over current volume)[19]	A; 500 vehicles	A; 500 vehicles	A; 500 vehicles
	Project Significant?	**No (construction and operation)**	**No (construction and operation)**	**No (construction and operation)**

[20] Per the thresholds of significance for intersections in the San Bernardino County *Road Planning and Design Standards*.

Copyright 2015, GC Environmental, Inc.

Table 13. Project impacts to roadway segments.

Roadway Segment	Existing Conditions		Conditions during Project Construction		Conditions during Project Operation	
	Daily Volume	LOS	Daily Volume	LOS	Daily Volume	LOS
Lenwood Rd. (SR-58 to Community Blvd.)	779 veh.	A	1,231 veh.	B	783 veh.; 803 veh. 40 days per year during facility maintenance	A
Community Blvd. (Lenwood Road to SR-58)	539 veh.	A	991 veh.	A	543 veh; 563 veh. 40 days per year during facility maintenance	A
SR-58 (West of Lenwood Road)	13,749 veh.	D	13,749 veh.	D	13,749 veh.	D
SR-58 (East of Lenwood Road)	15,942 veh.	D	16,394 veh.	E	15,946 veh.; 15,966 veh. 40 days per year during facility maintenance	D
Level-of-Significance	For roadway segments with LOS $\geq$ C: project reduces LOS to < C For roadway segments with LOS < C: project reduces LOS.					
Is Project Significant?	**Yes. The LOS of SR-58 east of Lenwood Road is reduced from D to E during project construction. No other significant LOS impacts would occur to roadway segments during project construction and operation.**					

As shown in Table 13, the project is anticipated to reduce the LOS of SR-58 east of Lenwood Road from D to E during project construction. Because the existing LOS of the roadway is below the San Bernardino County General Plan goal to maintain an LOS of C or better for all roadway segments in the Desert planning region, this impact is considered significant. However, Mitigation Measure (MM) TR-1 (as outlined in Section 8) will be able to adequately manage this temporary construction-related impact and reduce it to a less-than-significant level. The LOS reduction for Lenwood Road from SR-58 to Community Boulevard from A to B during project construction is not considered significant because this LOS still meets the San Bernardino County General Plan goal for level of service.

The project will not reach or exceed any thresholds-of-significance for the other road segments and intersections near the project site that are anticipated to be used by project-related traffic.

Because project decommissioning will involve similar traffic levels as project construction, the conclusions reached for project construction can be applied to project decommissioning if baseline traffic conditions were to remain the same. However, traffic conditions are likely to change over the life of the project; traffic conditions at the time of decommissioning are

Copyright 2015, GC Environmental, Inc.

therefore unknown and estimating these conditions would be speculative. Nonetheless, traffic increases during project decommissioning activities would be subject to the same requirements as construction and, because of their temporary nature, would not result in permanent LOS degradation if any degradation were in fact to occur.

The County *Road Planning and Design Standards* also considers a project's impact to traffic significant if a major street requires access that would create an unsafe situation or a new traffic signal, or if the project adds design features that may cause potential safety problems. Although five access points to the site from Community Blvd will be added, all driveways will conform to the San Bernardino County standards and regulations discussed in Section 3 (e.g., clearance standards from other driveways and intersections). Development of these access points would be designed to facilitate emergency response and general access to the site and will not create hazardous road conditions or design features. Once construction is complete, these access points will be used on a very limited basis. Therefore, the addition of access points will not have an impact on any local transportation or congestion management plans and no mitigation measures are proposed.

Because the roadways around the project site are not designated or otherwise established mass transit or motorized transit routes, the project will not have significant transportation impacts related to these matters.

Based on the discussion above, the project's transportation/traffic impacts are anticipated to be less-than-significant with the incorporation of mitigation during construction of the project with respect to CEQA Guidelines Questions A and B. Specifically, a traffic mitigation plan will be developed and implemented to mitigate the construction-related impacts of the project to a less-than-significant level. This plan is discussed in more detail in Section 8. **The project will not cause significant impacts with respect to CEQA Guidelines Questions A and B during operations.**

6.2 Impacts related to CEQA Guidelines Question C

Would the Project:

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?

Copyright 2015, GC Environmental, Inc.

Discussion

The nearest airport to the project is the Barstow-Daggett County Airport, approximately 18 miles to the east-southeast. The project lies outside the boundary of the airport's land use plan and safety review area and therefore does not present a substantial safety risk. The proposed project will not result in a change in air traffic patterns because it is not dependent on air transport related material, labor force, or service.

Level of Impact

No Impact.

6.3 Impacts related to CEQA Guidelines Question D

Would the Project:

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Discussion

As discussed under CEQA Guidelines Questions A and B, the project involves the construction of five access locations along Community Boulevard. These access points would be used for general and emergency access; once construction is complete, the access points will be very rarely used. All applicable County standards, specifications, and regulations will be complied with in the design and construction of these access points.

All access roads constructed within the site will be designed according to County standards and sized to allow vehicle access—including emergency access—throughout the facility. Applicable standards will include those discussed in Section 3 as well as conditions specific to the project as part of its Conditional Use Permit. Design parameters include road width and turning radii.

Traffic safety hazards could occur due to conflicts where construction vehicles access a public right-of-way from the Project area or due to increased truck traffic in general. Because project construction will be temporary, Mitigation Measure (MM) TR-1 (as outlined in Section 8) will be able to adequately reduce this impact to a less-than-significant level.

Copyright 2015, GC Environmental, Inc.

Level of Impact

Compliance with all applicable County regulations, standards, and guidelines is sufficient to ensure that the project will have a **less-than-significant impact** with respect to design features. Construction traffic could cause safety hazards that are **significant impacts unless mitigation measures are incorporated to reduce these impacts to a less-than-significant level**. Specifically, development and implementation of a traffic mitigation plan (as outlined in MM TR-1) would mitigate the construction-related impacts of the project to a **less-than-significant level with mitigation incorporated**. The traffic mitigation plan is discussed in more detail in Section 8.

6.4 Impacts Related to CEQA Guidelines Question E

Would the Project:

e) Result in inadequate emergency access?

Discussion

In addition to the site access points and internal roadway characteristics discussed above for CEQA Guidelines Questions A, B, and D, compliance with San Bernardino County Fire design standards specific to minimum fire/emergency equipment access and evacuation routes shall be required by the County as a condition of approval of the project's Conditional Use Permit.

Level of Impact

Compliance with all applicable County regulations, standards, and guidelines is sufficient to ensure that the project will have a **less-than-significant impact** with respect to this question. No mitigation measures are necessary.

6.5 Impacts Related to CEQA Guidelines Question F

Would the Project:

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Copyright 2015, GC Environmental, Inc.

Discussion

As discussed in Section 6.1 for CEQA Guidelines Questions A and B, the roadways around the project site are not on the fixed routes used by Barstow Area Transit System buses, nor are they identified as routes in the Non-motorized Transportation Plan produced by the San Bernardino Associated Governments. Also, the proposed project will not cause a demand for any such facilities that exist in the greater area. Potential impacts relate to construction traffic along Lenwood Road and Community Boulevard and its effect on bicyclists or pedestrians using these roads. However, as explained below, this temporary construction impact can be adequately mitigated to a level that is less-than-significant.

Level of Impact

The project could significantly impact the safety of bicyclists or pedestrians using local roads during construction unless mitigation is incorporated. MM TR-1 (as provided in Section 8) requires the preparation and implementation of a traffic mitigation plan that will include guidance and warning signage for pedestrians and bicyclists as well as the establishment of bicycle and pedestrian detours as necessary. Implementation of MM TR-1 would ensure that potential impacts on the circulation and safety of pedestrians and bicyclists in the area are reduced to below the level of significance.

Copyright 2015, GC Environmental, Inc.

7.0 CUMULATIVE IMPACTS

In addition to impacts related to the proposed project itself, CEQA requires that the potential cumulative impacts arising from the proposed project and other nearby projects be considered. A list of existing, proposed, and reasonably-foreseen projects is provided below in **Table 14.**

Table 14. Other projects near the Longboat Solar Project site.

Project Name/Proponent	Project Description	Status	Approximate Distance to Project
Green Valley Foods Improvements	Establish a 90,000 sf surface waste improvement pond.	Unlikely to be built	Adjacent to project site
State Route 58 Hinkley Expressway Project	Widen and realign existing 2-lane SR-58 to 4-lane expressway from 2.4 miles west of Hidden River Road to 0.7 mile east of Lenwood Road.	Project is anticipated to begin 1 June 2015.	Eastern terminus of is approximately 0.25 mile northwest of the northern parcel of project on SR-58.
Martinsville Project	315-acre specific plan	Early stages of review.	4 miles to the south. Approximate location: south of Lenwood Road; west of I-15.
Abengoa Mojave Solar Project	280-MW (gross) Parabolic Trough Solar Generating Facility	In Operation	12 miles to the northwest (Lockhart, CA)
NREL Solar Electric Generating Stations VIII and IX	178-MW (gross) Parabolic Trough Solar Generating Facility	In Operation	15 miles to the northwest (Lockhart, CA)
Nursery Products, LLC	Bio-solids and Greenwaste Composting Facility	In Operation	15 miles to the west (Hinkley, CA)
Sunlight Partners, LLC	4.5-MW Photovoltaic Solar Generating Facility	Permits Issued as of February 2015, construction status unknown.	16 miles to the southwest (Helendale, CA)
NREL Solar Electric Generating Stations I and II	46.8-MW (gross) Parabolic Trough Solar Generating Facility	In Operation	16 miles to the southeast (Daggett, CA)
Sunray Energy 2, LLC	44-MW Solar Generating Facility	Under Review as of February 2015.	16 miles to the southeast (Daggett, CA)

Copyright 2015, GC Environmental, Inc.

Project Name/Proponent	Project Description	Status	Approximate Distance to Project
Silver Valley	20-MW Solar Generating Facility	Conditionally Approved; No Permits Issued, Time Extension Approved as of February 2015.	18 miles to the northeast (East side of Sunrise Canyon Road, approximately 3.5 miles north of I-15 and Minneola Road)
Alamo Solar, LLC	20-MW Photovoltaic Solar Generating Facility	Approved April 2014; Status Unknown	23 miles to the southwest (Oro Grande, CA)
Solutions for Utilities, Inc. Phase 1&2(Now Soitec)	3-MW Solar Generating Facility	In Operation	24 miles to the southeast (Northwest corner of Cottonwood Road and Mountain View Road).
Soltech Solar (Newberry Springs)	2-MW Solar Generating Facility	Conditionally Approved; No Permits Issued, Time Extension Approved as of February 2015.	26 miles to the northeast (Northeast corner of Camelot Drive and Desert View Road)
NREL Solar Electric Generating Stations III through VII	169-MW (gross) Parabolic Trough Solar Generating Facility	In Operation	26 miles to the west-northwest (Kramer Junction, CA)
Boulevard Associates	191-MW Solar Generating Facility	Conditionally Approved; No Permits Issued, Time Extension Approved as of February 2015.	26 miles to the west-northwest (Kramer Junction, CA)

Of all the projects listed in Table 14, the following projects are the only projects relevant when contemplating cumulative transportation and traffic impacts:

- The Green Valley Foods project has not been built and likely will not be built during any known timeframe because the reason for its proposal—to properly dispose of process water from the facility—is being accomplished by transporting the process water off-site to an approved wastewater facility.
- The State Route 58 Hinkley Expressway Project (Expressway Project) is anticipated to begin 1 June 2015. The eastern terminus of the Expressway Project will be an interchange to replace the signalized intersection of State Route 58 and Lenwood Road. With respect for the potential of cumulative impacts involving the Expressway Project and the Longboat Solar Project, the highest potential for impacts would be realized if work on the Lenwood Road interchange and the Longboat Solar Project occurred simultaneously. As of February 2015, the California Department of Transportation has not received scheduling specifics from the contractor.

Copyright 2015, GC Environmental, Inc.

- The Martinsville Specific Plan plans for future residential and golf course development. No timetable for development has been proposed. According to the City of Barstow Community Development Department, a CEQA Negative Declaration will be submitted as part of a hearing before the City of Barstow Planning Commission.

Discussion

The Expressway Project is a major, multi-year project that will overlap with the construction phase of the Longboat Solar Project. Significant impacts to transportation and traffic are likely to occur if construction-related traffic associated with the Longboat Solar Project occurs simultaneously with construction traffic and detour routes associated with the Expressway Project. Potential impacts include: a decrease in safety to motorists, bicyclists, and pedestrians; deterioration of traffic flow on Highway 58 already impaired by limitations imposed by the Expressway Project such as lane reductions and detours; hindered access to emergency vehicles serving the public in the area; and hindered emergency access to the project site.

Level of Impact

The cumulative potential impacts related to the overlapping construction of the Expressway Project and the Longboat Solar Project are **less-than-significant with mitigation incorporated.** Mitigation will involve establishing a clearly-defined line of communication between the Longboat Solar Project contractor, the Expressway Project contractor, the California Department of Transportation, and the emergency services in the area (as applicable). Implementation of the traffic mitigation plan (MM TR-1 as discussed in Section 8) will mitigate the potential impacts to a less-than-significant level.

Copyright 2015, GC Environmental, Inc.

8.0 MITIGATION

As discussed in this Assessment, construction traffic generated by the project has the potential to cause significant impacts to transportation and traffic in the area. Due to the temporary nature of construction, these impacts will be short-lived. These impacts will be mitigated to a less-than-significant level with development and implementation of a traffic mitigation plan as outlined in MM TR-1.

MM TR-1: Prepare and submit a Construction Traffic Control Plan in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook that will include:

i. Timing of deliveries of heavy equipment and building materials;

ii. Directing construction traffic with a flag person;

iii. Placing temporary signing, lighting, and traffic control devices if required, including, but not limited to, appropriate signage along access routes to indicate the presence of heavy vehicles and construction traffic;

iv. Ensuring access for emergency vehicles to the project site;

v. Temporarily closing travel lanes or delaying traffic during materials delivery, transmission line stringing activities, or any other utility connections;

vi. Bicycle and pedestrian detour plans if/where applicable;

vii. Maintaining access to adjacent property;

viii. Specifying both construction-related vehicle travel and oversize load haul routes, minimizing construction traffic during the a.m. and p.m. peak hour, distributing construction traffic flow across alternative routes to access the project site, and avoiding residential neighborhoods to the maximum extent feasible;

ix. Traffic control plan coordination with the County, and potential traffic control plan adjustments, in the event of concurrent projects generating potentially overlapping traffic effects; and

x. Additional traffic control plan coordination with CalTrans regarding the SR 85 Hinkley Expressway Project if construction of the solar project occurs concurrently with construction of the expressway project.

Copyright 2015, GC Environmental, Inc.

Copies of the approved Construction Traffic Control Plan and all issued permits that may be necessary for construction such as (without limitation) work within roadway right-of-ways, the operation of oversized/overweight vehicles on San Bernardino County-maintained roads, and the use of a California Highway Patrol or pilot car escort shall be submitted to the San Bernardino County Planning and Community Development Department.

Copyright 2015, GC Environmental, Inc.

9.0 REFERENCES

California Department of Transportation (CALTRANS), 2014, November 12. Caltrans Earth. Available at <http://earth.dot.ca.gov>.

City of Barstow. *Barstow Area Transit Rider Guide*. 2014. Available at <http://www.barstowca.org/city-hall/city-departments/transportation/transit-schedule>.

San Bernardino Associated Governments, 2014, November 12. *Congestion Management Plan*. Available at <http://www.sanbag.ca.gov/planning2/congestion-mgmt.html>.

San Bernardino Associated Governments, 2011 (amended 2014). *Non-motorized Transportation Plan*. Available at <http://www.sanbag.ca.gov/planning2/plan_non-motor.html>.

San Bernardino County, 2015, January 21. Average Daily Traffic Counts. Available at <http://www.sbcounty.gov/dpw/trafficadt/AvgDailyTraffic.aspx>.

San Bernardino County, 2014, November 12. *San Bernardino County General Plan*. Available at <http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf>.

San Bernardino County, 1993, April 20. *Road Planning and Design Standards.* Available at <http://www.sbcounty.gov/Uploads/lus/PW/ROADPLANNINGDESIGNSTANDARDS.pdf>

San Bernardino County Land Use Services. *Plant Protection and Management Handout*. April 2007. Available at <http://cms.sbcounty.gov/lus/Planning/Handouts.aspx>.

San Bernardino County Land Use Services. *Temporary Structures and Uses Handout*. February 2008. Available at <http://cms.sbcounty.gov/lus/Planning/Handouts.aspx>.

Transportation Research Board, 2000. *Highway Capacity Manual*, 2000

URS Corporation. *County of San Bernardino 2007 General Plan*. 2007 (amended 2014). Available at <http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf>.

URS Corporation. *County of San Bernardino 2006 General Plan Program Final Environmental Impact Report and Appendices.* SCH #2005101038. 2007. Available at <http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FinalEIR2007.pdf>.

Copyright 2015, GC Environmental, Inc.

Figures

Figure 1: Site Vicinity Map

Figure 1: Site Vicinity Map

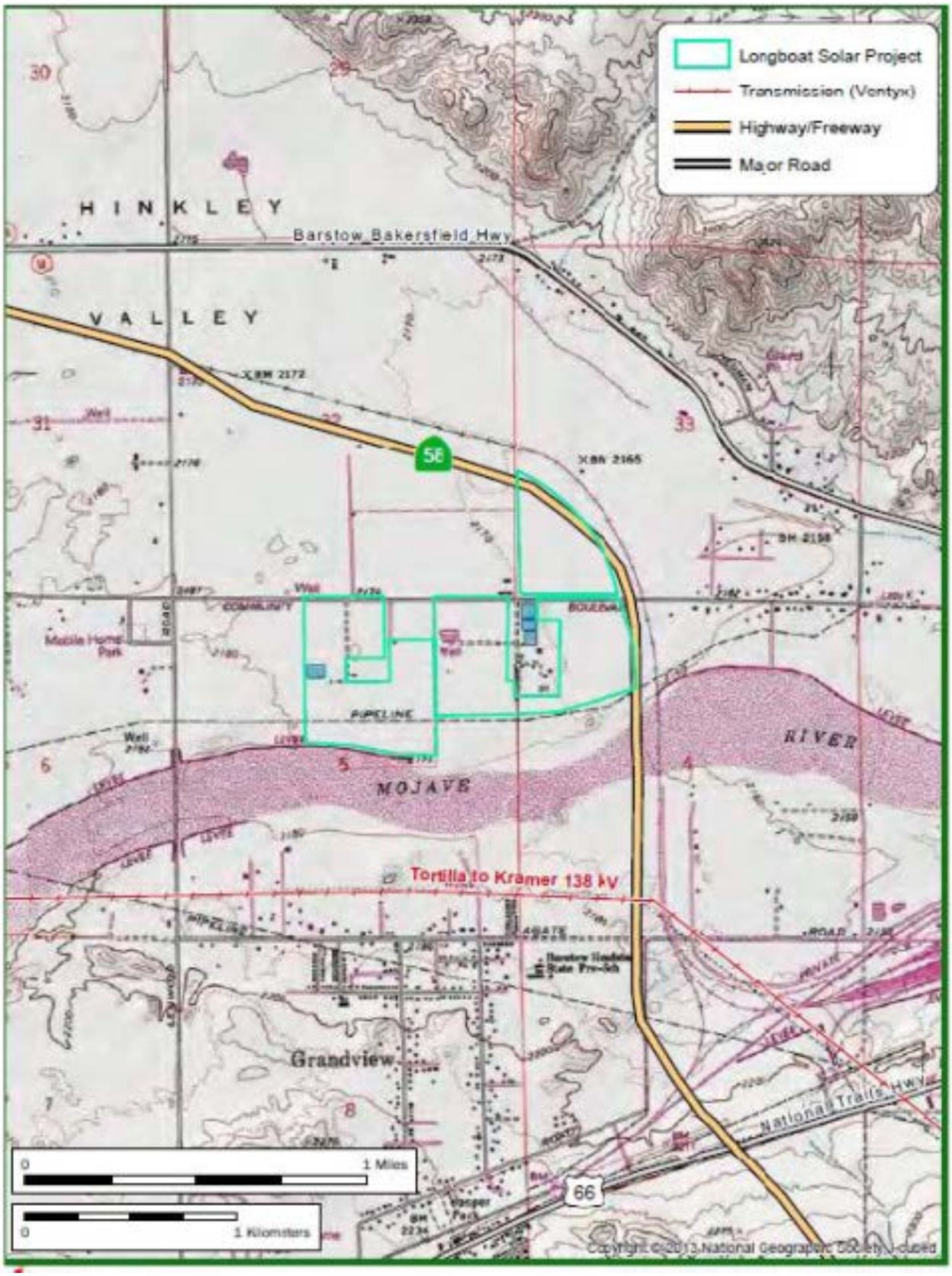
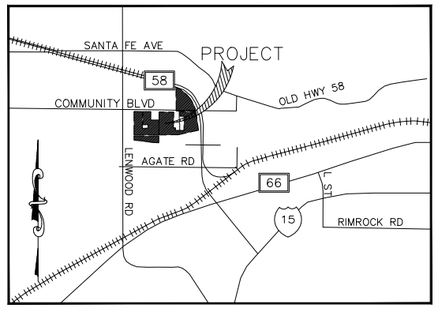


Figure 2: Preliminary Site Plan

Figure 2: Preliminary Site Plan

LONGBOAT SOLAR

VICINITY MAP
NOT TO SCALE



LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 1:

AREA 1 (PORTION OF APN: 0497-101-05 / HILLS RANCH, INC.):

BEING A PORTION OF THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 5, TOWNSHIP 9 NORTH, RANGE 2 WEST, SAN BERNARDINO BASE AND MERIDIAN, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 5; THENCE ON AND ALONG THE EAST LINE OF SAID SECTION 5, S 01 DEGREES 35' 40" W, A DISTANCE OF 1307.84 FEET TO THE TRUE POINT OF BEGINNING;
THENCE CONTINUING ALONG SAID EAST LINE, S 01 DEGREES 35' 40" W, A DISTANCE OF 547.15 FEET;
THENCE LEAVING SAID EAST LINE, S 89 DEGREES 56' 46" W, A DISTANCE OF 1308.39 FEET TO THE WEST LINE OF THE EAST HALF OF THE NORTHEAST QUARTER OF SAID SECTION 5;
THENCE ON AND ALONG SAID WEST LINE, N 01 DEGREES 7' 31" E, A DISTANCE OF 1817.04 FEET;
THENCE S 88 DEGREES 58' 34" E, ON AND ALONG A LINE PARALLEL WITH, AND 60.00 FEET SOUTHERLY, AS MEASURED AT RIGHT ANGLES FROM THE NORTH LINE OF SAID SECTION 5, A DISTANCE OF 1156.77 FEET;
THENCE S 01 DEGREES 35' 40" W, A DISTANCE OF 1247.84 FEET;
THENCE S 88 DEGREES 58' 34" E, A DISTANCE OF 166.09 FEET TO THE POINT OF BEGINNING.

CONTAINING 49.78 ACRES, MORE OR LESS.

AREA 2 (PORTION OF APN: 0497-121-28 / HILLS RANCH, INC.):

BEING A PORTION OF THE NORTHWEST QUARTER OF SECTION 4, TOWNSHIP 9 NORTH, RANGE 2 WEST, SAN BERNARDINO BASE AND MERIDIAN, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 4; THENCE ON AND ALONG THE WEST LINE OF SAID SECTION 4, S 01 DEGREES 35 '40" W, A DISTANCE OF 1511.08 FEET TO THE TRUE POINT OF BEGINNING;
THENCE LEAVING SAID WEST LINE, S 88 DEGREES 58' 34" E, A DISTANCE OF 674.27 FEET;
THENCE N 01 DEGREES 35' 40" E, A DISTANCE OF 1129.23 FEET;
THENCE N 88 DEGREES 24' 20" W, A DISTANCE OF 350.00 FEET;
THENCE N 01 DEGREES 35' 40" E, A DISTANCE OF 337.30 FEET;
THENCE S 88 DEGREES 47' 17" E, A DISTANCE OF 1284.53 FEET;
THENCE S 06 DEGREES 44' 25" E, A DISTANCE OF 1446.06 FEET;
THENCE S 77 DEGREES 56' 47" W, A DISTANCE OF 1649.24 FEET;
THENCE S 89 DEGREES 56' 46" W, A DISTANCE OF 214.99 FEET TO THE WEST LINE OF SAID SECTION 4;
THENCE ON AND ALONG SAID WEST LINE, N 01 DEGREES 35' 40" E, A DISTANCE OF 343.91 FEET TO THE POINT OF BEGINNING.

CONTAINING 45.12 ACRES, MORE OR LESS.

AREA 3 (PORTION OF APN: 0497-071-40 / HILLS RANCH, INC.):

BEING A PORTION OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 10 NORTH, RANGE 2 WEST, SAN BERNARDINO BASE AND MERIDIAN, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF SAID SECTION 33; THENCE N 27 DEGREES 53' 39" E, A DISTANCE OF 59.32 FEET TO THE TRUE POINT OF BEGINNING;
THENCE N 00 DEGREES 14' 26" E, A DISTANCE OF 1863.57 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 2880.02 FEET WITH A RADIAL LINE TO SAID POINT BEARS N 25 DEGREES 08' 39" E;
THENCE ALONG SAID CURVE SOUTHEASTERLY THROUGH A CENTRAL ANGLE OF 28 DEGREES 34' 01" AN ARC DISTANCE OF 1435.94 FEET TO A COMPOUND CURVE CONCAVE TO THE SOUTHWEST HAVING A RADIUS OF 2567.02 FEET;
THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 24 DEGREES 28' 29" AN ARC DISTANCE OF 1096.54 FEET;
THENCE S 17 DEGREES 44' 46" E, A DISTANCE OF 21.17 FEET TO THE NORTHERLY RIGHT OF WAY LINE OF COMMUNITY BOULEVARD;
THENCE ALONG SAID NORTHERLY RIGHT OF WAY LINE, BEING 33.00 FEET NORTHERLY, AS MEASURED AT RIGHT ANGLES TO THE SOUTH LINE OF SAID SECTION 33, N 88 DEGREES 47' 17" W, A DISTANCE OF 1515.93 FEET;
THENCE N 00 DEGREES 14' 26" E, A DISTANCE OF 20.00 FEET;
THENCE N 88 DEGREES 47' 17" W, A DISTANCE OF 40.00 FEET TO THE POINT OF BEGINNING.

CONTAINING 44.67 ACRES, MORE OR LESS.

SAID AREAS 1, 2 AND 3 CONTAIN 139.57 ACRES, MORE OR LESS.

SURVEYOR'S CERTIFICATION

TO: LONGBOAT SOLAR, LLC, A DELAWARE LIMITED LIABILITY COMPANY, TICOR TITLE COMPANY OF CALIFORNIA AND _____ .

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2011 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 3, 5, 6(a), 8, AND 11(a), OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED IN OCTOBER, 2013.

DATE OF PLAT OR MAP: OCTOBER 6, 2014

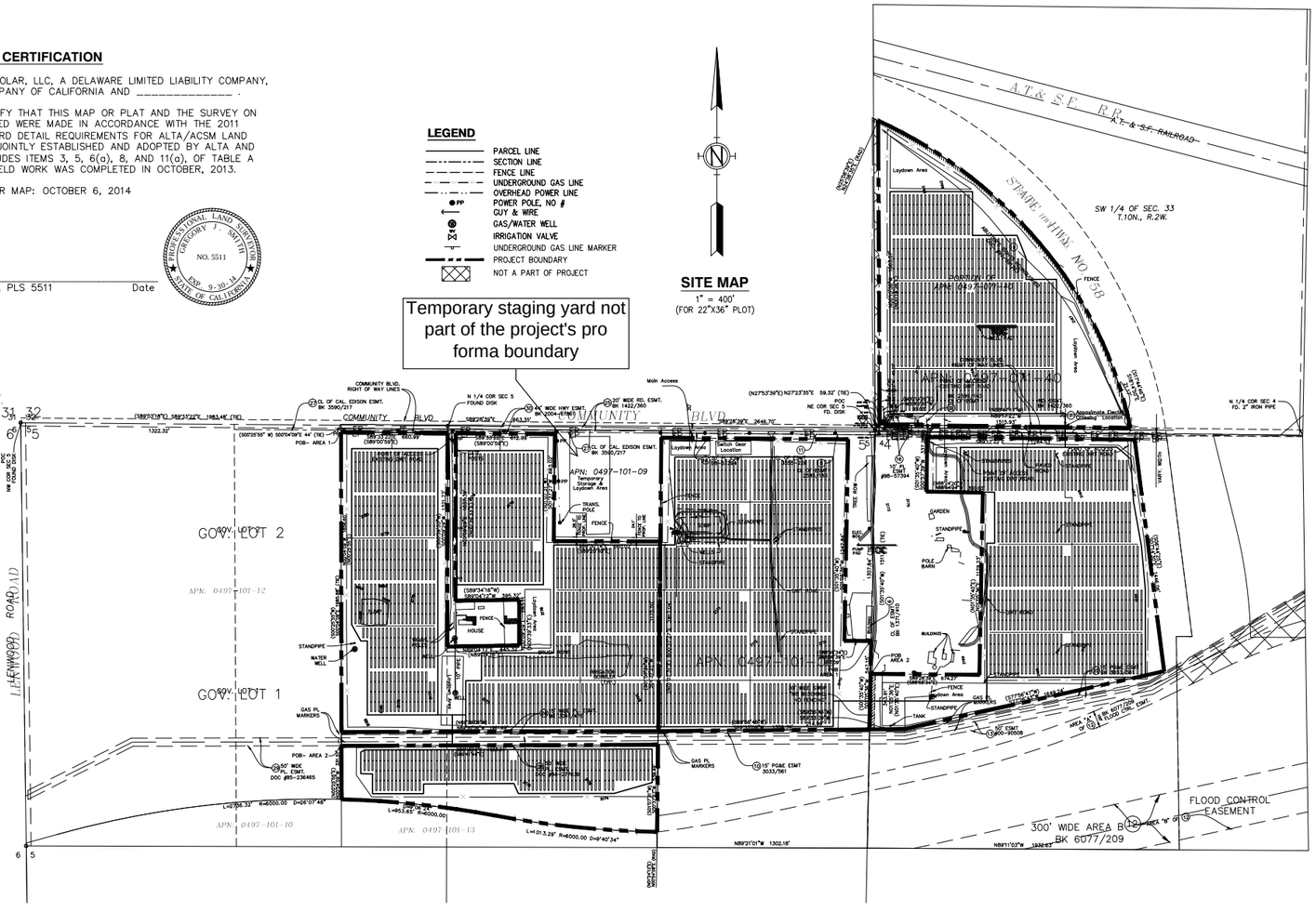
REGISTERED LAND SURVEYOR GREGORY J. SMITH NO. 5511 EXP. 9-30-14 STATE OF CALIFORNIA

Gregory J. Smith, PLS 5511 Date

LEGEND

- PARCEL LINE
- SECTION LINE
- FENCE LINE
- UNDERGROUND GAS LINE
- OVERHEAD POWER LINE
- POWER POLE, NO #
- GUY & WIRE
- GAS/WATER WELL
- IRRIGATION VALVE
- UNDERGROUND GAS LINE MARKER
- PROJECT BOUNDARY
- NOT A PART OF PROJECT

SITE MAP
1" = 400'
(FOR 22"X36" PLOT)



SMITHCO SURVEYING & ENGINEERING P.O. BOX 81626 BAKERSFIELD, CA 93380 PHONE: (661) 393-1217 FAX: (661) 393-1218	THIS DRAWING IS COPYRIGHTED AND IS THE SOLE PROPERTY OF THE OWNER. IT IS PRODUCED SOLEY FOR THE USE BY THE OWNER AND IT'S AFFILIATES. REPRODUCTION OR USE OF THIS DRAWING AND/OR THE INFORMATION CONTAINED IN IT IS FORBIDDEN WITHOUT THE WRITTEN PERMISSION OF THE OWNER.	DATE: 08/20/14 SCALE: AS SHOWN DRAWN: DL APPROVED:	REVISIONS DATE / DESCRIPTION / BY 08/27/14 SUBMITTED DL 09/15/14 NEW PRO FORMA REVIEWED DL 10/06/14 TITLE COMMITMENT REVIEWED DL	PREPARED FOR: EDF RENEWABLE ENERGY	PROJECT SITE: LONGBOAT SOLAR	DESCRIPTION: SHEET INDEX SECTIONS 4, 5, T.9N., R.2W., S.B.B.&M. SECTION 33, T.10N., R.2W., S.B.B.&M. SAN BERNARDINO COUNTY	SHEET: 1 OF 1 JOB NO.: 85-077

Figure 3: Baseline Traffic Study Field Analysis Locations

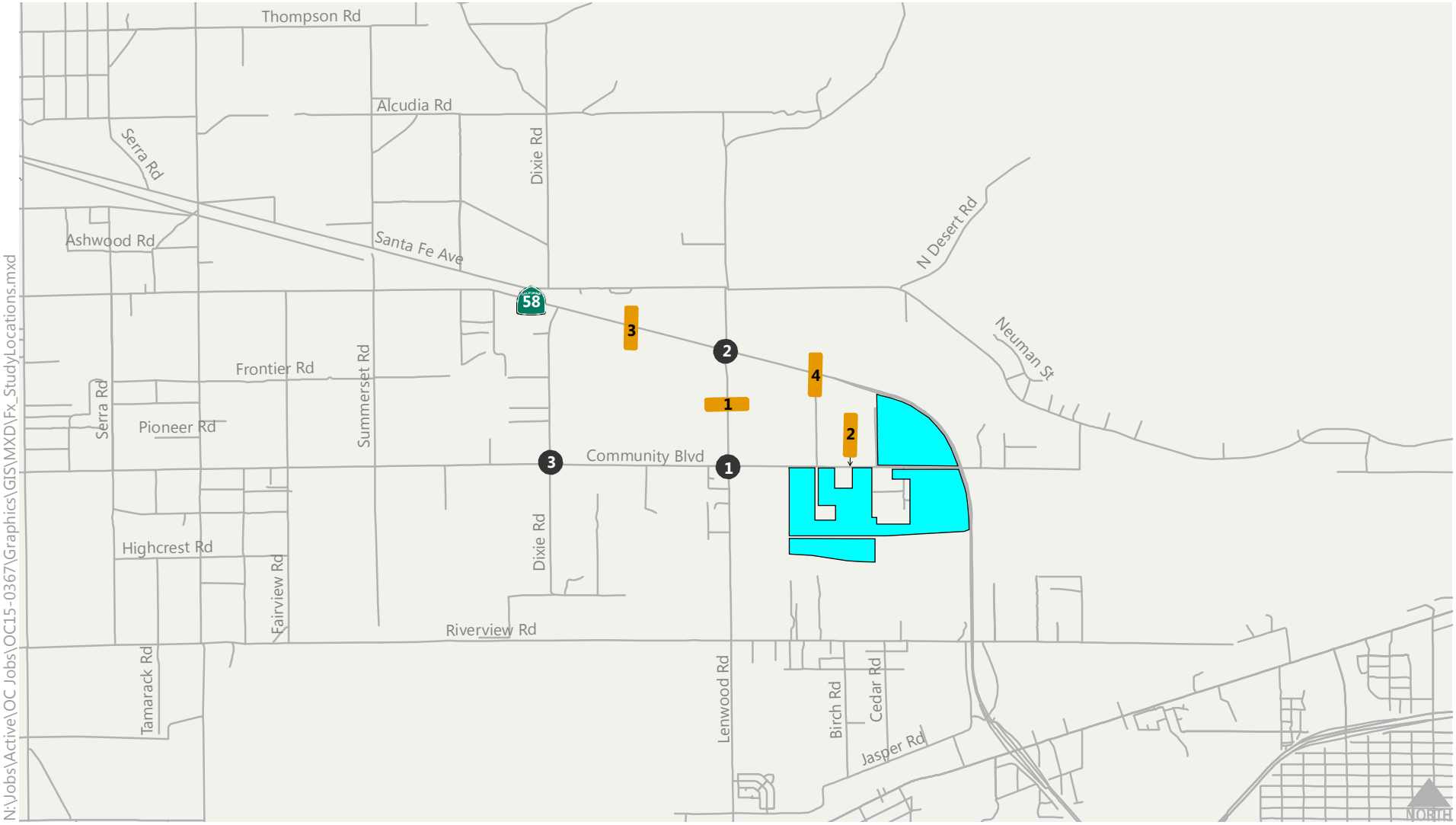


Figure 3

Baseline Traffic Study Field Analysis Locations

Appendix

Appendix A:
Baseline Traffic Study

BASELINE TRANSPORTATION STUDY
FOR THE
LONGBOAT SOLAR PROJECT

February 2015

Prepared for:

GC Environmental, Inc.

Prepared by:

FEHR & PEERS
8141 E. Kaiser Blvd
Anaheim, CA

Ref: OC15-0367

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

1. Introduction

Fehr & Peers conducted a baseline traffic study to evaluate existing conditions at the site of the proposed Longboat Solar project, in Lenwood, California. This report identifies the base data and level of service (LOS) for existing intersections and roadway segments in the project area.

Site Location and Study Area

The proposed project would be developed north of the City of Barstow and within the community of Lenwood in San Bernardino County, California. The project is bounded by State Route 58 (SR-58) and Community Boulevard. The study area for the transportation analysis encompasses SR-58, Community Boulevard, Dixie Road and Lenwood Road.

Project Description

The project would develop a solar farm on approximately 228 acres of primarily undeveloped disturbed arid land. The project includes solar development with associated generators, foundations, transformers, on site substation, collection lines, and laydown yards. The Proposed Project would tie in via a line tap on the existing 33kV transmission line along Community Boulevard and ultimately interconnect to Southern California Edison's Tortilla Substation in Barstow.

Format of Report

This report is divided into four chapters, including the introduction. In Chapter 2 we describe the analysis parameters for this report. In Chapter 3 we provide a discussion of existing conditions. We provide a summary and conclusion in Chapter 4.

2. Analysis Parameters

This chapter outlines the geographic scope of the transportation study, including study intersections and roadways, along with analysis methodologies and significance criteria employed in this study.

Project Study Area

The major roadway within the study area is Community Boulevard. This roadway extends east to west within the study area and connects to Dixie Road and Lenwood Road. SR-58 provides regional access to and from the site.

Project Study Intersections

Based on our review of the adjacent roadway network, we selected the following facilities for analysis in our study:

Intersections

1. Lenwood Road & Community Boulevard
2. Lenwood Road & SR-58
3. Dixie Road & Community Boulevard

Roadway Segments

1. Lenwood Road (SR-58 to Community Boulevard)
2. Community Boulevard (SR-58 to Lenwood Road)
3. SR-58 (west of Lenwood Road)
4. SR-58 (east of Lenwood Road)

Analysis Scenarios

Our analysis considers existing conditions. This is based on traffic counts collected in January 2015.

Analysis Methodologies

Signalized Intersections

Signalized intersection operations are evaluated using methodologies provided in the 2000 Highway Capacity Manual (HCM) (Transportation Research Board). These methodologies assess average delays at the intersection and then assign a corresponding letter grade that represents the overall operation of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). Descriptions of the LOS letter grades for signalized intersections are provided in Table 1.

TABLE 1
SIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 15.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 15.0 to 25.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 25.0 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55.0 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80.0

Source: *Highway Capacity Manual* (Transportation Research Board, 2000).

Unsignalized Intersections

Unsignalized intersection operations are evaluated using methodologies provided in the 2000 Highway Capacity Manual (HCM) (Transportation Research Board). These methodologies assess delays at the controlled approaches and then assign a corresponding letter grade that represents the overall condition of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). Descriptions of the LOS letter grades for unsignalized intersections are provided in Table 2.

TABLE 2
UNSIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 to 30.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 30.0 to 40.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 40.0 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 50.0

Source: *Highway Capacity Manual* (Transportation Research Board, 2000).

Intersection levels of service are calculated using Synchro 8.0 software, which implements 2000 HCM methodologies. Delay and the resulting LOS is based on total intersection operations.

Roadway Segments

The HCM 2000 methodology was applied for analyzing roadway segments within the study area. The thresholds for the roadway classifications of the study facilities are provided in Table 3.

TABLE 3
ROADWAY SEGMENT LOS CRITERIA

Roadway Type	Average Daily Volume				
	A	B	C	D	E
Major 2-Lane Highway	1,200	2,900	7,900	16,000	20,500
2-Lane Arterial	-	-	9,700	17,600	18,700
2-Lane Collector	-	-	7,500	9,500	12,000

Source: *Highway Capacity Manual* (Transportation Research Board, 2000).

The County strives to maintain LOS C operations on roadways in the desert region per the General Plan.

3. Existing Conditions

A comprehensive data collection effort was undertaken to develop a detailed understanding of existing conditions in the study area. The assessment of conditions relevant to this study included an inventory of the street and highway systems, traffic volumes on these facilities, and operating conditions at key intersections and roadway segments. A detailed description of these elements is presented in this chapter.

Roadway Facilities and Intersection Geometries

The main roadways within the study area include Community Boulevard, Lenwood Road, Dixie Road, and SR-58.

Community Boulevard is currently a two-lane roadway that extends east to west through the project site. Within the study area, the roadway has an undercrossing at SR-58, and intersects with both Dixie Road and Lenwood Road. Land along Community Boulevard near the project site is generally vacant, with a few buildings along the roadway. This roadway does not have a specific street designation in the San Bernardino County General Plan.

Lenwood Road is currently a two-lane roadway that extends north to south through the project site. Within the study area, the roadway connects at an at-grade intersection to SR-58, and also intersects with Community Boulevard. Land along Lenwood Road near the project site is generally vacant, with a residential community directly south. This roadway is designated as a Major Highway in the San Bernardino County General Plan.

Dixie Road is currently a two-lane roadway that extends north to south through the project site. Within the study area, the roadway has an at-grade intersection with SR-58, and also intersects with Community Boulevard. Land along Dixie Road near the project site is generally vacant. This roadway is not designated within the San Bernardino County General Plan.

State Route 58 is a two- to four-lane roadway which extends east to west, then turning south in the study area. SR-58 provides access to Kern County. The adjacent land is generally vacant. This roadway is designated as a Major Highway in the San Bernardino General Plan.

Existing Traffic Volumes and Levels of Service

This section presents the existing peak hour turning movement and daily roadway segment traffic volumes for the analyzed intersections and segments, and analyzes the resulting operating conditions at each location.

Existing Traffic Volumes

Traffic counts were collected at the aforementioned study intersections in January 2015. Intersection traffic counts were collected during the morning peak period (7:00 to 9:00 AM) and the afternoon peak period (4:00 to 6:00 PM) during a typical mid-week day. Classified roadway segment counts were collected over a 24-hour period. For roadway segment volumes, Passenger Car Equivalent (PCE) factors of

1.0, 1.5, and 2.0 were applied to cars, bobtail trucks and buses, and heavy trucks, respectively. The PCE factors are applied to account for the additional wear-and-tear and impact of heavy trucks on the roadways. Traffic Count Data Sheets are provided in Appendix A.

Existing Peak Hour Levels of Service

As shown in Table 4, all three intersections operate at LOS C or better during the peak hours, which is considered acceptable for the study area. Detailed level of service sheets are provided in Appendix B.

Roadway Segment Daily Levels of Service

As shown in Table 5, all four roadway segments operate at LOS D or better over the course of a day. Detailed LOS sheets are provided in Appendix B.

TABLE 4
INTERSECTION LEVELS OF SERVICE – EXISTING CONDITIONS

Intersection	Control	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
1. Lenwood Rd & Community Blvd	SSSC	9.1s	A	9.1s	A
2. Lenwood Rd & SR-58	Signalized	8.3s	A	8.8s	A
3. Dixie Rd & Community Blvd	SSSC	8.9s	A	8.5s	A

Notes:
Delay for signalized and unsignalized intersections based on application of *2000 Highway Capacity Manual* Methodology.
Delay was calculated using Synchro 8.0 software.
Source: Fehr & Peers, 2015.

TABLE 5
ROADWAY SEGMENT LEVELS OF SERVICE – EXISTING CONDITIONS

Intersection	Roadway Type	Volume	LOS
1. Lenwood Rd (SR-58 to Community Blvd)	2-Lane Arterial	779	A
2. Community Blvd (Lenwood Rd to SR-58)	2-Lane Collector	539	A
3. SR-58 (west of Lenwood Road)	Major 2-Lane Highway	13,749	D
4. SR-58 (east of Lenwood Road)	Major 2-Lane Highway	15,942	D

Source: Fehr & Peers, 2015.

4. Summary and Conclusions

This study was undertaken to develop a baseline analysis for the Longboat Solar project in the Lenwood community of San Bernardino County. The key findings and conclusions of the study are summarized below:

- Detailed intersection capacity and operation analyses were conducted at three intersections in the vicinity of the project site for weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM), and at four roadway segments.

- Under existing conditions, all three study intersections and four roadway segments operate at LOS D or better.

The County strives to maintain LOS C operations on roadways in the desert region per the General Plan.

REFERENCES

Adopted Capital Improvement Plan 2012-2013, City of Moreno Valley, 2012.

City of Moreno Valley General Plan, City of Moreno Valley, July 2006.

City of Moreno Valley Traffic Impact Analysis Preparation Guide, City of Moreno Valley, August 2007.

Highway Capacity Manual, Transportation Research Board, 2000.

Transportation Uniform Mitigation Fee Program, Western Riverside Council of Governments (WRCOG), available at: http://www.wrcog.cog.ca.us/content/tumf.asp.

Trip Generation, 9th Edition, Institute of Transportation Engineers, 2012.

APPENDIX A:
TRAFFIC COUNTS

ITM Peak Hour Summary

Prepared by:

NDS

Lenwood Rd and Community Blvd , Barstow

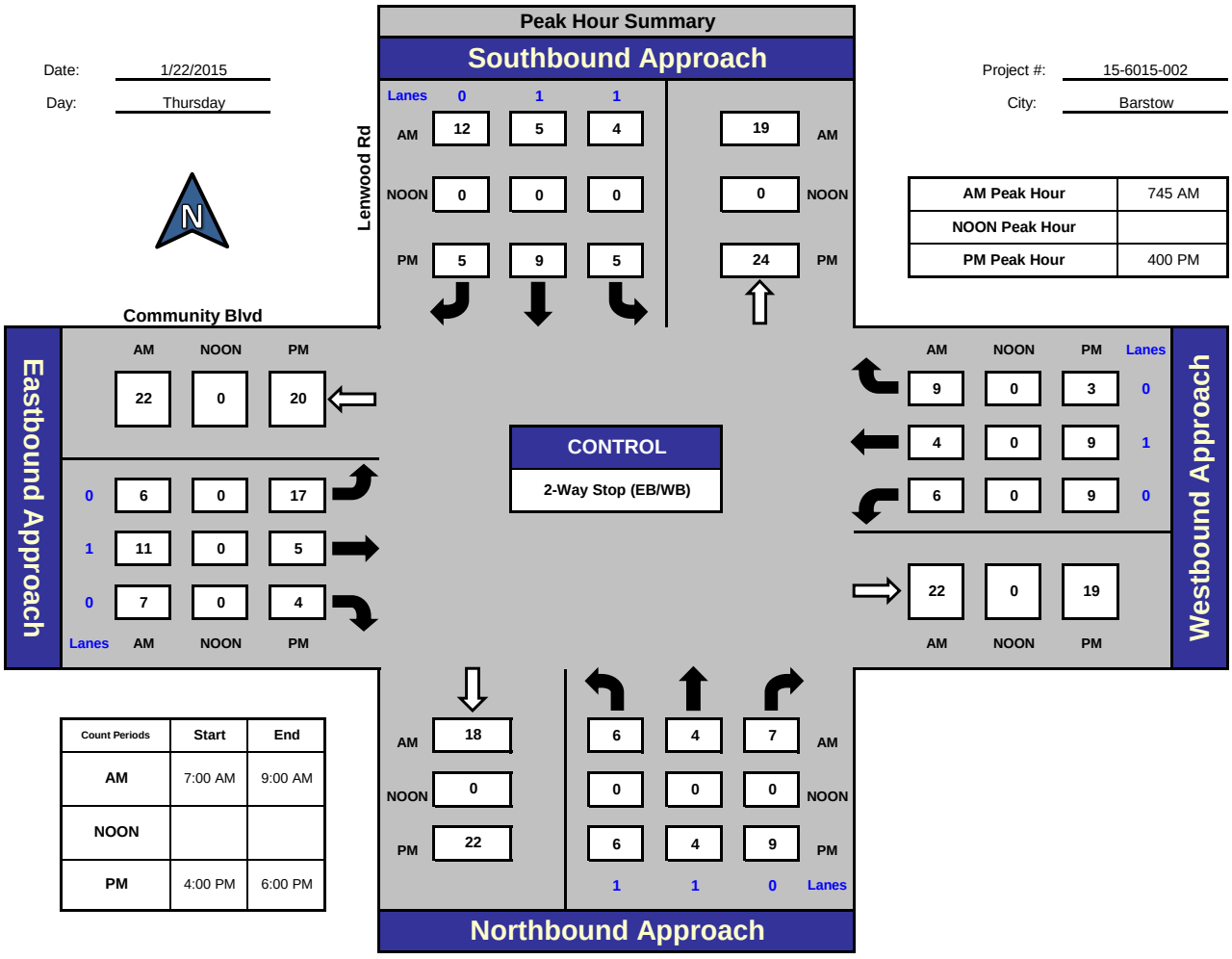
Date: 1/22/2015

Day: Thursday

Project #: 15-6015-002

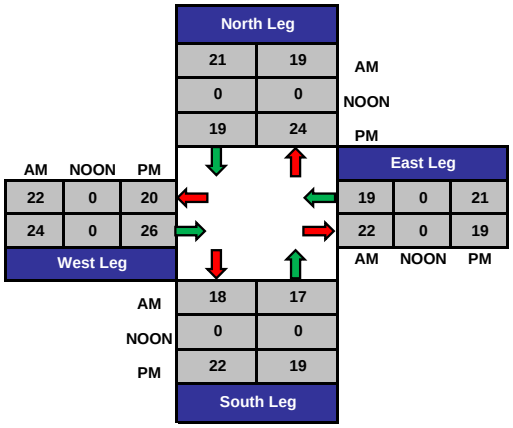
City: Barstow

AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	400 PM

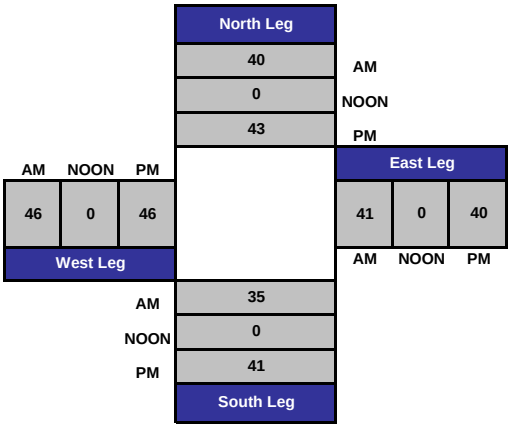


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-6015-002 **Day:** Thursday

City: Barstow **Date:** 1/22/2015

AM

NS/EW Streets:	Lenwood Rd			Lenwood Rd			Community Blvd			Community Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	0	1	0	0	1	0	
7:00 AM	1	0	1	1	2	2	1	0	2	0	1	1	12
7:15 AM	4	1	2	0	2	1	2	0	0	0	1	3	16
7:30 AM	0	0	1	0	1	1	3	0	1	0	0	0	7
7:45 AM	2	0	0	2	1	4	3	3	3	2	0	2	22
8:00 AM	2	2	3	0	1	2	1	4	3	3	0	3	24
8:15 AM	1	0	4	0	0	3	1	2	1	0	1	1	14
8:30 AM	1	2	0	2	3	3	1	2	0	1	3	3	21
8:45 AM	0	0	1	1	1	1	2	0	2	1	1	3	13
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	11	5	12	6	11	17	14	11	12	7	7	16	129
APPROACH %'s :	39.29%	17.86%	42.86%	17.65%	32.35%	50.00%	37.84%	29.73%	32.43%	23.33%	23.33%	53.33%	
PEAK HR START TIME :	745 AM												TOTAL
PEAK HR VOL :	6	4	7	4	5	12	6	11	7	6	4	9	81
PEAK HR FACTOR :	0.607			0.656			0.667			0.679			0.844

UTURNS

NB	SB	EB	WB

NB	SB	EB	WB
0	0	0	0

CONTROL : 2-Way Stop (EB/WB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-6015-002 **Day:** Thursday

City: Barstow **Date:** 1/22/2015

PM

NS/EW Streets:	Lenwood Rd			Lenwood Rd			Community Blvd			Community Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 1	NR 0	SL 1	ST 1	SR 0	EL 0	ET 1	ER 0	WL 0	WT 1	WR 0	TOTAL
4:00 PM	4	2	2	1	2	2	5	2	0	2	1	1	24
4:15 PM	2	2	1	2	6	2	3	0	2	3	2	0	25
4:30 PM	0	0	3	0	0	1	6	1	0	2	3	0	16
4:45 PM	0	0	3	2	1	0	3	2	2	2	3	2	20
5:00 PM	0	2	0	0	2	3	5	1	1	3	1	2	20
5:15 PM	0	3	2	1	4	1	2	1	0	2	5	0	21
5:30 PM	1	2	4	2	0	2	3	1	0	1	1	1	18
5:45 PM	2	2	0	2	2	3	3	2	3	1	0	2	22
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	9	13	15	10	17	14	30	10	8	16	16	8	166
APPROACH %'s :	24.32%	35.14%	40.54%	24.39%	41.46%	34.15%	62.50%	20.83%	16.67%	40.00%	40.00%	20.00%	
PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	6	4	9	5	9	5	17	5	4	9	9	3	85
PEAK HR FACTOR :	0.594			0.475			0.929			0.750			0.850

UTURNS	NB	SB	EB	WB
	NB	SB	EB	WB
	0	0	0	0

CONTROL : 2-Way Stop (EB/WB)

ITM Peak Hour Summary

Prepared by:

NDS

Lenwood Rd and SR-58 , Barstow

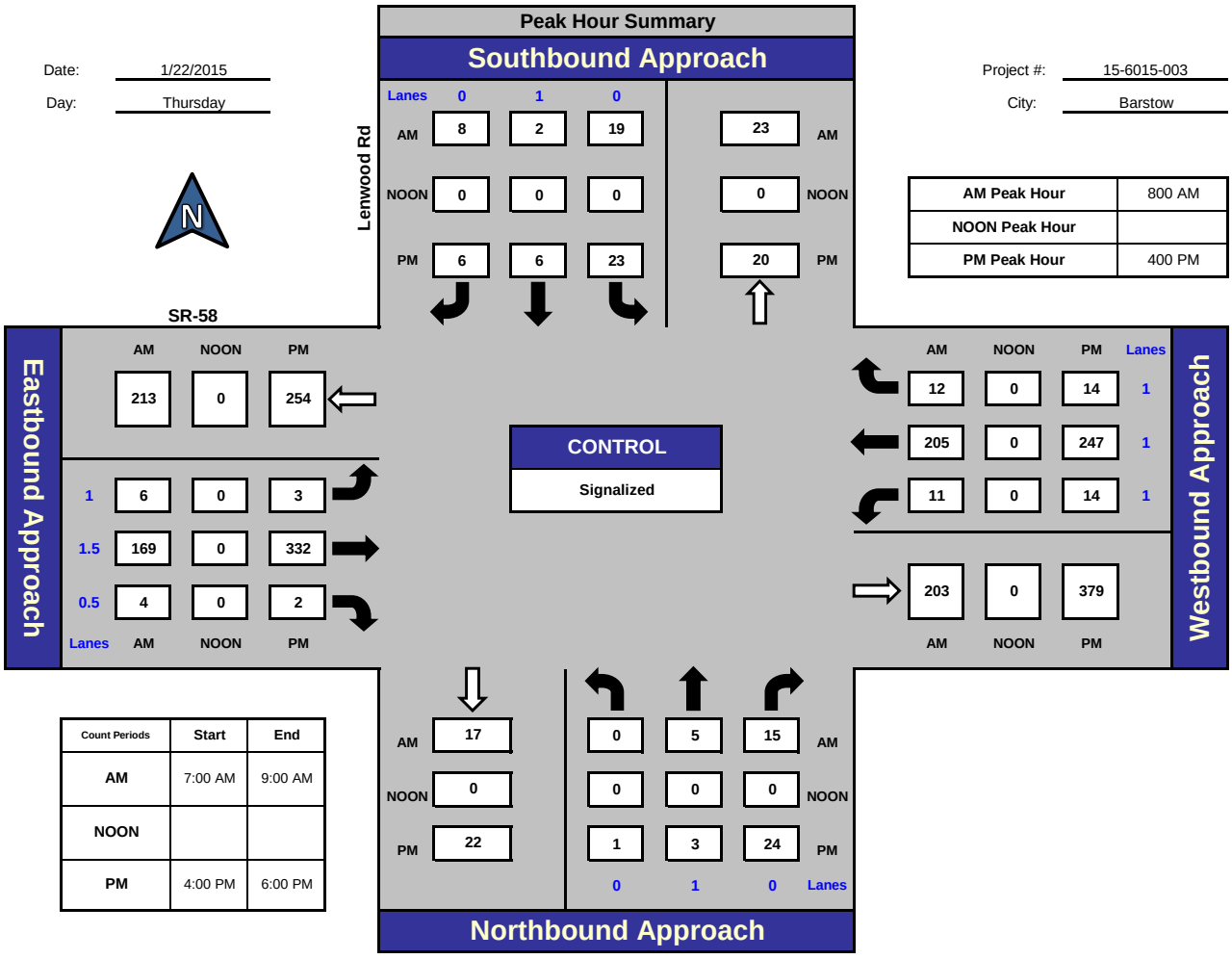
Date: 1/22/2015

Day: Thursday

Project #: 15-6015-003

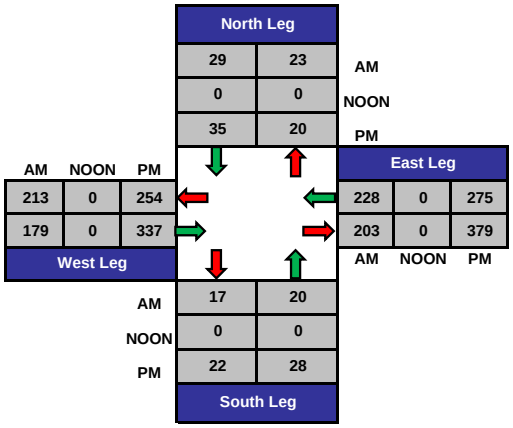
City: Barstow

AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	400 PM

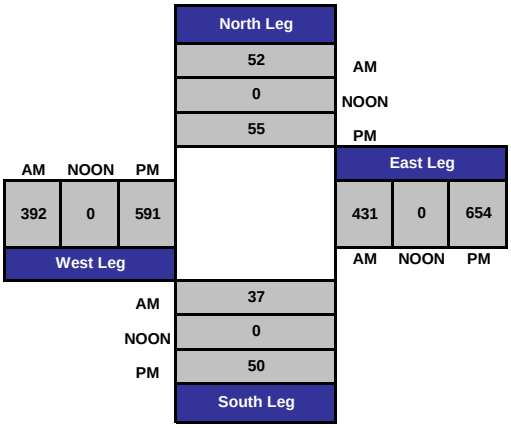


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-6015-003 **Day:** Thursday

City: Barstow **Date:** 1/22/2015

AM

NS/EW Streets:	Lenwood Rd			Lenwood Rd			SR-58			SR-58			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	1	1.5	0.5	1	1	1	
7:00 AM	0	0	2	0	0	0	0	35	2	2	33	3	77
7:15 AM	0	0	5	1	3	0	2	33	0	1	39	2	86
7:30 AM	1	0	3	2	0	1	2	30	1	1	25	4	70
7:45 AM	0	0	6	7	1	1	0	30	2	4	47	8	106
8:00 AM	0	3	4	4	0	2	3	44	0	3	58	1	122
8:15 AM	0	0	2	4	0	4	1	32	0	3	55	6	107
8:30 AM	0	1	4	3	1	1	2	41	4	4	55	3	119
8:45 AM	0	1	5	8	1	1	0	52	0	1	37	2	108
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1	5	31	29	6	10	10	297	9	19	349	29	795
APPROACH %'s :	2.70%	13.51%	83.78%	64.44%	13.33%	22.22%	3.16%	93.99%	2.85%	4.79%	87.91%	7.30%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	0	5	15	19	2	8	6	169	4	11	205	12	456
PEAK HR FACTOR :		0.714			0.725			0.861			0.891		0.934

UTURNS				
NB	SB	EB	WB
0	0	0	0

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-6015-003 **Day:** Thursday

City: Barstow **Date:** 1/22/2015

PM

NS/EW Streets:	Lenwood Rd			Lenwood Rd			SR-58			SR-58			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 1	ET 1.5	ER 0.5	WL 1	WT 1	WR 1	TOTAL
4:00 PM	1	2	7	6	1	3	1	84	0	5	69	4	183
4:15 PM	0	1	5	6	5	0	0	74	0	4	67	3	165
4:30 PM	0	0	6	6	0	3	0	92	1	1	60	2	171
4:45 PM	0	0	6	5	0	0	2	82	1	4	51	5	156
5:00 PM	0	0	8	2	2	3	1	102	0	3	58	3	182
5:15 PM	0	3	0	4	1	4	1	71	2	3	54	3	146
5:30 PM	0	2	6	2	1	1	1	55	1	2	61	4	136
5:45 PM	0	1	5	8	1	3	0	87	1	3	55	4	168
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1	9	43	39	11	17	6	647	6	25	475	28	1307
APPROACH %'s :	1.89%	16.98%	81.13%	58.21%	16.42%	25.37%	0.91%	98.18%	0.91%	4.73%	89.96%	5.30%	
PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	1	3	24	23	6	6	3	332	2	14	247	14	675
PEAK HR FACTOR :		0.700			0.795			0.906			0.881		0.922

UTURNS

NB	SB	EB	WB

NB	SB	EB	WB
0	0	0	0

CONTROL : Signalized

ITM Peak Hour Summary

Prepared by:

NDS

Dixie Rd and Community Blvd , Barstow

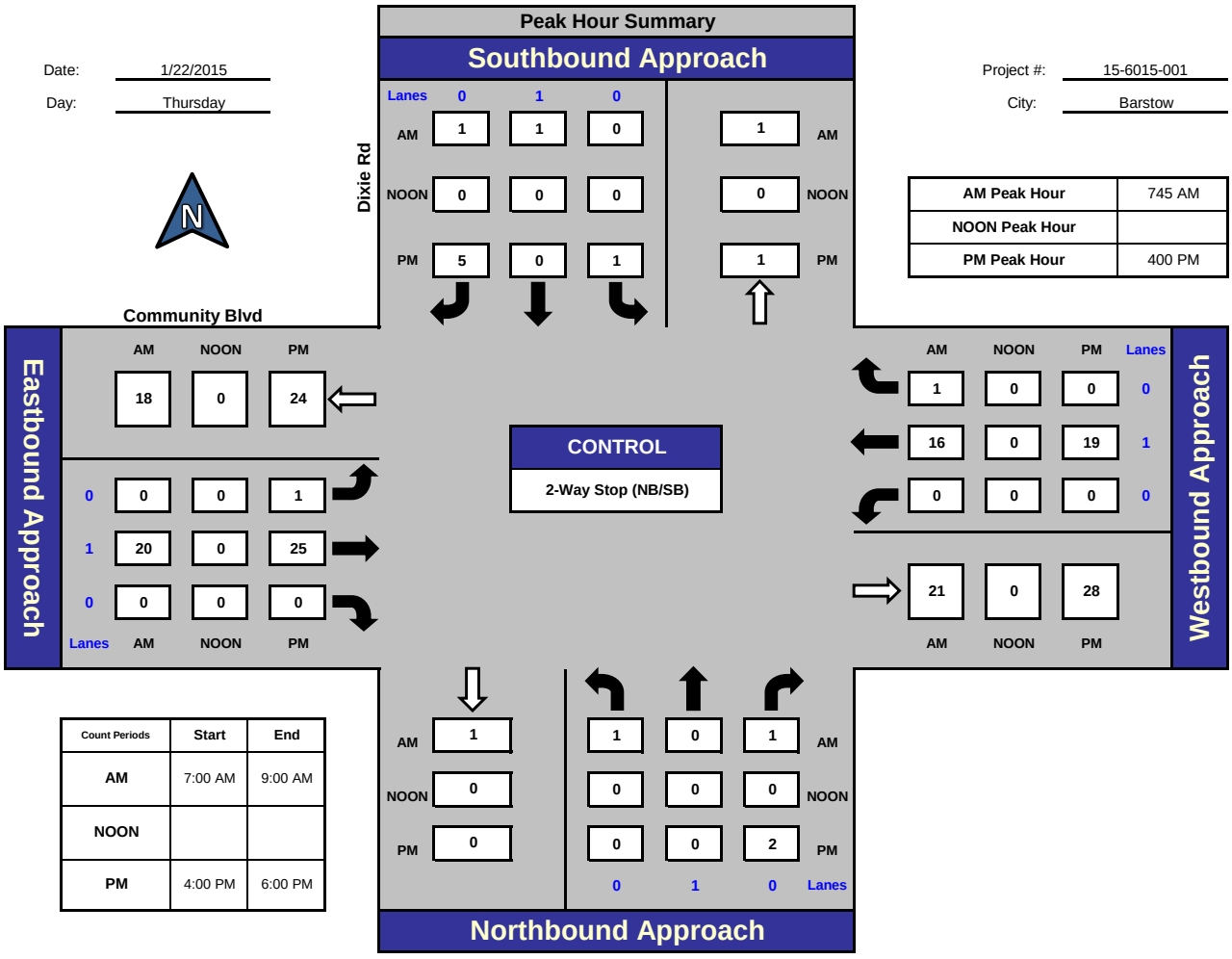
Date: 1/22/2015

Day: Thursday

Project #: 15-6015-001

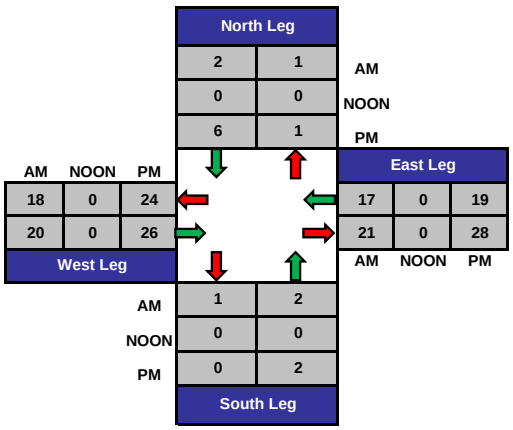
City: Barstow

AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	400 PM

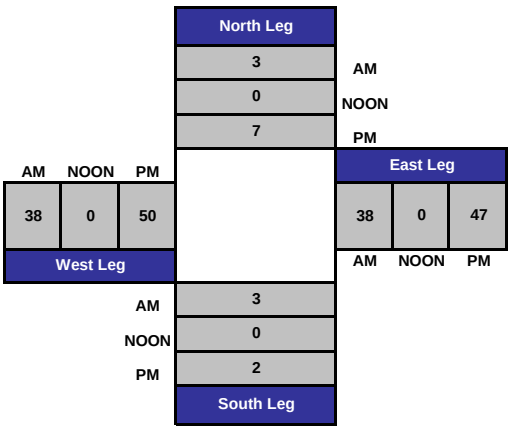


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-6015-001 **Day:** Thursday

City: Barstow **Date:** 1/22/2015

AM

NS/EW Streets:	Dixie Rd			Dixie Rd			Community Blvd			Community Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	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	
7:00 AM	0	0	0	0	0	1	0	3	0	0	6	0	10
7:15 AM	0	0	0	0	0	1	0	2	0	0	5	0	8
7:30 AM	0	0	1	0	0	0	0	1	1	0	1	1	5
7:45 AM	0	0	1	0	1	0	0	10	0	0	6	0	18
8:00 AM	0	0	0	0	0	0	0	7	0	0	3	0	10
8:15 AM	1	0	0	0	0	1	0	2	0	0	2	1	7
8:30 AM	0	0	0	0	0	0	0	1	0	0	5	0	6
8:45 AM	0	0	0	1	0	0	0	3	0	0	2	0	6
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1	0	2	1	1	3	0	29	1	0	30	2	70
APPROACH %'s :	33.33%	0.00%	66.67%	20.00%	20.00%	60.00%	0.00%	96.67%	3.33%	0.00%	93.75%	6.25%	
PEAK HR START TIME :	745 AM												TOTAL
PEAK HR VOL :	1	0	1	0	1	1	0	20	0	0	16	1	41
PEAK HR FACTOR :	0.500			0.500			0.500			0.708			0.569

UTURNS				
NB	SB	EB	WB	
NB	SB	EB	WB	
0	0	0	0	

CONTROL : 2-Way Stop (NB/SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-6015-001 **Day:** Thursday

City: Barstow **Date:** 1/22/2015

PM

NS/EW Streets:	Dixie Rd			Dixie Rd			Community Blvd			Community Blvd				UTURNS			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND							
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB
LANES:	0	1	0	0	1	0	0	1	0	0	1	0					
4:00 PM	0	0	0	0	0	1	0	7	0	0	5	0	13				
4:15 PM	0	0	1	0	0	0	0	4	0	0	7	0	12				
4:30 PM	0	0	0	0	0	1	0	9	0	0	5	0	15				
4:45 PM	0	0	1	1	0	3	1	5	0	0	2	0	13				
5:00 PM	0	0	0	1	0	0	0	6	0	0	4	0	11				
5:15 PM	0	0	1	0	0	0	0	3	0	0	5	0	9				
5:30 PM	0	0	0	1	0	0	0	1	0	0	2	0	4				
5:45 PM	1	0	1	0	0	0	0	7	0	0	7	0	16				
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB
TOTAL VOLUMES :	1	0	4	3	0	5	1	42	0	0	37	0	93	0	0	0	0
APPROACH %'s :	20.00%	0.00%	80.00%	37.50%	0.00%	62.50%	2.33%	97.67%	0.00%	0.00%	100.00%	0.00%					
PEAK HR START TIME :	400 PM												TOTAL				
PEAK HR VOL :	0	0	2	1	0	5	1	25	0	0	19	0	53				
PEAK HR FACTOR :	0.500			0.375			0.722			0.679			0.883				

CONTROL : 2-Way Stop (NB/SB)

Prepared by National Data & Surveying Services

CLASSIFICATION

Lenwood Rd Bet. SR-58 & Community Blvd

Day: Thursday
Date: 1/22/2015

City: Barstow
Project #: CA15_6014_001n

North Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	1	0	0	1	0	0	0	0	0	0	0	0	2
04:00	0	1	2	0	2	0	0	0	1	0	0	0	0	6
05:00	0	5	2	1	3	0	0	0	0	0	0	0	0	11
06:00	0	9	3	0	2	0	0	0	0	0	0	0	0	14
07:00	0	9	2	0	3	0	0	1	2	0	0	0	0	17
08:00	0	10	4	0	4	0	0	1	0	0	0	0	0	19
09:00	0	8	3	1	6	0	0	0	1	0	0	0	0	19
10:00	0	7	5	0	4	0	0	0	0	0	0	0	0	16
11:00	0	11	1	1	4	0	0	1	0	0	0	0	0	18
12:00 PM	0	8	1	0	7	0	0	0	0	0	0	0	0	16
13:00	0	9	4	0	4	0	1	1	0	0	0	0	0	19
14:00	0	9	8	0	6	0	0	0	0	0	1	0	0	24
15:00	0	18	11	3	3	0	0	0	3	0	0	0	0	38
16:00	0	17	4	0	4	0	0	0	0	0	0	0	0	25
17:00	0	16	5	0	3	0	0	0	1	0	0	0	0	25
18:00	0	10	3	0	1	0	0	0	0	0	0	0	0	14
19:00	0	9	1	0	0	0	0	0	0	0	0	0	0	10
20:00	0	9	0	0	1	0	0	0	0	0	0	0	0	10
21:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
22:00	0	5	0	2	0	0	0	0	0	0	1	0	0	8
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		**178**	**60**	**8**	**58**		**1**	**4**	**8**		**2**			**319**
% of Totals		56%	19%	3%	18%		0%	1%	3%		1%			100%
			238				59						14	
AM Volumes	0	65	23	3	29	0	0	3	4	0	0	0	0	127
% AM		20%	7%	1%	9%			1%	1%					40%
AM Peak Hour		11:00	10:00	05:00	09:00			07:00	07:00					08:00
Volume		11	5	1	6			1	2					19
PM Volumes	0	113	37	5	29	0	1	1	4	0	2	0	0	192
% PM		35%	12%	2%	9%		0%	0%	1%		1%			60%
PM Peak Hour		15:00	15:00	15:00	12:00		13:00	13:00	15:00		14:00			15:00
Volume		18	11	3	7		1	1	3		1			38

Directional Peak Periods	**AM 7-9**		**NOON 12-2**		**PM 4-6**		**Off Peak Volumes**	
All Classes	Volume	%	Volume	%	Volume	%	Volume	%
	36 ⟷	11%	35 ⟷	11%	50 ⟷	16%	198 ⟷	62%

Classification Definitions

1 Motorcycles	**4** Buses	**7** > =4-Axle Single Units	**10** >=6-Axle Single Trailers	**13** >=7-Axle Multi-Trailers
2 Passenger Cars	**5** 2-Axle, 6-Tire Single Units	**8** <=4-Axle Single Trailers	**11** <=5-Axle Multi-Trailers	
3 2-Axle, 4-Tire Single Units	**6** 3-Axle Single Units	**9** 5-Axle Single Trailers	**12** 6-Axle Multi-Trailers	

Prepared by National Data & Surveying Services

CLASSIFICATION

Lenwood Rd Bet. SR-58 & Community Blvd

Day: Thursday
Date: 1/22/2015

City: Barstow
Project #: CA15_6014_001s

South Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	4	0	0	0	0	0	1	0	0	0	0	0	5
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	0	0	0	0	0	0	1	1	0	0	0	0	2
04:00	0	4	2	0	1	0	0	0	1	0	0	0	0	8
05:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
06:00	0	24	17	0	6	0	0	0	0	0	0	0	0	47
07:00	0	6	1	1	6	0	0	0	3	0	0	0	0	17
08:00	0	5	4	1	1	0	0	1	4	0	0	0	0	16
09:00	0	6	1	1	0	0	0	0	1	0	1	0	0	10
10:00	0	4	4	1	2	0	0	0	0	0	1	0	0	12
11:00	0	12	6	0	3	0	0	0	3	0	0	0	0	24
12:00 PM	0	2	2	0	1	1	0	0	1	0	1	0	0	8
13:00	0	13	7	0	2	1	1	1	1	0	0	0	0	26
14:00	0	8	7	2	2	0	1	1	2	0	0	0	0	23
15:00	0	19	11	0	1	0	0	0	0	0	0	0	0	31
16:00	0	17	2	0	2	0	0	0	0	0	0	0	0	21
17:00	0	12	3	0	4	0	0	0	1	0	0	0	0	20
18:00	0	8	5	0	1	0	0	0	1	0	0	0	0	15
19:00	0	5	1	0	1	0	0	0	2	0	0	0	0	9
20:00	0	7	1	0	1	0	0	0	1	0	0	0	0	10
21:00	0	11	1	0	1	1	0	0	21	0	0	0	0	35
22:00	0	11	1	0	0	0	0	0	1	0	0	0	0	13
23:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Totals		**184**	**76**	**6**	**35**	**3**	**2**	**5**	**44**		**3**			**358**
% of Totals		51%	21%	2%	10%	1%	1%	1%	12%		1%			100%
			260				40						52	
AM Volumes	0	69	35	4	19	0	0	3	13	0	2	0	0	145
% AM		19%	10%	1%	5%			1%	4%		1%			41%
AM Peak Hour		06:00	06:00	07:00	06:00				08:00		09:00			06:00
Volume		24	17	1	6			1	4		1			47
PM Volumes	0	115	41	2	16	3	2	2	31	0	1	0	0	213
% PM		32%	11%	1%	4%	1%	1%	1%	9%		0%			59%
PM Peak Hour		15:00	15:00	14:00	17:00	12:00	13:00	13:00	21:00		12:00			21:00
Volume		19	11	2	4	1	1	1	21		1			35

Directional Peak Periods All Classes	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
	Volume	%	Volume	%	Volume	%	Volume	%
	33	9%	34	9%	41	11%	250	70%

Classification Definitions

1 Motorcycles	**4** Buses	**7** > =4-Axle Single Units	**10** >=6-Axle Single Trailers	**13** >=7-Axle Multi-Trailers
2 Passenger Cars	**5** 2-Axle, 6-Tire Single Units	**8** <=4-Axle Single Trailers	**11** <=5-Axle Multi-Trailers	
3 2-Axle, 4-Tire Single Units	**6** 3-Axle Single Units	**9** 5-Axle Single Trailers	**12** 6-Axle Multi-Trailers	

Prepared by National Data & Surveying Services

CLASSIFICATION

Lenwood Rd Bet. SR-58 & Community Blvd

Day: Thursday
Date: 1/22/2015

City: Barstow
Project #: CA15_6014_001

Summary

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	5	1	0	0	0	0	1	0	0	0	0	0	7
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	1	0	0	1	0	0	1	1	0	0	0	0	4
04:00	0	5	4	0	3	0	0	0	2	0	0	0	0	14
05:00	0	8	2	1	3	0	0	0	0	0	0	0	0	14
06:00	0	33	20	0	8	0	0	0	0	0	0	0	0	61
07:00	0	15	3	1	9	0	0	1	5	0	0	0	0	34
08:00	0	15	8	1	5	0	0	2	4	0	0	0	0	35
09:00	0	14	4	2	6	0	0	0	2	0	1	0	0	29
10:00	0	11	9	1	6	0	0	0	0	0	1	0	0	28
11:00	0	23	7	1	7	0	0	1	3	0	0	0	0	42
12:00 PM	0	10	3	0	8	1	0	0	1	0	1	0	0	24
13:00	0	22	11	0	6	1	2	2	1	0	0	0	0	45
14:00	0	17	15	2	8	0	1	1	2	0	1	0	0	47
15:00	0	37	22	3	4	0	0	0	3	0	0	0	0	69
16:00	0	34	6	0	6	0	0	0	0	0	0	0	0	46
17:00	0	28	8	0	7	0	0	0	2	0	0	0	0	45
18:00	0	18	8	0	2	0	0	0	1	0	0	0	0	29
19:00	0	14	2	0	1	0	0	0	2	0	0	0	0	19
20:00	0	16	1	0	2	0	0	0	1	0	0	0	0	20
21:00	0	14	1	0	1	1	0	0	21	0	0	0	0	38
22:00	0	16	1	2	0	0	0	0	1	0	1	0	0	21
23:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Totals		**362**	**136**	**14**	**93**	**3**	**3**	**9**	**52**		**5**			**677**
% of Totals		53%	20%	2%	14%	0%	0%	1%	8%		1%			100%

AM Volumes	0	134	58	7	48	0	0	6	17	0	2	0	0	272
% AM		20%	9%	1%	7%			1%	3%		0%			40%
AM Peak Hour		06:00	06:00	09:00	07:00			08:00	07:00		09:00			06:00
Volume		33	20	2	9			2	5		1			61
PM Volumes	0	228	78	7	45	3	3	3	35	0	3	0	0	405
% PM		34%	12%	1%	7%	0%	0%	0%	5%		0%			60%
PM Peak Hour		15:00	15:00	15:00	12:00	12:00	13:00	13:00	21:00		12:00			15:00
Volume		37	22	3	8	1	2	2	21		1			69

Directional Peak Periods	**AM 7-9**			**NOON 12-2**			**PM 4-6**			**Off Peak Volumes**		
All Classes	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%
	69		10%	69		10%	91		13%	448		66%

Classification Definitions

1 Motorcycles
2 Passenger Cars
3 2-Axle, 4-Tire Single Units
4 Buses
5 2-Axle, 6-Tire Single Units
6 3-Axle Single Units
7 > =4-Axle Single Units
8 <=4-Axle Single Trailers
9 5-Axle Single Trailers
10 >=6-Axle Single Trailers
11 <=5-Axle Multi-Trailers
12 6-Axle Multi-Trailers
13 >=7-Axle Multi-Trailers

Prepared by National Data & Surveying Services

CLASSIFICATION

Community Blvd Bet. Lenwood Rd & SR-58

Day: Thursday
Date: 1/22/2015

City: Barstow
Project #: CA15_6014_002e

East Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
01:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	2	0	0	2	0	0	0	1	0	0	0	0	5
05:00	0	8	3	0	1	0	0	0	0	0	0	0	0	12
06:00	0	13	5	1	0	0	0	0	0	0	0	0	0	19
07:00	0	4	3	2	0	0	0	0	0	0	0	0	0	9
08:00	0	10	6	0	3	0	0	0	1	0	0	0	0	20
09:00	0	3	0	0	1	0	0	0	0	0	1	0	0	5
10:00	0	6	8	1	3	0	0	0	0	0	0	0	0	18
11:00	0	8	8	0	2	0	0	0	0	0	0	0	0	18
12:00 PM	0	4	1	0	1	0	0	0	0	0	0	0	0	6
13:00	0	7	3	0	2	0	0	0	0	0	0	0	0	12
14:00	0	5	2	1	1	1	0	1	0	0	0	0	0	11
15:00	0	19	7	2	4	0	0	0	0	0	0	0	0	32
16:00	0	12	4	1	2	0	0	0	0	0	0	0	0	19
17:00	0	9	4	0	3	0	0	0	0	0	0	0	0	16
18:00	0	9	2	0	3	0	0	0	0	0	0	0	0	14
19:00	0	5	1	0	1	0	0	0	1	0	0	0	0	8
20:00	0	9	2	0	1	0	0	0	0	0	0	0	0	12
21:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
22:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
23:00	0	1	0	0	2	0	0	0	0	0	0	0	0	3
Totals		**143**	**60**	**8**	**32**	**1**		**1**	**3**		**1**			**249**
% of Totals		57%	24%	3%	13%	0%		0%	1%		0%			100%

AM Volumes	0	57	34	4	12	0	0	0	2	0	1	0	0	110
% AM		23%	14%	2%	5%				1%		0%			44%
AM Peak Hour		06:00	10:00	07:00	08:00				04:00		09:00			08:00
Volume		13	8	2	3				1		1			20
PM Volumes	0	86	26	4	20	1	0	1	1	0	0	0	0	139
% PM		35%	10%	2%	8%	0%		0%	0%					56%
PM Peak Hour		15:00	15:00	15:00	15:00	14:00		14:00	19:00					15:00
Volume		19	7	2	4	1		1	1					32

Directional Peak Periods All Classes	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
	Volume	%	Volume	%	Volume	%	Volume	%
	29	12%	18	7%	35	14%	167	67%

Classification Definitions

1 Motorcycles	**4** Buses	**7** > =4-Axle Single Units	**10** >=6-Axle Single Trailers	**13** >=7-Axle Multi-Trailers
2 Passenger Cars	**5** 2-Axle, 6-Tire Single Units	**8** <=4-Axle Single Trailers	**11** <=5-Axle Multi-Trailers	
3 2-Axle, 4-Tire Single Units	**6** 3-Axle Single Units	**9** 5-Axle Single Trailers	**12** 6-Axle Multi-Trailers	

Prepared by National Data & Surveying Services

CLASSIFICATION

Community Blvd Bet. Lenwood Rd & SR-58

Day: Thursday
Date: 1/22/2015

City: Barstow
Project #: CA15_6014_002w

West Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
04:00	0	3	1	0	2	0	0	0	0	0	0	0	0	6
05:00	0	7	5	0	0	0	0	0	0	0	0	0	0	12
06:00	0	5	3	0	1	2	0	1	0	0	0	0	0	12
07:00	0	6	1	0	1	0	0	1	1	0	0	0	0	10
08:00	0	11	5	0	5	0	0	0	0	0	0	0	0	21
09:00	0	11	2	0	2	0	0	1	0	0	0	0	0	16
10:00	0	5	4	0	4	0	0	0	0	0	0	0	0	13
11:00	0	8	6	1	1	0	0	0	0	0	0	0	0	16
12:00 PM	0	7	7	0	1	0	0	0	0	0	0	0	0	15
13:00	0	8	3	0	5	0	0	0	0	0	0	0	0	16
14:00	0	10	2	0	1	0	0	0	0	0	0	0	0	13
15:00	0	12	5	1	0	0	0	0	1	0	0	0	0	19
16:00	0	15	5	0	0	0	0	0	0	0	0	0	0	20
17:00	0	11	5	0	3	0	0	0	0	0	0	0	0	19
18:00	0	11	3	0	2	0	0	0	0	0	0	0	0	16
19:00	0	9	1	0	1	0	0	0	0	0	0	0	0	11
20:00	0	7	2	0	0	0	0	0	0	0	0	0	0	9
21:00	0	2	2	0	0	0	0	0	0	0	0	0	0	4
22:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
23:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Totals		**156**	**63**	**2**	**29**	**2**		**3**	**2**					**257**
% of Totals		61%	25%	1%	11%	1%		1%	1%					100%

AM Volumes	0	60	27	1	16	2	0	3	1	0	0	0	0	110
% AM		23%	11%	0%	6%	1%		1%	0%					43%
AM Peak Hour		08:00	11:00	11:00	08:00	06:00		06:00	07:00					08:00
Volume		11	6	1	5	2		1	1					21
PM Volumes	0	96	36	1	13	0	0	0	1	0	0	0	0	147
% PM		37%	14%	0%	5%				0%					57%
PM Peak Hour		16:00	12:00	15:00	13:00				15:00					16:00
Volume		15	7	1	5				1					20

Directional Peak Periods	**AM 7-9**		**NOON 12-2**		**PM 4-6**		**Off Peak Volumes**	
All Classes	Volume	%	Volume	%	Volume	%	Volume	%
	31	12%	31	12%	39	15%	156	61%

Classification Definitions

1 Motorcycles	**4** Buses	**7** > =4-Axle Single Units	**10** >=6-Axle Single Trailers	**13** >=7-Axle Multi-Trailers
2 Passenger Cars	**5** 2-Axle, 6-Tire Single Units	**8** <=4-Axle Single Trailers	**11** <=5-Axle Multi-Trailers	
3 2-Axle, 4-Tire Single Units	**6** 3-Axle Single Units	**9** 5-Axle Single Trailers	**12** 6-Axle Multi-Trailers	

Prepared by National Data & Surveying Services

CLASSIFICATION

Community Blvd Bet. Lenwood Rd & SR-58

Day: Thursday
Date: 1/22/2015

City: Barstow
Project #: CA15_6014_002

Summary

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
01:00	0	1	1	0	0	0	0	0	0	0	0	0	0	2
02:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
04:00	0	5	1	0	4	0	0	0	1	0	0	0	0	11
05:00	0	15	8	0	1	0	0	0	0	0	0	0	0	24
06:00	0	18	8	1	1	2	0	1	0	0	0	0	0	31
07:00	0	10	4	2	1	0	0	1	1	0	0	0	0	19
08:00	0	21	11	0	8	0	0	0	1	0	0	0	0	41
09:00	0	14	2	0	3	0	0	1	0	0	1	0	0	21
10:00	0	11	12	1	7	0	0	0	0	0	0	0	0	31
11:00	0	16	14	1	3	0	0	0	0	0	0	0	0	34
12:00 PM	0	11	8	0	2	0	0	0	0	0	0	0	0	21
13:00	0	15	6	0	7	0	0	0	0	0	0	0	0	28
14:00	0	15	4	1	2	1	0	1	0	0	0	0	0	24
15:00	0	31	12	3	4	0	0	0	1	0	0	0	0	51
16:00	0	27	9	1	2	0	0	0	0	0	0	0	0	39
17:00	0	20	9	0	6	0	0	0	0	0	0	0	0	35
18:00	0	20	5	0	5	0	0	0	0	0	0	0	0	30
19:00	0	14	2	0	2	0	0	0	1	0	0	0	0	19
20:00	0	16	4	0	1	0	0	0	0	0	0	0	0	21
21:00	0	4	2	0	0	0	0	0	0	0	0	0	0	6
22:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
23:00	0	1	1	0	2	0	0	0	0	0	0	0	0	4
Totals		299	123	10	61	3		4	5		1			506
% of Totals		59%	24%	2%	12%	1%		1%	1%		0%			100%

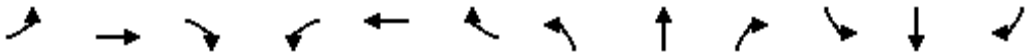
AM Volumes	0	117	61	5	28	2	0	3	3	0	1	0	0	220
% AM		23%	12%	1%	6%	0%		1%	1%		0%			43%
AM Peak Hour		08:00	11:00	07:00	08:00	06:00		06:00	04:00		09:00			08:00
Volume		21	14	2	8	2		1	1		1			41
PM Volumes	0	182	62	5	33	1	0	1	2	0	0	0	0	286
% PM		36%	12%	1%	7%	0%		0%	0%					57%
PM Peak Hour		15:00	15:00	15:00	13:00	14:00		14:00	15:00					15:00
Volume		31	12	3	7	1		1	1					51

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Classes	Volume	↔	%	Volume	↔	%	Volume	↔	%	Volume	↔	%
	60	↔	12%	49	↔	10%	74	↔	15%	323	↔	64%

Classification Definitions

1 Motorcycles
2 Passenger Cars
3 2-Axle, 4-Tire Single Units
4 Buses
5 2-Axle, 6-Tire Single Units
6 3-Axle Single Units
7 > =4-Axle Single Units
8 <=4-Axle Single Trailers
9 5-Axle Single Trailers
10 >=6-Axle Single Trailers
11 <=5-Axle Multi-Trailers
12 6-Axle Multi-Trailers
13 >=7-Axle Multi-Trailers

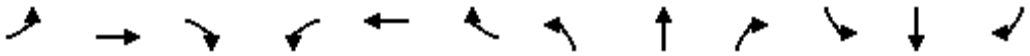
APPENDIX B:
LEVEL OF SERVICE WORKSHEETS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	11	7	6	4	9	6	4	7	4	5	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	7	13	8	7	5	11	7	5	8	5	6	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	55	50	13	54	53	9	20			13		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	55	50	13	54	53	9	20			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 %	99	98	99	99	99	99	100			100		
cM capacity (veh/h)	924	835	1067	921	832	1073	1596			1605		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	29	23	7	13	5	20
Volume Left	7	7	7	0	5	0
Volume Right	8	11	0	8	0	14
cSH	915	964	1596	1700	1605	1700
Volume to Capacity	0.03	0.02	0.00	0.01	0.00	0.01
Queue Length 95th (ft)	2	2	0	0	0	0
Control Delay (s)	9.1	8.8	7.3	0.0	7.2	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.1	8.8	2.6		1.4	
Approach LOS	A	A				

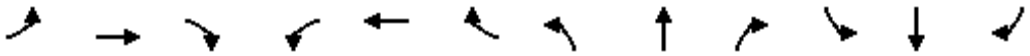
Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	15.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	169	4	11	205	12	0	5	15	19	2	8
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			4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.90			0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.97	
Satd. Flow (prot)	1770	3528		1770	1863	1583		1671			1734	
Flt Permitted	0.62	1.00		0.63	1.00	1.00		1.00			0.89	
Satd. Flow (perm)	1156	3528		1182	1863	1583		1671			1591	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	182	4	12	220	13	0	5	16	20	2	9
RTOR Reduction (vph)	0	2	0	0	0	8	0	10	0	0	5	0
Lane Group Flow (vph)	6	184	0	12	220	5	0	11	0	0	26	0
Turn Type	Perm	NA		Perm	NA	Perm		NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	16.0	16.0		16.0	16.0	16.0		16.0			16.0	
Effective Green, g (s)	16.0	16.0		16.0	16.0	16.0		16.0			16.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40	0.40		0.40			0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)	462	1411		472	745	633		668			636	
v/s Ratio Prot		0.05			c0.12			0.01				
v/s Ratio Perm	0.01			0.01		0.00					c0.02	
v/c Ratio	0.01	0.13		0.03	0.30	0.01		0.02			0.04	
Uniform Delay, d1	7.2	7.6		7.3	8.2	7.2		7.2			7.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.1	0.2		0.1	1.0	0.0		0.0			0.1	
Delay (s)	7.3	7.8		7.4	9.2	7.2		7.3			7.4	
Level of Service	A	A		A	A	A		A			A	
Approach Delay (s)		7.8			9.0			7.3			7.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		

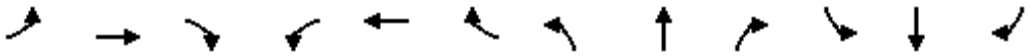
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	20	0	0	16	1	1	0	1	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
Hourly flow rate (vph)	0	35	0	0	28	2	2	0	2	0	2	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	30			35			67	65	35	66	64	29
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	30			35			67	65	35	66	64	29
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)	1583			1576			923	826	1038	926	827	1046

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	35	30	4	4
Volume Left	0	0	2	0
Volume Right	0	2	2	2
cSH	1583	1576	977	923
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	8.7	8.9
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	8.7	8.9
Approach LOS			A	A

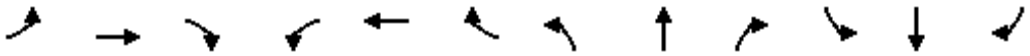
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	5	4	9	9	3	6	4	9	5	9	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	20	6	5	11	11	4	7	5	11	6	11	6
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	55	14	54	52	10	16			15		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	53	55	14	54	52	10	16			15		
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	99	100	99	99	100	100			100		
cM capacity (veh/h)	928	830	1067	929	832	1071	1601			1602		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	31	25	7	15	6	16
Volume Left	20	11	7	0	6	0
Volume Right	5	4	0	11	0	6
cSH	925	901	1601	1700	1602	1700
Volume to Capacity	0.03	0.03	0.00	0.01	0.00	0.01
Queue Length 95th (ft)	3	2	0	0	0	0
Control Delay (s)	9.0	9.1	7.3	0.0	7.3	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.0	9.1	2.3		1.9	
Approach LOS	A	A				

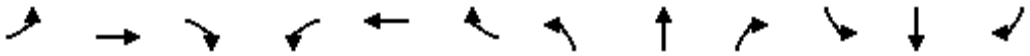
Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	15.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	332	2	14	247	14	1	3	24	23	6	6
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			4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.88			0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.97	
Satd. Flow (prot)	1770	3536		1770	1863	1583		1642			1761	
Flt Permitted	0.59	1.00		0.54	1.00	1.00		1.00			0.88	
Satd. Flow (perm)	1093	3536		997	1863	1583		1638			1598	
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)	3	361	2	15	268	15	1	3	26	25	7	7
RTOR Reduction (vph)	0	1	0	0	0	9	0	16	0	0	4	0
Lane Group Flow (vph)	3	362	0	15	268	6	0	14	0	0	35	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	16.0	16.0		16.0	16.0	16.0		16.0			16.0	
Effective Green, g (s)	16.0	16.0		16.0	16.0	16.0		16.0			16.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40	0.40		0.40			0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)	437	1414		398	745	633		655			639	
v/s Ratio Prot		0.10			c0.14							
v/s Ratio Perm	0.00			0.02		0.00		0.01			c0.02	
v/c Ratio	0.01	0.26		0.04	0.36	0.01		0.02			0.05	
Uniform Delay, d1	7.2	8.0		7.3	8.4	7.2		7.3			7.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.0	0.4		0.2	1.4	0.0		0.1			0.2	
Delay (s)	7.2	8.5		7.5	9.8	7.3		7.3			7.5	
Level of Service	A	A		A	A	A		A			A	
Approach Delay (s)		8.4			9.5			7.3			7.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	28.3%	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)	1	25	0	0	19	0	0	0	2	1	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	1	28	0	0	22	0	0	0	2	1	0	6
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	22			28			58	52	28	55	52	22
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	22			28			58	52	28	55	52	22
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	99
cM capacity (veh/h)	1594			1585			933	838	1047	941	838	1056

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	22	2	7
Volume Left	1	0	0	1
Volume Right	0	0	2	6
cSH	1594	1585	1047	1035
Volume to Capacity	0.00	0.00	0.00	0.01
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.3	0.0	8.4	8.5
Lane LOS	A		A	A
Approach Delay (s)	0.3	0.0	8.4	8.5
Approach LOS			A	A

Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			