Community & Economic
Development Department
Planning Division

3900 Main Street, 3rd Floor • Riverside, CA 92522
951.826.5371 • fax 951.826.5981
RiversideCA.gov/Planning

NOTICE OF INTENT TO ADOPT MITIGATED NEGATIVE DECLARATION FOR THE LINCOLN AVENUE WAREHOUSE, CASE #P16-0413 FOR THE CITY OF RIVERSIDE, CALIFORNIA

PROJECT DESCRIPTION: The proposed project consists of 5.9 acres of light industrial development to include construction of a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet) and will involve site clearing, rough grading and compaction, pouring of concrete and asphalt, and construction of a single structure. The project site is located on the southwest corner of Lincoln Avenue and Grace Street (7820 Lincoln Avenue), approximately 0.5 mile south of State Route 91. Currently, the project site is surrounded on three sides by warehouse uses to the south, west, and northwest. Due north across the intersection of Lincoln Avenue and Grace Street are single-family residential uses; to the east across Grace Street are multifamily residential uses. The proposed project will have a 78-foot building setback from Lincoln Avenue and a 74-foot building setback from Grace Street. There will be three main entrances to the project site, two located on Lincoln Avenue and one on Grace Street. The two main freight truck entrance/exits to the proposed warehouse will be on the northwest and southeast sides of the building; the main passenger vehicle entrance will be north of the proposed warehouse on Lincoln Avenue. The project is not proposed for 24-hour operation. The proposed project will result in a building coverage of 39.4 percent with a total of 195 parking stalls on all four sides of the proposed project site.

NOTES: Tribal Consultations have been conducted pursuant to Assembly Bill 52.

PROJECT LOCATION: The project site is located on the southwest corner of Lincoln Avenue and Grace Street (7820 Lincoln Avenue), approximately 0.5 mile south of State Route 91. The project site is further identified by APN 237-040-016 and USGS *Riverside West, California* Quadrangle, Township 3 South, Range 5 West, Section 9 of the San Bernardino Base Meridian.

HAZARDOUS WASTE SITES: Pursuant to Section 15087c6 of the Guidelines for California Environmental Quality Act the City acknowledges the non-existence of hazardous waste sites within the project area reviewed by this Mitigated Negative Declaration.

PROJECT CONTACT: Matthew Taylor, Assistant Planner **PHONE:** (951) 826-5944
E-MAIL: mtaylor@riversideca.gov

PUBLIC REVIEW AND WRITTEN COMMENTS: The review period for submitting written comments on the Mitigated Negative Declaration pursuant to State CEQA Guidelines Section 15105 commences on Friday, January 27, 2017 and will close on Wednesday, February 15, 2017 at 5:00 p.m. If you have any questions regarding the project or Mitigated Negative Declaration, please contact Matthew Taylor, Assistant Planner**,** by e-mail or phone as indicated above.

Comments should be addressed to: Matthew Taylor, Assistant Planner
City of Riverside, Planning Division
3900 Main Street, 3rd Floor
Riverside, CA 92522

DOCUMENT AVAILABILITY: The Mitigated Negative Declaration is available at the City Planning Division, located at the address above, and may also be viewed on the City's website at http://riversideca.gov/ceqa.

DETERMINATION: The Development Review Committee's determination becomes final on Thursday, February 23, 2017, unless appealed to the City Council no later than 5:00 p.m., Monday, March 6, 2017. Appeal procedures are available from the Planning Division.

If you challenge the above proposed action in court, you may be limited to raising only those issues you or someone else raised in written comments delivered to the Planning Division of the City of Riverside during the comment period specified above.

INITIAL STUDY
for the
Lincoln Avenue Warehouse Project
7820 Lincoln Avenue in the
City of Riverside

Prepared for:

City of Riverside Community Development Department
Planning Division

Prepared by:

LSA Associates, Inc.
1500 Iowa Avenue, Suite 200
Riverside, California 92507

JANUARY 2017

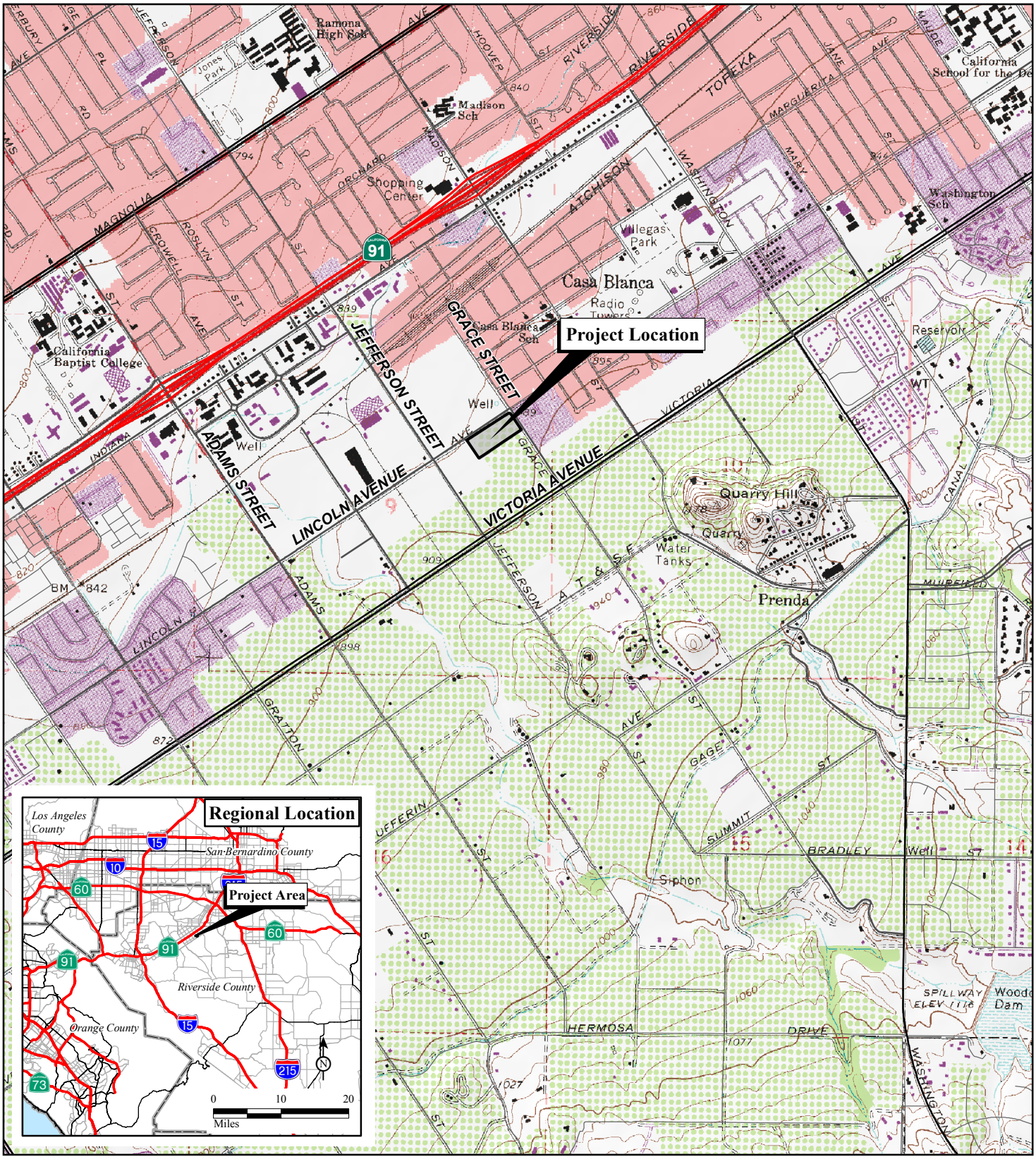
INTRODUCTION

This document serves as the Initial Study (IS) for the Lincoln Avenue Warehouse (proposed project or project) in the City of Riverside (City), California. The City, through its Community Development Department, Planning Division (Department), is the lead agency responsible for the review and approval of the proposed project for compliance with the California Environmental Quality Act (CEQA).

This Initial Study has been prepared by LSA on behalf of the Department and is in conformance with Sections 15063 and 15064 of the *CEQA Guidelines* (14 CCR 15000 et seq.). The purpose of the Initial Study Checklist/Environmental Evaluation is to identify any potentially significant impacts associated with the proposed project, and to determine if an Environmental Impact Report (EIR) is required to provide additional analysis.

ENVIRONMENTAL CHECKLIST

1. **Case Number:** P16-0413
2. **Project Title:** Lincoln Avenue Warehouse
3. **Lead Agency:** City of Riverside
   Community Development Department
   Planning Division
   3900 Main Street, 3rd Floor
   Riverside, California 92522
4. **Contact Person:** Matthew Taylor, Assistant Planner
   Phone Number: (951) 826-5944
5. **Project Location:** 7820 Lincoln Avenue, Riverside, California 92504. Assessor's Parcel Number (APN) 237-040-016 and United States Geological Survey (USGS) *Riverside West, California* Quadrangle, Township 3 South, Range 5 West, Section 9 of the San Bernardino Base Meridian.
6. **Project Applicant/Project Sponsor's Name and Address:** Riverside Lincoln, LLC
   Attn: Klaas Vlietstra
   563 Spoleto Drive
   Pacific Palisades, California 90272
7. **General Plan Designation:** Business/Office Park (B/OP)
8. **Zoning:** Business and Manufacturing Park Zone (BMP)
9. **Description of Project:** The proposed project consists of 5.9 acres of light industrial development including construction of a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet) and will involve site clearing, rough grading and compaction, pouring of concrete and asphalt, and construction of a single structure. The project site is located on the southwest corner of Lincoln Avenue and Grace Street (7820 Lincoln Avenue), approximately 0.5 mile south of State Route 91. Currently, the project site is surrounded on three sides by warehouse uses to the south, west, and northwest. Due north across the intersection of Lincoln Avenue and Grace Street are single-family residential uses; to the east across Grace Street are multifamily residential uses. The proposed project will have a 78-foot building setback from Lincoln Avenue and a 74-foot building setback from Grace Street. There will be three main entrances to the project site, two located on Lincoln Avenue and one on Grace Street. The two main freight truck entrance/exits to the proposed warehouse will be on the northwest and southeast sides of the building; the main passenger vehicle entrance will be north of the proposed warehouse on Lincoln Avenue. The project is not proposed for 24-hour operation. The proposed project will result in a building coverage of 39.4 percent with a total of 195 parking stalls on all four sides of the proposed project site. The project site is further identified by APN 237-040-016 and USGS *Riverside West, California* Quadrangle, Township 3 South, Range 5 West, Section 9 of the San Bernardino Base Meridian. Refer to Figures 1 through 3.



LSA

FIGURE 1

0 1000 2000
FEET

Lincoln Avenue & Grace Street Warehouse

Regional and Project Location

SOURCE: USGS 7.5' Quad: Riverside West, 1980, CA; 2013/Riverside County, 2015.

I:\RVL1601\Reports\IS_MND\fig1_RegLocTopo.mxd (8/18/2016)

LSA

FIGURE 2

Legend

Project Boundary

N

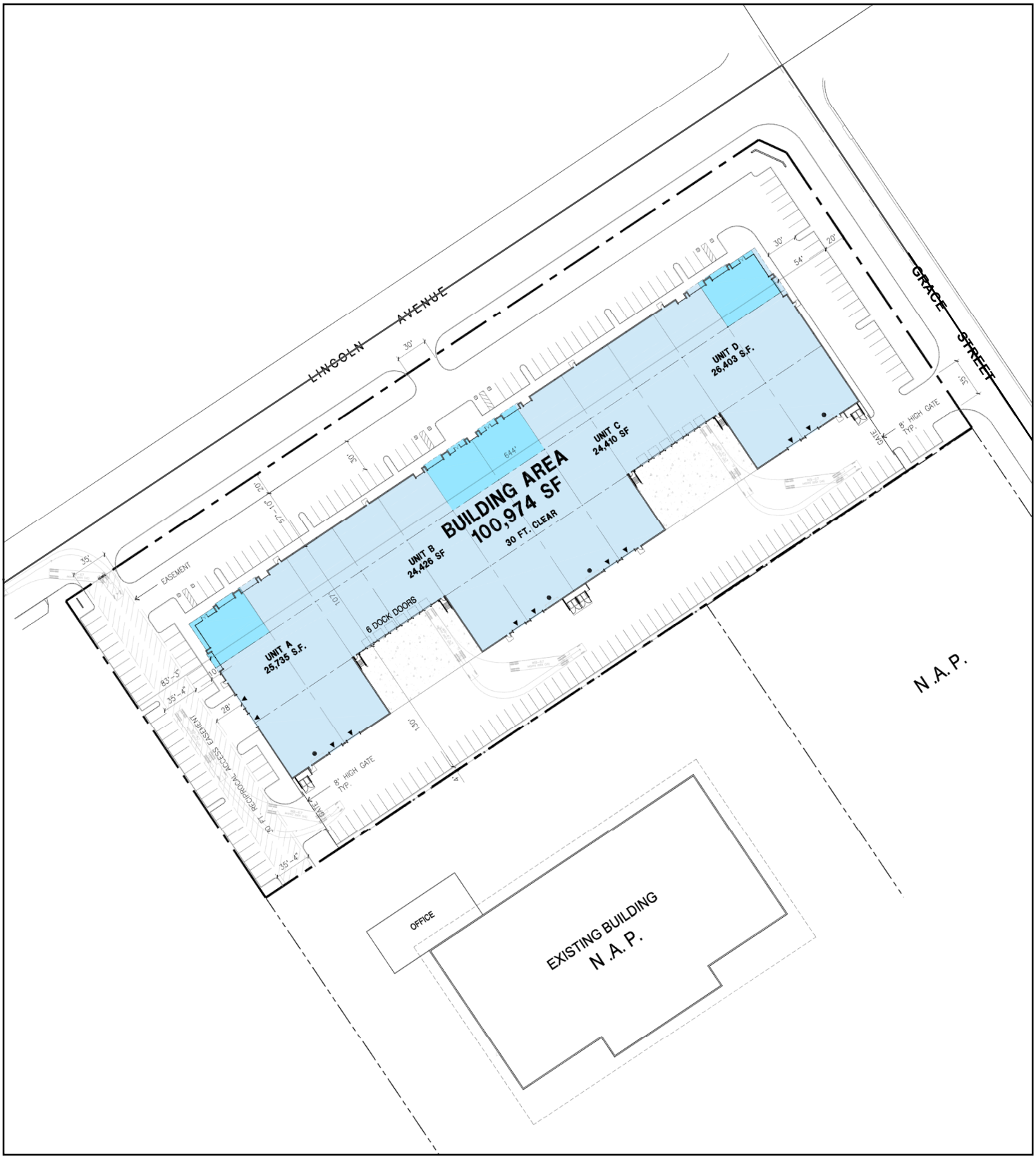
0 60 120
FEET

SOURCE: Bing Aerial, 2016, Soil Data Mart.

Lincoln Avenue & Grace Street Warehouse

Project Site

I:\RVL1601\Reports\IS_MND\fig2_ProjectSite.mxd (8/18/2016)



LSA

FIGURE 3

N

0 60 120
FEET

SOURCE: HPA Architechture, May 11, 2016.

Lincoln Avenue & Grace Street Warehouse

Conceptual Site Plan

I:\RVL1601\Reports\IS_MND\fig3_Concept_SitePlan.mxd (8/18/2016)

10. **Surrounding land uses and setting: Briefly describe the project's surroundings:**

Direction	Existing Land Use	General Plan Designation	Zoning Designation
Project Site	Vacant Land	Business/Office Park (B/OP)	Business and Manufacturing Park Zone (BMP)
North	Single-family dwellings	Medium Density Residential (MDR)	Single-family residential (R-1-7000)
East	Multifamily dwellings	Medium Density Residential (MDR)	Residential (R-1-7000)
South	Warehouse	Business/Office Park (B/OP)	Business/Office Park (B/OP)
West	Warehouse	Business/Office Park (B/OP)	Business and Manufacturing Park Zone (BMP)

11. **Other public agencies whose approval is required (e.g., permits, financial approval, or participation agreement):**

    a. South Coast Air Quality Management District (SCAQMD) – Dust Control Plan
    b. Regional Water Quality Control Board (RWQCB), Santa Ana Region – National Pollutant Discharge Elimination System (NPDES) Construction General Permit
    c. RWQCB, Santa Ana Region – 401 Water Quality Certification – Waste Discharge Requirement (WDR)
    d. Santa Ana Regional Water Quality Control Board – Water Quality Management Plan (WQMP); and
    e. Santa Ana Regional Water Quality Control Board – Storm Water Pollution Prevention Plan (SWPPP).

12. **Other Environmental Reviews Incorporated by Reference in this Review:**

    a. Riverside General Plan 2025
    b. City of Riverside General Plan 2025 Final Program Environmental Impact Report (FPEIR)
    c. Title 19, Zoning Code
    d. Title 20, Cultural Resources

13. **California Native American tribes traditionally and currently affiliated with the project area requesting consultation pursuant to Public Resources Code Section 21080.3.1:**

    a. Agua Caliente Band of Cahuilla Indians

14. **Acronyms:**

AQMP .....Air Quality Management Plan
BAU.....Business As Usual
BMP.....Best Management Practice
CEQA .....California Environmental Quality Act
CMP.....Congestion Management Plan
CNEL.....Community Noise Equivalent Level
dBA .....A-weighted decibels
DPM .....Diesel Particulate Matter
EIR.....Environmental Impact Report
EMWD .....Eastern Municipal Water District
EOP .....Emergency Operations Plan
FAA .....Federal Aviation Administration
FAR .....Federal Air Regulations
FEMA.....Federal Emergency Management Agency
FTA .....Federal Transit Administration
GIS.....Geographic Information System
GHG .....Greenhouse Gas
GP 2025.....General Plan 2025
IS .....Initial Study
LHMP.....Local Hazard Mitigation Plan
L_{max} .....Maximum Noise Level
MARB/MIP .....March Air Reserve Base/March Inland Port
MBTA .....Migratory Bird Treaty Act
MJPA-JLUS .....March Joint Powers Authority-Joint Land Use Study

MND.....Mitigated Negative Declaration
MSHCP .....Western Riverside County Multiple Species Habitat Conservation Plan
MT CO_2e .....Metric Tons of Carbon Dioxide-Equivalent Gases
NCCP.....Natural Communities Conservation Plan
NPDES .....National Pollutant Discharge Elimination System
OEM .....Office of Emergency Services
OPR .....(California) Office of Planning & Research
PEIR .....Program Environmental Impact Report
PW.....Public Works, Riverside
RCALUC.....Riverside County Airport Land Use Commission
RCALUCP.....Riverside County Airport Land Use Compatibility Plan
RCP .....Regional Comprehensive Plan
RCTC.....Riverside County Transportation Commission
RMC .....Riverside Municipal Code
RPD .....Riverside Police Department
RPU .....Riverside Public Utilities
RRG.....Riverside Restorative Growthprint
RRG-CAP.....Riverside Restorative Growthprint Climate Action Plan
RRG-EPAP.....Riverside Restorative Growthprint Economic Prosperity Action Plan
RTIP .....Regional Transportation Improvement Plan
RTP.....Regional Transportation Plan
RUSD .....Riverside Unified School District
SCAG .....Southern California Association of Governments
SCAQMD.....South Coast Air Quality Management District
SCH .....State Clearinghouse
SKR-HCP .....Stephens' Kangaroo Rat Habitat Conservation Plan
SWPPP .....Storm Water Pollution Prevention Plan
USGS.....United States Geological Survey
WMWD.....Western Municipal Water District
WQMP.....Water Quality Management Plan
WRCOG .....Western Riverside Council of Governments

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

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

DETERMINATION

(To be completed by the Lead Agency) On the basis of this initial evaluation which reflects the independent judgment of the City of Riverside, it is recommended that:

The City of Riverside finds that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared. ☐

The City of Riverside finds that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared. ☒

The City of Riverside finds that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required. ☐

The City of Riverside finds that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed. ☐

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

Signature _____ Date _____

Printed Name & Title _____ For City of Riverside

EVALUATION OF ENVIRONMENTAL IMPACTS

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

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

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

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a. **Earlier Analysis Used.** Identify and state where they are available for review.

   b. **Impacts Adequately Addressed.** Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c. **Mitigation Measures.** For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measure which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

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

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

8) The explanation of each issue should identify:

   a. The significance criteria or threshold, if any, used to evaluate each question; and

   b. The mitigation measure identified, if any, to reduce the impact to less than significance.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
1. AESTHETICS. Would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒

1a. Response: (*Source: General Plan 2025 Figure CCM-4 – Master Plan of Roadways, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.1-1 – Scenic and Special Boulevards and Parkways, Table 5.1-A – Scenic and Special Boulevards, Table 5.1-B – Scenic Parkways, and Riverside Municipal Code Title 19-Zoning*)

No Impact. The most prominent scenic vistas that can be seen from the western Riverside city limits are the San Gabriel and San Bernardino Mountains and Mount Rubidoux. Due to the topography, landscaping, and surrounding buildings, these scenic vistas cannot be seen from the majority of the project site or immediate vicinity. The project area (i.e., along Lincoln Avenue and Grace Street) contains visual obstructions such as ornamental landscaping, street trees and signs, and existing buildings that substantially limit views of these scenic vistas. Since the proposed infill project is within an urbanized area completely surrounded by existing development, visual obstruction of scenic vistas will not occur. Additionally, the proposed project will be subject to the City's *Citywide Design and Sign Guidelines* and be required to undergo Planning Division Staff review and approval to ensure design elements are proposed and implemented in accordance with Title 19 - Zoning of the City's Municipal Code prior to permit issuance. Therefore, the project will have **no impact** to scenic vistas. No mitigation is required.

b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒

1b. Response: *(Source: General Plan 2025 Figure CCM-4 – Master Plan of Roadways, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.1-1 – Scenic and Special Boulevards, Parkways, Table 5.1-A – Scenic and Special Boulevards, Table 5.1-B – Scenic Parkways, the City's Urban Forest Tree Policy Manual, and Title 20 – Cultural Resources)*

No Impact. There are no state scenic highways within the City that could be potentially affected. The proposed project is not located along or within view of a scenic boulevard, parkway, or special boulevard as designated by the City's General Plan 2025. The nearest scenic and special boulevard to the proposed project is Victoria Avenue, which is located approximately 1,000 feet south of the project site. An existing warehouse building and block wall immediately south of the project site, as well as a nursery and associated trees farther south, block views of the site from Victoria Avenue. Additionally, the project site is currently used for temporary staging of construction and industrial equipment and does not contain any scenic resources. The proposed project is commensurate with the existing business, office, and manufacturing-urban setting surrounding the project site. Therefore, the proposed project will have **no impact** on scenic resources within a state scenic highway. No mitigation is required.

c. Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐

1c. Response: *(Source: General Plan 2025, Riverside General Plan and Supporting Documents Environmental Impact Report, Zoning Code, Citywide Design and Sign Guidelines)*

Less Than Significant Impact. The proposed project is a business, office, and manufacturing use infill project located amidst existing warehousing uses, and the proposed project will develop the site for future uses of similar nature. The project site is currently in a blighted condition and is used as a temporary staging area for construction and industrial equipment. The proposed project will be developed in a consistent and aesthetically pleasing manner subject to the City's *Citywide Design and Sign Guidelines* and required to undergo Planning Division Staff review and approval to ensure design elements are proposed and implemented in accordance with Title 19 - Zoning of the City's Municipal Code prior to permit issuance.

The proposed project will be constructed to heights commensurate with the surrounding development and include architectural elements such as height variations and entrance features to add subtle variation to the overall structure and reduce the massive scale appearance of a large building. The proposed project will be developed in an architecturally pleasing fashion to reflect the overall appearance of a high-quality industrial development. In these ways, the project will not substantially degrade the area's visual quality and will have a **less than significant impact** on the existing visual character of the area. No mitigation is required.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	☐	☒	☐

1d. Response: ***(Source: General Plan 2025, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.1-2 – Mount Palomar Lighting Area, Title 19 – Article VIII – Chapter 19.556 – Lighting, Citywide Design and Sign Guidelines, and Title 19 – Article VIII – Chapter 19.710 – Design Review)***

Less Than Significant Impact. The project will not result in a new source of substantial light or glare that would adversely affect daytime or nighttime views. Currently, nighttime lighting is produced by adjacent commercial/industrial properties to the south, west, and northwest of the project site. The proposed project will include exterior and parking lot lighting at entrances, exists, pathways, and loading areas that will incrementally increase ambient nighttime illumination in the area. The proposed structure on site will be constructed primarily of tilt-up concrete panels with a color scheme similar to surrounding facilities. To reduce impacts from light or glare to less than significant levels, all new lighting proposed or required for the project will be constructed in accordance with *Title 19 – Article VIII – Chapter 19.556 – Lighting* of the Riverside Municipal Code. Additionally, any exterior building materials will be constructed in accordance with *Title 19 – Article VIII – Chapter 19.710 – Design Review* of the Riverside Municipal Code and in compliance with the *Citywide Design and Sign Guidelines*. As such, the project will have a **less than significant impact** on day or nighttime views due to glare and lighting. No mitigation is required.

2. AGRICULTURE AND FOREST RESOURCES.				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information complied by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and the forest carbon measurement methodology provided in the Forest Protocols adopted by the California Air Resources Board. Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

2a. Response: ***(Source: General Plan 2025 – Figure OS-2 – Agricultural Suitability & Riverside General Plan and Supporting Documents Environmental Impact Report – Appendix I – Designated Farmland Table)***

No Impact. The project is located within an urbanized area. A review of Figure OS-2 – Agricultural Suitability in the General Plan 2025 reveals the project site is designated as *Urban and Built-up Land* and not designated as *Prime Farmland, Unique Farmland, or Farmland of Statewide Importance*, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. Therefore, the project will have **no impact** to designated farmland. No mitigation is required.

b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒

2b. Response: ***(Source: General Plan 2025 – Figure OS-3 – Williamson Act Preserves, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.2-4 – Proposed Zones Permitting Agricultural Uses, and Title 19)***

No Impact. A review of Figure 5.2-2 – Williamson Act Preserves of the City of Riverside General Plan 2025 Final Program Environmental Impact Report (FPEIR) reveals the project site is not located within an area that is affected by a Williamson Act Preserve or under a Williamson Act Contract. Moreover, the project site is not zoned for agricultural use; therefore, the project will have **no impact** related to agricultural zoning or Williamson Act contract lands. No mitigation is required.

c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) timberland (as defined	☐	☐	☐	☒

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
in Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				

2c. Response: ***(Source: General Plan – Figure OS-2 – Agricultural Suitability, Figure OS-3 – Williamson Act Preserves, Riverside General Plan and Supporting Documents Environmental Impact Report Appendix I – Designated Farmland Table, Title 19 – Article V – Chapter 19.100 – Residential Zones – RC Zone and RA-5 Zone)***

No Impact. There is no forest land or timberland within project site or the entire City of Riverside. Therefore, **no impact** to forest land or timberland will occur from the proposed project. No mitigation is required.

d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

2d. Response: ***(Source: General Plan – Figure OS-2 – Agricultural Suitability, Figure OS-3 – Williamson Act Preserves, Riverside General Plan and Supporting Documents Environmental Impact Report Appendix I – Designated Farmland Table, Title 19 – Article V – Chapter 19.100 – Residential Zones – RC Zone and RA-5 Zone)***

No Impact. There is no forest land or timberland within project site or the entire City of Riverside. Therefore, **no impact** to forest land or timberland will occur from the proposed project. No mitigation is required.

e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

2e. Response: ***(Source: General Plan – Figure OS-2 – Agricultural Suitability, Figure OS-3 – Williamson Act Preserves, Riverside General Plan and Supporting Documents Environmental Impact Report Appendix I – Designated Farmland Table, Title 19 – Article V – Chapter 19.100 – Residential Zones – RC Zone and RA-5 Zone)***

No Impact. The proposed project is located in an urbanized area of the City and the project site is identified as *Urban and Built-up Land* and therefore does not support agricultural resources or operations. The proposed project will not result in the conversion of designated farmland to non-agricultural uses. The project site is used as a temporary staging area for construction and industrial equipment and there are no agricultural resources or operations, including farmlands, on the project site. The City of Riverside has no forest land or timberland. Therefore, **no impact** will occur regarding the conversion of Farmland to non-agricultural use or to the loss of forest land and timberland from the proposed project. No mitigation is required.

3. AIR QUALITY.				
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐

3a. Response: ***(Source: Appendix A – Air Quality and Greenhouse Gas Analysis and Health Risk Assessment, CEQA Air Quality Handbook, South Coast Air Quality Management District (SCAQMD), April 1993)***

Less Than Significant Impact. The project site is located in the South Coast Air Basin (Basin), which is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The Basin includes all of Orange County and portions of Los Angeles, Riverside, and San Bernardino Counties. The SCAQMD adopted an Air Quality Management Plan (AQMP), the main purpose of which is to describe air pollution control strategies to be taken by a city, county, or region classified as a nonattainment area in order to bring the area into compliance with federal and state air quality standards. A nonattainment area is considered to have air quality worse than the National Ambient Air Quality Standards (NAAQS) as defined in the Federal Clean Air Act. The Basin is in nonattainment for the federal and state standards for ozone (O_3) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) and in nonattainment for the state standards for particulate matter less than 10 microns in diameter (PM_{10}) and nitrogen dioxide (NO_2). The Basin is in attainment/maintenance/unclassified status for all other federal and state criteria pollutant standards.

Consistency with the draft 2016 AQMP (i.e., an update to the adopted 2012 AQMP) for the Basin means that a project will be consistent with the goals, objectives, and assumptions in the respective plan to achieve the federal and state air quality standards. Pursuant to the methodology provided in Chapter 12 of the 1993 SCAQMD *CEQA Air Quality Handbook*, consistency with the Basin 2016 AQMP is affirmed when a project (1) does not increase the frequency or severity of an air quality standards violation or cause a new violation; and (2) is consistent with the growth assumptions in the AQMP. For the proposed project to be

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

consistent with the AQMP adopted by the SCAQMD, the pollutants emitted from the project should not exceed the SCAQMD daily threshold or cause a significant impact on air quality, or the project must already have been included in the AQMP projections. Additionally, if feasible mitigation measures are implemented and shown to reduce the impact level from significant to less than significant, a project may be deemed consistent with the AQMP.

According to the *CEQA Air Quality Handbook*, consistency with AQMP growth assumptions must be analyzed for new or amended General Plan elements, Specific Plans, and significant projects. The proposed uses are consistent with the zoning designation for the project site and its surrounding area, which is consistent with the City's General Plan. The City's General Plan is consistent with the Southern California Association of Governments (SCAG) Regional Comprehensive Plan Guidelines and the SCAQMD AQMP. In addition, the proposed project is not considered a significant project (e.g., large-scale projects such as airports, electrical generating facilities, petroleum and gas refineries, designation of oil drilling districts, water ports, solid waste disposal sites, and offshore drilling facilities). As discussed in checklist response 3b, below, the proposed project's short-term construction and long-term pollutant emissions will not exceed the emissions thresholds established in the SCAQMD's *CEQA Air Quality Handbook*; therefore, the project would not result in an increase in the frequency or severity of any air quality standards violation and will not cause a new air quality standard violation. For these reasons, the proposed project is consistent with the City's General Plan and the regional AQMP. Therefore, impacts related to implementation of the AQMP would be **less than significant,** and no mitigation is required.

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐

3b. Response: ***(Source: Appendix A – Air Quality and Greenhouse Gas Analysis and Health Risk Assessment, Appendix H – Traffic Impact Analysis, CEQA Air Quality Handbook, South Coast Air Quality Management District (SCAQMD), April 1993, Southern California Association of Governments (SCAG) Regional Travel Demand Model and 2008 Model Validation, June 2012)***

Less Than Significant Impact. The proposed project will generate pollutant emissions associated with construction activities, vehicle trip generation, power and gas consumption, and stationary activities. However, the discussion below demonstrates the proposed project will implement **Standard Conditions AQ-1** and **AQ-2** to ensure compliance with pertinent SCAQMD guidelines and the California Code of Regulations (CCR) and will not exceed SCAQMD significance thresholds. Specific criteria for determining whether the potential air quality impacts of a project are significant are set forth in the SCAQMD's 1993 *CEQA Air Quality Handbook*. The criteria include emissions thresholds and compliance with state and national air quality standards. A summary of the specific criteria contained in the SCAQMD's CEQA Air Quality Handbook is presented below.

Regional Thresholds for Construction and Operational Emissions. Table 3.A shows significance thresholds for construction and operational emissions that have been established by the SCAQMD.

Table 3.A: SCAQMD Significance Thresholds

Air Pollutant	Construction Phase	Operational Phase
VOCs	75 lbs./day	55 lbs./day
CO	550 lbs./day	550 lbs./day
NOx	100 lbs./day	55 lbs./day
SOx	150 lbs./day	150 lbs./day
PM_{10}	150 lbs./day	150 lbs./day
$PM_{2.5}$	55 lbs./day	55 lbs./day

Source: South Coast Air Quality Management District (2016).

CO = carbon monoxide
lbs. = pounds
NOx = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
VOCs = volatile organic compounds
SCAQMD = South Coast Air Quality Management District
SOx = sulfur oxides

Projects in the Basin with construction and operational emissions that exceed any of the emission thresholds above are considered significant under SCAQMD guidelines.

Local Microscale Concentration Standards. The significance of localized project impacts depends on whether ambient CO levels in the vicinity of the project are above or below state and federal CO standards. If ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, project emissions are considered significant if they increase 1-hour CO concentrations by 1.0 parts per million (ppm) or more or 8-hour CO concentrations by 0.45 ppm or more. The following are

applicable local emission concentration standards for CO:

- California State 1-hour CO standard of 20.0 ppm
- California State 8-hour CO standard of 9.0 ppm

Localized Significance Thresholds. Localized significance thresholds (LSTs) represent the maximum emissions from a project that are not expected to cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area and distance to the nearest sensitive receptor. Using the LST thresholds for receptors at 25 meters (82 feet) for NOx, CO, PM_{10}, and $PM_{2.5}$ from a 5-acre site for this project, the emissions thresholds shown in Table 3.B will apply.

Table 3.B: SCAQMD LST Thresholds (lbs./day)

	NOx	CO	PM_{10}	$PM_{2.5}$
Construction	270	1,577	13.0	8.0
Operations	270	1,577	4.0	2.0

Source: SCAQMD 2008.

Projects in the Basin with emissions that exceed any of the LSTs above are considered significant by the SCAQMD.

Short-Term (Construction) Emissions. Air quality impacts could occur during construction of the proposed project from soil disturbance and equipment exhaust. Major sources of emissions during grading and site preparation include (1) exhaust emissions from construction vehicles, (2) equipment and fugitive dust generated by construction vehicles and equipment traveling over exposed surfaces, and (3) soil disturbances from grading and backfilling. The following summarizes construction emissions and associated impacts of the proposed project.

Equipment Exhausts and Related Construction Activities. Construction activities produce combustion emissions from various sources (e.g., grading, site preparation, utility engines, tenant improvements, and motor vehicles transporting the construction crew). Exhaust emissions from construction activities envisioned on site will vary daily as construction activity levels change. The use of construction equipment on site will result in localized exhaust emissions. As part of the *Air Quality and Greenhouse Gas Analysis* (Appendix A), construction emissions were calculated using the California Emissions Estimator Model (CalEEMod Version 2016.3.1)[1] and are summarized in Table 3.C. As specified in **Standard Conditions A-1 and A-2,** proposed project construction is required to comply with SCAQMD Rules 402 and 403, applicable CCR, and California Department of Resources Recycling and Recovery (CalRecycle) Sustainable (Green) Building Program regulations, which include implementation of standard control measures to control fugitive dust and construction equipment emissions. Table 3.C details that by complying with SCAQMD's standard control measures, construction equipment/vehicle emissions during construction periods will not exceed any of the SCAQMD-established daily emissions thresholds. Therefore, with implementation of **Standard Conditions AQ-1** and **AQ-2**, short-term (construction) air quality impacts will be **less than significant**. No mitigation is required.

Table 3.C: Short-Term Regional Construction Emissions

	Total Regional Pollutant Emissions, lbs./day							
Construction Phase	**VOC**	**NOx**	**CO**	**SO_2**	**Fugitive PM_{10}**	**Exhaust PM_{10}**	**Fugitive $PM_{2.5}$**	**Exhaust $PM_{2.5}$**
Site Preparation	5.08	52.36	24.47	0.04	8.33	0.71	4.52	0.71
Grading	3.17	33.96	17.95	0.03	3.12	0.58	1.56	0.58
Building Construction	3.74	30.67	23.16	0.04	1.02	0.72	0.28	0.72
Paving	1.80	14.60	13.42	0.02	0.22	0.42	0.06	0.42
Architectural Coatings	53.60	2.07	2.60	0.00	0.17	0.07	0.04	0.07
Peak Daily	**53.60**	**52.36**	**24.47**	**0.04**	**9.04**		**5.23**	
SCAQMD Thresholds	**75**	**100**	**550**	**150**	**150**		**55**	
Significant Emissions?	**No**	**No**	**No**	**No**	**No**		**No**	

Source: *Air Quality and Greenhouse Gas Analysis* (Appendix A)

[1] CalEEMod default values were used for all construction components.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

CO = carbon monoxide
lbs./day = pounds per day
NOx = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SCAQMD = South Coast Air Quality Management District
SO_2 = sulfur dioxide
VOC = volatile organic compounds

Fugitive Dust. Fugitive dust emissions are generally associated with land clearing and exposure of soils to the air and wind, as well as cut-and-fill grading operations. Dust generated during construction varies substantially on a project-by-project basis, depending on the level of activity, the specific operations, and weather conditions at the time of construction. In accordance with **Standard Condition A-1**, the proposed project will be required to comply with SCAQMD Rules 402 and 403 to control fugitive dust. Previously referenced Table 3.C lists total construction emissions (i.e., fugitive dust emissions and construction equipment exhausts). Since construction operations on site must comply with dust control and other measures prescribed by SCAQMD Rules 402 and 403 to ensure that short-term construction impacts are minimized, compliance with these rules is assumed in Table 3.C. Compliance with SCAQMD Rules 402 and 403, as specified in **Standard Condition A-1**, will ensure that fugitive dust (PM_{10} and $PM_{2.5}$) generation will be **less than significant.** No mitigation is required.

Architectural Coatings. Architectural coatings contain VOCs that are similar to ROCs and are part of the O_3 precursors. Based on the proposed project, application of the architectural coatings for the proposed peak construction day is estimated to result in a combined peak of 53.60 lbs./day of VOC. Therefore, this VOC emission will not exceed the SCAQMD VOC threshold of 75 lbs./day. Therefore, impacts due to application of architectural coating will be **less than significant**, and no mitigation is required.

Localized Impacts Analysis. Table 3.D shows the on-site construction emissions of CO, NOx, PM_{10}, and $PM_{2.5}$. Table 3.D shows that the construction emission rates do not exceed the PM_{10} and $PM_{2.5}$ LSTs, and the NOx and CO for existing sensitive receptors within 25 meters (82 feet) from the project site for LST analyses. Therefore, short-term LST significant air quality impacts will be **less than significant** and no mitigation is required.

Table 3.D: Construction Localized Significance Threshold Impacts

Emissions Sources	NOx	CO	PM_{10}	$PM_{2.5}$
On-site Emissions (lbs./day)	52	23	8.8	5.2
LST Thresholds	**270**	**1,577**	**13.0**	**8.0**
Significant Emissions?	**No**	**No**	**No**	**No**

Source: *Air Quality and Greenhouse Gas Analysis* (Appendix A)

Source Receptor Area: Metropolitan Riverside County Area, 5 acres, 25 meter (82 feet) distance.

CO = carbon monoxide
lbs./day = pounds per day
LST = localized significance threshold
NOx = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size

Naturally Occurring Asbestos. The proposed project is located in Riverside County, which is among the counties that are found to have serpentine and ultramafic rock in their soils. However, no such rock materials have been found in the project area in the past 25 years. Therefore, the potential risk for naturally occurring asbestos during project construction is small and **less than significant**. No mitigation is required.

Long-Term Project Operational Emissions. Long-term air pollutant emission impacts are those associated with area sources, stationary sources and mobile sources involving any project-related changes. The proposed project will result in net increases in both stationary- and mobile-source emissions. The stationary- and area-source emissions will come from many sources, including the use of consumer products, landscape equipment, general energy, and solid waste.

As part of the *Air Quality and Greenhouse Gas Analysis* (Appendix A), long-term operational emissions associated with the proposed project were calculated using the CalEEMod (Version 2016.3.1) and are shown in Table 3.E. Area sources include architectural coatings, consumer products, hearths, and landscaping. Energy sources include natural gas consumption for heating and cooking. Mobile-source emissions usually result from vehicle trips associated with a project.

Project operational (vehicular) impacts are dependent on both overall daily vehicle trip generation and the effect of the proposed project on peak hour traffic volumes and traffic operations in the vicinity of the project site. The project-related operational air quality impacts derive primarily from vehicle trips generated by the proposed project. Project operational vehicle impacts are dependent on both overall daily vehicle trip generation and the effect of the project on peak hour traffic volumes and traffic operations. It should be noted that the project's Traffic Impact Analysis (TIA) (Appendix H) presents the total vehicle trips in terms of Passenger Car Equivalents (PCEs) and actual vehicles in an effort to recognize and acknowledge the effects of heavy vehicles at the study area intersections.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

For purposes of the air quality study, the PCE trips were not used. Rather, to estimate and model vehicular-source emissions more accurately, the actual number of vehicles, by vehicle classification (e.g., passenger cars including light trucks and heavy trucks) were used in the analysis. The vehicle fleet mix, in terms of actual vehicles, as derived from the traffic study for the proposed project comprised approximately 79.55 percent passenger cars and approximately 20.45 percent total trucks. For analysis purposes 3.40 percent of all vehicles are assumed to be Light-Heavy-Duty (LHD), 4.69 percent of all vehicles are assumed to be Medium-Heavy-Duty (MHD), and 12.36 percent of all vehicles are assumed to be Heavy-Heavy-Duty (HHD).

Table 3.E: Opening Year Regional Operational Emissions

Source	Pollutant Emissions, lbs/day					
	VOC	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Proposed Scenario						
Area	2.29	<0.01	0.03	0	<0.01	<0.01
Energy	0.10	0.88	0.74	<0.01	0.07	0.07
Mobile	1.79	27.67	25.86	0.14	9.25	2.64
Total Project Emissions	**4.18**	**28.55**	**26.63**	**0.14**	**9.32**	**2.71**
SCAQMD Thresholds	**55**	**55**	**550**	**150**	**150**	**55**
Significant?	**No**	**No**	**No**	**No**	**No**	**No**

Source: *Air Quality and Greenhouse Gas Analysis* (Appendix A).

CO = carbon monoxide
lbs./day = pounds per day
NOx = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SCAQMD = South Coast Air Quality Management District
SOx = sulfur oxides
VOC = volatile organic compounds

A technical deficiency inherent in calculating the projected vehicle emissions associated with any project is related to the estimation of trip length and vehicle miles traveled (VMT). VMT for a given project is calculated by the total number of vehicle trips to/from the project multiplied by the average trip length. This method of estimating VMT for use in calculating vehicle emissions likely results in the over-estimation and double-counting of emissions because, for an industrial warehouse, the land use is likely to attract (divert) existing vehicle trips that are already on the circulation system as opposed to generating new trips. In this regard, the proposed project will, to a large extent, redistribute existing mobile-source emissions rather than generate additional emissions within the Basin. As such, the estimation of the project's mobile source emissions is likely overstated in that no credit for, or reduction in, emissions is assumed based on diversion of existing trips. Provided below is a summary of the VMT recommendations of the SCAQMD and SCAG, followed by a description of the methodology used to calculate the VMT rates used in this analysis.

SCAQMD Recommendation. In the last five years, the SCAQMD has provided numerous comments on the trip length for warehouse and industrial land use projects. The SCAQMD asserts that the model-default trip length in CalEEMod and the URBan EMISsions (URBEMIS) 2007 model (version 9.2.4) will underestimate emissions. The SCAQMD asserts that for warehouse, distribution center, and industrial land use projects, most of the heavy-duty trucks will be hauling consumer goods, often from the Ports of Long Beach and Los Angeles (POLA and POLB) and/or to destinations outside of California. The SCAQMD states that for this reason, the CalEEMod and the URBEMIS model default trip length (approximately 16.6 miles) will not be representative of activities at like facilities. The SCAQMD generally recommends the use of a 40-mile one-way trip length. It should be noted that most of the POLA and POLB tenants CEQA projects in the last ten years have already analyzed the 40-mile truck trips in their CEQA analyses; therefore, repeating this 40-mile trip length for the proposed project is considered as double counting the truck emissions in Basin.

Southern California Association of Government (SCAG) Heavy Duty Truck Model. The SCAG comprises six counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura) and 190 cities in Southern California, and is the organization charged with addressing and resolving short- and long-term regional policy issues. The SCAG region also consists of 14 sub-regional entities recognized by the Regional Council as partners in the regional policy planning process. The SCAG region has more than 19 million residents and encompasses more than 38,000 square miles, representing the largest and most diverse region in the country. The SCAG maintains a regional transportation model. In its most recent (2016) transportation validation for the 2008 Regional Model, the SCAG indicates the average internal truck trip length for the SCAG region is 5.92 miles for Light Duty Trucks, 13.06 miles for Medium Duty Trucks, and 24.11 miles for Heavy Duty Trucks.

Vehicle Trip Length Approach for Mobile Source Emission Analysis. The use of the average travel distance of 24.11 miles as

the vehicle trip length for all vehicles is deemed to be the most applicable for the proposed project. This same methodology is employed in analyses for similar projects in the City and other jurisdictions within the County, and is considered by the Lead Agency to be appropriate and accurate.

Fugitive Dust Related to Vehicular Travel. Vehicles traveling on paved roads will be a source of fugitive emissions due to the generation of road dust inclusive of tire wear particulates. The emissions estimates for travel on paved roads were calculated using the CalEEMod model.

Previously referenced Table 3.E details the increase of all criteria pollutants as a result of the proposed project and shows that it will not exceed the corresponding SCAQMD daily emission thresholds for any criteria pollutants.

In addition, the project design will comply with Title 24 of the CCR established by the California Energy Commission (CEC) regarding energy conservation and green building standards. The proposed project will include light-colored roof, and exterior windows will have window treatments for efficient energy conservation to reduce operational air quality emissions. Therefore, project-related long-term air quality impacts will be **less than significant** and no mitigation is required.

Localized Impacts Analysis. Table 3.F details the calculated emissions for the proposed operational activities compared with the appropriate LSTs. By design, the localized impacts analysis only includes on-site sources; however, CalEEMod outputs do not separate on-site and off-site emissions for mobile sources. For a worst-case scenario assessment, the emissions shown in Table 3.F include all on-site project-related stationary sources and 5 percent of the project-related new mobile sources, which is an estimate of the amount of project-related new vehicle traffic that will occur on site. A total of 5 percent is considered conservative because the average trip lengths assumed are 24.11 miles for home to work, 8.40 miles for home to shopping, and 6.90 miles for other types of trips. Although CalEEMod default values for home to work trip lengths are 16.6 miles, the trip length for the home to work scenario of the proposed project is changed from 16.6 miles to 24.11 miles based on the most recent transportation validation for the 2008 SCAG Regional Model, in which the average internal truck trip length for the SCAG region is 24.11 miles for Heavy Duty Trucks. For conservative purposes, a distance of 24.11 miles for home to work is considered most appropriate for the proposed project. The CalEEMod default values for the two other trip lengths (8.40 miles home to shopping and 6.90 miles other trips) remain unchanged for this analysis.

It is unlikely that the average on-site distance driven will be even 1,000 feet, which is approximately 2.2 percent of the total miles traveled. Considering the total trip length included in CalEEMod, the 5 percent assumption is conservative. Table 3.F reveals the operational emissions rates will not exceed the NOx, CO, PM_{10}, and $PM_{2.5}$ LSTs for the existing sensitive receptors (such as the Victoria Heights Apartments) located within the 82-foot minimum distance for LST analyses. Therefore, locally significant air quality impacts will be **less than significant** and no mitigation is required.

Table 3.F: Long-Term Operational Localized Significance Thresholds

Emissions Sources	NOx	CO	PM_{10}	$PM_{2.5}$
On-site emissions (lbs./day)	1.38	1.32	0.46	0.13
LST Thresholds	**270**	**1,577**	**4.0**	**2.0**
Significant Emissions?	**No**	**No**	**No**	**No**

Source: *Air Quality and Greenhouse Gas Analysis* (Appendix A)

Source Receptor Area: Metropolitan Riverside County Area, 5 acres, 25 meter (82 feet) distance, on-site traffic 5 percent of total.

CO = carbon monoxide
lbs./day = pounds per day
LST = localized significance thresholds
NOx = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size

Long-Term Microscale (CO Hotspot) Analysis. Local ambient air quality is most affected by CO emissions from motor vehicles. CO is typically the contaminant of greatest concern because it is the pollutant created in greatest abundance by motor vehicles and does not readily disperse into the air. Because CO does not readily disperse into the atmosphere, areas of vehicle congestion create pockets of high CO concentrations called "hotspots." These pockets have the potential to exceed the state 1-hour standard of 20 ppm of CO and/or the 8-hour standard of 9.0 ppm.

Vehicular trips associated with the proposed project will contribute to congestion at intersections and along roadway segments in the project vicinity. Localized air quality impacts will occur when emissions from vehicular traffic increase as a result of the proposed project. The primary mobile-source pollutant of local concern is CO, which is a direct function of vehicle idling time and, thus, of traffic flow conditions. CO transport is extremely limited; under normal meteorological conditions, CO disperses rapidly with distance from the source. However, under certain extreme meteorological conditions, CO concentrations near a

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

congested roadway or intersection may reach unhealthful levels, affecting local sensitive receptors (e.g., residents, schoolchildren, the elderly, and hospital patients). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service or with extremely high traffic volumes. In areas with high ambient background CO concentrations, modeling is recommended to determine a project's effect on local CO levels.

An assessment of project-related impacts on localized ambient air quality requires that future ambient air quality levels be projected. Existing CO concentrations in the immediate project vicinity are not available. Ambient CO levels monitored at the Rubidoux Air Monitoring Station, the closest station with complete monitored CO data approximately five (5) miles north of the project site, showed a highest recorded 1-hour concentration of 2.5 ppm (the state standard is 20 ppm) and a highest 8-hour concentration of 1.7 ppm (the state standard is 9 ppm) during the past 3 years. The highest CO concentrations will normally occur during peak traffic hours; thus, CO impacts calculated under peak traffic conditions represent a worst-case analysis.

As described in the project-specific TIA (Appendix H), all three study area intersections (i.e., Adams Street/Lincoln Avenue, Jefferson Street/Lincoln Avenue, and Grace Street/Lincoln Avenue) currently operate at satisfactory levels of service (LOS). With addition of the project in the existing setting, all study area intersections will continue to operate at satisfactory LOS during the a.m. and p.m. peak hours.

CO levels have dropped dramatically throughout the Basin over the last several decades. Baseline levels can accommodate substantial local emission increases without the creation of any CO "hotspots." According to the CO attainment demonstration in the 2003 AQMP, Wilshire Boulevard and Veteran Avenue is the most congested intersection in SCAQMD air basin with daily traffic volumes of about 100,000 per day. It has been demonstrated in the regional CO attainment/maintenance plan that even the most congested intersection with the highest traffic volumes anywhere in the Basin no longer poses any risk of a CO "hotspot." Given the extremely low level of CO concentrations in the project area and the mitigation of traffic impacts at all study area intersections, project-related vehicles are not expected to contribute significantly to CO concentrations exceeding the state or federal CO standards. Because no CO hotspot will occur, air quality impacts related to CO concentrations will be **less than significant,** and no mitigation is required.

Standard Construction Conditions: No mitigation is required; however, the following Standard Conditions are regulatory requirements that will be implemented to ensure air quality impacts during construction remain less than significant.

Standard Condition A-1: **Compliance with SCAQMD Rules 402 and 403.** During construction, the construction contractor shall comply with the South Coast Air Quality Management District (SCAQMD) Rules 402 and 403 for controlling fugitive dust emissions and construction equipment emissions. In compliance with Rule 403, fugitive dust shall be controlled with best-available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. In addition, dust suppression techniques shall be implemented to prevent fugitive dust from creating a nuisance off site. The following applicable dust suppression techniques from Rule 403 shall be implemented during project construction:

- Nontoxic chemical soil stabilizers shall be applied according to manufacturers' specifications to all inactive construction areas (previously graded areas inactive for 10 days or more).
- Active sites shall be watered at least twice daily. (Locations where grading is to occur shall be thoroughly watered prior to earthmoving.)
- All trucks hauling dirt, sand, soil, or other loose materials shall be covered, or at least 2 feet (0.6 meter) of freeboard (vertical space between the top of the load and the top of the trailer) shall be maintained in accordance with the requirements of California Vehicle Code (CVC) Section 23114.
- Construction access roads shall be paved at least 100 feet (30 meters) onto the site from the main road.
- Traffic speeds on all unpaved roads shall be reduced to 15 mph or less.

Additionally, the following construction emissions control measures from the SCAQMD CEQA Handbook are required to further minimize fugitive dust emissions:

- Disturbed areas shall be revegetated as quickly as possible.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

- All excavating and grading operations shall be suspended when wind speeds (as instantaneous gusts) exceed 25 mph.
- All streets shall be swept once per day if visible soil materials are carried to adjacent streets (recommend water sweepers with reclaimed water).
- Wheel washer devices shall be installed at locations where vehicles enter and exit unpaved roads onto paved roads, or vehicles and any equipment leaving the site shall be washed each trip.
- All on-site roads shall be paved as soon as feasible, watered periodically, or chemically stabilized.
- The area disturbed by clearing, grading, earthmoving, or excavation operations shall be minimized at all times.
- The construction contractor shall select the construction equipment used on site based on low-emission factors and high-energy efficiency. The construction contractor shall ensure that construction-grading plans include a statement that all construction equipment will be tuned and maintained in accordance with the manufacturers' specifications.
- The construction contractor shall utilize electric or diesel-powered equipment in lieu of gasoline-powered engines where feasible.
- The construction contractor shall ensure that construction-grading plans include a statement that work crews will shut off equipment when not in use. During smog season (May through October), the overall length of the construction period will be extended, thereby decreasing the size of the area prepared each day, to minimize vehicles and equipment operating at the same time.
- The construction contractor shall time the construction activities so as to not interfere with peak-hour traffic and minimize obstruction of through traffic lanes adjacent to the site; if necessary, a flagperson shall be retained to maintain safety adjacent to existing roadways.
- The construction contractor shall support and encourage ridesharing and transit incentives for the construction crew.

Standard Condition A-2: **Compliance with Title 13, California Code of Regulations, Section 2449(d)(d).** Operators of applicable off-road vehicles (self-propelled diesel-fueled vehicles 25 horsepower and up that were not designed to be driven on-road) must limit idling to no more than five (5) minutes:

- All construction vehicles shall be prohibited from idling in excess of five (5) minutes, both on and off site.

As previously stated, the proposed project must comply with dust control and other measures prescribed by SCAQMD Rules 402 and 403, and applicable California Code of Regulations outlined as **Standard Conditions A-1** and **A-2**, so compliance with these rules is assumed in the air quality analysis for the proposed project (Appendix A). With compliance with **Standard Conditions A-1** and **A-2,** the proposed project will not exceed any air quality standard or contribute substantially to an existing or projected air quality violation. Impacts are **less than significant** and no mitigation is required.

c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐

3c. Response: ***(Source: Appendix A – Air Quality and Greenhouse Gas Analysis and Health Risk Assessment, City of Riverside Public Works Department Traffic Impact Analysis Preparation Guide, January 2016.)***

Less Than Significant Impact. The cumulative impacts analysis is based on projections in the regional AQMP. As described in the consistency analysis presented in checklist response 3a, above, the proposed project is consistent with the growth assumptions in the City's General Plan, the 2016 RTP/SCS, and the regional draft 2016 AQMP. Further, as discussed in checklist response 3b,

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

the proposed project does not increase the frequency or severity of an air quality standards violation or cause a new violation. The cumulative analysis includes projects in Riverside and adjacent cities (i.e., Moreno Valley, Corona, and Norco). This study area is described as the appropriate tool to evaluate discrete project-related circulation impacts for the City, which encompasses the air quality impacts from the proposed project. As detailed in the TIA (Appendix H), the proposed project plus pending and approved baselines (the cumulative scenarios)[2] will not result in any significant LOS change or intersection delay (see Section 16-Traffic). Thus, the combined effects of the related projects will be less than significant. Because there is no cumulative significant impact, and the proposed project is consistent with the growth assumptions in the 2016 RTP/SCS and the draft 2016 AQMP, the combined effects are not cumulatively significant. Therefore, there will be no cumulatively considerable net increase of the criteria pollutants that are in nonattainment status in the South Coast Air Basin. Long-term cumulative air quality impacts will be **less than significant** and no mitigation is required.

d. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐

3d. Response ***(Source: Appendix A – Air Quality and Greenhouse Gas Analysis and Health Risk Assessment)***

Less Than Significant Impact. Construction of the proposed project will include the use of diesel-powered equipment that release diesel particulate matter (DPM), a toxic air contaminant with known carcinogenic and chronic health effects. For construction analyses, the emissions of DPM are included in the exhaust PM_{10} emissions. Previously referenced Table 3.C details the exhaust PM_{10} emissions from construction will vary from 0.10 lbs./day to 1.01 lbs./day during the different phases of project construction. This DPM emissions rate is very low, and to determine the carcinogenic and chronic health risk levels, this emissions rate will be spread over a 2-year construction period. This low-average DPM emissions rate, combined with the fact that the nearest sensitive receptors are approximately 80 feet from the project site, means the construction health risk levels are very low and well below thresholds of significance.

A project-specific Health Risk Assessment (HRA) (Appendix A), examines the potential mobile source health risk impacts to nearby sensitive receptors associated with the development of the proposed project; more specifically, health risk impacts as a result of exposure to DPM as a result of heavy-duty diesel trucks accessing the project site. The mobile source HRA has been prepared in accordance with the document *Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis* and comprises all relevant and appropriate procedures presented by the U.S. Environmental Protection Agency (EPA), California Environmental Protection Agency (CalEPA), and the SCAQMD. Cancer risk is expressed in terms of expected incremental incidence per million population. The SCAQMD has established an incidence rate of 10 persons per million as the maximum acceptable incremental cancer risk due to DPM exposure. This threshold serves to determine whether or not a given project has a potentially significant development-specific and cumulative impact.

The residential land use with the greatest potential exposure to operational DPM source emissions are the residential dwelling units (i.e., Victoria Heights Apartments and single-family homes) located immediately across Grace Street approximately 80 feet northeast of the project site. At the maximally exposed individual receptor (MEIR), the maximum incremental cancer risk attributable to project DPM source emissions is estimated at 0.52 in one million, which is less than the threshold of 10 in one million. At this same location, non-cancer risks were estimated to be 0.0003, which does not exceed the applicable threshold of 1.0.

Therefore, sensitive receptors are not expected to be exposed to substantial pollutant concentrations from operational emissions associated with the proposed project. Impacts related to exposure of sensitive receptors to substantial pollutant concentrations will be **less than significant** and no mitigation is required.

e. Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

3e. Response: ***(Source: Appendix A – Air Quality and Greenhouse Gas Analysis and Health Risk Assessment)***

Less Than Significant Impact. The potential for the proposed project to generate objectionable odors has also been considered. Land uses generally associated with odor complaints include:

- Agricultural uses (livestock and farming);
- Wastewater treatment plants;

[2] According to the City of Riverside Public Works Department Traffic Impact Analysis Preparation Guide dated January 2016, cumulative scenarios would include traffic generated by other approved and/or pending projects in the study area, which encompasses a one-and-a-half mile radius of the project site. These approved and/or pending projects would reasonably be expected to be in place by the proposed project's build out year and shall include all pending, approved, recorded, or constructed projects that are not occupied at the time of the existing traffic counts. Therefore, the terms "proposed project plus pending and approved baselines" refers to "proposed project plus pending and approved projects."

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

- Food processing plants;
- Chemical plants;
- Composting operations;
- Refineries;
- Landfills;
- Dairies; and
- Fiberglass molding facilities.

The proposed project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed project's long-term operational uses. Standard construction requirements will minimize odor impacts from construction. The construction odor emissions will be temporary, short-term, and intermittent in nature and will cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected project-generated refuse will be stored in covered containers and removed at regular intervals in compliance with the City's solid waste regulations. The proposed project also will be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances. Therefore, odors associated with the proposed project construction and operations will be **less than significant** and no mitigation is required.

4. BIOLOGICAL RESOURCES. Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐

4a. Response: ***(Source: General Plan 2025 – Figure OS-6 – Stephen's Kangaroo Rat (SKR) Core Reserve and Other Habitat Conservation Plans (HCP), Figure OS-7 – Multiple Species Habitat Conservation Plan (MSHCP) Cores and Linkages, Figure OS-8 – MSHCP Cell Areas, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.4-2 – MSHCP Area Plans, Figure 5.4-4 – MSHCP Criteria Cells and Subunit Areas, Figure 5.4-6 – MSHCP Narrow Endemic Plant Species Survey Area, Figure 5.4-7 – MSHCP Criteria Area Species Survey Area, Figure 5.4-8 – MSHCP Burrowing Owl Survey Area, Riverside County Integrated Project Conservation Summary Report Generator, Appendix B – MSHCP Consistency Analysis and Habitat Assessment, Appendix E – Phase I Environmental Site Assessment)***

Less Than Significant With Mitigation Incorporated. The project site is located within the Cities of Riverside and Norco Area Plan area of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) but is not located within a Criteria Area or adjacent to a Criteria Area or Conservation Area. Thus, the project will have no effects to Criteria Areas, and the project is not subject to the Urban/Wildlands Interface Guidelines. As detailed in Figure 4, the project site is within the MSHCP survey areas for the burrowing owl, and results of the burrowing owl habitat assessment (Appendix B) are discussed in detail below.

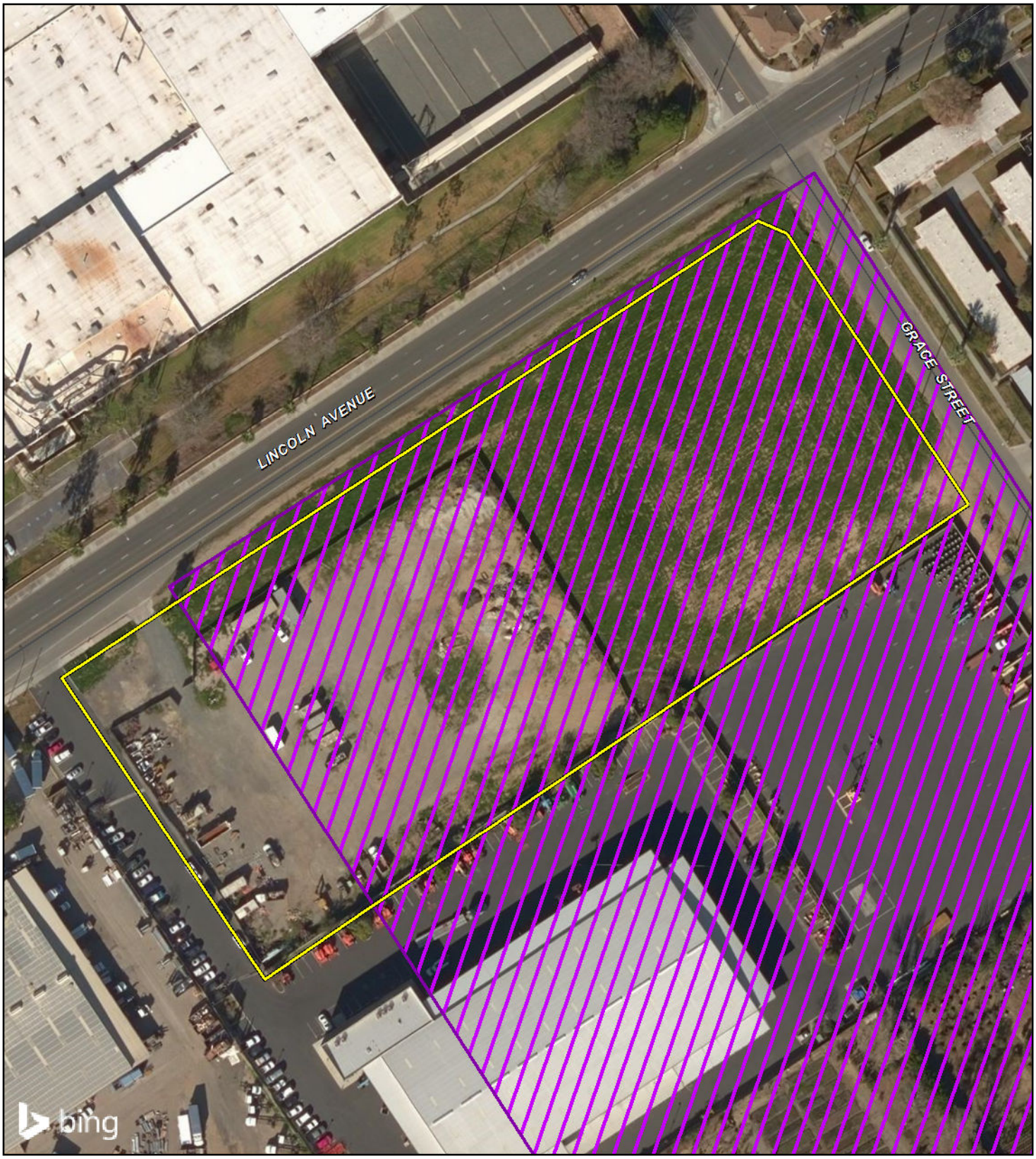
The project site is highly disturbed due to historic and current land use practices. From at least 1931 until 1990, the project site contained orchards. Since 1990, the project site has been subject to weed abatement activity and recent use as a storage yard for vehicles and construction equipment. Native plant communities are absent due to the disturbance caused by historic agricultural practices and the current weed abatement and use as an industrial storage yard.

The vegetation present on the project site is sparse and ruderal in nature and is best described as non-native grasslands. The specific vegetative species observed on site consists almost solely of newly emergent Russian thistle (*Salsola tragus*), commonly known as tumbleweed. Lamb's quarters (*Chenopodium album*) and puncture vine (*Tribulus terrestris*) were also observed on site. A Mexican fan palm (*Washingtonia robusta*) and an arroyo willow (*Salix lasiolepis*) were observed on the project site.

Wildlife common to developed areas was observed on the project site. Bird species observed were mourning dove (*Zenaida macroura*) and common raven (*Corvus corax*). Remnant small mammal burrows (3 inches or less in diameter) likely associated with Botta's pocket gopher (*Thomomys bottae*) were also observed on the project site.

The project site is within the MSHCP burrowing owl (*Athene cunucularia*) survey area. Burrowing owls are found in open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals. They can also inhabit grass,

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
forb, and shrub stages of pinyon, and ponderosa pine habitats. They nest in abandoned burrows of ground squirrels or other animals, in pipes, under piles of rock or debris, and in other similar features. A habitat suitability assessment (HSA) for burrowing owl was conducted on August 11, 2016 (Appendix B). The project site does not contain suitable habitat for the burrowing owl due to the absence of potential nesting sites as described above. No burrowing owls or burrowing owl sign (e.g., whitewash, pellets, scat, tracks, and/or feathers) were observed during the HSA. Focused burrowing owl surveys were not conducted for the proposed project due to the absence of suitable habitat for the burrowing owl on the proposed project site at this time. Per the MSHCP 30-day Pre-Construction Burrowing Owl Survey Guidelines (revised August 17, 2006), an additional pre-construction survey for burrowing owl is required within 30 days prior to beginning of site grading to determine if site conditions change (e.g., establishment of ground squirrel burrows) and result in suitable habitat. **Mitigation Measure BIO-1** requires that pre-construction burrowing owl surveys are conducted prior to any ground-disturbing activities.				



LSA

Legend

Project Boundary

MSHCP Burrowing Owl Survey Area

FIGURE 4

N

0 60 120

FEET

SOURCE: Bing Aerial, MSHCP Survey Areas, 2005.

Lincoln Avenue & Grace Street Warehouse

MSHCP Survey Areas

I:\RVL1601\Reports\IS_MND\fig4_MSHCP_SurveyAreas.mxd (10/24/2016)

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Mitigation Measure BIO-1 **Pre-construction Burrowing Owl Survey:** Prior to the issuance of any grading or demolition permit, a pre-construction burrowing owl/Initial Take and Avoidance Survey must be conducted within 30 days prior to the beginning of project construction to determine if the project site contains suitable burrowing owl habitat and to avoid any potential impacts to the species. The survey shall be conducted in accordance with the recommendations of the State of California, Natural Resource Agency, California Department of Fish and Wildlife (CDFW), Staff Report on Burrowing Owl Mitigation (March 2012) and include 100 percent coverage of the project site. If the survey reveals no suitable habitat for burrowing owl is present, no further work in this regard is required.

If active burrowing owl burrows are determined to be present, the burrow(s) shall be flagged and a 160-foot buffer will be created around the burrow(s) during the non-breeding season (September 1 to January 30) and a 250-foot buffer shall be created during the breeding season (February 1 to August 31). The buffer limits may vary depending on burrow location and burrowing owl sensitivity to human activity. Any relocation efforts must be coordinated with the CDFW and United States Fish and Wildlife Service (USFWS). This measure shall be implemented to the satisfaction of the County of Riverside and the CDFW.

Implementation of **Mitigation Measure BIO-1** will result in a **less than significant impact** to burrowing owls.

As previously stated, a Mexican fan palm and an arroyo willow were observed on the project site. The Mexican fan palm and arroyo willow provide potential roosting and nesting habitat for migratory birds. Additionally, the site is suitable for ground nesting species such as killdeer (*Charadrius vociferous*). Due the presence of trees on the project site, **Mitigation Measure BIO-2** is required to ensure removal of the trees and other construction activities do not result in significant impacts to migratory birds in accordance with the Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code (Sections 3503, 3503.5, and 3515).

Mitigation Measure BIO-2 **Pre-construction Nesting Bird Survey:** Vegetation-clearing and rough grading should be completed outside of bird breeding season (typically February 1 through August 31). If vegetation-clearing and rough grading cannot be conducted outside the bird breeding season, a pre-construction nesting bird survey shall be required prior to the issuance of any grading or demolition permit and within 30 days prior to commencement of construction. The pre-construction nesting bird survey may be conducted concurrent with the pre-construction burrowing owl/Initial Take and Avoidance Survey.

The pre-construction nesting bird survey shall consist of full coverage of the on-site trees and project site. If no active nests are found, no further work in this regard is required. If active nests are found, the nest locations shall be mapped by the biologist utilizing GPS equipment. The nesting bird species and, to the degree feasible, the nesting stage (e.g., incubation of eggs, feeding of young, or near fledging) shall be documented. Additionally, an exclusionary buffer shall be established by the project biologist. The buffer may be up to 500 feet in diameter depending on the species of nesting bird found. This buffer must be clearly marked in the field by construction personnel under guidance of the biologist, and construction and/or vegetation clearing shall not occur within this zone until the biologist determines the young have fledged or the nest is no longer active. This measure shall be implemented to the satisfaction of the City of Riverside.

Implementation of **Mitigation Measure BIO-2** will result in a **less than significant impact** to migratory birds in accordance with the MBTA and the California Fish and Game Code (Sections 3503, 3503.5, and 3515).

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒

4b. Response: ***(Source: General Plan 2025 – Figure OS-6 – Stephen's Kangaroo Rat (SKR) Core Reserve and Other Habitat Conservation Plans (HCP), Figure OS-7 – MSHCP Cores and Linkages, Figure OS-8 – MSHCP Cell Areas, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.4-2 – MSHCP Area Plans, Figure 5.4-4 – MSHCP Criteria Cells and Subunit Areas, Figure 5.4-6 – MSHCP Narrow Endemic Plant***

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Species Survey Area, Figure 5.4-7 – MSHCP Criteria Area Species Survey Area, Figure 5.4-8 – MSHCP Burrowing Owl Survey Area, MSHCP Section 6.1.2 – Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools, Appendix B – MSHCP Consistency Analysis and Habitat Assessment)

No Impact. The project site is located within the Cities of Riverside and Norco Area Plan area of the MSHCP, but is not located within a Criteria Area or adjacent to a Criteria Area or Conservation Area. Thus, the project will have no effects to Criteria Areas and the project is not subject to the Urban/Wildlands Interface Guidelines. Native plant communities are absent due to the disturbance caused by historic agricultural practices and the current weed abatement and use as an industrial storage yard. No riparian/riverine/vernal pool resources are present, and the project will have no effects to these MSHCP resources. Therefore, the project will have **no impact** on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. No mitigation is required.

c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, and coastal) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒

4c. Response: ***(Source: City of Riverside GIS/CADME USGS Quad Map Layer, Appendix B – MSHCP Consistency Analysis and Habitat Assessment)***

No Impact. The project site is located within an urbanized area where no federally protected wetlands, as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, and coastal), exist on site or within proximity to the project site. The project site does not contain any discernible drainage courses, inundated areas, wetland vegetation, or hydric soils and thus does not include United States Army Corps of Engineers (USACE) jurisdictional drainages or wetlands. Therefore, the proposed project will have **no impact** to federally protected wetlands as defined by Section 404 of the Clean Water Act. No mitigation is required.

d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒

4d. Response: ***(Source: MSHCP, General Plan 2025 – Figure OS-7 – MSHCP Cores and Linkage, Appendix B – MSHCP Consistency Analysis and Habitat Assessment)***

No Impact. Habitat fragmentation occurs when a single, contiguous habitat area is divided into two or more areas, or where an action isolates the two or more new areas from each other. Isolation of habitat occurs when wildlife cannot move freely from one portion of the habitat to another or to/from one habitat type to another. Habitat fragmentation may occur when a portion of one or more habitats is converted into another habitat, as when scrub habitats are converted into annual grassland habitat because of frequent burning. Wildlife movement includes seasonal migration along corridors, as well as daily movements for foraging. Examples of migration corridors may include areas of unobstructed movement for deer, riparian corridors providing cover for migrating birds, routes between breeding waters and upland habitat for amphibians, and between roosting and feeding areas for birds.

The project site does not provide any vegetation, drainages, or other resources necessary to support local or regional wildlife movement and migration. The project site is not identified as a regionally important dispersal or seasonal migration corridor. The project site does not consist of any critical habitat and is heavily disturbed with minimal vegetation. Due to the surrounding industrial land uses, the potential surrounding habitat is already fragmented. Therefore, the proposed project will not significantly affect a native or migratory wildlife corridor or cause habitat fragmentation. Implementation of the proposed project will have **no impact** on wildlife movement and migratory species. No mitigation is required.

e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐

4e. Response: ***(General Plan 2025-Land Use and Urban Design Element & Open Space and Conservation Element, City of Riverside Urban Forest Tree Policy Manual, Riverside Municipal Code Section 16.72.040 and Section 16.40.040)***

Less Than Significant Impact. Implementation of the proposed project is subject to all applicable federal, state, and local policies and regulations related to the protection of biological resources and tree preservation. In addition, the project is required

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

to comply with Riverside Municipal Code Section 16.72.040, establishing MSHCP mitigation fee, and Section 16.40.040, establishing Threatened and Endangered Species Fees, as applicable.

Any project within the City of Riverside's boundaries that proposes planting a street tree within a City right-of-way must follow the *Urban Forest Tree Policy Manual*. The Manual documents guidelines for the planting, pruning, preservation, and removal of all trees in City rights-of-way. The specifications in the Manual are based on national standards for tree care established by the International Society of Arboriculture, the National Arborists Association, and the American National Standards Institute. The proposed project will be in compliance with the City's Urban Forest Tree Policy Manual when planting and/or removing trees within a City right-of-way; therefore, impacts will be **less than significant**. No mitigation is required.

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☒	☐	☐

4f. Response: ***(Source: General Plan 2025 – Figure OS-6 – Stephen's Kangaroo Rat (SKR) Core Reserve and Other Habitat Conservation Plans (HCP), Figure OS-7 – Multiple Species Habitat Conservation Plan (MSHCP) Cores and Linkages, Figure OS-8 – MSHCP Cell Areas, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.4-2 – MSHCP Area Plans, Figure 5.4-4 – MSHCP Criteria Cells and Subunit Areas, Figure 5.4-6 – MSHCP Narrow Endemic Plant Species Survey Area, Figure 5.4-7 – MSHCP Criteria Area Species Survey Area, Figure 5.4-8 – MSHCP Burrowing Owl Survey Area, Riverside County Integrated Project Conservation Summary Report Generator, Appendix B – MSHCP Consistency Analysis and Habitat Assessment, Appendix E – Phase I Environmental Site Assessment)***

Less Than Significant With Mitigation Incorporated. Refer to checklist response 4a.

5. CULTURAL RESOURCES. Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5 of the CEQA Guidelines?	☐	☒	☐	☐

5a. Response: ***(Source: Appendix C – Cultural Resources Assessment)***

Less Than Significant With Mitigation Incorporated. CEQA defines a "historical resource" as a resource that meets one or more of the following criteria: (1) is listed in, or determined eligible for listing in, the California Register of Historical Resources (California Register); (2) is listed in a local register of historical resources as defined in Public Resources Code (PRC) §5020.1(k); (3) is identified as significant in a historical resource survey meeting the requirements of PRC §5024.1(g); or (4) is determined to be a historical resource by a project's Lead Agency (PRC §21084.1 and *State CEQA Guidelines* §15064.5[a]). A "substantial adverse change" to a historical resource, according to PRC §5020.1(q), "means demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired."

A project-specific Cultural Resources Assessment (Appendix C) was conducted for the proposed project and included an archival records search and intensive pedestrian survey of the project site. The records search included a review of all recorded prehistoric and historic cultural resources within one mile of the project site, as well as a review of known cultural resources survey and excavation reports. The intensive pedestrian survey included visual inspection of all accessible exposed areas of the project site in systematic parallel transects spaced approximately 30 feet where possible. Special attention was given to areas of exposed soil for surface artifacts and features indicative of past human occupation. The purpose of the intensive pedestrian survey was to identify and document, prior to the beginning of ground-disturbing activities, any cultural resources, and identify any area(s) that might be sensitive for buried cultural resources.

The archival records search revealed 22 cultural resources within one mile of the proposed project, none of which is located within the project site, and nine previous cultural resource studies conducted within one mile of the proposed project, none of which included the project. The cultural resources consist of six water conveyance and citrus industry-related resources, 11 historic-period residences, three commercial properties, two historic roads, and the Casa Blanca School. No prehistoric resources were noted within the one-mile records search radius. The nearest cultural resource to the project site is Victoria Avenue, one of the historic roads, approximately 0.2 mile south of the project site.

No prehistoric or historic resources were identified during the intensive pedestrian survey. Despite the apparent lack of prehistoric or historic resources, there remains some potential for the proposed project to unearth previously undocumented resources during construction. Therefore, **Mitigation Measure CUL-1** is required in the event that unanticipated prehistoric or historic resources

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

are unearthed during project construction.

Mitigation Measure CUL-1 **Unanticipated Cultural Resources:** Prior to issuance of grading permits, the City shall verify that the following note is included on the grading plans:

"If any suspected cultural resources are discovered during ground-disturbing activities, the construction supervisor is obligated to halt work within a 100-foot radius around the find and call the project archaeologist to the site to assess the significance of the find. The project archaeologist, the project applicant, and the City Planning Division shall confer regarding the disposition of the discovered resource(s). The project archaeologist shall monitor remaining earthmoving activities at the project site, and a treatment plan and/or preservation plan shall be prepared and reviewed by the project applicant and the City Planning Division and implemented by the project archaeologist to protect the identified cultural resource(s) from damage and destruction. A final report containing the significance and treatment findings shall be prepared by the project archaeologist and submitted to the City Planning Division and the Eastern Information Center at the University of California, Riverside. Any cultural material, excluding sacred, ceremonial, grave goods, and human remains, collected during construction and from any previous archaeological studies or excavations on the project site shall be curated, as determined by the treatment plan, according to current professional repository standards. This measure shall be implemented to the satisfaction of the City Planning Division."

Implementation of **Mitigation Measure CUL-1** will reduce impacts on known, unknown, or potential cultural resources that may be located within the project site to **less than significant** levels**.**

b. Cause a substantial adverse change in the significance of an archeological resource pursuant to § 15064.5 of the CEQA Guidelines?	☐	☒	☐	☐

5b. Response: ***(Source: Appendix C – Cultural Resources Assessment)***

Less Than Significant With Mitigation Incorporated. Refer to checklist response 5a.

c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

5c. Response: ***(Source: United States Geological Survey – Geologic Map of the*** **Riverside West, California** ***7.5-minute Quadrangle, General Plan 2025 Policy HP-1.3)***

Less Than Significant With Mitigation Incorporated. The project site is underlain by old alluvial fan deposits of late to middle Pleistocene age (11,700 to 781,000 years ago). These deposits are generally sandy alluvial fan deposits covering extensive areas along the Santa Ana River and may include a thin layer of Holocene (11,700 years ago to present) alluvial fan material. Although Holocene sediments generally are considered too young to yield paleontological resources, sediments of middle and late Pleistocene age are known to yield paleontological resources.

In accordance with policy HP 1.3 of the City's General Plan 2025, the City is required to protect paleontological resources pursuant to applicable local, state, and federal laws. As with archaeological resources, paleontological resources are generally considered to be historical resources, as defined in *CEQA Guidelines* Section 15064.5(a)(3)(D). Due to the age of the sediments underlying the project site, paleontological resources may be present in these potentially fossil-bearing soils and rock formations below the ground surface. Ground-disturbing activities in these potentially fossil-bearing soils and rock formations have the potential to damage or destroy paleontological resources. Therefore, implementation of **Mitigation Measure CUL-2** is required in the event that unanticipated paleontological resources are unearthed during project construction.

Mitigation Measure CUL-2 **Unanticipated Paleontological Resources:** Prior to issuance of grading permits, the City shall verify that the following note is included on the grading plans:

"If any suspected paleontological resources (fossils) are discovered during ground-disturbing activities, the construction supervisor is obligated to halt work within a 100-foot radius around the find until a qualified paleontologist can assess the significance of the find. The project paleontologist shall monitor remaining ground-disturbing activities in native soils at the project site and shall be equipped to record and salvage fossil resources that may be unearthed during construction. The paleontologist shall temporarily halt or divert construction equipment to allow

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

recording and removal of the unearthed resources. Any fossils found shall be offered for curation at a curation facility approved by the City. A report of findings, including, when appropriate, an itemized inventory of recovered specimens and a discussion of their significance, shall be prepared upon completion of the steps outlined above. The report and inventory, when submitted to the appropriate lead agency, will signify completion of the program to mitigate impacts on paleontological resources. This measure shall be implemented to the satisfaction of the City Planning Division."

Implementation of **Mitigation Measure CUL-2** will reduce impacts to paleontological resources to **less than significant** levels by ensuring paleontological resources will be subject to scientific recovery and evaluation.

d. Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

5d. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.5-1 – Archaeological Sensitivity and Figure 5.5-2 – Prehistoric Cultural Resources Sensitivity, Appendix C – Cultural Resources Assessment)***

Less Than Significant Impact. No known human remains are present on the project site and there is no evidence that Native Americans are buried on the project site. In the unlikely event that human remains are encountered during project grading, the proper authorities (i.e., Riverside County Coroner) will be notified and standard procedures for the respectful handling of human remains during the earthmoving activities will be followed. Construction contractors are required to adhere to California Code of Regulations (CCR) Section 15064.5(e), Public Resources Code (PRC) Section 5097, and Section 7050.5 of the State's Health and Safety Code. In the event of an unanticipated discovery of a human burial, human bone, or suspected human bone, the law requires all excavation or grading in the vicinity of the find halt immediately, the area of the find be protected, and the contractor immediately notify the County Coroner of the find. The construction contractor, developer, and the County Coroner are required to comply with the provisions of CCR Section 15064.5(e), PRC Section 5097.98, and Section 7050.5 of the State's Health and Safety Code. Compliance with these provisions (specified in **Standard Condition C-1**), will ensure that any potential impacts to unknown buried human remains will be **less than significant** by ensuring appropriate examination, treatment, and protection of human remains as required by state law. No mitigation is required.

Standard Condition: No mitigation is required; however, the following Standard Condition is a regulatory requirement that will be implemented to reduce impacts related to discovery of human remains during construction.

Standard Condition C-1: **Discovery of Human Remains:** Consistent with the requirements of California Code of Regulations (CCR) Section 15064.5(e), if human remains are encountered, work within 25 feet of the discovery shall be redirected and the County Coroner notified immediately. State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code (PRC) Section 5097.98. If the remains are determined to be Native American, the County Coroner shall notify the Native American Heritage Commission (NAHC), which shall determine and notify a Most Likely Descendant (MLD). With the permission of the property owner, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials. Consistent with CCR Section 15064.5(d), if the remains are determined to be Native American and an MLD is notified, the City shall consult with the MLD as identified by the NAHC to develop an agreement for treatment and disposition of the remains.

Compliance with **Standard Condition C-1** will ensure there will be no significant impacts related to the discovery of human remains.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
6. GEOLOGY AND SOILS. Would the project:				
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐

6a.i. Response: ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones, California Code of Regulations – Title 24, Appendix D – Geotechnical Investigation)***

Less Than Significant Impact. The entire southern California region, including the project area, is considered seismically active. The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 with the main purpose of reducing the hazard of surface faulting to structures built for human occupancy. In the City of Riverside, there are no Alquist-Priolo zones, and the project site does not contain any known fault lines. The nearest active Alquist-Priolo Fault Zones to the project site are the San Jacinto Fault and Elsinore Fault, located approximately 12 miles northeast and southwest of the project site, respectively. Therefore, the potential for fault rupture at or near the project site is low. Additionally, the proposed warehouse structure is not intended for permanent, full-time human occupancy, and compliance with applicable 2013 California Building Code (CBC) (California Code of Regulations, Title 24) regulations will ensure impacts related to fault rupture will be **less than significant**. No mitigation is required.

ii. Strong seismic ground shaking?	☐	☐	☒	☐

6a.ii. Response: ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones, California Code of Regulations – Title 24, Appendix D – Geotechnical Investigation)***

Less Than Significant Impact. Like all of southern California, the project site has and will continue to be subject to ground shaking generated from activity on local and regional faults. The San Jacinto Fault Zone and the Elsinore Fault Zone, located northeast and southwest of the City, have the potential to cause moderate to large earthquakes that will result in intense ground shaking. The San Jacinto Fault and Elsinore Fault are each located approximately 12 miles from the project site.

The proposed warehouse structure is not intended for permanent, full-time human occupancy, and compliance with applicable 2013 CBC (California Code of Regulations, Title 24) regulations, which establish engineering standards appropriate for the potential seismic hazards of the project site, will result in a warehouse structure designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage, and loss of life as a result of strong seismic ground shaking. The project-specific geotechnical investigation (Appendix D) presented site-specific seismic design parameters in accordance with the 2013 CBC and based, in part, on site-specific soil conditions, occupancy, the configuration of the proposed structure including the structural system and height, and proximity of known faults to the project site (Table 6.A).

Table 6.A: 2013 California Building Code Seismic Design Parameters

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.500
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.600
Site Class	—	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.500
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.900
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.000
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.600

Source: *Geotechnical Investigation of the Proposed Commercial/Industrial Building* (Southern California Geotechnical, June 2016, Appendix D).

Incorporation of these site-specific seismic design parameters into the project design will minimize the potential damage that will occur as a result of strong seismic ground shaking.

Standard Conditions: Implementation of **Standard Condition GS-1** will ensure site-specific seismic design parameters in

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

accordance with the 2013 CBC are implemented during construction and operation of the proposed project.

Standard Condition GS-1: **2013 CBC Seismic Design Parameters:** Prior to issuance of grading permits, the project applicant or its designee shall demonstrate that all applicable 2013 CBC seismic design parameters are integrated in to the structural design of the proposed warehouse. This measure shall be implemented to the satisfaction of the Director of the City of Riverside Community and Economic Development Department, Building and Safety Division, or designee.

Implementation of **Standard Condition GS-1** will ensure site-specific seismic design parameters in accordance with the 2013 CBC are implemented during construction and operation of the proposed project and will result in a warehouse structure designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage, and loss of life as a result of strong seismic ground shaking. With implementation of **Standard Condition GS-1**, impacts associated with strong seismic ground shaking will be **less than significant. No mitigation is required.**

iii. Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐

6a.iii. Response: ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones, Figure PS-2 – Liquefaction Zones, Riverside General Plan and Supporting Documents Environmental Impact Report Figure PS-3 – Soils with High Shrink-Swell Potential, and Appendix D – Geotechnical Investigation)***

Less Than Significant Impact. Liquefaction is a phenomenon that occurs when strong earthquake shaking causes soils to collapse from a sudden loss of cohesion and undergo a transformation from a solid to a liquefied state. The proposed project site is located in an area identified as having low liquefaction susceptibility, largely due to the relatively deep groundwater depth of the project site and vicinity (Appendix D). Local groundwater levels are greater than 50 feet, which will reduce the potential for liquefaction. The proposed project does not contain any structures that are intended for permanent, full-time human occupancy, so the dangers posed by liquefaction and subsequent ground failure in a seismic event are less than critical (i.e., compared to residential structures). Through compliance with the 2013 California Building Code and implementation of standard engineering and construction protocols, impacts associated with seismic-related ground failure, including liquefaction, will be reduced to **less than significant** levels. No mitigation is required.

iv. Landslides?	☐	☐	☐	☒

6a.iv. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.6-1 – Areas Underlain by Steep Slope, Appendix D – Geotechnical Investigation, Title 18 – Subdivision Code, and Title 17 – Grading Code)***

No Impact. Factors that contribute to the stability of slopes include slope height and steepness, engineering characteristics of the earth materials comprising the slope, and intensity of ground shaking that could destabilize weak slopes. The project site and its surroundings have generally flat topography and are not located in an area prone to landslides per Figure 5.6-1 of the *Riverside General Plan and Supporting Documents Environmental Impact Report*. Therefore, there will be **no impact** related to landslides. No mitigation is required.

b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐

6b. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.6-1 – Areas Underlain by Steep Slope, Figure 5.6-4 – Soils, Table 5.6-B – Soil Types, Title 18 – Subdivision Code, Title 17 – Grading Code)***

Less Than Significant Impact. Project-specific geotechnical borings encountered undocumented fill soils extending to depths of over three feet below grade (Appendix D). Beneath these fill materials are native alluvial soils comprising very loose to medium dense silty sands. During grading and construction, disturbance of soil by heavy construction equipment could result in erosion. State and federal requirements call for the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) establishing erosion and sediment controls for construction activities. The project must also comply with the National Pollutant Discharge Elimination System (NPDES) regulations. In addition, the proposed project must comply with the City Grading Code (Title 17) and erosion control standards (Title 18), both of which are designed to minimize soil erosion. Compliance with state and federal requirements, as well as with Title 17 and Title 18 of the City Municipal Code, will ensure that the proposed project will have a **less than significant** impact related to soil erosion or loss of topsoil. No mitigation is required.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐

6c. Response: ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones, Figure PS-2 – Liquefaction Zones, Riverside General Plan and Supporting Documents Environmental Impact Report Figure PS-3 – Soils with High Shrink-Swell Potential, Figure 5.6-1 – Areas Underlain by Steep Slope, Figure 5.6-4 – Soils, Table 5.6-B – Soil Types, Title 18 – Subdivision Code, Title 17 – Grading Code, and Appendix D – Geotechnical Investigation)***

Less Than Significant With Mitigation Incorporated. The project site is generally flat and gently slopes toward the west, with approximately 5-6 feet of elevation differential across the site. On-site soils consist generally of very loose to medium dense silty, alluvial sands, and borings conducted for the site-specific geotechnical investigation (Appendix D) encountered undocumented fill soils extending to depths of over three feet below grade, which are not considered suitable in their present condition for support of the proposed warehouse.

As described previously in this section, on-site soils are not considered susceptible to landslides or liquefaction. In the absence of a shallow groundwater table, lateral spreading is also considered unlikely. The geotechnical investigation indicated the near-surface alluvium is subject to moderate amounts of consolidation when exposed to load increases expected to be exerted by the foundations of the proposed project, as well as minor amounts of collapse when exposed to moisture infiltration. Therefore, remedial grading of the project site will be necessary to provide a subgrade suitable for support of the foundations and floor slab of the proposed warehouse.

Mitigation Measures: Implementation of **Mitigation Measure GEO-1** will ensure the grading recommendations outlined in the project-specific geotechnical investigation (Appendix D) are implemented during construction of the proposed project in accordance with the 2013 CBC and the City Grading Code (Title 17).

Mitigation Measure GEO-1: **Site Grading:** Prior to issuance of building permits, the project applicant or its designee shall demonstrate all recommendations contained in the project-specific geotechnical investigation are implemented. Geotechnical recommendations include, but are not limited to, overexcavation of existing soils to a depth of at least five (5) feet below existing grade, five (5) feet below proposed building pad subgrade elevations, and to a depth sufficient to remove all undocumented fill soils, whichever is greater. Following completion of overexcavation, the subgrade soils within the building area must be evaluated by the project geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the proposed warehouse.

Some localized areas of deeper excavation may be required if loose, porous, or low density native soils are encountered at the base of the overexcavation. After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches. The subgrade should then be thoroughly moisture conditioned to achieve a moisture content of at least 2 to 4 percent above optimum and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill. This measure shall be implemented to the satisfaction of the Director of the City of Riverside Community and Economic Development Department, Building and Safety Division, or designee.

The recommended remedial grading will remove the undocumented fill soils and upper portion of the underlying alluvial soils and replace these materials with compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation will not be subject to significant load increases from the foundations of the proposed warehouse. With implementation of **Mitigation Measure GEO-1**, post-construction static settlement of the proposed warehouse is expected to be within tolerable limits.

Removal and recompaction of the near-surface fill soils and alluvium is estimated to result in an average shrinkage of 10 to 15 percent. Minor ground subsidence is expected to occur in the soils below the zone of removal due to settlement and machinery working. The subsidence is estimated to be 0.10± feet and is considered low.

Project-specific results of soluble sulfate testing indicate the selected sample of the on-site soils contains negligible concentrations of soluble sulfates, in accordance with American Concrete Institute (ACI) guidelines. Therefore, specialized concrete mix designs are not considered to be necessary for sulfate protection purposes. However, it is recommended that additional soluble sulfate

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building area.

Mitigation Measures: Implementation of **Mitigation Measure GEO-2** will test the soluble sulfate concentrations of the soils present at pad grade within the building area to ensure these soils do not require specialized concrete mix designs for sulfate protection purposes.

Mitigation Measure GEO-2: **Soluble Sulfate Testing:** The project applicant or its designee shall conduct soluble sulfate testing at the completion of rough grading to verify the soluble sulfate concentrations of the soils present at pad grade within the building area are compliant with ACI guidelines. If soluble sulfate testing reveals high concentrations of soluble sulfates, specialized concrete mix designs must be implemented in accordance with ACI guidelines to ensure proper sulfate protection. This measure shall be implemented to the satisfaction of the Director of the City of Riverside Community and Economic Development Department, Building and Safety Division, or designee.

Per the recommendations of the geotechnical investigation, the project shall be required to over-excavate areas of compressible soils and place compacted structural fill. In addition, the project shall be required to test the soluble sulfate concentrations of the soils present at pad grade within the building area to ensure these soils do not require specialized concrete mix designs for sulfate protection purposes. Implementation of **Mitigation Measures GEO-1** and **GEO-2**, as well as adherence to the City Grading Code (Title 17) and erosion control standards (Title 18) of the City Municipal Code, will ensure the project site is adequately prepared to prevent the collapse of the graded pad and/or slopes. Therefore, impacts related to geologic conditions are reduced to **less than significant** levels.

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☒	☐	☐

6d. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.6-4 – Soils, Figure 5.6-4 – Soils, Table 5.6-B – Soil Types, Figure 5.6-5 – Soils with High Shrink-Swell Potential, Appendix D – Geotechnical Investigation, and California Building Code as adopted by the City of Riverside and set out in Title 16 of the Riverside Municipal Code)***

Less Than Significant With Mitigation Incorporated. Expansive soils, defined in the CBC, generally have a significant amount of clay particles that can give up water (shrink) or take on water (swell). The change in volume exerts stress on buildings and other loads placed on these soils. The extent of shrink/swell is influenced by the amount and kind of clay in the soil. The occurrence of these soils is often associated with geologic units having marginal stability. The distribution of expansive soils can be widely dispersed and they can occur in hillside areas as well as low-lying alluvial basins.

According to the project-specific geotechnical investigation (Appendix D), representative samples of the near-surface soils indicate these materials have negligible expansive characteristics (EI = 2). Therefore, no design considerations related to expansive soils are considered warranted for this project. However, additional expansion index testing is recommended at the completion of rough grading to verify the expansion potential of the as-graded building pad.

Mitigation Measures: Implementation of **Mitigation Measure GEO-3** will test the expansion index of the soils present at pad grade within the building area to ensure these soils are not subject to significant expansion as defined in Table 18-1-B of the Uniform Building Code (1994).

Mitigation Measure GEO-3: **Expansive Soil Testing:** The project applicant or its designee shall conduct expansive soil testing at the completion of rough grading to verify the expansion index of the soils present at pad grade within the building area are compliant with the Uniform Building Code (1994). If expansive soils are encountered at the as-graded building pad, the project geotechnical engineer may recommend additional excavation of localized areas. After a suitable overexcavation subgrade has been achieved, the exposed soils shall be scarified to a depth of at least 12 inches. The subgrade shall then be thoroughly moisture conditioned to achieve a moisture content of at least 2 to 4 percent above optimum and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill. This measure shall be implemented to the satisfaction of the Director of the City of Riverside Community and Economic Development Department, Building and Safety Division, or designee.

Per the recommendations of the geotechnical investigation, the project shall be required to test for expansive soils at pad grade

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
within the building area to ensure construction atop these soils is in accordance with the Uniform Building Code (1994). Implementation of **Mitigation Measure GEO-3**, as well as adherence to the City Grading Code (Title 17) and erosion control standards (Title 18) of the City Municipal Code, will ensure impacts related to expansive soils are reduced to **less than significant** levels.				
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
6e. Response: ***(Source: Project Conceptual Site Plan – Figure 3)*** **No Impact.** The proposed project will be connected to existing wastewater collection and conveyance facilities owned and operated by the City. Local wastewater will be collected and conveyed to the regional sewer system; therefore, septic tanks will not be necessary. Because the proposed project will not include the installation of septic tanks or alternative wastewater disposal systems, **no impact** will occur. No mitigation is required.				
7. GREENHOUSE GAS EMISSIONS. Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐

7a. Response: ***(Source: Appendix A – Air Quality and Greenhouse Gas Analysis and Health Risk Assessment)***

Less Than Significant Impact. "Greenhouse gases" (GHGs) (so called because of their role in trapping heat near the surface of the earth) emitted by human activity are implicated in global climate change, commonly referred to as "global warming." GHGs contribute to an increase in the temperature of the Earth's atmosphere by transparency to short wavelength visible sunlight, but near opacity to outgoing terrestrial long wavelength heat radiation in some parts of the infrared spectrum. The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and water vapor. For purposes of planning and regulation, Section 15364.5 of the CCR defines GHGs as including, but not limited to, CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Fossil fuel consumption in the transportation sector (e.g., on-road motor vehicles, off-highway mobile sources, and aircraft) is the single largest source of GHG emissions, accounting for approximately half of GHG emissions globally. Industrial and commercial sources are the second largest contributors of GHG emissions with about one-fourth of total emissions.

State CEQA Guidelines Section 15064(b) provides that the "determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data," and further states that an "ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting."

The City has adopted Appendix G of the *State CEQA Guidelines* as the significance threshold for GHG emissions. A project would normally have a significant effect on the environment if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

On December 30, 2009, the Natural Resources Agency adopted amendments to the *State CEQA Guidelines* that became effective on March 18, 2010. The amendments to the *State CEQA Guidelines* include new requirements to evaluate GHG emissions. Pursuant to the amended *State CEQA Guidelines*, a lead agency should consider the following when assessing the significance of impacts from GHG emissions on the environment:

1. The extent to which the project may increase (or reduce) GHG emissions compared to the existing environmental setting;
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and
3. The extent to which the project complies with regulations or requirements adopted to implement an adopted statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

The City adopted its Riverside Restorative Growthprint (RRG) Economic Prosperity Action Plan (RRG-EPAP) and Climate Action Plan (RRG-CAP) in January 2016. In 2014, the City was one of 12 that collaborated with the Western Riverside Council

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

of Governments (WRCOG) on a Subregional Climate Action Plan (Subregional CAP) that includes 36 measures to guide the City's GHG reduction efforts through 2020. Through the WRCOG Subregional CAP process, the City has committed to a 2020 emissions target of 2,224,908 MT CO_2e, which is 26.4 percent below the City's 2007 baseline and 15 percent below 2010 emissions. This represents a reduction of 779,304 MT CO_2e from the City's 2020 business-as-usual (BAU) forecast. The City is aiming for a 2035 emissions target of 1,542,274 MT CO_2e, which is 49 percent below the 2007 baseline and represents a reduction of 2,120,931 MT CO_2e from the 2035 BAU forecast.

The RRG-CAP expands upon the efforts of the WRCOG Subregional CAP, employing local measures to help the City achieve deep GHG reductions through the year 2035. To further develop local GHG reduction measures for the RRG-CAP, the City conducted a detailed assessment of local strategies and actions related to the measures identified in the Subregional CAP and expanded the discussion and analysis with respect to implementation (particularly post-2020), costs and funding, performance metrics, and local co-benefits. Importantly, the discussions identify local economic and entrepreneurship opportunities that can be integrated with local, regional, and global GHG reductions (e.g., the development of green enterprise zones).

To provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents, the SCAQMD convened a GHG CEQA Significance Threshold Working Group (Working Group). Based on the last Working Group meeting (Meeting No. 15) held in September 2010, the SCAQMD has proposed to adopt a tiered approach for evaluating GHG emissions for development projects where the SCAQMD is not the lead agency. The applicable tier for this project is Tier 2 (determining whether the project is consistent with a GHG reduction plan). This concept is equivalent to the existing consistency determination requirements in *CEQA Guidelines* Sections 15064(h)(3), 15125(d), or 15152(a). This analysis considers GHG emission significance by determining the project's consistency with the policies and goals in the RRG-EPAP and RRG-CAP.

Emissions estimates for the proposed project were calculated as part of Air Quality and Greenhouse Gas Analysis (Appendix A) and are discussed below. GHG emissions estimates are provided herein for informational purposes only because there is no established quantified GHG emissions threshold. Bearing in mind that CEQA does not require "perfection" but instead "adequacy, completeness, and a good faith effort at full disclosure," the analysis below is based on methodologies and information available to the City and the applicant at the time this analysis was prepared. Estimation of GHG emissions in the future does not account for all changes in technology that may reduce such emissions; therefore, the estimates are based on past performance and represent a scenario that is worse than that which is likely to be encountered (after energy-efficient technologies have been implemented). While information is presented below to assist the public and decision-makers in understanding the project's potential contribution to global climate change impacts, the information available to the cities is not sufficiently detailed to allow a direct comparison between particular project characteristics and particular climate change impacts, or between any particular proposed mitigation measure and any reduction in climate change impacts.

Construction and operation of the proposed project will generate GHG emissions, with the majority of energy consumption (and associated generation of GHG emissions) occurring during the project's operation (as opposed to during its construction). Typically, more than 80 percent of the total energy consumption takes place during the use of buildings and less than 20 percent of energy is consumed during construction. As of yet, there is no study that quantitatively assesses all of the GHG emissions associated with each phase of the construction and use of an individual development.

Overall, the following activities associated with the proposed project could directly or indirectly contribute to the generation of GHG emissions:

- **Construction Activities:** During construction of the project, GHGs will be emitted through the operation of construction equipment and from worker and vendor vehicles, each of which typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs (e.g., CO_2, CH_4, and N_2O). Furthermore, CH_4 is emitted during the fueling of heavy equipment.
- **Gas, Electricity, and Water Use:** Natural gas use results in the emission of two GHGs: CH_4 (the major component of natural gas) and CO_2 (from the combustion of natural gas). Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. California's water conveyance system is energy-intensive. Preliminary estimates indicate that the total energy used to pump and treat this water exceeds 6.5 percent of the total electricity used in the state per year.
- **Solid Waste Disposal:** Solid waste generated by the project could contribute to GHG emissions in a variety of ways. Landfilling and other methods of disposal use energy for transporting and managing the waste, and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of CH_4 from the anaerobic decomposition of organic materials. CH_4 is 25 times more potent a GHG than CO_2. However, landfill CH_4 can also

be a source of energy. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere.

- **Motor Vehicle Use:** Transportation associated with the proposed project will result in GHG emissions from the combustion of fossil fuels in daily automobile and truck trips.

Table 7.A lists the annual CO_2 emissions for each of the planned construction phases.

Table 7.A: Construction Greenhouse Gas Emissions

Construction Phase		Total Regional Pollutant Emissions (MT/year)			
		CO_2	CH_4	N_2O	Total CO_2e
2017	Site Preparation	5.57	<0.01	0.00	5.61
	Grading	8.72	<0.01	0.00	8.78
	Building Construction	406.12	0.06	0.00	407.81
2018	Building Construction	21.09	<0.01	0.00	21.19
	Architectural Coating	2.01	<0.01	0.00	2.01
	Paving	9.47	<0.01	0.00	9.54
Total Construction Emissions		452.98	0.08	0.00	454.94
Amortized over 30 years		**15.10**	**<0.01**	**0.00**	**15.16**

Air Quality and Greenhouse Gas Analysis and Health Risk Assessment (Appendix A)

CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
MT/year = metric tons per year
N_2O = nitrous oxide

Long-term operation of the proposed project will generate GHG emissions from area and mobile sources and indirect emissions from stationary sources associated with energy consumption. Mobile-source emissions of GHGs will include project-generated vehicle trips associated with on-site facilities and customers and visitors to the project site. Area-source emissions will be associated with activities (e.g., landscaping and maintenance of proposed land uses, natural gas for heating, and other sources). Increases in stationary-source emissions will also occur at off-site utility providers as a result of demand for electricity, natural gas, and water by the proposed uses.

The GHG emission estimates presented in Table 7.B details the emissions associated with the level of development envisioned by the proposed project at opening.

Table 7.B: Operational Greenhouse Gas Emissions

Source	Pollutant Emissions, MT/year					
	Bio-CO_2	NBio-CO_2	Total CO_2	CH_4	N_2O	Total CO_2e
Construction emissions amortized over 30 years	0.00	15.10	15.10	<0.01	0.00	15.16
Operational Emissions						
Area Sources	0.00	<0.01	<0.01	<0.01	0.00	0.01
Energy Sources	0.00	529.98	529.98	0.02	<0.01	532.29
Mobile Sources	0.00	1,737.44	1,737.44	0.07	0.00	1,739.29
Waste Sources	25.41	0.00	25.41	1.50	0.00	62.96
Water Usage	7.41	96.87	104.28	0.76	<0.01	128.99
Total Project Emissions	32.82	2,364.29	2,397.11	2.36	0.02	2,478.71

Source: Air Quality and Greenhouse Gas Analysis and Health Risk Assessment (Appendix A)

Note: Numbers in table may not appear to add up correctly due to rounding of all numbers to two significant digits.

Bio-CO_2 = biologically generated CO_2
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
MT = metric tons
N_2O = nitrous oxide
NBio-CO_2 = Nonbiologically generated CO_2

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

As detailed in Table 7.B, the proposed project will result in an increase of 2,477.62 MT CO_2e/yr. The proposed project emissions level of MT CO_2e/yr is less than the SCAQMD Tier 3 threshold of 3,000 MT CO_2e/yr for commercial projects and 10,000 MT CO_2e/yr for industrial projects; thus, project-level and cumulative GHG emissions will be less than significant. Therefore, the proposed project will not generate greenhouse gas emissions which will have a significant impact on the environment. Associated impacts will be **less than significant**, and no mitigation is required.

As stated previously, this analysis considers GHG emission significance by determining the proposed project's consistency with the policies and goals in the Riverside RRG-EPAP and RRG-CAP. As discussed in checklist response 7b, below, the project will be consistent with the strategies and goals from the RRG-CAP and will not conflict with or impede the implementation of reduction goals identified in Assembly Bill (AB) 32, the Governor's Executive Order (EO) S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor. Implementation of reduction goals identified in the Riverside RRG-CAP, AB 232, the EO S-3-05, and other strategies to help reduce GHGs will ensure project impacts related to greenhouse gas emissions will remain **less than significant.** No mitigation is required.

To ensure the proposed project complies with and will not conflict with or impede the implementation of reduction goals identified in the Riverside RRG-CAP, AB 32, the EO S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor, the project will implement a variety of measures that will reduce its GHG emissions. To the extent feasible, and to the satisfaction of the City of Riverside (City), the following measures will be incorporated into the design and construction of the project:

Construction and Building Materials.

- Use locally produced and/or manufactured building materials for at least 10 percent of the construction materials used for the project.
- Recycle/reuse at least 50 percent of the demolished and/or grubbed construction materials (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard) if feasible.
- Use "green building materials," such as those materials that are resource-efficient and are recycled and manufactured in an environmentally friendly way, for at least 10 percent of the project.

Energy Efficiency Measures.

- Design all project buildings to meet or exceed the California Building Code's (CBC) Title 24 energy standard, including, but not limited to, any combination of the following:
  - Increase insulation such that heat transfer and thermal bridging is minimized;
  - Limit air leakage through the structure or within the heating and cooling distribution system to minimize energy consumption; and
  - Incorporate ENERGY STAR® or better rated windows, space heating and cooling equipment, light fixtures, appliances, or other applicable electrical equipment.
- Install efficient lighting and lighting control systems. Use daylight as an integral part of the lighting systems in buildings.
- Install "cool" roofs and cool pavements.
- Install energy-efficient heating and cooling systems, appliances and equipment, and control systems.
- Install solar lights or light-emitting diodes (LEDs) for outdoor lighting or outdoor lighting that meets the City Code.
- Exterior windows shall utilize window treatments for efficient energy conservation.

Water Conservation and Efficiency Measures.

- Devise a comprehensive water conservation strategy appropriate for the project and its location. The strategy may include the following, plus other innovative measures that may be appropriate:
  - Create water-efficient landscapes within the development.
  - Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

- Use reclaimed water, if available, for landscape irrigation within the project. Install the infrastructure to deliver and use reclaimed water, if available.
- Design buildings to be water-efficient. Install water-efficient fixtures and appliances, including low-flow faucets and waterless urinals.
- Restrict watering methods (e.g., prohibit systems that apply water to non-vegetated surfaces) and control runoff.

Solid Waste Measures.

- To facilitate and encourage recycling to reduce landfill-associated emissions, among others, the project will provide trash enclosures that include additional enclosed area(s) for collection of recyclable materials. The recycling collection area(s) will be located within, near, or adjacent to each trash and rubbish disposal area. The recycling collection area will be a minimum of 50 percent of the area provided for the trash/rubbish enclosure(s) or as approved by the Solid Waste Division of the Public Works Department of the City of Riverside.
- Provide employee education on waste reduction and available recycling services.

Transportation Measures.

- To facilitate and encourage non-motorized transportation, bicycle racks shall be provided in convenient locations to facilitate bicycle access to the project area. The bicycle racks shall be shown on project landscaping and improvement plans submitted for Planning Division approval and shall be installed in accordance with those plans.
- Provide pedestrian walkway and connectivity requirements.

With implementation of the reduction goals identified above, the proposed project will not conflict with or impede implementation of AB 32, EO S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor. Therefore, the proposed project will not generate greenhouse gas emissions that will have a significant impact on the environment. Associated impacts will be **less than significant,** and no mitigation is required.

b. Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

7b. Response: ***(Source: Appendix A – Air Quality and Greenhouse Gas Analysis and Health Risk Assessment,*** *Title 19 – Article VIII – Chapter 19.570 – Water Efficient Landscaping and Irrigation.****)***

Less Than Significant Impact. As discussed in checklist response 7a, above, the City adopted its Riverside Restorative Growthprint (RRG) Economic Prosperity Action Plan (RRG-EPAP) and Climate Action Plan (RRG-CAP) in January 2016. This analysis considers GHG emission significance by determining the proposed project's consistency with the policies and goals in the Riverside RRG-EPAP and RRG-CAP. Table 7.C lists the applicable strategies and goals from the RRG-CAP and indicates how the proposed project achieves compliance.

Table 7.C: Project Compliance with Greenhouse Gas Emission Reduction Strategies

Strategy	Project Compliance
Energy Efficiency Measures	
Measure SR-2: 2013 California Building Energy Efficiency Standards (Title 24, Part 6). Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts including new technologies, and new policy and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California (including both investor-owned and publicly owned utilities). **Green Building Strategy.** Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.	**Compliant.** The proposed project will comply with the requirements of Measure SR-2: 2016 California Building Energy Efficiency Standards (Title 24, Part 6) including measures to incorporate energy-efficient building design features. The proposed project will incorporate modestly enhanced window and rigid wall insulation, as well as cool roof design, in the construction of the proposed warehouse. Additionally, the proposed project will incorporate energy-efficient heating and cooling systems, daylighting, energy-efficient lightbulbs, and Energy Star-rated appliances where applicable.
Water Conservation and Efficiency Measures	
Water Use Efficiency. Reduce per capita water use by 20% by 2020. SB X7-7 is part of a California legislative package passed in 2009 that requires urban retail water suppliers	**Compliant.** The proposed project will comply with the requirements of *Title 19 – Article VIII – Chapter 19.570*

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

to reduce per-capita water use by 10% from a baseline level by 2015, and to reduce per-capita water use by 20% by 2020. Green accountability performance (GAP) Goal 16 directly aligns with SB X7-7. In Southern California, energy costs and GHG emissions associated with the transport, treatment, and delivery of water from outlying regions are high. Therefore, the region has extra incentive to reduce water consumption. While this is considered a state measure, it is up to the local water retailers, jurisdictions, and water users to meet these targets. The City of Riverside requires private development projects with a landscape area equal to or greater than 2,500 square feet to comply with *Title 19 – Article VIII – Chapter 19.570 – Water Efficient Landscaping and Irrigation*.	– *Water Efficient Landscaping and Irrigation*, including measures to increase water use efficiency. Water-efficient irrigation systems and devices and drought-tolerant landscaping will be installed on the project site.
Solid Waste Reduction Measures	
Construction and Demolition Waste Diversion. Meet mandatory requirement to divert 50% of C&D waste from landfills by 2020 and exceed requirement by diverting 90% of C&D waste from landfills by 2035. Effective July 1, 2014, CALGreen, the state's Green Building Standards Code, requires jurisdictions to divert a minimum of 50% of their nonhazardous C&D waste from landfills. Reductions for the year 2020 assume that 100% of new construction and applicable retrofit projects meet the minimum diversion rates established by the State. For 2035, this measure assumes that C&D waste diversion will increase to 90% for new construction and retrofit projects. This increase is in line with GAP Goal 6.A which aims to develop measures to encourage that a minimum of 90% of recoverable waste from all construction sites be recycled throughout Riverside by 2015, beginning with 40% in 2010 and increasing by 10% each year thereafter.	**Compliant.** The project will comply with Measure SR-13: Construction and Demolition Waste Diversion. At least 50 percent of the demolished and/or grubbed construction materials (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard) will be reused/recycled.
Transportation and Motor Vehicle Measures	
Pavley and Low Carbon Fuel Standard (LCFS). ARB identified this measure as a Discrete Early Action Measure. This measure would reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. **Vehicle Aerodynamic and Hybridization.** Aerodynamic efficiency measures for HD trucks pulling trailers 53 feet or longer that include improvements in trailer aerodynamics and use of rolling resistance tires were adopted in 2008 and went into effect in 2010. Future, yet to be determined improvements, includes hybridization of medium duty and heavy duty trucks.	**Compliant.** The project does not involve the manufacture, sale, or purchase of vehicles. However, vehicles that operate within and access the project site will comply with Pavley and Low Carbon Fuel Standard. Medium duty and heavy duty trucks and trailers working from the proposed warehouse will be subject to aerodynamic and hybridization requirements as established by ARB; no feature of the project will interfere with implementation of these requirements and programs.

Source: Air Quality and Greenhouse Gas Analysis and Health Risk Assessment (Appendix A)
ARB = California Air Resources Board GHG = greenhouse gas

Through compliance with the policies and goals of the Riverside RRG-EPAP and RRG-CAP, the GHG impacts related to conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHG will be **less than significant. N**o mitigation is required.

8. HAZARDS & HAZARDOUS MATERIALS. Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐

8a. Response: ***(Source: Appendix E – Phase I Environmental Site Assessment, California Health and Safety Code, Title 49 of the Code of Federal Regulations)***

Less Than Significant Impact. The proposed project will result in the construction of light industrial uses. Potential hazardous materials such as fuel, paint products, lubricants, solvents, and cleaning products may be used and/or stored on site during the construction and/or occupancy of the proposed project. However, due to the limited quantities of these materials to be used by the proposed project, they are not considered hazardous to the public at large. In accordance with the City's Hazardous Materials Policy, the transport, use, and storage of hazardous materials during the construction and operation of the site will be conducted pursuant to all applicable local, state and federal laws, and in cooperation with the County's Department of Environmental Health.

The project may involve the use of hazardous materials but shall comply with all applicable federal, state, and local laws and regulations pertaining to the transport, use, disposal, handling, and storage of hazardous waste, including but not limited to Title 49 of the Code of Federal Regulations implemented by Title 13 of the CCR, which describes strict regulations for the safe transportation of hazardous materials. Compliance with all applicable federal, state, and local laws related to the transportation, use and storage of hazardous materials will reduce the likelihood and severity of accidents during transit, use, and storage.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

As required by California Health and Safety Code Section 25507, a business shall establish and implement a Hazardous Materials Business Emergency Plan for emergency response to a release or threatened release of a hazardous material in accordance with the standards prescribed in the regulations adopted pursuant to Section 25503 if the business handles a hazardous material or a mixture containing a hazardous material that has a quantity at any one time above the thresholds described in Section 25507(a) (1) through (6).

Compliance with all applicable local, state, and federal laws, including but not limited to Title 49 of the Code of Federal Regulations implemented by Title 13 of the CCR, as well as Health and Safety Code Section 25507, will ensure a **less than significant** impact from the routine transport, use, or disposal of hazardous materials. No mitigation is required.

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐

8b. Response: ***(Source: Appendix E – Phase I Environmental Site Assessment,*** *United States Environmental Protection Agency - Resource Conservation and Recovery Act Information Database, https://www3.epa.gov/enviro/facts/rcrainfo/search.html, Website accessed December 19, 2016. California Regional Water Quality Control Board - GeoTracker Database, http://geotracker.waterboards.ca.gov/, Website accessed December 19, 2016.****)***

Less Than Significant Impact. A Phase I Environmental Site Assessment (ESA) was completed for a 9.6-acre parcel which encompasses the 5.9-acre project site. The project site consisted of vacant land at the time of the Phase I ESA, containing end dumped fill consisting of concrete and asphalt, but historically was used for agriculture. A concrete slab associated with an aboveground fuel tank and composite shingles possibly containing asbestos were identified on the southern half of the 9.6-acre parcel as part of the Phase I ESA, but these items were located south of the subject 5.9-acre project site on the adjacent parcel, which is already developed with light industrial uses. Due to the proposed light industrial uses of the project site, no adverse environmental impacts are anticipated from previous agricultural uses (Appendix E).

The Phase I ESA concluded no hazardous materials were located on the subject 5.9-acre project site (Appendix E). On August 31, 2016, LSA inspected the project site to assess if any on-site changes had occurred since development of the Phase I ESA. The project site consists of disked land, sparsely vegetated, and subject to perennial weed abatement. No structures or structural foundations were observed on the project site, but the western half of the project site is currently used as a storage yard for vehicle and construction equipment. Soil staining and/or foul odors were not observed.

According to the Phase I ESA, the Resource Conservation and Recovery Act Information System (RCRIS) list of large- and small-quantity hazardous waste generators listed two facilities within one-eighth of a mile from the project site. The two sites are the ER Carpenter Company at 7809 Lincoln Avenue and the Supreme Truck Bodies of California at 7888 Lincoln Avenue. According to the Phase I ESA, both listed sites are small-quantity generators located at or below gradient to the project site and will not adversely impact the project site (Appendix E). A subsequent search of the RCRIS database revealed these sites are no longer listed in the RCRIS database.

According to the Phase I ESA, the California Regional Water Quality Control Board (CRWQCB) lists four sites with leaking underground storage tanks (LUSTs) within one-half mile of the project site (Appendix E). These include:

1. Riverside City Corporate Yard at 8095 Lincoln Avenue; status is not confirmed.
2. California Highway Patrol at 8118 Lincoln Avenue; status is case closed.
3. Topham and Sons at 3245 Madison Street; status is not confirmed.
4. City of Riverside Training Tower at 3205 St. Lawrence Street; status is case closed.

The above LUST sites are at or below gradient to the project site and, according to the Phase I ESA, no adverse environmental impacts to the project site are anticipated from the above LUST sites due to their distance from the project site (Appendix E). A subsequent search of the CRWQCB GeoTracker database reveals each of these four sites contains a *completed-case closed* cleanup status regulatory profile (California Regional Water Quality Control Board 2016).

Compliance with local, State, and federal laws will reduce impacts from reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment to **less than significant** levels. No mitigation is required.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐

8c. Response: ***(Source: General Plan 2025 Public Safety Element and Education Element, Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.7-D – CalARP RMP Facilities in the Project Area, Figure 5.13-2 – RUSD Boundaries, Table 5.13-D RUSD Schools, Figure 5.13-3 AUSD Boundaries, Table 5.13-E AUSD Schools, Figure 5.13-4 – Other School District Boundaries, California Health and Safety Code, Title 49 of the Code of Federal Regulations, California Building Code)***

Less Than Significant Impact. According to the General Plan 2025 Education Element (Figure E-1) the nearest school (classified as "other school") to the project site is the Corona-College Heights Orange & Lemon Association located off Jefferson Street and Lincoln Avenue approximately 0.1 mile west of the project site. An additional school located less than one-quarter mile of the project site is Casa Blanca Preschool approximately 0.24 mile northeast of the project site. The City does not have jurisdiction with respect to the location, design, or construction of school facilities. However, the City works with the Riverside Unified School District concerning the design of roads and other public improvements in and around school sites, and is responsible for fire, police, and public safety concerns involving all facilities within the City, including schools.

Warehousing and other light industrial uses currently exist north, west, and south of the proposed project. The proposed project will consist of light industrial uses consistent with the General Plan 2025 land use designation of Business/Office Park (B/OP) and City Zoning designation of Business and Manufacturing Park Zone (BMP), and the proposed project uses are commensurate with the surrounding land uses, which are industrial in nature. The amount and type of hazardous materials that will be used during project construction is unknown at this time. Although construction and operation of the proposed project is not expected to utilize acutely hazardous materials, the possibility exists that such materials could be stored or transported to and from the project site. For the purposes of this analysis, it is assumed the proposed project will not handle substances that may be acutely hazardous. However, the handling of hazardous materials or emission of hazardous substances, if present, will be in accordance with a Hazardous Materials Business Emergency Plan administered by the City Fire Prevention Bureau, as applicable, in accordance with California Health and Safety Code Section 25507 and other local, state, and federal standards, ordinances, and regulations.

As required by Health and Safety Code Section 25507, a business shall establish and implement a Hazardous Materials Business Emergency Plan for emergency response to a release or threatened release of a hazardous material in accordance with the standards prescribed in the regulations adopted pursuant to Section 25503 if the business handles a hazardous material or a mixture containing a hazardous material that has a quantity at any one time above the thresholds described in Section 25507(a) (1) through (6).

Compliance with Health and Safety Code Section 25507 will ensure that impacts associated with environmental and health hazards related to an accidental release of hazardous materials or emissions of hazardous substance near existing or proposed schools are **less than significant**. No mitigation is required.

d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

8d. Response: ***(Source: General Plan 2025 Figure PS-5 – Hazardous Waste Sites, Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.7-A – CERCLIS Facility Information, Figure 5.7-B – Regulated Facilities in TRI Information and 5.7-C – DTSC EnviroStor Database Listed Sites)***

No Impact. According to the City's General Plan (Figure PS-5) and Phase I ESA encompassing the 5.9-acre project site**,** the project site is not included on any list of hazardous materials sites pursuant to Government Code Section 65962.5 (Appendix E). Therefore, **no impact** related to this issue will occur and no mitigation is required.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☒	☐

8e. Response: ***(Source: General Plan 2025 Figure PS-6 – Airport Safety Zones and Influence Areas, Riverside County Airport Land Use Compatibility Plan, and March Air Reserve Base/March Inland Port Comprehensive Land Use***

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Plan (1999))

Less Than Significant Impact. The project site is located in Zone E of the Riverside Municipal Airport Land Use Plan, which has the fewest restrictions on proposed land uses. General restrictions in Zone E include airspace review for objects greater than 100 feet tall, discouragement of major spectator-oriented sports stadiums, amphitheaters, and concert halls, and other hazards to flight such as tall objects, electronic forms of interference, and land uses that may attract birds. The proposed project consists of industrial uses and is consistent with the allowable land uses and intensities of Zone E. Therefore, the project does not include any features that are considered a hazard to flight or are not allowed in Zone E. Impacts to people residing and/or working on the project site are **less than significant**. No mitigation is required.

f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒

8f. Response: ***(Source: General Plan 2025 Figure PS-6 – Airport Safety Zones and Influence Areas, Riverside County Airport Land Use Compatibility Plan)***

No Impact. The project site is not located in the vicinity of a private airstrip. Therefore, the project will have **no impact** related to the safety of people near private airstrips. No mitigation is required.

g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐

8g. Response: ***(Source: City of Riverside Emergency Operations Plan - January 2011. Traffic Engineering Section of the City of Riverside Public Works Department, The Press Enterprise - Local News - Police Adjust Patrol Areas - December 29, 2016)***

Less Than Significant Impact. The proposed project will be constructed and operated in accordance with the City's Emergency Operations Plan to ensure a coordinated and effective planned response by the City Police and Fire Departments to extraordinary emergency situations and disasters. As part of the City's plan review process, the proposed project will implement a Public-Safety Radio Amplification System in accordance with City Municipal Code, Section 16.36.010 to 16.36.090 which will be subject to inspection and approval by the City Police Department in connection with the City Fire Department. Additionally, the proposed project will include a C10 fire alarm, a "Knox" key system at the perimeter gate, and an "Infrared Automatic Gate System" to ensure immediate fire department access to the project site in the event of an emergency.

As of December 1, 2016, the Riverside Police Department (RPD) realigned its Neighborhood Policing Centers, or Beats, from four geographical service areas (north, east, west, and central) to Beat 1 through Beat 5. Each Beat is assigned a Lieutenant Area Commander to oversee the daily policing needs of the community. Prior to the realignment, the proposed project was within the Central Beat, which spanned from the Santa Ana River to the southern City boundary and from Tyler Street to Alessandro Boulevard. However the Beat realignment places the proposed project within Beat 4, which is approximately fifteen percent smaller in area compared to the previous Central Beat. The smaller patrol area is expected to improve police response times, and the closest officers will respond to major incidents regardless of which Beat they are patrolling. Beat 4 is served by the RPD Lincoln Avenue Station located at 8181 Lincoln Avenue, less than one-half mile west of the project site.

As part of the proposed project's construction, a temporary street closure may be necessary, but if necessary will be of short duration so as not to interfere or impede with any emergency response or evacuation plan. Prior to issuance of a construction permit, , the developer will submit a Traffic Control Plan to the City Public Works Department that will provide appropriate measures to facilitate the passage of persons and vehicles through/around any required road closures as part of the City's plan review process. Adherence to these measures will reduce potential impacts related to this issue to **less than significant** levels. No mitigation is required.

h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

8h. Response: ***(Source: General Plan 2025 Figure PS-7 – Fire Hazard Areas, GIS Map Layer VHFSZ 2010, City of Riverside's EOP 2002, Riverside Operational Area – Multi-Jurisdictional LHMP 2004 Part 1/Part 2 and OEM's Strategic Plan)***

No Impact. The project site is not in or near a fire hazard zone. Therefore, the project will have **no impact** with regard to

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
wildland fires. No mitigation is required.				
9. HYDROLOGY AND WATER QUALITY. Would the project:				
a. Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐

9a. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.8-A – Beneficial Uses Receiving Water, Appendix F – Water Quality Management Plan, Appendix G – Infiltration Report)***

Less Than Significant Impact. The proposed project is located on a 5.9-acre property within the Santa Ana River Watershed. The project site is undeveloped. Ninety percent of the project site is graded, earthen ground surface and 10 percent is impervious asphalt driveway and parking lot. The proposed project consists of the construction of a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet) and will involve site clearing, rough grading and compaction, pouring of concrete and asphalt, and construction of a single structure. The project site clearing and grading phases will disturb vegetation and surface soils, potentially resulting in erosion and sedimentation. If left exposed and with no vegetative cover, the project site's bare soil could be subject to additional wind and water erosion. Since the proposed project involves over one acre of ground disturbance, it is subject to National Pollution Discharge Elimination System (NPDES) requirements and must implement a Storm Water Pollution Prevention Plan (SWPPP). Implementation of site-specific best management practices (BMPs), as established by the SWPPP, will ensure all impacts related to erosion and sedimentation from ground disturbance are less than significant.

Under existing conditions, the project site drains in a northwesterly direction toward Lincoln Avenue where runoff enters a city storm drain leaving the site. The proposed project will maintain the existing drainage pattern from the southeast to the northwest corner but will direct flows to proposed bioretention facilities located in the landscape setback fronting Lincoln Avenue and through permeable pavement proposed in the southern and western portions of the project site. Each sump has an infiltration/ bioretention facility for treatment with an overflow/outlet storm drain that will connect and discharge to the existing city storm drain in the northwest corner. To address potential water contaminants, the project is required to comply with applicable federal, state, and local water quality regulations in accordance with the project-specific NPDES and SWPPP. Given compliance with all applicable federal, state, and local laws regulating surface water quality, the proposed project as designed will result in a **less than significant** impact to any water quality standards or waste discharge. No mitigation is required.

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐

9b. Response: ***(Source: General Plan 2025, General Plan 2025 Figure LU-10 – Land Use Policy Map, Table LU-5 – Zoning/General Plan Consistency Matrix, Table PF-1 – Riverside Public Utilities (RPU) Projected Domestic Water Supply (AC-FT/YR), Table PF-2 – RPU Projected Water Demand, RPU Map of Water Supply Basins, RPU Urban Water Management Plan, Riverside General Plan and Supporting Documents Environmental Impact Report Page 5.16-33, Table 5.16-E – RPU Projected Domestic Water Supply (AC-FT/YR), Table 5.16-F – RPU Projected Water Demand, Table 5.16-G – General Plan Projected Water Demand for RPU Including Water Reliability for 2025, Table 5.16-H – Current and Projected Domestic Water Supply (AC-FT/YR) Western Municipal Water District, Table 5.16-I – Current and Projected Water Use for Western Municipal Water District, Table 5.16-J – General Plan Projected Water Demand for Western Municipal Water District Including Water Reliability 2025, Figure 5.16-4 – Water Facilities, and Figure 5.16-6 – Sewer Infrastructure and Wastewater Integrated Master Plan and Certified EIR, Title 19 – Article VIII – Chapter 19.570 – Water Efficient Landscaping and Irrigation.)***

Less Than Significant Impact. The proposed project is located within the Riverside South Water Supply Basin. The proposed project site has been designed to maximize the landscape areas, thereby minimizing the impervious area to the maximum extent possible. The project site is proposing an 88 percent impervious ratio, which is lower than the 90 percent impervious ratio typical of commercial and light-industrial developments. Runoff from the site will disperse into infiltration/bioretention facilities located in the landscape setback fronting Lincoln Avenue and through permeable pavement proposed in the southern and western portions of the project site prior to discharging into the city storm drain.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Projected domestic water demand in the City is expected to increase from 77,767 acre-feet per year in 2005 to 99,835 acre-feet per year in 2025 in normal water years, and Riverside Public Utilities anticipates a water supply of 112,671 acre-feet per year in the year 2025 with a projected water surplus of approximately 12,836 acre-feet per year[3] under a Typical Growth Scenario. During single dry year conditions, supply is expected to exceed demand by 9,528 acre-feet, and under multiple dry year conditions, supply is expected to exceed demand by 14,786 acre feet. According to the Riverside General Plan and Supporting Documents Environmental Impact Report, Riverside Public Utilities would adequately serve the City under a Typical Growth Scenario through 2025 but may not meet the estimated water demand for Maximum build-out or Maximum build-out with Planned Residential Development without purchasing excess water from the Western Municipal Water District, which is expected to have 123,784 acre-feet annually to sell to other agencies like Riverside Public Utilities. Although water supply may be available for purchase from the Western Municipal Water District under Maximum build-out or Maximum build-out with Planned Residential Development scenarios, the Riverside Public Utilities currently does not have contracts to purchase excess water from the Western Municipal Water District, and new or expanded entitlements would be needed in the unlikely event population levels grew to Maximum build-out or Maximum build-out with Planned Residential Development levels.

The General Plan 2025 land use designation for the project site is Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park (BMP) Zone. The proposed project is consistent with the City General Plan 2025 and Zoning Ordinance. Since the proposed project consists of a speculative warehouse, the actual uses of the proposed warehouse facilities, and therefore the amount of employment generated, could vary depending on the building occupants. Based on the Institute of Transportation Engineers (ITE) *Trip Generation* (9th Edition, Pages 193 and 203) rates for Land Use 150 – "Warehousing," the proposed project will create approximately 93 jobs.[4] However, since the proposed project is a speculative warehouse, the worst-case scenario for the proposed project would be to assume a more intense land use under the ITE *Trip Generation* using rates for Land Use 110 – "General Light Industrial," (ITE *Trip Generation*, 9th Edition: Pages 93 and 102), which indicates the proposed project will create approximately 233 jobs.[5] Therefore, the proposed project is expected to generate between 93 and 233 new jobs depending on the ultimate use of the proposed warehouse facilities.

The potential exists for the proposed project to result in temporary population growth in the City through construction employment opportunities; however, the proposed uses are consistent with the General Plan 2025 and zoning ordinance, so no significant permanent population increase is expected as a result of the proposed project. As a result, the proposed project will not induce a population increase above that which has been planned for by the City, and the proposed project will remain consistent with the Typical Growth Scenario of the General Plan 2025 where future water supply was determined to be adequate (see Tables 5.16-E, 5.16-F, 5.16-G, 5.16-H, 5.16-I and 5.16-J of the Riverside General Plan and Supporting Documents Environmental Impact Report).

The proposed project will utilize water conservation project design features such as low-flush toilets, low-flow faucets, and native and drought-tolerant landscaping in compliance with the City's Water Efficient Landscape Ordinance (WELO, RMC 19.570). Furthermore, the proposed project is required to comply with all NPDES regulations, which will further ensure the project will not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. Therefore, the proposed project will result in a **less than significant** impact to groundwater supplies and recharge. No mitigation is required.

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☒	☐	☐
d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☒	☐	☐

9c-d. Response: ***(Source: Appendix F – Water Quality Management Plan, Appendix G – Infiltration Report)***

Less Than Significant With Mitigation Incorporated. The proposed project is subject to NPDES requirements, as well as preparation and implementation of a SWPPP for the prevention of runoff during construction activities since it includes more than

[3] 112,671 acre-feet per year (projected 2025 supply) – 99,835 acre-feet per year (projected 2025 demand) = 12,836 acre-feet per year (projected 2025 surplus).

[4] Average 3.56 daily vehicle trips per 1,000 square feet gross floor area and average 3.89 daily vehicle trips per employee. 3.56 ÷ 3.89 = 0.92 employee per 1,000 square feet gross floor area. 0.92 × 100.974 = 93 employees.

[5] Average 6.97 daily vehicle trips per 1,000 square feet gross floor area and average 3.02 daily vehicle trips per employee. 6.97 ÷ 3.02 = 2.308 employee per 1,000 square feet gross floor area. 2.308 × 100.974 = 233 employees.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

one acre of disturbance. No existing streams or rivers exist on the project site, and the existing project site does not have any features or facilities promoting infiltration except that which occurs as runoff surface flows across the barren dirt to existing storm drain facilities northwest of the project site. According to the project-specific Water Quality Management Plan (WQMP) the proposed sump condition basins, to which the project site is designed to direct flow, will infiltrate the maximum volume of runoff feasible and will fully address all drainage management areas (Appendix F).

Under existing conditions, the project site drains in a northwesterly direction over surface soils towards Lincoln Avenue where runoff enters a city storm drain leaving the site. According to the project-specific infiltration report, the existing project site consists of class B soils with a relatively high silt content and generally poor infiltration rate (Appendix G). The proposed project will maintain the existing drainage pattern from the southeast to the northwest corner but will direct flows to proposed bioretention facilities located in the landscape setback fronting Lincoln Avenue and through permeable pavement proposed in the southern and western portions of the project site. Each sump has an infiltration/bioretention facility for treatment with an overflow/outlet storm drain that will connect and discharge to the existing city storm drain in the northwest corner. Due to the poor infiltration rate of the existing on-site soils, a design infiltration rate of 1.0 inch per hour is required for the proposed sump condition basins located in the landscape setback fronting Lincoln Avenue.

Mitigation Measures: Implementation of **Mitigation Measure HYD-1** will identify the soil classification at the base of the proposed sump condition basins to ensure they correspond with those identified in the project-specific infiltration report (Appendix G) and the proposed bioretention facilities are adequate for addressing drainage conditions at all drainage management areas.

Mitigation Measure HYD-1: **Drainage Management Areas:** The project applicant or its designee shall ensure a representative from the geotechnical engineer is on-site during construction of the proposed bioretention/ infiltration system to identify the soil classification at the base of the proposed bioretention/ infiltration system and confirm the soils present correspond to those presented in the infiltration report. This will ensure the performance of the sump condition basins will be consistent with the rates reported in the infiltration report (1.0 inch per hour). Further coordination with the project civil engineer will be required if soils at the base of the proposed bioretention/infiltration system do not correspond to soils presented in the infiltration report.

The proposed bioretention/infiltration system must be designed by the project civil engineer in accordance with the City and/or Riverside County guidelines. The project civil engineer must apply an appropriate factor of safety and design the system to be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. This measure shall be implemented to the satisfaction of the City of Riverside.

Implementation of **Mitigation Measure HYD-1** will ensure the drainage pattern of the project site does not result in substantial erosion and/or siltation on- or off-site or substantially increase the rate or amount of surface runoff in a manner that will result in flooding on- or off-site. Therefore, the project will have a **less than significant** impact to existing drainage patterns.

e. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	☐	☒	☐	☐
f. Otherwise substantially degrade water quality?	☐	☒	☐	☐

9e-f. Response: ***(Source: Appendix F – Water Quality Management Plan, Appendix G – Infiltration Report)***

Less Than Significant With Mitigation Incorporated. The project is over one acre in size and is required to comply with the State's General Permit for Construction Activities (SWPPP). As stated in the permit, during and after construction, best management practices (BMPs) will be implemented to reduce/eliminate adverse water quality impacts resulting from development. All impacts related to runoff during site preparation, demolition, and grading will be addressed by the SWPPP. The site has been designed to maximize the landscape areas, thereby minimizing the impervious area to the maximum extent practicable. The project is proposing an 88 percent impervious ratio, which is lower than the 90 percent impervious ratio typical of commercial and light-industrial developments. Runoff from the site will disperse into infiltration/bioretention facilities located in the landscape setback fronting Lincoln Avenue and through permeable pavement proposed in the southern and western portions of the project site prior to discharging into the city storm drain.

According to the project-specific WQMP, the proposed sump condition basins to where the project site is designed to direct flow

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

will infiltrate the maximum volume of runoff feasible and will fully address all drainage management areas; Low Impact Development (LID) Principles and LID BMPs have been incorporated into the project design to ensure the design capture volume of the proposed treatment facilities is sufficient (Appendix F). Further, implementation of **Mitigation Measure HYD-1** will ensure the performance of the sump condition basins will be consistent with the rates reported in the infiltration report (1.0 inch per hour).

Any sources of storm water pollution will be mitigated through adherence to NPDES permit requirements, and implementation of **Mitigation Measure HYD-1** will ensure the proposed project will not create or contribute runoff water exceeding capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. For these reasons, there will be a **less than significant** impact from storm water exceeding the capacity of existing or planned storm water drainage systems, substantial additional sources of polluted runoff, or other sources of water quality degradation.

g. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒

9g. Response: ***(Source: General Plan 2025 Figure PS-4 – Flood Hazard Areas, and FEMA Flood Hazard Map Number 06065C0720G)***

No Impact. The project does not involve the construction of housing. There will be **no impact** caused by this project, as it will not place housing within a 100-year flood hazard area. No mitigation is required.

h. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒

9h. Response: ***(Source: General Plan 2025 Figure PS-4 – Flood Hazard Areas, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.8-2 – Flood Hazard Areas, FEMA Flood Hazard Number 06065C0720G)***

No Impact. The project site is not located within a 100-year flood hazard area as depicted on the *Riverside General Plan and Supporting Documents Environmental Impact Report* Figure 5.8-2 – Flood Hazard Areas and the National Flood Insurance Rate Map (Map Number 06065C0720G, Effective Date August 28, 2008). Therefore, the project will not place a structure within a 100-year flood hazard area that would impede or redirect flood flows. **No impact** will occur and no mitigation is required.

i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☒	☐

9i. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.8-2 – Flood Hazard Areas, and FEMA Flood Hazard Number 06065C0720G, City Municipal Code, Title 18 – Subdivision Code, Chapter 18.210 – Development Standards, Section 18.210- 100 – Flood Prone Lands and Drainage, Title 16 – Buildings & Construction, Chapter 16.18 – Flood Hazard Area & Implementation of Natural Flood Insurance Program, and State Civil Code Section 1103 through 1103.4)***

Less Than Significant Impact. Prenda Dam is located approximately two miles southeast of the project site, placing the project site partially within the Prenda Dam inundation area. Therefore, the proposed project may expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, as depicted on the *Riverside General Plan and Supporting Documents Environmental Impact Report* Figure 5.8-2 – Flood Hazard Areas. In the event of a dam failure, first flow waters are expected to reach the site in 20 minutes.

The City Municipal Code, Title 18 – Subdivision Code, Section Chapter 18.210 – Development Standards, Section 18.210-100 – Flood Prone Lands and Drainage, and Title 16 – Buildings & Construction, Chapter 16.18 Flood Hazard Area & Implementation of National Flood Insurance Program requires new construction located within flood hazard areas to mitigate flood hazards by including on-site drainage, anchoring methods to prevent floating structures, elevating buildings above flood levels, and flood proofing, which requires buildings to be inspected and certified by a professional engineer, surveyor or building inspector. The proposed project will be conditioned to meet these requirements, including compliance with State Civil Code Section 1103 through 1103.4 requiring notification to those potentially affected of the risk involved in locating within a flood hazard or dam inundation area. These requirements will be confirmed through the City's plan review process. Therefore, through compliance with City Municipal Code and State Civil Code, impacts from placing a structure within an area that would expose people or

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
structures to a significant risk of loss, injury, or death as a result of the failure of a levee or dam will be **less than significant**. No mitigation is required.				
j. Expose people or structures to inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
9j. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Chapter 7.5.8 – Hydrology and Water Quality)***				
No Impact. Tsunamis are large waves that occur in coastal areas. Since the City is not located in a coastal area, **no impact** from inundation by tsunami will occur. The proposed project site and its surroundings have generally flat topography and are within an urbanized area not within proximity to Lake Mathews, Lake Evans, the Santa Ana River, Lake Hills, Norco Hills, Box Springs Mountain Area or any of the nine arroyos that traverse the City and its sphere of influence. Therefore, **no impact** from inundation by seiche or mudflow will occur. No mitigation is required.				
10. LAND USE AND PLANNING. Would the project:				
a. Physically divide an established community?	☐	☐	☒	☐
10a. Response: ***(Source: General Plan 2025 Land Use and Urban Design Element Figure LU-10– Land Use Policy Map, Zoning Map of the City of Riverside, City of Riverside GIS/CADME Map Layers)***				
Less Than Significant Impact. The project site is located within the General Plan 2025 land use designation Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park Zone (BMP). The proposed project consists of light industrial uses consistent with the existing General Plan 2025 land use designation and City zoning designation. Additionally, the proposed project is commensurate with the surrounding land uses to the northwest, south, and west, which are light industrial in nature. Therefore, the proposed project will integrate uniformly with the established light industrial uses surrounding the project site on three sides. The proposed project will be served by fully improved public streets and other infrastructure and does not involve the subdivision of land or the creation of streets that could alter the existing surrounding pattern of development or established community. Therefore, a **less than significant** impact will occur to established communities from the proposed project. No mitigation is required.				
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
10b. Response: ***(Source: General Plan 2025 Figure LU-10 – Land Use Policy Map, Table LU-5 – Zoning/General Plan Consistency Matrix, Figure LU-7 – Redevelopment Areas, Zoning Map of the City of Riverside, Title 18 – Subdivision Code, Title 7 – Noise Code, Title 17 – Grading Code, Title 20 – Cultural Resources Code, Title 16 – Buildings and Construction and Citywide Design and Sign Guidelines)***				
No Impact. The project site is located within the General Plan 2025 land use designation Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park Zone (BMP). The proposed project consists of light industrial uses consistent with the existing General Plan 2025 land use designation and City zoning designation. Additionally, the proposed project is consistent with the surrounding land uses on three sides, which are light industrial in nature. Warehousing and other light industrial uses currently exist north, west, and south of the proposed project; therefore, the proposed project will integrate uniformly with the established light industrial land uses surrounding the project site. Furthermore, the proposed project is not located within other plan areas and it is not a project of statewide, regional or area-wide significance. For these reasons, this project will have **no impact** on an applicable land use plan, policy, or regulation. No mitigation is required.				
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☒	☐	☐
10c. Response: ***(Source: Regional Conservation Authority, http://wrcrca.maps.arcgis.com/apps/webappviewer/index.html?id=2ba3285ccc8841ed978d2d825e74c5fa website accessed September 14, 2016, General Plan 2025 – Figure OS-7 – MSHCP Core and Linkage, Appendix B – MSHCP Consistency Analysis and Habitat Assessment)***				

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Less Than Significant With Mitigation Incorporated. The project site is located within the Cities of Riverside and Norco Area Plan area of the Western Riverside Multiple Species Habitat Conservation Plan (MSHCP), but is not located within a Criteria Area or adjacent to a Criteria Area or Conservation Area. Thus, the project will have no effect on Criteria Areas, and the project is not subject to the Urban/Wildlands Interface Guidelines of the MSHCP. As detailed previously in Figure 4, the project site is within the MSHCP survey areas for the burrowing owl, and results of the burrowing owl habitat assessment (Appendix B) are discussed in detail in checklist response 4a.

A habitat suitability assessment (HSA) for burrowing owl was conducted on August 11, 2016 (Appendix B). The project site does not contain suitable habitat for the burrowing owl due to the absence of potential nesting sites. No burrowing owls or burrowing owl signs (e.g., whitewash, pellets, scat, tracks, and/or feathers) were observed during the HSA.

Per the MSHCP 30-day Pre-Construction Burrowing Owl Survey Guidelines (revised August 17, 2006), an additional pre-construction survey for burrowing owl is required within 30 days prior to beginning of site grading to determine if site conditions change (e.g., establishment of ground squirrel burrows) and result in suitable habitat. **Mitigation Measure BIO-1** requires that pre-construction burrowing owl surveys are conducted prior to any ground-disturbing activities. Refer to checklist response 4a for **Mitigation Measure BIO-1.**

Implementation of **Mitigation Measure BIO-1** will result in a **less than significant** impact on any applicable habitat conservation plan or natural community conservations plan.

11. MINERAL RESOURCES. Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒

11a. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.10-1 – Mineral Resources)***

No Impact. The Surface Mining and Reclamation Act of 1975 (SMARA) requires classification of land into mineral resource zones (MRZs) according to the known or inferred mineral potential of the area. Construction aggregate resources (sand and gravel) deposits were the first commodity selected for classification by the State Mining and Geology Board. Once mapped, the State Mining and Geology Board is required to designate for future use those areas that contain aggregate deposits that are of prime importance in meeting the region's future need for construction-quality aggregates.

SMARA encourages each local jurisdiction to develop policies to conserve important mineral resources, where feasible, that might otherwise be unavailable when needed. The SMARA requires that once policies are adopted, local agency land use decisions must be in accordance with its mineral resource management policies. These decisions must also balance the mineral value of the resource to the market region as a whole, not just their importance to the local jurisdiction. Under SMARA, areas are categorized into MRZs as follows:

MRZ-1 Areas where the available geologic information indicates no significant mineral deposits or a minimal likelihood of significant mineral deposits.

MRZ-2a Areas where the available geologic information indicates that there are significant mineral deposits.

MRZ-2b Areas where the available geologic information indicates that there is a likelihood of significant mineral deposits.

MRZ-3a Areas where the available geologic information indicates that mineral deposits are likely to exist; however, the significance of the deposit is undetermined.

MRZ-3b Areas where the available geologic information indicates that mineral deposits are inferred to exist, however, the significance of the deposit is undetermined.

MRZ-4 Areas where there is not enough information available to determine the presence or absence of mineral deposits.

The project site is designated as MRZ-4 under SMARA in accordance with Figure 5.10-1 of the Riverside General Plan and Supporting Documents Environmental Impact Report. This designation means that there is not enough information available to determine the presence or absence of mineral deposits. Additionally, the project site has minimal potential to be mined in the future because it is completely surrounded by urban development and is not considered a state-designated mineral resource extraction zone. Therefore, the proposed project will not result in the loss of a known mineral resource that would be of value to the region or residents of the state. **No impact** on regionally or statewide significant mineral resources will occur and no

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
mitigation is required.				
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

11b. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.10-1 – Mineral Resources, General Plan 2025 Open Space and Conservation Element, Figure – OS-1 – Mineral Resources)***

No Impact. The City historically featured a significant granitic rock quarrying industry, but these operations ceased several decades ago as urban development supplanted mineral resource extraction in the City. The only area in the City designated by the U.S. Geological Survey as a known significant mineral resource area, defined by the state as MRZ-2, is a small section along the northern City boundary between Market Street and Mission Boulevard between the Santa Ana River and Lake Evans.

According to Figure OS-1 of the General Plan 2025 Open Space Element and Figure 5.10-1 of the Riverside General Plan and Supporting Documents Environmental Impact Report, the eastern half of the City is generally designated MRZ-3, containing known or inferred mineral occurrences of undetermined mineral resource significance, and the western half of the City is generally designated MRZ-4, where there is not enough information available to determine the presence or absence of mineral deposits. The project site is located in the western half of the City within MRZ-4 in an area where there is not enough information available to determine the presence or absence of mineral deposits; therefore, the project site is not located in an area defined as a significant mineral resource area.

The Riverside General Plan and Supporting Documents Environmental Impact Report determined there are no specific areas within the City that have locally-important mineral resource recovery sites, and implementation of the General Plan 2025 will not significantly preclude potential extraction of significant mineral resources. The proposed project is consistent with the General Plan 2025 land use designation and City zoning designation. Therefore, the project will have **no impact** on locally significant mineral resources. No mitigation is required.

12. NOISE. Would the project result in:				
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐

12a. Response: ***(Source: City of Riverside Municipal Code Title 7 – Noise Control; City of Riverside General Plan 2025 Final Program Environmental Impact Report (FPEIR) Section 5.11 - Noise, General Plan 2025 – Noise Element, General Plan 2025 Figure N-1 – 2003 Roadway Noise, Figure N-5 – 2025 Roadway Noise, Federal Highway Administration Highway Traffic Noise Prediction Model - FHWA RD-77-108, Appendix H – Traffic Impact Analysis, Appendix I - Noise Impact Analysis)***

Less Than Significant With Mitigation Incorporated. A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site are the noise criteria listed in the Noise Element of the General Plan 2025 and in Title 7 - Noise Control of the City's Municipal Code.

Regarding noise-related environmental impacts, the closest sensitive receptors to the project site are the multifamily residences approximately 80 feet east of the project site's eastern boundary across Grace Street. Additional single-family residences are located approximately 100 feet north of the project site's northeast corner across the intersection of Grace Street and Lincoln Avenue. These nearby sensitive uses could potentially be subject to noise-related environmental impacts from construction and operation at the project site. Lands to the north, west, and south are occupied by existing light industrial uses and therefore are not considered sensitive to noise-related environmental impacts.

City of Riverside Noise Element. The City in its General Plan 2025 Noise Element has established noise/land use noise compatibility criteria. Single-family and multifamily residences are normally acceptable in exterior noise environments up to 60 A-weighted decibels (dBA) Community Noise Equivalent Level (CNEL) and conditionally acceptable in exterior noise environments of up to 65 dBA CNEL. Infill residential uses are normally acceptable in exterior noise environments up to 65 dBA CNEL and conditionally acceptable in exterior noise environments of up to 75 dBA CNEL. Interior noise levels within residential

structures are acceptable up to 45 dBA CNEL. Commercial uses are normally acceptable in exterior noise environments of up to 65 dBA CNEL. Industrial uses are normally acceptable up to 70 dBA CNEL. For the purposes of the noise and vibration impact analysis (Appendix I), the multifamily (apartments or condominiums) and single-family residential uses with outdoor active use areas located to the east and/or northeast of the project site (e.g., patios or balconies) exposed to noise levels exceeding 65 dBA CNEL would need to be mitigated.

City of Riverside Municipal Code Noise Ordinance. The City has incorporated the following measures in its Municipal Code to control loud, unnecessary, and unusual nuisance noises:

- **Exterior Sound Level Limits.** Unless a variance has been granted, it shall be unlawful for any person to cause or allow the creation of any noise that exceeds the following:
  - The exterior noise standard of the applicable land use category (see Table 12.A), up to 5 dB (up to 60 dBA during the day and up to 50 dBA during the night), for a cumulative period of more than 30 minutes in an hour; or
  - The exterior noise standard of the applicable land use category, plus 5 dB (60 dBA during the day and 50 dBA during the night), for a cumulative period of more than 15 minutes in any hour; or
  - The exterior noise standard of the applicable land use category, plus 10 dB (65 dBA during the day and 55 dBA during the night), for a cumulative period of more than 5 minutes in any hour; or
  - The exterior noise standard of the applicable land use category, plus 15 dB (70 dBA during the day and 65 dBA during the night), for a cumulative period of more than 1 minute in any hour; or
  - The exterior noise standard of the applicable land use category, plus 20 dB (75 dBA during the day and 70 dBA during the night) or the maximum measured ambient noise level, for any period of time.
- **Interior Sound Level Limits.** No person shall operate or cause to be operated, any source of sound indoors that causes the noise level, when measured inside another dwelling unit, school or hospital, to exceed:
  - The interior noise standard for the applicable noise category (see Table 12.A), up to 5 dB (up to 50 dBA during the day and up to 40 dBA during the night), for a cumulative period of more than 5 minutes in any hour; or
  - The interior noise standard for the applicable land use category, plus 5 dB (55 dBA during the day and 45 dBA during the night), for a cumulative period of more than 1 minute in any hour; or
  - The interior noise standard for the applicable land use category, plus 10 dB (60 dBA during the day and 50 dBA during the night) or the maximum measured ambient noise level, for any period of time.

Table 12.A: City of Riverside Sound Level Limits (dBA)

Land Use Category	Time Period	Exterior Noise Standard	Interior Noise Standard
Residential	Night (10:00 p.m. to 7:00 a.m.) Day (7:00 a.m. to 10:00 p.m.)	45 55	35 45
School	7:00 a.m. to 10:00 p.m. (while school is in session)	N/A[1]	45
Hospital	Anytime	N/A	45
Office/Commercial	Anytime	65	N/A
Industrial	Anytime	70	N/A
Community Support	Anytime	60	N/A
Public Recreation Facility	Anytime	65	N/A
Nonurban	Anytime	70	N/A

Source: Riverside Municipal Code, Title 7 – Noise Control (City of Riverside, 2005).
[1] N/A = Not Applicable. The City of Riverside has not established a sound level limit for this land use.
dBA = A-weighted decibels

Based on Table 12.A and Sections 7.25.010 and 7.30.015 of the City Municipal Code, the maximum exterior noise level for residential uses is 75 dBA maximum noise level (L_{max}) (55 dB + 20 dB) during daytime hours and 65 dBA L_{max} (45 dB + 20 dB) during nighttime hours, or the maximum measured ambient noise level for any period of time. Similarly, the maximum interior nuisance noise level for residential uses is 55 dBA L_{max} (45 dB + 10 dB) during daytime hours and 45 dBA L_{max} (35 dB + 10 dB)

during nighttime hours, or the maximum measured ambient noise level for any period of time.

Section 7.35.010.B(5) of Title 7 the City Municipal Code (Noise Control) requires construction activities to be restricted within the City to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays; construction activities are prohibited on Sundays and federal holidays. Section 7.35.020.G - Exemptions states, "Noise sources associated with construction, repair, remodeling, or grading of any real property; provided a permit has been obtained from the City as required; and provided said activities do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday" are exempt from the noise level limits of the Municipal Code. On August 18, 2016, the City of Riverside City Council adopted Ordinance 7341, amending the Noise Code to exempt construction noise between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. Saturdays from the standards of the Noise Code.

Ambient Noise Measurements. The project site is proposed at the southwest corner of Lincoln Avenue and Grace Street. Three short-term (15-minute each) noise measurements at three representative locations (Short Term [ST] 1-3) in the project vicinity, as identified by City staff, were conducted on December 20, 2016 (Figure 5 and Appendix I).

- **ST-1:** 2809 Grace Avenue, on the sidewalk next to the Victoria Heights Apartments. The short-term 15-minute measurement at location 1 (ST-1) shows that noise levels measured at this location were 71.3 dBA L_{eq} (equivalent continuous sound level) and 84.6 dBA L_{max}, with the noise sources coming from traffic on Grace Street and Lincoln Avenue. There was also grading activity related to roadway construction on the west side of Grace Street, south of the project site.
- **ST-2:** 7689 Lincoln Avenue, in front of a single-family house on the north side of Lincoln Avenue. The noise levels measured at this location were 64.5 dBA L_{eq} and 81.3 dBA L_{max}, with noise sources coming from Lincoln Avenue and Grace Street and little grading activity noise recorded.
- **ST-3:** At a location on the eastern portion of the project site, approximately 100 feet from Grace Street and 300 feet from Lincoln Avenue. The noise levels were 54.8 dBA L_{eq} and 64.0 dBA L_{max}. Noise sources contributing to this measurement included machinery hum from the industrial activity north of Lincoln Avenue and traffic on Lincoln Avenue.

Table 12.B lists the measured noise levels at the identified locations during the specified time period.

Table 12.B: Summary of Short-Term Noise Level Measurements

Location / Time	Measured Ambient Noise Level (dBA)		
	L_{eq}	L_{max}	Noise Sources
ST-1: 2809 Grace Street, east of project site (9:55 a.m. to 10:15 a.m.)	71.3	84.6	Traffic on Grace Street and Lincoln Avenue; grading on west side of Grace Street, south of the project site.
ST-2: 7689 Lincoln Avenue, north of project site (9:16 a.m. to 9:37 a.m.)	64.5	81.3	Traffic on Lincoln Avenue and Grace Street
ST-3: On project site; 100 feet west of Grace Street and 300 feet south of Lincoln Avenue (10:25 a.m. to 10:45 a.m.)	54.8	64.0	Traffic on Lincoln Avenue and Grace Street; machinery hum from industrial activity north of Lincoln Avenue

Source: Noise Impact Analysis (Appendix I)
dBA = A-weighted decibels
L_{max} = maximum instantaneous sound level
L_{eq} = equivalent continuous sound level
ST = Short Term

Existing Vehicle Traffic Noise. The Federal Highway Administration (FHWA) highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate highway traffic-related noise conditions along the roadway segments in the project vicinity. The project-specific Traffic Impact Analysis (Appendix H) was used to establish traffic volumes on Lincoln Avenue and Grace Street to assess existing traffic noise. Table 12.C provides the traffic noise levels along the roadways adjacent to the project site. These noise levels represent the worst-case scenario, which assumes no shielding is provided between the traffic and the location where the noise contours are drawn.

Table 12.C: Existing Traffic Noise Levels

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Roadway Segment	ADT	Centerline to 70 dBA CNEL (Feet)	Centerline to 65 dBA CNEL (Feet)	Centerline to 60 dBA CNEL (Feet)	CNEL (dBA) 50 Feet from Centerline of Outermost Lane
Lincoln Avenue between Adams Street and Jefferson Street	6,300	<50	64	135	64.6
Lincoln Avenue between Jefferson Street and Project Driveway 1	5,800	<50	59	127	65.3
Lincoln Avenue between Project Driveway 1 and Project Driveway 2	5,800	<50	59	127	65.3
Lincoln Avenue between Project Driveway 2 and Grace Street	5,800	<50	59	127	65.3
Lincoln Avenue east of Grace Street	6,000	<50	60	129	65.5
Grace Street between Lincoln Avenue and Project Driveway 3	780	<50	<50	<50	52.2
Grace Street north of Lincoln Avenue	320	<50	<50	<50	48.3
Grace Street south of project Driveway 3	820	<50	<50	<50	52.4

Source: Noise Impact Analysis (Appendix I)
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels

The Passenger Car Equivalent (PCE) turn volumes from the project-specific Traffic Impact Analysis (Appendix H) were used, multiplied by 10, to get the average daily traffic (ADT) volume.[6] The traffic distribution (fleet mix) included in the Riverside County set for roadways designated as "secondary", "collectors" or smaller" was used for respective roadway segments. The proposed project will use an existing driveway (Project Driveway 1) located on the northwest portion of the project site, which facilitates reciprocal access with an adjacent industrial building. Two additional driveways are proposed on Lincoln Avenue (Project Driveway 2) and Grace Street (Project Driveway 3) (Figure 5). Passenger vehicle access will be permitted via all three driveways, but truck access will be provided via Project Driveways 1 and 3 in accordance with **Mitigation Measure NOI-1** presented below. The project-specific noise measurements and analysis for truck delivery and driveway activity (Appendix I) are based on incorporation of **Mitigation Measure NOI-1** into the operation of the proposed project. The specific assumptions used in developing the noise levels outlined in Table 12.C, as well as model printouts, are provided in Appendix I - Noise Impact Analysis.

Construction Impacts. Short-term noise impacts will be associated with excavation, grading, and erecting of buildings on site during construction of the proposed project. Construction-related short-term noise levels will be higher than existing ambient noise levels in the project area today, but will cease once construction of the project is completed. Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the project site for the proposed project will incrementally increase noise levels on access roads leading to the site. Although there will be a relatively high single-event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 feet will generate up to a maximum of 87 dBA L_{max}) for the sensitive receptors along Lincoln Avenue and Grace Street, the effect on longer term (hourly or daily) ambient noise levels will be small.

According to *Section 5.11 - Noise* of the City of Riverside General Plan 2025 Final Program Environmental Impact Report (FPEIR), audible increases in noise levels generally refer to a change of 3 dB or greater since this level has been found to be barely perceptible in exterior environments, and a clearly perceptible increase in noise exposure of +5 dB to sensitive receptors would be considered significant. When compared to the existing traffic volumes on streets in the project vicinity, the projected construction traffic will be minimal and less than 10 percent of the average daily traffic (ADT) on any street segment in the project vicinity, and its associated long-term noise level change will be 0.5 dBA or less along Lincoln Avenue and 1.9 dBA or less along Grace Street, which is less than both the barely perceptible audible increase of 3 dBA and the clearly perceptible

[6] The 10 multiplier is a standard assumption that daily traffic volumes is 10 times that of the peak hour volume, calculated with peak hour intersection turn volumes detailed in Appendix H.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

audible increase of 5 dBA in exterior environments (Appendix I). Therefore, short-term construction-related impacts associated with worker commute and equipment transport to the project site will be **less than significant**.

The second type of short-term noise impact is related to noise generated during grading and building erection on the project site. Construction is typically completed in discrete steps, each of which has its own mix of equipment, and consequently, its own noise characteristics. These various sequential phases will change the character of the noise generated on the site and the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Typical construction noise levels range up to 90 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels, because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery, such as backfillers, bulldozers, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Construction of the proposed project is expected to require the use of earthmoving equipment such as bulldozers, haul trucks, front-end loaders, and water and pickup trucks at the project site. The maximum noise level generated by each scraper on the proposed project site is assumed to be 84 dBA L_{max} at 50 feet from the scraper. Each bulldozer will generate 82 dBA L_{max} at 50 feet from the bulldozer. Each doubling of the sound sources with equal strength increases the noise level by 3 dBA. Several pieces of earthmovers and bulldozers are expected to be used on site. Two scrapers operating near each other would result in a combined noise level of 87 dBA Lmax (i.e., 84 dBA + 84 dBA = 87 dBA) at 50 feet. Two bulldozers operating near each other would result in a combined noise level of 85 dBA Lmax (i.e., 82 dBA + 82 dBA = 85 dBA) at 50 feet; however, four bulldozers operating near each other would generate a combined noise level of 88 dBA (82 dBA + 82 dBA + 82 dBA + 82 dBA = 88 dBA). When these machines are simultaneously working in close proximity to each other, their respective noise levels would be added together and would result in a worst-case combined noise level of 90 dBA Lmax (i.e., 88 dBA + 87 dBA = 90 dBA) at a distance of 50 feet from the active construction area.

Geometric spreading causes sound levels to attenuate or be reduced, resulting in a 6-decibel reduction in the noise level for each doubling of distance from a single point source of noise, such as an idling truck, to the noise-sensitive receptor of concern. Noise from on-site construction will not only be reduced by distance attenuation but also be masked by existing traffic noise on both Lincoln Avenue and Grace Street. The nearest noise-sensitive residential uses are multifamily residences approximately 80 feet to the east of the proposed active construction area and will be exposed to intermittent maximum construction noise levels reaching 87 dBA L_{max} (3 dBA noise reduction compared to noise level at 50 feet). The single-family residences to the northeast of the project site are approximately 100 feet from the project boundary and will be potentially exposed to intermittent maximum construction noise levels reaching 84 dBA L_{max} (6 dBA noise reduction compared to noise level at 50 feet).

Since designated outdoor living areas of both the multi-family and single-family residences, respectively east and northeast of the project site, will face the project site, occupants of these areas will be potentially exposed to intermittent maximum construction noise exceeding 75 dBA L_{max} during daytime hours. However, Section 7.35.020.G - Exemptions states, "Noise sources associated with construction, repair, remodeling, or grading of any real property; provided a permit has been obtained from the City as required; and provided said activities do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday" are exempt from the noise level limits of the Municipal Code. On August 18, 2016, the City of Riverside City Council adopted Ordinance 7341, amending the Noise Code to exempt construction noise between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. Saturdays from the standards of the Noise Code. Compliance with Section 7.35.010.B(5) of the City Municipal Code will ensure construction activities occur between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, between 8:00 a.m. and 5:00 p.m. on Saturdays, and do not occur on Sundays and federal holidays.

The proposed project is required to comply with the construction hours specified in Section 7.35.010.B(5) of the City Municipal Code. As specified in **Standard Condition N-1**, construction activities are restricted within the City to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, between 8:00 a.m. and 5:00 p.m. on Saturdays, and are prohibited on Sundays and federal holidays.

Standard Construction Condition: No mitigation is required; however, the following Standard Condition is a regulatory requirement that will be implemented to ensure noise impacts during construction remain less than significant.

Standard Condition N-1: **Compliance with Section 7.35.010.B(5) of the City Municipal Code.** Construction activities, including operating or causing the operation of any tools or equipment used in construction,

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

drilling, repair, alteration, grading, or demolition work, shall be restricted to the hours of 7:00 a.m. to 7:00 p.m. on week days and 8:00 a.m. to 5:00 p.m. on Saturdays, and are prohibited at any time on Sundays and federal holidays.

With implementation of **Standard Condition N-1**, construction noise impacts to nearby sensitive receptors will remain **less than significant.** No mitigation is required.

Operational Impacts. The project is not proposed for 24-hour operations. Long-term noise associated with the project site will be generated from vehicle traffic and on-site stationary sources, such as truck delivery and loading/unloading activities. The typical exterior noise standard used in this analysis is 75 dBA L_{max} during the day (7:00 a.m.–10:00 p.m.) and 65 dBA L_{max} exterior noise standard during the night (10:00 p.m.–7:00 a.m.) for sensitive receptors, in accordance with Sections 7.25.010 and 7.30.015 of the City Municipal Code. As noise spreads from a source, it loses energy, so that the farther away the noise receiver is from the noise source, the lower the perceived noise level would be. Again, geometric spreading causes the sound level to attenuate or be reduced, resulting in a 6-decibel reduction in the noise level for each doubling of distance from a single-point source of noise, such as an idling truck, to the noise sensitive receptor of concern. Although individual activity associated with the proposed project may generate relatively high and intermittent noise, these noise levels will be compatible with noise levels generated by other traffic and warehouse-related noise sources that currently exist adjacent to the north, west, and south of the project site as indicated in previously referenced Figure 2 and Table 12.B.

The proposed on-site industrial uses will generate noise from truck delivery, loading/unloading activities, and other activities at the parking lot. These activities are potential point sources of noise that could affect nearby noise-sensitive receptors. The proposed project will include loading/unloading docks on the south side of the warehouse building, which would shield existing residential uses located east and northeast of the project site. Delivery trucks would park at the loading/unloading docks to load and unload. Although a typical truck unloading process takes an average of 15 to 20 minutes, the maximum noise level associated with such activities, typically up to 75 dBA L_{max} at 50 feet[7], occurs in a much shorter period of time (i.e., in a few minutes). The combination of the intermittent activities, even over the course of a day, does not amount to a significant amount of time.

According to the project-specific Noise Impact Analysis (Appendix I), delivery trucks for the proposed on-site uses will result in a maximum noise level similar to noise readings from loading and unloading activities for other similar projects, which generate a noise level of 75 dBA L_{max} at 50 feet, and are used in this analysis. Based on the conceptual site plan (previously referenced Figure 3), the shortest distance from the loading/unloading areas on the southern portion of the project site to the nearest residences in the project vicinity (along Grace Street) is approximately 280 feet, which would result in a 15 dBA noise attenuation (compared to the levels at 50 feet) as a result of geometric spreading. Additionally, the loading/unloading docks are designed to be recessed approximately 60 feet against the warehouse structure, so the nearest residences 280 feet to the east will be shielded by the warehouse structure itself, which will further reduce loading/unloading noise by at least an additional 15 dBA. Therefore, loading/unloading noise associated with operation of the proposed project will be reduced to 45 dBA L_{max} at ground level for the nearest sensitive receptors to the the project site. Additionally, traffic noise associated with Lincoln Avenue and Grace Street would mask the majority of the loading and unloading noise from the proposed project, as indicated in Table 12.B. The anticipated 45 dBA L_{max} noise level is lower than the typical exterior noise standard of 75 dBA L_{max} during the day (7:00 a.m.–10:00 p.m.) and 65 dBA L_{max} exterior noise standard during the night (10:00 p.m.–7:00 a.m.). Therefore, noise associated with loading and unloading activities at the loading areas will not result in noise levels exceeding the noise standards at the nearest residences approximately 280 feet east of the loading/unloading areas.

In warm-climate areas (e.g., Southern California), with windows or doors open, the exterior-to-interior noise attenuation will be 12 dBA. With windows closed, this noise attenuation increases to 24 dBA. For the nearest residences 280 feet east of the project site loading/unloading docks, standard building construction (with windows rated Sound Transmission Class [STC] 24 to STC-28) with windows closed will provide sufficient exterior-to-interior noise attenuation (45 dBA – 24 dBA = 21 dBA) for noise from stationary sources to meet the City's 60 and 50 dBA L_{max} interior noise standards during daytime and nighttime hours, respectively. Therefore, no window upgrades will be required to reduce the exterior stationary-source noise to meet the City's 50 dBA L_{max} interior noise standard.

As mentioned previously, all three project driveways will allow full access to passenger vehicles. Truck access will be provided via project driveways 1 and 3 only, and the project-specific noise measurements and analysis for truck delivery and driveway activity (Appendix I) are based on incorporation of **Mitigation Measure NOI-1** into the operation of the proposed project.

[7] Delivery trucks for the on-site industrial uses would result in a maximum noise level similar to noise readings from loading and unloading activities for other industrial/commercial use projects, which generate a noise level of 75 dBA Lmax at 50 feet based on measurements conducted by LSA in past years (Appendix I).

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Mitigation Measure NOI-1 allows full tuck access (ingress and egress) through driveway 1, limits truck access to only egress maneuvers through driveway 3, and prohibits any truck access through driveway 2 (Figure 5). All vehicle restrictions will be enforced with signage in conformance with Chapter 19.62 (General Sign Provisions) of the City Municipal Code.

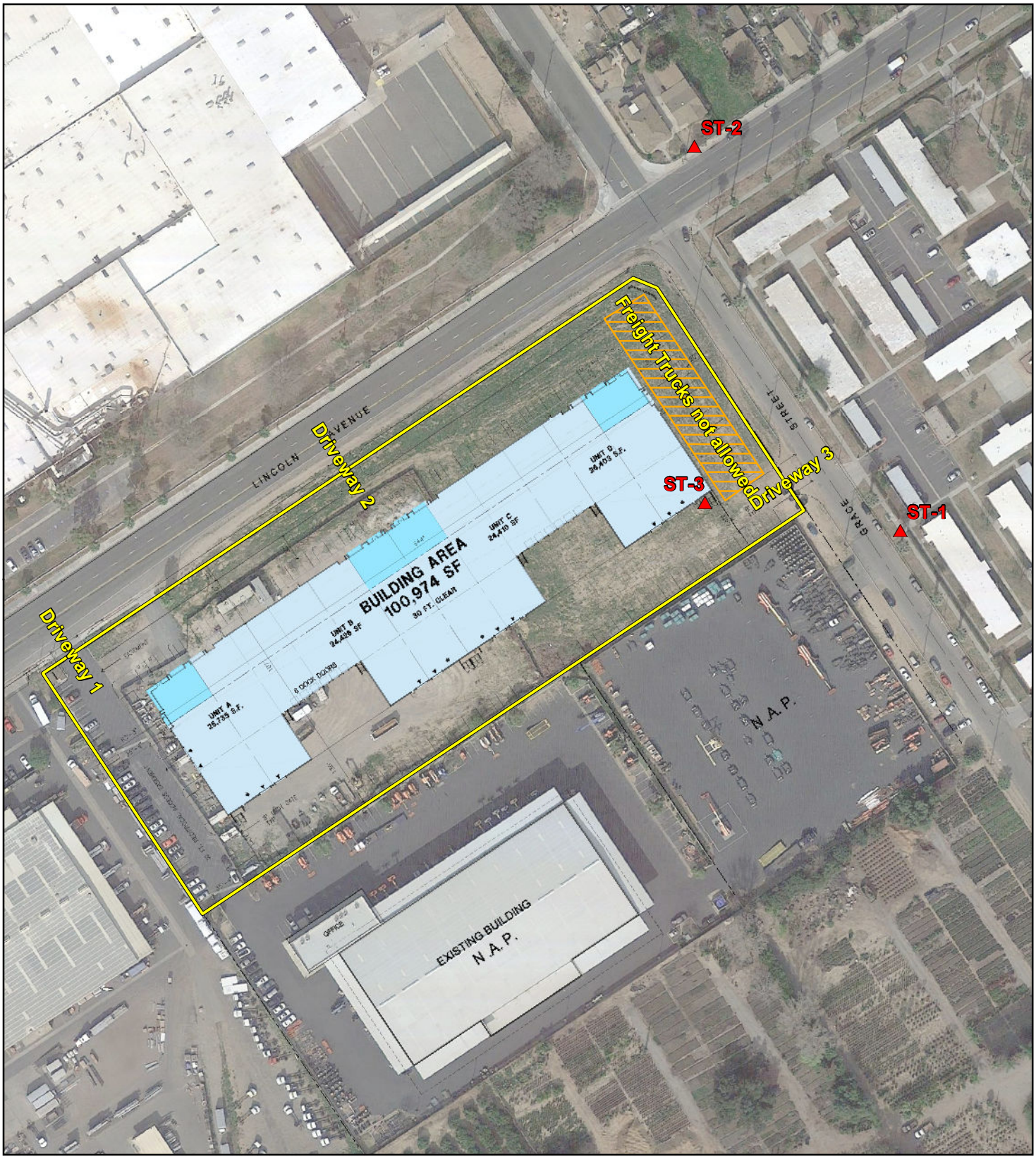
Although no significant impacts were identified in the project-specific Noise Impact Analysis (Appendix I), the following **Mitigation Measure** shall be implemented to ensure noise impacts during operation of the proposed project remain **less than significant**.

Mitigation Measure NOI-1: **Operational Noise.** Prior to the issuance of occupancy permits, the Community and Economic Development Department, Planning Division, or designee, shall verify adequate signage in accordance with Chapter 19.62 (General Sign Provisions) of the City Municipal Code is installed throughout the project site to direct delivery truck and other freight movement into, out of, and within the project site as follows:

- Primary delivery truck and other freight ingress and egress activity shall occur through the westernmost driveway (Driveway 1) along Lincoln Avenue.
- Primary passenger vehicle ingress and egress activity shall occur through the easternmost driveway (Driveway 2) along Lincoln Avenue.
- Delivery truck and other freight access through the driveway along Grace Street (Driveway 3) shall be used only on an as-needed basis unless safety or technical factors take precedence.
- Delivery truck and other freight access through the driveway along Grace Street (Driveway 3) shall be used only for exiting the project site (egress) unless safety or technical factors take precedence; no delivery truck or other freight ingress through the driveway along Grace Street (Driveway 3) is permitted.
- Delivery truck and other freight vehicles are not permitted in the driveway or parking lot area along the east side of the proposed warehouse structure unless safety or technical factors take precedence.

Implementation of **Mitigation Measure NOI-1** will ensure long-term, operational noise impacts to the multifamily and single-family residences respectively east and north of the project site remain **less than significant**.

With implementation of **Mitigation Measure NOI-1**, Delivery truck movement in driveway areas of the project site will be as close as 100 feet to the multifamily residences to the east and 350 feet to the single-family residences to the northeast. These distances will provide 6 dBA and 16 dBA in noise attenuation, respectively, and are measured from the delivery truck ingress/egress driveway along Grace Street (Driveway 3), closest to the sensitive receptors. Although no structure shielding effect will occur between the delivery truck ingress/egress driveway along Grace Street and the nearby sensitive receptors, the noise attenuation from distance divergence will result in ground-level noise levels of 69 dBA L_{max} at the multifamily residences (75 dBA L_{max} - 6 dBA attenuation) and 59 dBA L_{max} at the single-family residences (75 dBA L_{max} - 16 dBA attenuation). This range of maximum noise levels is lower than the typical daytime exterior noise standards of 75 dBA L_{max} (7:00 a.m.–10:00 p.m.), (10:00 p.m.–7:00 a.m.). Implementation of **Mitigation Measure NOI-1** will direct delivery truck movement to ensure on-site operation noise impacts to the nearby residences east and north of the project site remain **less than significant**.



LSA

FIGURE 5

Project Boundary

Noise Sampling Point

N

0 75 150
FEET

SOURCE: HPA Architechture, May 11, 2016; Google Earth, 2016.

I:\RVL1601\Reports\IS_MND\fig5_NoiseLoc.mxd (12/29/2016)

Lincoln Avenue & Grace Street Warehouse

Ambient Noise Measurement Locations

Table 12.D: Existing Traffic Noise Levels Without and With Project

Roadway Segment	Existing Without Project (Baseline)					Existing With Project						
	ADT[8]	Centerline to 70 dBA CNEL (feet)	Centerline to 65 dBA CNEL (feet)	Centerline to 60 dBA CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	ADT	Change in ADT	Centerline to 70 dBA CNEL (feet)	Centerline to 65 dBA CNEL (feet)	Centerline to 60 dBA CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase over Baseline CNEL (dBA) 50 feet from Centerline of Outermost Lane
Lincoln Avenue between Adams Street and Jefferson Street	6,300	< 50	64	135	64.6	6,900	600	< 50	68	143	65.0	0.4
Lincoln Avenue between Jefferson Street and Project Driveway 1	5,800	< 50	59	127	65.3	6,400	600	< 50	63	135	65.8	0.5
Lincoln Avenue between Project Driveway 1 and Project Driveway 2	5,800	< 50	59	127	65.3	6,300	500	< 50	62	134	65.7	0.4
Lincoln Avenue between Project Driveway 2 and Grace Street	5,800	< 50	59	127	65.3	6,600	800	< 50	64	138	65.9	0.6
Lincoln Avenue east of Grace Street	6,000	< 50	60	129	65.5	6,500	500	< 50	64	137	65.8	0.3
Grace Street between Lincoln Avenue and Project Driveway 3	780	< 50	< 50	< 50	52.2	1,200	420	< 50	< 50	< 50	54.1	1.9
Grace Street north of Lincoln Avenue	320	< 50	< 50	< 50	48.3	320	0	< 50	< 50	< 50	48.3	0.0
Grace Street south of Project Driveway 3	820	< 50	< 50	< 50	52.4	760	-60	< 50	< 50	< 50	52.1	-0.3

Source: Noise Impact Analysis (Appendix I)
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic CNEL = Community Noise Equivalent Level dBA = A-weighted decibels

Table 12.E: Cumulative (2017) Traffic Noise Levels Without and With Project

Roadway Segment	Cumulative (2017) Without Project (Baseline)					Cumulative (2017) With Project						
	ADT[8]	Centerline to 70 dBA CNEL (feet)	Centerline to 65 dBA CNEL (feet)	Centerline to 60 dBA CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	ADT	Change in ADT	Centerline to 70 dBA CNEL (feet)	Centerline to 65 dBA CNEL (feet)	Centerline to 60 dBA CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase over Baseline CNEL (dBA) 50 feet from Centerline of Outermost Lane
Lincoln Avenue between Adams Street and Jefferson Street	6,700	< 50	67	140	64.9	7,300	600	< 50	71	148	65.3	0.4
Lincoln Avenue between Jefferson Street and Project Driveway 1	6,100	< 50	61	131	65.6	6,800	700	< 50	66	141	66.0	0.4
Lincoln Avenue between Project Driveway 1 and Project Driveway 2	6,200	< 50	62	132	65.6	6,700	500	< 50	65	139	66.0	0.4
Lincoln Avenue between Project Driveway 2 and Grace Street	6,200	< 50	62	132	65.6	6,900	700	< 50	66	142	66.1	0.5
Lincoln Avenue east of Grace Street	6,000	< 50	60	129	65.5	6,600	600	< 50	64	138	65.9	0.4
Grace Street between Lincoln Avenue and Project Driveway 3	790	< 50	< 50	< 50	52.3	1,200	410	< 50	< 50	< 50	54.1	1.8
Grace Street north of Lincoln Avenue	320	< 50	< 50	< 50	48.3	320	0	< 50	< 50	< 50	48.3	0.0
Grace Street south of Project Driveway 3	830	< 50	< 50	< 50	52.5	770	-60	< 50	< 50	< 50	52.1	-0.4

Source: Noise Impact Analysis (Appendix I)
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic CNEL = Community Noise Equivalent Level dBA = A-weighted decibels

[8] The Passenger Car Equivalent (PCE) turn volumes from the project-specific Traffic Impact Analysis (Appendix H) were used, multiplied by 10, to get the average daily traffic (ADT) volume. The traffic distribution (fleet mix) included in the Riverside County set for roadways designated as "secondary", "collectors" or smaller" was used for respective roadway segments.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Representative parking activities, such as employees conversing and doors slamming, generate approximately 60 to 70 dBA L_{max} at 50 feet. This level of noise is generally lower than that of the truck delivery and loading/unloading activities. The nearest residences are multifamily located 115 feet east of the proposed project parking lot. With the noise attenuation effect from the distance divergence (+6 dBA), noise in the parking lot will be attenuated to between 54 and 64 dBA L_{max} or less at the nearest off-site outdoor living areas to the east and is not anticipated to be a significant noise issue with respect to nearby residences. This noise would be intermittent in nature and would rarely occur in the evening or overnight. Because parking lot activity would occur intermittently throughout the day and each time would last less than one minute, noise associated with these parking lot activities when averaged over a 24-hour period and weighted for evening and nighttime quieter ambient noise levels would not contribute significantly to the CNEL level in the project vicinity. The CNEL levels associated with these parking lot activities would not exceed the City's 65 dBA CNEL exterior noise standard for off-site noise-sensitive uses; therefore, no mitigation is required.

Tables 12.D and 12.E detail the traffic noise levels in the project vicinity for the existing and cumulative (2017) project scenarios, respectively. According to the project-specific Noise Impact Analysis (Appendix I), traffic noise levels in the project vicinity would be moderate along Lincoln Avenue, with the 70 dBA CNEL confined to within the roadway right-of-way under both the existing with project and cumulative (2017) with project scenarios while the 65 dBA CNEL would extend to 64 feet from the Lincoln Avenue centerline under the existing with project scenario and 66 feet from the Lincoln Avenue centerline under the cumulative (2017) with project scenario (Tables 12.D and 12.E). Traffic noise levels along Grace Street would be low, with the 70, 65, and 60 dBA CNEL noise contours confined to within the roadway right-of-way under both the existing with project and cumulative (2017) with project scenarios (Tables 12.D and 12.E).

Based on the Traffic Impact Analysis (Appendix H), the proposed project is expected to generate a daily traffic volume of 704 vehicle trips, of which 144 trips are by multiple-axle trucks. When multiple-axle truck volumes are converted to Passenger Car Equivalents (PCEs), the daily traffic volume generated by the proposed project will be 923 vehicle trips (Appendix H). These traffic volumes are expected to travel on roadways in the project vicinity. According to the project-specific Noise Impact Analysis (Appendix I), each doubling of a sound source with equal strength increases the noise level by 3 dBA; therefore, traffic volumes would need to double the baseline volume to increase the traffic noise by 3 dBA. *Section 5.11 - Noise* of the City's FPEIR states audible increases of 3 dB have been found to be barely perceptible in exterior environments, and a clearly perceptible increase in noise exposure of +5 dB to sensitive receptors would be considered significant. However, as detailed in Tables 12.D and 12.E, the project-related CNEL increases over baseline (0.5 dBA or less along Lincoln Avenue and 1.9 dBA or less along Grace Street) would not be perceptible to the human ear in an outdoor environment, and **less than significant** impacts on off-site land uses would occur along Lincoln Avenue or Grace Street. No mitigation is required.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐

12b. Response: ***(Source: Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment (2006), https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf Website accessed September 2016; California Department of Transportation (Caltrans), Transportation-Related Earthborne Vibrations, Technical Advisory, 1992, Appendix I - Noise Impact Analysis)***

Less Than Significant Impact. Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernable, but without the effects associated with the shaking of a building, there is less adverse reaction. Vibration propagation is more efficient in stiff, clay soils than in loose, sandy soils. Shallow rock concentrates the vibration energy close to the surface and can result in ground-borne vibration problems at some distance from the source. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of groundborne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

The Federal Transit Administration (FTA) in its *Transit Noise and Vibration Impact Assessment* (2006) included groundborne vibration and noise impact criteria guidance, as shown in Table 12.F. The criteria presented in Table 12.F account for variation in project types, as well as the frequency of events, which differ widely among transit projects. Although the criteria are provided for community response to groundborne vibration from rail rapid transit systems, they also provide useful guidelines for human response to exposure to vibration in general and are used in this analysis for vibration impact assessment. Table 12.G lists the vibration damage criteria for various structural categories. These are identified by the FTA as criteria that should be used during the environmental impact assessment phase or environmental review process in general to identify problem locations that must be

addressed during final design.

Table 12.F: Groundborne Vibration and Noise Impact Criteria

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 µin/sec)		Groundborne Noise Impact Levels (dB re 20 µPa)	
	Frequent[1] Events	Infrequent[2] Events	Frequent[1] Events	Infrequent[2] Events
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[3]	65 VdB[3]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA

Source: Federal Transit Administration in its Transit Noise and Vibration Impact Assessment (2006)
[1] "Frequent Events" is defined as more than 70 events per day.
[2] "Infrequent Events" is defined as fewer than 70 events per day.
[3] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research requires detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
[4] Vibration-sensitive equipment is used in buildings where sufficient noise attenuation is provided; additionally, such equipment is not sensitive to either airborne or ground-borne noise.

µin/sec = microinches per second
µPa = micropascals
dB = decibels
dBA = A-weighted decibels
FTA = Federal Transit Administration
HVAC = heating, ventilation, and air conditioning
VdB = vibration velocity decibels

Table 12.G: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate Lv[1]
Reinforced concrete, steel, or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: Federal Transit Administration in its Transit Noise and Vibration Impact Assessment (2006)
[1] RMS VdB re 1 µin/sec.

µin/sec = microinches per second
in/sec = inches per second
Lv = 20 log10 (V/Vref) is the vibration velocity in decibels
PPV = peak particle velocity
RMS = root mean square
VdB = vibration velocity decibels

Tables 12.F (criteria in terms of vibration velocity decibels (VdB)) and 12.G (criteria in terms of inches per second [in/sec] and VdB) are FTA-recommended thresholds used to evaluate the effects of vibration on human response and structural damage. For example, for a building that is constructed with reinforced concrete with no plaster, the FTA guidelines show that a vibration level of up to 102 VdB (0.5 in/sec) (FTA 2006) is considered acceptable and will not result in construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 in/sec).

Additionally, for new residential buildings, the vibration damage potential threshold recommended by Caltrans is 1 in/sec from transient sources, such as pile driving and blasting. Caltrans also states that it takes at least 0.9 in/sec of peak particle velocity (PPV) for the human response to be strongly perceptible, or 0.25 in/sec to be distinctly perceptible.

The nearest buildings/structures in the project vicinity are a warehouse/office building approximately 80 feet to the south of the project site and residential units approximately 80 feet to the east and 100 feet to the northeast when measuring from the proposed project property line (i.e. limits of grading) to the sensitive receptor structures. Construction on the project site will result in the exposure of persons to excessive groundborne vibration or groundborne noise levels. However, groundborne vibration during construction activity is temporary and will cease to occur after project construction is completed. The proposed project will require the use of excavators, scrapers, and graders, as well as a bulldozer and other construction equipment. As shown in Table 12.H, a large bulldozer will generate approximately 0.089 PPV (in/sec) when measured at 25 feet, while a loaded truck will generate 0.076 PPV (in/sec) at 25 feet. Jackhammering will generate approximately 0.035 PPV (in/sec) when measured at 25 feet.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Table 12.H: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 feet	
	PPV (in/sec)	L_V (VdB)
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks	**0.076**	**86**
Jackhammer	**0.035**	**79**
Small Bulldozer	0.003	58

Sources: Federal Transit Administration in its Transit Noise and Vibration Impact Assessment (2006)
Note: Equipment and associated source vibration levels that are expected to be used on the project site are shown in **bold**.

feet = foot/feet
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
VdB = velocity decibels

As detailed in the project-specific Noise Impact Analysis (Appendix I), vibration levels from construction equipment and activities, including bulldozers, drilling, trucks, and jackhammers, will not exceed 0.12 in/sec at the nearest buildings/structures in the project vicinity, and they will be lower than the 0.2 PPV (in/sec) FTA vibration damage criteria at the nearest structures that are more than 50 feet away for non-engineered timber and masonry buildings. The predicted vibration levels (at or below 0.12 in/sec) also will not exceed the Caltrans vibration damage potential threshold for residential buildings of 1 in/sec from transient sources (Caltrans 1992). Therefore, no building damage will occur as a result of project construction.

Regarding the potential for vibration impacts to sensitive receptors, none of the predicted vibration levels (at or below 0.12 in/sec) for sensitive uses in the vicinity of the project site will reach either of the Caltrans threshold levels (0.9 in/sec of PPV for the human response to be strongly perceptible or 0.25 in/sec to be distinctly perceptible) (Caltrans 1992). Therefore, vibration impacts to sensitive receptors will be **less than significant**.

Table 12.I lists the projected vibration level from various construction equipment expected to be used on the project site to the sensitive uses in the project vicinity. For typical construction activity, the equipment with the highest vibration generation potential is the large bulldozers, which will generate 87 VdB at 25 feet. With the vibration attenuation through distance divergence, a vibration level at 50 feet is 9 VdB lower than the vibration level at 25 feet. Vibration at 100 feet from the source is 18 VdB lower than the vibration level at 25 feet. Therefore, vibration levels from project construction will be reduced to 72 VdB or lower at the nearest buildings/structures south, east, and northeast of the project site. This range of vibration levels from construction equipment or activity will be below the FTA 94 VdB threshold and will not exceed the FTA threshold of 80 VdB for residences due to infrequent events. Therefore, vibration impacts during construction will be **less than significant,** and no mitigation is required.

Table 12.I: Summary of Construction Equipment and Activity Vibration

Equipment/Activity	Vibration Level (VdB)			
	At 25 feet	Distance Attenuation	Intervening Buildings/ Sound Walls[1]	Maximum Vibration Level
Residences adjacent to the site, 80 feet				
Large dozers, front end loaders, grader, backhoe	87	15	0	72
Loaded trucks	86	15	0	71
Jackhammers, forklift	79	15	0	64

Source: Noise Impact Analysis (Appendix I)
Note: The FTA recommended threshold is 0.2 in/sec or approximately 94 VdB at the receiving property structure or building.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

[1] Intervening buildings/sound walls put weight on the transmission path and provide a damping effect on vibration.
[2] Large bulldozers represent the construction equipment with the highest vibration potential that will be used on site. Other equipment will result in lower vibration levels compared to that of large bulldozers.

feet = feet in/sec = inches per second FTA = Federal Transit Administration
VdB = vibration velocity decibels

Operation of the proposed project will not involve any vibration sources, as compared to those from construction equipment, which would cause exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. As detailed in Table 12.F, the vibration threshold for Category 2 (buildings where people sleep) is 72 VdB for frequent events and 80 VdB for infrequent events. Vehicles with rubber tires on roadway segments surrounding the project site will not generate any significant groundborne vibration that would exceed the 65 VdB perception threshold for such uses and would remain well below the 72 VdB for frequent events and 80 VdB for infrequent events threshold. Therefore, vibration impacts during operation will be **less than significant,** and no mitigation is required.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐

12c. Response: ***(Source: City of Riverside Municipal Code Title 7 – Noise Control; General Plan 2025 – Noise Element, General Plan 2025 Figure N-1 – 2003 Roadway Noise, Figure N-5 – 2025 Roadway Noise, Appendix H – Traffic Impact Analysis, Appendix I - Noise Impact Analysis)***

Less Than Significant Impact. The primary existing noise sources in the project area are transportation facilities. Traffic along Lincoln Avenue and other local streets is the dominant source of ambient noise. Although individual activity associated with the proposed project may generate additional noise, these noise levels will be compatible with noise levels generated by other warehouse-related noise sources that currently exist adjacent to the northwest, west, and south of the project site (previously referenced Figure 2). *Section 5.11 - Noise* of the City's FPEIR states audible increases of 3 dB have been found to be barely perceptible in exterior environments, and a clearly perceptible increase in noise exposure of +5 dB to sensitive receptors would be considered significant.. As discussed in checklist response 12a, the proposed project will not result in an increase in ambient noise levels of more than 3 dBA at sensitive receptors in the vicinity of the project site (Tables 12.D and 12.E). Therefore, the impact related to permanent increases in ambient noise levels will be **less than significant,** and no mitigation is required.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐

12d. Response: ***(Source: City of Riverside Municipal Code Title 7 – Noise Control; General Plan 2025 – Noise Element, General Plan 2025 Figure N-1 – 2003 Roadway Noise, Figure N-5 – 2025 Roadway Noise, Appendix H – Traffic Impact Analysis, Appendix I - Noise Impact Analysis)***

Less Than Significant Impact. As discussed in checklist response 12a, short-term noise impacts will be associated with excavation, grading, and erecting of buildings on site during construction of the proposed project. Construction-related short-term noise levels will be higher than existing ambient noise levels in the project area today, but will cease once construction of the project is completed. Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the project site for the proposed project will incrementally increase noise levels on access roads leading to the site. Although there will be a relatively high single-event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 feet will generate up to a maximum of 87 dBA L_{max}) for the sensitive receptors along Lincoln Avenue and Grace Street, the effect on longer term (hourly or daily) ambient noise levels will be small.

The second type of short-term noise impact is related to noise generated during grading and building erection on the project site. Since designated outdoor living areas of both the multifamily and single-family residences, respectively east and northeast of the project site, will face the project site, occupants of these areas will be potentially exposed to intermittent maximum construction noise exceeding 75 dBA L_{max} during daytime hours. However, on August 18, 2016, the City Council adopted Ordinance 7341, amending the Noise Code to exempt construction noise between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. Saturdays from the standards of the Noise Code. Incorporation of Section 7.35.010.B(5) of the City Municipal Code into the project design will ensure construction activities occur between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, between 8:00 a.m. and 5:00 p.m. on Saturdays, and do not occur on Sundays and federal holidays.

The proposed project is required to comply with the construction hours specified in Section 7.35.010.B(5) of the City Municipal Code. Compliance with **Standard Condition N-1** will ensure construction activities are restricted within the City to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, between 8:00 a.m. and 5:00 p.m. on Saturdays, and are prohibited on

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Sundays and federal holidays. **No impact** will occur, and no mitigation is required.

Based on the Traffic Impact Analysis (Appendix H), the proposed project is expected to generate a daily traffic volume of 704 vehicle trips, of which 144 trips are by multiple-axle trucks. When multiple-axle truck volumes are converted to Passenger Car Equivalents (PCEs), the daily traffic volume generated by the proposed project will be 923 vehicle trips (Appendix H). These traffic volumes are expected to travel on roadways in the project vicinity. According to the project-specific Noise Impact Analysis (Appendix I), each doubling of a sound source with equal strength increases the noise level by 3 dBA; therefore, traffic volumes would need to double the baseline volume to increase the traffic noise by 3 dBA. *Section 5.11 - Noise* of the City's FPEIR states audible increases of 3 dB have been found to be barely perceptible in exterior environments, and a clearly perceptible increase in noise exposure of +5 dB to sensitive receptors would be considered significant. When compared to the existing traffic volumes on streets in the project vicinity, the projected construction traffic will be minimal and less than 10 percent of the average daily traffic (ADT) on any street segment in the project vicinity, and its associated long-term noise level change will be 0.5 dBA or less along Lincoln Avenue and 1.9 dBA or less along Grace Street, which is less than the clearly perceptible audible increase of 5 dBA in exterior environments (Appendix I). Therefore, short-term construction-related impacts associated with worker commute and equipment transport to the project site will be **less than significant**. Additionally, as detailed in Tables 12.D and 12.E, the project-related CNEL increases over baseline (0.5 dBA or less along Lincoln Avenue and 1.9 dBA or less along Grace Street) during operation of the proposed project would not be perceptible to the human ear in an outdoor environment, and **less than significant** impacts on off-site land uses would occur along Lincoln Avenue or Grace Street. No mitigation is required.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☒	☐

12e. Response: ***(Sources: General Plan 2025 Figure PS-6 – Airport Safety Zones and Influence Areas, General Plan 2025 Figure N-8 – Riverside and Flabob Airport Noise Contours; Riverside County Airport Land Use Compatibility Plan, and March Air Reserve Base/March Inland Port Comprehensive Land Use Plan (1999)).***

Less Than Significant Impact. The project site is located in Zone E of the Riverside Municipal Airport Land Use Plan, approximately 2.35 miles southeast of the Riverside Municipal Airport. Zone E of the Riverside Municipal Airport Land Use Plan has the fewest restrictions on proposed land uses, and the project site is outside the 55 dBA noise contour for the Riverside Municipal Airport. The dominant source of ambient noise in proximity to the project site is vehicle traffic along Lincoln Avenue and nearby connector streets. Therefore, the proposed project will not expose people working on the project site to excessive noise levels from a public airport or public use airport. The proposed project will have a **less than significant** impact related to airport noise. No mitigation is required.

f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

12f. Response: ***(Source: General Plan 2025 Figure PS-6 – Airport Safety Zones and Influence Areas).***

No Impact. The project site is not within the vicinity of a private airstrip. Therefore, the project will have **no impact** related to noise associated with private airstrips. No mitigation is required.

13. POPULATION AND HOUSING. Would the project:				
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐

13a. Response: ***(Source: General Plan 2025 Table LU-3 – Land Use Designations, Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition), Riverside General Plan and Supporting Documents Environmental Impact Report Section 5.12-Population and Housing, Table 5.12-A – SCAG Population and Households Forecast, Table 5.12-B – General Plan Population and Employment Projections–2025, Table 5.12-C – 2025 General Plan and SCAG Comparisons, Table 5.12-D – General Plan Housing Projections 2025, Capital Improvement Program and SCAG's RCP and RTP)***

Less Than Significant Impact. The *CEQA Guidelines* identify a project as growth inducing if it fosters economic or population growth or the construction of additional housing either directly or indirectly in the surrounding environment (*CEQA Guidelines*

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Section 15126.2[d]). New employees from commercial or industrial development and new population from residential development represent direct forms of growth. These direct forms of growth have a secondary effect of expanding the size of local markets and inducing additional economic activity in the area.

Under CEQA, growth inducement is not considered necessarily detrimental, beneficial, or of little significance to the environment. Typically, the growth-inducing potential of a project would be considered substantial if it fosters growth or a concentration of population in excess of what is assumed in pertinent master plans, land use plans, or in projections made by regional planning agencies (e.g., SCAG).

The General Plan 2025 land use designation for the project site is Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park Zone (BMP). The proposed project is consistent with the City General Plan 2025 and zoning ordinance and will construct a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet). Since the proposed project consists of a speculative warehouse, the actual uses of the proposed warehouse facilities, and therefore the amount of employment generated, could vary depending on the building occupants. Based on the ITE *Trip Generation* (9th Edition: Pages 193 and 203) rates for Land Use 150 – "Warehousing," the proposed project will create approximately 93 jobs.[9] However, since the proposed project is a speculative warehouse, the worst-case scenario for the proposed project would be to assume a more intense land use under the ITE *Trip Generation* using rates for Land Use 110 – "General Light Industrial," (ITE *Trip Generation*, 9th Edition: Pages 93 and 102), which indicates the proposed project will create approximately 233 jobs.[10] Therefore, the proposed project is expected to generate between 93 and 233 new jobs depending on the ultimate use of the proposed warehouse facilities.

Although the potential exists for the proposed project to result in temporary population growth through employment opportunities, the proposed uses are consistent with the General Plan 2025 and zoning ordinance and, therefore, population increase as a result of the proposed project is not considered substantial. As a result, the proposed project will not induce a population increase above that which has been planned for by the City.

The proposed project will be developed in accordance with related General Plan policies designed to minimize adverse conditions to population and housing increases for the City. Therefore, this project will have a **less than significant** impact to the environment from population growth. No mitigation is required.

b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

13b. Response: ***(Source: CADME Land Use 2003 Layer, Google imaging, etc.)***

No Impact. The proposed project will not displace existing housing, necessitating the construction of replacement housing elsewhere, because the project site is proposed on a vacant site that does not contain existing housing that would be removed or affected by the proposed project. There will be **no impact** on existing housing, necessitating the construction of replacement housing elsewhere. No mitigation is required.

c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

13c. Response: ***(Source: CADME Land Use 2003 Layer, Google imaging, etc.)***

No Impact. The proposed project will not displace any people, necessitating the construction of replacement housing elsewhere, because the project site is proposed on a vacant site that has no existing housing or residents that will be removed or affected by the proposed project. Therefore, the proposed project will have **no impact** on people, necessitating the need for replacement housing. No mitigation is required.

[9] Average 3.56 daily vehicle trips per 1,000 square feet gross floor area and average 3.89 daily vehicle trips per employee. 3.56 ÷ 3.89 = 0.92 employee per 1,000 square feet gross floor area. 0.92 × 100.974 = 93 employees.

[10] Average 6.97 daily vehicle trips per 1,000 square feet gross floor area and average 3.02 daily vehicle trips per employee. 6.97 ÷ 3.02 = 2.308 employee per 1,000 square feet gross floor area. 2.308 × 100.974 = 233 employees.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
14. PUBLIC SERVICES.				
Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a. Fire protection?	☐	☐	☒	☐

14a. Response: ***(Source: CAL FIRE Cooperative Efforts 2012, Riverside Fire Department Field Operations Division, Riverside General Plan and Supporting Documents Environmental Impact Report Public Services Element, Table 5.13-B – Fire Station Locations, Table 5.13-C – Riverside Fire Department Statistics and Ordinance 5948 § 1, Riverside Municipal Code – Section 16.32.080)***

Less Than Significant Impact. In the City of Riverside, typical fire prevention and suppression services are provided by the Riverside Fire Department (RFD). Under the California Master Mutual Aid Agreement, CAL FIRE also assists the RFD in a disaster when Department resources are available, regardless of the type of disaster. In turn, CAL FIRE can access RFD through the same agreement for assistance in wildland fire suppression. RFD also has a mutual aid agreement with the Riverside County Fire Department.

There are 14 fire stations strategically placed throughout the City. The "first in" station to serve the project site will be Fire Station 10 located at 2590 Jefferson Street, approximately 0.5 mile from the project site. The RFD's Operations Division responds to more than 30,000 emergency calls annually. The average on-site response to fire calls is six minutes. Delivering and maintaining such a high level of service in the future as the City grows is a major concern to the RFD. The City's Fire Department's goal is to maintain a five-minute response time for the first arriving units 90 percent of the time for all EMS and fire related incidents. As of 2013, the Fire Department arrives within seven minutes of dispatch over 70 percent of the time. The first arriving unit is capable of advancing the first line for fire control, initiating rescue, or providing basic life support for medical incidents. Additionally, the City's Fire Department policy states that units will be located and staffed such that an effective response force of four units with twelve personnel minimum shall be available to all areas of the City within a maximum of ten minutes (total response time).

The project site is located in an urbanized area and consists of construction and operation of a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet). The proposed project will be constructed pursuant to the 2013 California Fire Code as adopted and amended by the City of Riverside. The proposed project structure will include installation of an automatic fire sprinkler system in accordance with City ordinance 16.32.080 and will be subject to inspection and approval by the City Fire Department prior to occupancy. Additionally, the proposed project will include a C10 fire alarm, a "Knox" key system at the perimeter gate, and an "Infrared Automatic Gate System" to ensure immediate fire department access to the project site in the event of an emergency. Additionally, with 100,974 square feet of gross floor area, the proposed project will employ between 93 and 233 people.[11,12] Since the project proposes light industrial instead of residential uses, the project site will not be continuously occupied by the maximum number of possible individuals. Therefore, the proposed project will cause in incremental increase in the need for fire protection services which, in and of itself, will not create the need for new or altered fire services.

As with all development within the City, the project applicant shall pay applicable development impact fees to support the provision of fire services. In addition, with implementation of General Plan 2025 policies, compliance with existing codes and standards, and through Fire Department practices, impacts on the demand for additional fire facilities or services will be **less than significant**. No mitigation is required.

b. Police protection?	☐	☐	☒	☐

14b. Response: ***(Source: Riverside Police Department Field Operations Division, General Plan 2025 Figure PS-8 – Neighborhood Policing Centers, Riverside Municipal Code – Section 16.36.010 to 16.36.090, The Press Enterprise - Local News - Police Adjust Patrol Areas - December 29, 2016)***

[11] Average 3.56 daily vehicle trips per 1,000 square feet gross floor area and average 3.89 daily vehicle trips per employee. 3.56 ÷ 3.89 = 0.92 employee per 1,000 square feet gross floor area. 0.92 × 100.974 = 93 employees.

[12] Average 6.97 daily vehicle trips per 1,000 square feet gross floor area and average 3.02 daily vehicle trips per employee. 6.97 ÷ 3.02 = 2.308 employee per 1,000 square feet gross floor area. 2.308 × 100.974 = 233 employees.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Less Than Significant Impact. As of December 1, 2016, the Riverside Police Department (RPD) realigned its Neighborhood Policing Centers, or Beats, from four geographical service areas (north, east, west, and central) to Beat 1 through Beat 5. Each Beat is assigned a Lieutenant Area Commander to oversee the daily policing needs of the community. Prior to the realignment, the proposed project was within the Central Beat, which spanned from the Santa Ana River to the southern City boundary and from Tyler Street to Alessandro Boulevard. However the Beat realignment places the proposed project within Beat 4, which is approximately fifteen percent smaller in area compared to the previous Central Beat. The smaller patrol area is expected to improve police response times, and the closest officers will respond to major incidents regardless of which Beat they are patrolling. Beat 4 is served by the RPD Lincoln Avenue Station located at 8181 Lincoln Avenue, less than one-half mile west of the project site.

Incoming calls requesting police services are assigned by urgency. Priority 1 calls are typically of a life-threatening nature, such as a robbery in process or an accident involving bodily injury. Police officers strive to respond within 7 minutes to Priority 1 calls. Officers will respond to less-urgent Priority 2 calls within 12 minutes. Priority 2 calls are not life threatening and include such incidents as burglary, petty theft, shoplifting, etc.

As stated previously, with 100,974 square feet of gross floor area, the proposed project will employ between 93 and 233 people. As part of the City's plan review process, the proposed project will implement a Public-Safety Radio Amplification System in accordance with City Municipal Code, Section 16.36.010 to 16.36.090 which will be subject to inspection and approval by the City Police Department in connection with the City Fire Department. Since the project proposes light industrial instead of residential uses, the project site will not be continuously occupied by the maximum number of possible individuals. Therefore, the proposed project will cause an incremental increase in the need for police protection services which, in and of itself, will not create the need for new or altered police services.

As with all development within the City, the project applicant shall pay applicable development impact fees to support the provision of police services. In addition, with implementation of General Plan 2025 policies, compliance with existing codes and standards, and through Police Department practices, impacts on the demand for additional police facilities or services will be **less than significant**. No mitigation is required.

c. Schools?	☐	☐	☐	☒

14c. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.13-2 – RUSD Boundaries, Table 5.13-D – RUSD, Figure 5.13-3 – AUSD Boundaries, Table 5.13-E – AUSD, Table 5.13-G – Student Generation for RUSD and AUSD By Education Level, and Figure 5.13-4 – Other School District Boundaries, Senate Bill 50, California Government Code Section 65995)***

No Impact. The proposed project is within the boundaries of the Riverside Unified School District. Since the project proposes light industrial rather than residential uses, no additional housing will be generated such that the number of school-aged children would increase as a result of the proposed project. The project applicant shall pay school development impact fees, as required pursuant to Senate Bill 50 and California Government Code, Section 65995. Through compliance with Senate Bill 50 and California Government Code, Section 65995, **no impact** to schools will occur. No mitigation is required.

d. Parks?	☐	☐	☐	☒

14d. Response: ***(Source: General Plan 2025 Figure PR-1 – Parks, Open Spaces and Trails, Table PR-4 – Park and Recreation Facilities, Parks Master Plan 2003, Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.14-A – Park and Recreation Facility Types, and Table 5.14-C – Park and Recreation Facilities Funded in the Riverside Renaissance Initiative)***

No Impact. The project proposes a light industrial use rather than a residential use and will not involve the addition of any housing units that would permanently increase the population. The City's adopted standard for developed park acreage of 3 acres per 1,000 residents will not be adversely affected. Additionally, the proposed project site is not located in an area of the City identified to have a parkland shortage. Therefore, no significant increase in demand on park uses or recreational facilities will occur. In accordance with the City's Parks, Recreation, and Community Services-Park Planning Division, the applicant will make payment of all applicable Park Development Impact Fees (local, aquatic, regional/reserve, and trail fees) for privately developed areas. With the payment of applicable development impact fees, the proposed project will have **no impact** on the demand for additional park facilities or services. No mitigation is required.

e. Other public facilities?	☐	☐	☒	☐

14e. Response: ***(Source: General Plan 2025 Figure LU-8 – Community Facilities, Riverside General Plan and***

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
Supporting Documents Environmental Impact Report Figure 5.13-5 – Library Facilities, Figure 5.13-6 – Community Centers, Table 5.3-F – Riverside Community Centers, Table 5.13-H – Riverside Public Library Service Standards)				
Less Than Significant Impact. The project proposes light industrial uses within an urbanized area. Since the proposed project will not generate additional housing units that would permanently increase the population, the proposed project will not substantially increase the demand for other public services within the City. With the payment of applicable development impact fees, implementation of General Plan 2025 policies, and compliance with existing codes, standards, and established Park and Recreation and Community Services and Library practices, impacts on the demand for additional public facilities or services will be **less than significant**. No mitigation is required.				
15. RECREATION. Would the project:				
a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
15a. Response: ***(Source: General Plan 2025 Figure PR-1 – Parks, Open Spaces and Trails, Table PR-4 – Park and Recreation Facilities, Figure CCM-6 – Master Plan of Trails and Bikeways, Parks Master Plan 2003, Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.14-A – Park and Recreation Facility Types, and Table 5.14-C – Park and Recreation Facilities Funded in the Riverside Renaissance Initiative, Table 5.14-D – Inventory of Existing Community Centers, Riverside Municipal Code Chapter 16.60 – Local Park Development Fees, Bicycle Master Plan May 2007)***				
No Impact. The project proposes a light industrial use rather than a residential use and will not involve the addition of any housing units that would permanently increase the population. The City's adopted standard for developed park acreage of 3 acres per 1,000 residents will not be adversely affected. Additionally, the proposed project site is not located in an area of the City identified to have a parkland shortage. Therefore, no significant increase in demand on park uses or recreational facilities will occur. In accordance with the City's Parks, Recreation, and Community Services-Park Planning Division, the applicant will make payment of all applicable Park Development Impact Fees (local, aquatic, regional/reserve, and trail fees) for privately developed areas. Since the proposed project does not include any uses that would increase the use of existing neighborhood and regional parks such that substantial physical deterioration of the facilities would occur or be accelerated, this project will have **no impact** on existing neighborhood and regional parks. No mitigation is required.				
b. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
15b. Response: ***(Source: General Plan 2025 Figure PR-1 – Parks, Open Spaces and Trails, Table PR-4 – Park and Recreation Facilities, Figure CCM-6 – Master Plan of Trails and Bikeways, Parks Master Plan 2003, Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.14-A – Park and Recreation Facility Types, and Table 5.14-C – Park and Recreation Facilities Funded in the Riverside Renaissance Initiative, Table 5.14-D – Inventory of Existing Community Centers, Riverside Municipal Code Chapter 16.60 – Local Park Development Fees, Bicycle Master Plan May 2007)***				
No Impact. The proposed project does not include recreational amenities or parkland. Additionally, the project proposes a light industrial use rather than a residential use and will not involve the addition of any housing units that would permanently increase the population. Therefore, the construction or expansion of recreational facilities in the absence of a population increase is not necessary. **No impact** will occur and no mitigation is required.				
16. TRANSPORTATION/TRAFFIC. Would the project:				
a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance 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?	☐	☐	☒	☐
16a. Response: ***(Source: Appendix H – Traffic Impact Analysis, Transportation Research Board Special Report 209 –***				

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

2010 Highway Capacity Manual – Institute of Transportation Engineers (ITE)* Trip Generation– *9th Edition, General Plan 2025 Circulation and Community Mobility Element, City of Fontana Truck Trip Generation Study - August 2003)

Less Than Significant Impact. The project site is 1.2 miles southeast of State Route 91 with access to the freeway from Adams Street, approximately 0.6 mile southwest of the project site. The proposed project will add approximately 100,974 square feet of light industrial warehousing in the area. A project-specific Traffic impact Analysis (TIA) was conducted for the proposed project (Appendix H). The proposed project is expected to generate a daily traffic volume of 704 vehicle trips, of which 144 trips are by multiple-axle trucks. When multiple-axle truck volumes are converted to Passenger Car Equivalents (PCEs), the daily traffic volume generated by the proposed project will be 923 vehicle trips (Appendix H). These traffic volumes are expected to travel on roadways in the project vicinity.

Construction. Construction-related trips generated on a daily basis throughout each phase of construction will derive from construction workers and delivery of construction materials. It is anticipated project construction will generate haul trips that will be distributed throughout the day. During construction, there will also be passenger car construction trips associated with employee arrivals and departures. The weekday a.m. peak period is 7:00 a.m. to 9:00 a.m., and the weekday p.m. peak period is 4:00 p.m. to 6:00 p.m. It is anticipated the majority of construction workers will arrive and depart outside the peak hours, while delivery trucks will arrive and depart throughout the day.

Project construction is anticipated to take nine months, with an expected start date of March 2017 and completion date of November 2017. All construction equipment, including construction worker vehicles, will be staged on the project site for the duration of the construction period. In addition, the proposed project construction schedule will comply with the City of Riverside's Municipal Code Section 7.35.010, which limits construction activities to Monday through Friday from 7:00 a.m. to 7:00 p.m., and Saturday from 8:00 a.m. to 5:00 p.m. No construction activities will occur on Sundays or federal holidays. In addition, as part of the plan review process, the City will require the developer to submit a Traffic Management Plan that will provide appropriate measures to facilitate the passage of persons and vehicles through/around any required road closures. Through compliance with City Municipal Code Section 7.35.010, construction impacts related to conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system will be **less than significant**. No mitigation is required.

Operation. Roadway performance is most often controlled by the performance of intersections, specifically during peak traffic periods. This is because traffic control at intersections interrupts traffic flow that would otherwise be relatively unimpeded except for the influences of on-street parking, access to adjacent land uses, or other factors resulting in interaction of vehicles between intersections. For this reason, traffic analyses for individual projects typically focus on peak-hour operating conditions for key intersections rather than roadway segments. Operating conditions at intersections are typically described in terms of level of service (LOS). LOS is a measure of a roadway's operating performance and is a tool used in defining thresholds of significance. LOS is described with a letter designation from A to F, with LOS A representing the best operating conditions (free-flow traffic) and LOS F the worst (traffic jammed). Table 16.A summarizes the relationship of delay and LOS at unsignalized and signalized intersections.

Table 16.A: Level of Service Criteria for Unsignalized and Signalized Intersections

Level of Service	Unsignalized Intersection Average Delay per Vehicle (sec.)	Signalized Intersection Average Delay per Vehicle (sec.)
A	$\leq$ 10	$\leq$ 10
B	> 10 and $\leq$ 15	> 10 and $\leq$ 20
C	> 15 and $\leq$ 25	> 20 and $\leq$ 35
D	> 25 and $\leq$ 35	> 35 and $\leq$ 55
E	> 35 and $\leq$ 50	> 55 and $\leq$ 80
F	> 50	> 80

Source: Traffic Impact Analysis (Appendix H)

The City's significance criteria are used for all study intersections under the City's jurisdiction. The City uses LOS D as its minimum level of service criteria for intersections and roadways of Collector or higher classification, while LOS C is to be maintained on local street intersections. All study intersections are located on either Lincoln Avenue, which is designated as a 4-lane arterial, or Grace Street, a 2-lane local street. Since the proposed project is consistent with the City's General Plan, LOS D is the minimum level of service standard for intersections on Lincoln Avenue, and LOS C is used for intersections located solely on

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Grace Street.

The study area for traffic includes the following six intersections, which are under the jurisdiction of the City:

1. Adams Street/Lincoln Avenue;
2. Jefferson Street/Lincoln Avenue;
3. Project Driveway 1/Lincoln Avenue;
4. Project Driveway 2/Lincoln Avenue;
5. Grace Street/Lincoln Avenue; and
6. Project Driveway 3/Grace Street.

Consistent with the City's Traffic Impact Analysis guidelines, the 2010 *Highway Capacity Manual* (HCM) analysis methodologies were used to determine intersection levels of service for all study area intersections. The traffic analysis examined traffic operations in the vicinity of the proposed project under the following six scenarios:

- Existing traffic conditions;
- Existing with project traffic conditions;
- Project completion (2017) conditions
- Project completion (2017) with project traffic conditions;
- Cumulative (2017) traffic conditions; and
- Cumulative (2017) with project traffic conditions.

For each scenario, traffic operations at study intersections are evaluated for the a.m. and p.m. peak hours. The a.m. peak hour is defined as the one hour of highest traffic volumes occurring between 7:00 a.m. and 9:00 a.m. The p.m. peak hour is defined as the one hour of highest traffic volumes occurring between 4:00 p.m. and 6:00 p.m.

The concept of passenger car equivalents (PCEs) accounts for the larger impact of trucks on traffic operations. It does so by assigning each type of truck a PCE factor that represents the number of passenger vehicles that could travel through an intersection in the same time that a particular type of truck could.

The trip generation for the proposed project is based on rates for Land Use 110 – "General Light Industrial" from the ITE *Trip Generation*, 9th Edition. All trip generation rates were converted to passenger vehicle and truck trips using the vehicle mix included in the Fontana Truck Trip Generation Study. As such, for a light industrial land use, trucks comprise 21.4 percent of the total trip generation. Truck trips were converted to PCEs using a 1.5 PCE factor for two-axle trucks, 2.0 for three-axle trucks, and 3.0 for four or more axle trucks. As shown in Table 16.B, the project is expected to generate 923 daily total PCE trips, with 119 PCE trips occurring the a.m. peak hour and 125 PCE trips occurring during the p.m. peak hour.

Table 16.B: Project Trip Generation

Land Use: 100.9 TSF Warehouse	A.M. Peak Hour			P.M. Peak Hour			Daily
	In	Out	Total	In	Out	Total	
Trips/Unit (Cars)	0.636	0.087	0.723	0.095	0.667	0.762	5.546
Trips/Unit (2-Axle Trucks)	0.065	0.009	0.074	0.009	0.069	0.078	0.241
Trips/Unit (3-Axle Trucks)	0.032	0.004	0.036	0.005	0.033	0.038	0.323
Trips/Unit (4+ Axle Trucks)	0.077	0.010	0.087	0.011	0.081	0.092	0.860
Trips/Unit (Total)	0.810	0.110	0.920	0.120	0.850	0.970	6.970
Trip Generation (Cars)	64	9	73	10	67	77	560
Trip Generation (2-Axle Trucks)	7	0	7	1	7	8	24
Trip Generation (3-Axle Trucks)	3	1	4	1	3	4	33
Trip Generation (4+ Axle Trucks)	8	1	9	1	8	9	87
Trip Generation (Total, unconverted)	**82**	**11**	**93**	**13**	**85**	**98**	**704**

ISSUES (AND SUPPORTING INFORMATION SOURCES):				Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
Trip Generation (Cars)	64	9	73	10	67	77	560
PCE Trip Generation (2-Axle Trucks)	11	0	11	2	11	13	36
PCE Trip Generation (3-Axle Trucks	6	2	8	2	6	8	66
PCE Trip Generation (4+ Axle Trucks)	24	3	27	3	24	27	261
PCE Trip Generation (Total)	105	14	119	17	108	125	923
Total PCE Trips	**105**	**14**	**119**	**17**	**108**	**125**	**923**

TSF = Thousand Square Feet
Source: Traffic Impact Analysis (Appendix H)

Tables 16.C, 16.D, and 16.E summarize the delay and LOS at the study area intersections under "existing" and "with the project" for the 2017 (project completion) and 2017 (cumulative) scenarios, respectively.

Table 16.C: Existing Intersection Levels of Service

Intersection		Control	Without Project				With Project				Significant Impact
			A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour		
			Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	
1	Adams Street/Lincoln Avenue	Signal	26.3	C	21.8	C	29.2	C	22.3	C	No
2	Jefferson Street/ Lincoln Avenue	AWSC	21.1	C	17.5	C	23.9	C	19.0	C	No
3	Project Driveway 1/ Lincoln Street	TWSC	12.6	B	11.5	B	14.2	B	13.3	B	No
4	Project Driveway 2/ Lincoln Street	TWSC	*Future Intersection*				11.3	B	11.6	B	No
5	Grace Street/Lincoln Avenue	TWSC	16.9	C	14.2	B	18.4	C	16.9	C	No
6	Project Driveway 3/ Grace Street	TWSC	8.7	A	8.5	A	9.3	A	9.3	A	No

Source: Traffic Impact Analysis (Appendix H)
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
Delay = Average control delay in seconds (For TWSC intersections, reported delay is for worst-case movement).
LOS = Level of Service

Table 16.D: Project Completion (2017) Intersection Levels of Service

Intersection		Control	Without Project				With Project				Significant Impact
			A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour		
			Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	
1	Adams Street/Lincoln Avenue	Signal	26.6	C	21.8	C	29.7	C	22.3	C	No
2	Jefferson Street/ Lincoln Avenue	AWSC	21.9	C	18.1	C	24.8	C	19.7	C	No
3	Project Driveway 1/ Lincoln Street	TWSC	12.7	B	11.6	B	15.5	C	13.4	B	No
4	Project Driveway 2/ Lincoln Street	TWSC	*Future Intersection*				11.3	B	11.6	B	No

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

5	Grace Street/Lincoln Avenue	TWSC	17.3	C	14.3	B	18.8	C	17.1	C	No
6	Project Driveway 3/ Grace Street	TWSC	8.7	A	8.5	A	9.3	A	9.3	A	No

Source: Traffic Impact Analysis (Appendix H)
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
Delay = Average control delay in seconds (For TWSC intersections, reported delay is for worst-case movement).
LOS = Level of Service

Table 16.E: Cumulative (2017) Intersection Levels of Service

			Without Project				With Project				
			A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour		
	Intersection	Control	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Significant Impact
1	Adams Street/Lincoln Avenue	Signal	26.8	C	22.0	C	30.2	C	22.5	C	No
2	Jefferson Street/ Lincoln Avenue	AWSC	22.8	C	19.0	C	26.0	C	20.8	C	No
3	Project Driveway 1/ Lincoln Street	TWSC	12.9	B	11.8	B	15.8	C	13.7	B	No
4	Project Driveway 2/ Lincoln Street	TWSC	*Future Intersection*				11.5	B	11.8	B	No
5	Grace Street/Lincoln Avenue	TWSC	17.8	C	14.8	B	19.3	C	17.7	C	No
6	Project Driveway 3/ Grace Street	TWSC	8.7	A	8.5	A	9.3	A	9.3	A	No

Source: Traffic Impact Analysis (Appendix H)
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
Delay = Average control delay in seconds (For TWSC intersections, reported delay is for worst-case movement).
LOS = Level of Service

Table 16.C reveals in the "existing" scenario, all study area intersections operate at satisfactory levels of service. Tables 16.D and 16.E reveal all study area intersections are projected to operate at satisfactory levels of service under the "with the project" scenario for the 2017 (project completion) and 2017 (cumulative) scenarios.

The City's significance criteria are used for all study intersections under the City's jurisdiction. For projects in conformance with the City's General Plan, a significant project impact occurs at a study area intersection when the peak hour LOS falls below D (to E or F) for intersections and roadways of Collector or higher classification, while LOS C is to be maintained on local street intersections in accordance with General Plan Policy CCM-2.3. All study intersections are located on either Lincoln Avenue, which is designated as a 4-lane arterial, or Grace Street, a 2-lane local street. Since the proposed project is consistent with the City's General Plan and LOS C or better will be maintained under the "with the project" for the 2017 (project completion) and 2017 (cumulative) scenarios, operational impacts related to conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system will be **less than significant.** No mitigation is required.

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?	☐	☐	☒	☐

16b. Response: ***(Source: 2011 Riverside County Congestion Management Program, Appendix H – Traffic Impact Analysis, Transportation Research Board Special Report 209 – 2010 Highway Capacity Manual – Institute of***

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Transportation Engineers (ITE)* Trip Generation – *9th Edition, General Plan 2025 Circulation and Community Mobility Element)

Less Than Significant Impact. The *2011 Riverside County Congestion Management Program* includes guidelines to more directly link land use, transportation and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related impacts, and improve air quality. These guidelines establish a system of state highways and principal arterial roadways designated by the Riverside County Transportation Commission (RCTC). The adopted minimum Level of Service (LOS) threshold for congestion management program (CMP) state highways and principal arterial roadways is LOS E, unless the intersection or segment had a lower LOS (LOS F) in 1991; these facilities are exempt from CMP deficiency plan requirements.

Table 4-1 in the CMP lists the exempt facilities, which include the project study area intersection and highway segment on Adams Street, which is the designated arterial street connecting the project site with State Route 91. Since the intersection and highway segment included in the study area is exempt from the CMP deficiency plan, a CMP analysis is not required. Additionally, the LOS standard and significance criteria used in the project-specific TIA for this analysis is more conservative than the CMP thresholds of significance. Since the proposed project will maintain LOS C or better under the "with the project" for the 2017 (project completion) and 2017 (cumulative) scenarios, and the proposed project TIA presents a more conservative analysis than the CMP thresholds of significance for evaluating project-related traffic impacts within the study area, the proposed project will not conflict with an applicable CMP, including but not limited to LOS standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways. Impacts will be **less than significant** and no mitigation is required.

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?	☐	☐	☐	☒

16c. Response: ***(Source: General Plan 2025 Figure PS-6 – Airport Safety Zones and Influence Areas)***

No Impact. The project site is located in Zone E of the Riverside Municipal Airport Land Use Plan. Zone E has the fewest restrictions on proposed land uses. General restrictions in Zone E include airspace review for objects greater than 100 feet tall, discouragement of major spectator oriented sports stadiums, amphitheaters, and concert halls, and other hazards to flight such as tall objects, electronic forms of interference, and land uses that may attract birds.

The proposed project consists of light-industrial warehouse uses less than 100 feet tall in Zone E and therefore will not 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. **No impact** to air traffic patterns will occur. No mitigation is required.

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

16d. Response: ***(Source: Figure 3 – Conceptual Site Plan, Appendix H – Traffic Impact Analysis)***

Less Than Significant Impact. Vehicle traffic to and from the project site will utilize the existing network of regional and local roadways that serve the project site. Vehicle access to the project site will be provided via three driveways (Figure 5). The proposed project will use an existing driveway located on the northwest portion of the project site and currently used by an adjacent industrial building. Two additional driveways are proposed, one on Lincoln Avenue and one on Grace Street. The proposed project will not introduce any new roadways or introduce a land use that will conflict with existing urban land uses in the surrounding area. Design of the proposed project, including curb cuts, ingress, egress, traffic signage, and other streetscape changes, will be subject to review and approval by the Traffic Engineering Section of the Public Works Department as part of the plan review process. Therefore, impacts related to increased hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment) will be **less than significant**. No mitigation is required.

e. Result in inadequate emergency access?	☐	☐	☒	☐

16e. Response: ***(Source: California Department of Transportation Highway Design Manual, Municipal Code, and Fire Code)***

Less Than Significant Impact. Emergency vehicle access to the project site will be provided via three driveways. The proposed project will use an existing driveway located on the northwest portion of the project site and currently used by an adjacent industrial building. Two additional driveways are proposed, one on Lincoln Avenue and one on Grace Street. All three driveways will allow full access to emergency vehicles. Sufficient space and turning radius for fire trucks will be provided on the project site

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

around the proposed buildings.

The proposed project will be constructed pursuant to the 2013 California Fire Code as adopted and amended by the City of Riverside. The proposed project structure will include installation of an automatic fire sprinkler system in accordance with City Ordinance 16.32.080 and will be subject to inspection and approval by the City Fire Department prior to occupancy. Additionally, the proposed project will include a C10 fire alarm, a "Knox" key system at the perimeter gate, and an "Infrared Automatic Gate System" to ensure immediate fire department access to the project site in the event of an emergency.

As part of the plan review process, the City will require the developer to submit a Traffic Management Plan that will provide appropriate measures to facilitate the passage of persons and vehicles through/around any required road closures. Adherence to these measures will reduce potential impacts related to emergency access to **less than significant** levels. No mitigation is required.

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)?	☐	☐	☐	☒

16f. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report, General Plan 2025 Land Use and Urban Design, Circulation and Community Mobility and Education Elements, Bicycle Master Plan, School Safety Program – Walk Safe! – Drive Safe!)***

No Impact. The proposed project will not affect adopted policies supporting alternative transportation and will be subject to compliance with policies, plans, and programs of the City and other applicable agencies regarding alternative modes of transportation. Pedestrians accessing the project may utilize pedestrian facilities (e.g., sidewalks and crosswalks) that are part of the surrounding street system. A sidewalk along the north side of Lincoln Avenue can be used to access the project site, and improvements to the south side of Lincoln Avenue will include perimeter lighting and pedestrian access facilities. Additionally, the proposed project will include installation of a curb, gutter, and sidewalk, as well as parkway improvements along the west side of Grace Street. All street-side frontage improvements will occur in accordance with the City's *Citywide Design and Sign Guidelines* subject to City Planning Staff review and approval to ensure design elements are proposed and implemented in accordance with Title 19 - Zoning of the City's Municipal Code prior to permit issuance.

Lincoln Avenue, Adams Avenue, and State Route 91 are served by transit facilities (Riverside Transit Agency [RTA] Bus Route 10). Bus stops at the Lincoln Avenue/Grace Street intersection and the Lincoln Avenue Avenue/Jefferson Avenue intersection are the closest bus stops (between 40 feet and 400 feet) to the project site. The proposed project will not remove or relocate any alternative transportation access points. Therefore, the proposed project does not conflict with adopted plans, policies, or programs supporting alternative transportation. **No impact** related to public transit, bicycle, or pedestrian facilities plans will occur and no mitigation is required.

17. TRIBAL CULTURAL RESOURCES. Would the project:				
a. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American Tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?	☐	☒	☐	☐

17a.i. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.5-1 – Archaeological Sensitivity and Figure 5.5-2 – Prehistoric Cultural Resources Sensitivity, Appendix C – Cultural Resources Assessment)***

Less Than Significant With Mitigation Incorporated. Chapter 532, Statutes of 2014 (i.e., Assembly Bill [AB] 52), requires Lead Agencies evaluate a project's potential to impact "tribal cultural resources." Such resources include "[s]ites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that are eligible for inclusion in the California Register of Historical Resources or included in a local register of historical resources." AB 52 also gives Lead Agencies the discretion to determine, supported by substantial evidence, whether a resource qualifies as a "tribal

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

cultural resource."

Also per AB 52 (specifically PRC 21080.3.1), Native American consultation is required upon request by a California Native American tribe that has previously requested that the City provide it with notice of such projects.

The City commenced tribal notification in accordance with AB 52 on September 15, 2016. The 30-day notification response window closed on October 17, 2016. Two California Native American tribes, the Agua Caliente Band of Cahuilla Indians and the San Manuel Band of Mission Indians, expressed interest in the proposed project. Both tribes requested and were provided copies of the project-specific Cultural Resources Assessment (Appendix C).

Neither the Agua Caliente Band of Cahuilla Indians nor the San Manuel Band of Mission Indians proclaimed the presence of tribal cultural resources on or in the vicinity of the project site. The Agua Caliente Band of Cahuilla Indians requested compliance with State Health and Safety Code §7050.5, which shall occur in accordance with **Standard Condition C-1**, and the San Manuel Band of Mission Indians has provided no further comment on the proposed project. However, there remains some potential during construction for the proposed project to unearth previously undocumented tribal cultural resources with the potential to be considered significant by the Lead Agency as defined in Public Resources Code section 5020.1(k). Therefore, **Mitigation Measure CUL-1** and **Standard Condition C-1** are required in the event that unanticipated tribal cultural resources or human remains are unearthed during project construction. Implementation of **Mitigation Measure CUL-1** and **Standard Condition C-1**, pursuant to CCR Section 15064.5(d)(e), State Health and Safety Code §7050.5, and PRC §5097.98, will reduce impacts from the discovery of unanticipated tribal cultural resources or human remains to **less than significant** levels.

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

17.a.ii. Response: ***(Source: Appendix C – Cultural Resources Assessment)***

Less Than Significant With Mitigation Incorporated. CEQA defines a "historical resource" as a resource that meets one or more of the following criteria: (1) is listed in, or determined eligible for listing in, the California Register of Historical Resources (California Register); (2) is listed in a local register of historical resources as defined in PRC §5020.1(k); (3) is identified as significant in a historical resource survey meeting the requirements of PRC §5024.1(g); or (4) is determined to be a historical resource by a project's Lead Agency (PRC §21084.1 and *State CEQA Guidelines* §15064.5[a]).

A resource may be listed as a historical resource in the California Register if it meets any of the following National Register of Historic Places criteria as defined in PRC §5024.1(C):

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
2. Is associated with the lives of persons important in our past.
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
4. Has yielded, or may be likely to yield, information important in prehistory or history.

A "substantial adverse change" to a historical resource, according to PRC §5020.1(q), "means demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired."

A project-specific Cultural Resources Assessment (Appendix C) conducted for the proposed project included an archival records search and intensive pedestrian survey of the project site. The records search included a review of all recorded prehistoric and historic cultural resources within one mile of the project site, as well as a review of known cultural resources survey and excavation reports. The intensive pedestrian survey included visual inspection of all accessible exposed areas of the project site in systematic parallel transects spaced at 10-meter intervals (approximately thirty feet), where possible.

The archival records search revealed 22 cultural resources within one mile of the proposed project, none of which is located within the project site, and nine previous cultural resource studies conducted within one mile of the proposed project, none of which includes the project. The cultural resources consist of six water conveyance and citrus industry-related resources, 11

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

historic-period residences, three commercial properties, two historic roads, and the Casa Blanca School. No prehistoric resources were noted within the one-mile records search radius. The nearest cultural resource to the project site is Victoria Avenue, one of the historic roads, approximately 0.2 mile south of the project site.

The intensive pedestrian survey revealed the project site is undeveloped. The eastern portion of the project site has been capped with artificial fill, and only minimal vegetation was noted. The western portion of the project site is being used for equipment storage. No prehistoric or historic resources or human remains were identified during the intensive pedestrian survey.

Based on the results of the project-specific Cultural Resources Assessment (Appendix C), in conjunction with comments received by the City pursuant to AB 52, no tribal cultural resources considered to be significant by the Lead Agency pursuant to PRC §5024.1(C), or human remains, are known to exist on the project site. However, there remains some potential during construction for the proposed project to unearth human remains or previously undocumented tribal cultural resources with the potential to be considered significant by the Lead Agency pursuant to PRC §5024.1(C). Therefore, **Mitigation Measure CUL-1** and **Standard Condition C-1** are required in the event that unanticipated tribal cultural resources or human remains are unearthed during project construction. Implementation of **Mitigation Measure CUL-1** and **Standard Condition C-1**, pursuant to CCR Section 15064.5(d)(e), State Health and Safety Code §7050.5, and PRC §5097.98, will reduce impacts from the discovery of unanticipated tribal cultural resources or human remains to **less than significant** levels.

18. UTILITIES AND SYSTEM SERVICES. Would the project:				
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐

18a. Response: (*Source: Riverside County Drainage Area Management Plan (DAMP), General Plan 2025 Figure PF-2 – Sewer Facilities Map, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.16-5 – Sewer Service Areas, Table 5.16-*K *– Estimated Future Wastewater Generation for the City of Riverside's Sewer Service Area, Figure 5.8-1 – Watersheds, Wastewater Integrated Master Plan and Certified EIR*)

Less Than Significant. The project is within the boundaries of the Santa Ana Regional Water Quality Control Board (RWQCB) and subject to the Riverside County Drainage Area Management Plan. The proposed project will connect to existing wastewater collection and conveyance facilities owned and operated by the City via sewer laterals from the project site, and wastewater from the project site and vicinity will be transported to the Riverside Regional Water Quality Control Plant. If an existing sewer lateral will be utilized, video inspection prior to connection will be required in accordance with the City's Municipal Separate Sewer Permit (MS4) as part of the City's Development Review Process through the Public Works Department.

All new development is required to comply with all provisions of the NPDES program and the City's Municipal Separate Sewer Permit (MS4), as enforced by the RWQCB. The proposed project will result in typical wastewater discharges that will not require new methods or equipment for treatment that are not currently permitted for the Riverside Regional Water Quality Control Plant. Therefore, the proposed project will not exceed applicable wastewater treatment requirements of the RWQCB with respect to discharges to the sewer system or storm water system within the City. Because the proposed project is required to adhere to the above regulations related to wastewater treatment, the project will have a **less than significant** impact. No mitigation is required.

b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐

18b. Response: ***(Source: General Plan 2025 Table PF-1 – Riverside Public Utilities (RPU) Projected Domestic Water Supply (AC-FT/YR), Table PF-2 – RPU Projected Water Demand, RPU, Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.16-E – RPU Projected Domestic Water Supply (AC-FT/YR), Table 5.16-F – RPU Projected Water Demand, Table 5.16-G – General Plan Projected Water Demand for RPU Including Water Reliability for 2025, Table 5.16-H – Current and Projected Domestic Water Supply (AC-FT/YR) Western Municipal Water District, Table 5.16-I – Current and Projected Water Use for Western Municipal Water District, Table 5.16-J – General Plan Projected Water Demand for Western Municipal Water District Including Water Reliability 2025, Table 5.16-K – Estimated Future Wastewater Generation for the City of Riverside's Sewer Service Area, Figure 5.16-4 – Water Facilities, Figure 5.16-6 – Sewer Infrastructure and Wastewater Integrated Master Plan and Certified EIR, and City of Riverside Department of Public Works - https://riversideca.gov/publicworks/sewer/wqcp.asp, website accessed December 22, 2016.)***

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Less Than Significant Impact. Water service is provided by Riverside Public Utilities. Projected domestic water demand in the City is expected to increase from 77,767 acre-feet per year in 2005 to 99,835 acre-feet per year in 2025 in normal water years, and Riverside Public Utilities anticipates a water supply of 112,671 acre-feet per year in the year 2025 with a projected water surplus of approximately 12,836 acre-feet per year[13] under a Typical Growth Scenario.[14] During single dry year conditions, supply is expected to exceed demand by 9,528 acre-feet, and under multiple dry year conditions, supply is expected to exceed demand by 14,786 acre feet. According to the Riverside General Plan and Supporting Documents Environmental Impact Report, Riverside Public Utilities would adequately serve the City under a Typical Growth Scenario through 2025 but may not meet the estimated water demand for Maximum build-out or Maximum build-out with Planned Residential Development without purchasing excess water from the Western Municipal Water District, which is expected to have 123,784 acre-feet annually to sell to other agencies like Riverside Public Utilities. Although water supply may be available for purchase from the Western Municipal Water District under Maximum build-out or Maximum build-out with Planned Residential Development scenarios, the Riverside Public Utilities currently does not have contracts to purchase excess water from the Western Municipal Water District, and new or expanded entitlements would be needed in the unlikely event population levels grew to Maximum build-out or Maximum build-out with Planned Residential Development levels.

Wastewater collection and treatment service is provided by the City of Riverside Public Works Department. More than 800 miles of public sewers convey wastewater from residences and businesses to the Riverside Regional Water Quality Control Plant. The proposed project will connect to the existing municipal sewer system via sewer laterals from the project site. If an existing sewer lateral will be utilized, video inspection prior to connection will be required in accordance with the City's Municipal Separate Sewer Permit (MS4). Additionally, as part of the City's Development Review Process through the Public Works Department, the applicant must submit a Wastewater Discharge Survey for industrial site and be approved by the City Environmental Compliance Section prior to the issuance of building permits. If an interceptor or wastewater treatment system is determined to be installed or replaced for a tenant, this requirement must be complied with prior to opening the business or by the date determined by the City's Environmental Compliance Section.

According to the City Public Works Department, the Riverside Regional Water Quality Control Plant has a wastewater treatment capacity of 40 million gallons per day, with capacity anticipated to be reached not before 2025, and a planned expansion of the facility to increase capacity to 52.2 million gallons per day. According to the Riverside General Plan and Supporting Documents Environmental Impact Report, the Riverside Regional Water Quality Control Plant would adequately serve the City under a Typical Growth Scenario through 2025 but would not meet the estimated wastewater treatment demand of 55.3 million gallons per day for Maximum build-out or 64.0 million gallons per day for Maximum build-out with Planned Residential Development.

The General Plan 2025 land use designation for the project site is Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park Zone (BMP). The proposed project is consistent with the City General Plan 2025 and zoning ordinance and will construct a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet). Since the proposed project consists of a speculative warehouse, the actual uses of the proposed warehouse facilities, and therefore the amount of employment generated, could vary depending on the building occupants. As detailed in checklist response 9b, the proposed project is expected to generate between 93 and 233 new jobs depending on the ultimate use of the proposed warehouse facilities.

Although the potential exists for the proposed project to result in temporary population growth through employment opportunities, the proposed uses are consistent with the General Plan 2025 and zoning ordinance and, therefore, population increase as a result of the proposed project is not considered substantial. As a result, the proposed project will not induce a population increase above that which has been planned for by the City, and the proposed project will remain consistent with the Typical Growth Scenario of the General Plan 2025 where future water and wastewater capacity was determined to be adequate (see Tables 5.16-E, 5.16-F, 5.16-G, 5.16-H, 5.16-I, 5.16-J, and 5.16-K of the Riverside General Plan and Supporting Documents Environmental Impact Report). Through the payment of applicable development impact and hook-up fees, the project will have a **less than significant** impact to the environment from construction of new water or wastewater treatment facilities or the expansion of existing facilities. No mitigation is required.

[13] 112,671 acre-feet per year (projected 2025 supply) – 99,835 acre-feet per year (projected 2025 demand) = 12,836 acre-feet per year (projected 2025 surplus).
[14] *Section 5.16 Utilities and Service Systems*, Riverside General Plan and Supporting Documents Environmental Impact Report. Page 5.16-33. November 2007.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☒	☐	☐

18c. Response: (*Source: General Plan 2025 Public Facilities Element, Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.16-2 – Drainage Facilities, Appendix F – Water Quality Management Plan, Appendix G – Infiltration Report, Subdivision Code Title 18 – Section 18.48.020, California Government Code – Section 66483*)

Less Than Significant With Mitigation Incorporated. The proposed project is located on a 5.9-acre property within the Santa Ana River Watershed. The project site is undeveloped. Ninety percent of the project site is graded, earthen ground surface and 10 percent is impervious asphalt driveway and parking lot. The proposed project site has been designed to maximize the landscape areas, thereby minimizing the impervious area to the maximum extent possible. The project site is proposing an 88 percent impervious ratio, which is lower than the 90 percent impervious ratio typical of commercial and light-industrial developments. The proposed increase in impervious surface area will generate increased storm water flows with potential to impact drainage facilities and require the provision of additional facilities.

The proposed project will maintain the existing drainage pattern from the southeast to the northwest corner, but runoff from the project site will disperse into infiltration/bioretention facilities located in the landscape setback fronting Lincoln Avenue and through permeable pavement proposed in the southern and western portions of the project site prior to discharging into the city storm drain. Each sump has an infiltration/bioretention facility for treatment with an overflow/outlet storm drain that will connect and discharge to the existing city storm drain in the northwest corner. Due to the poor infiltration rate of the existing on-site soils, a design infiltration rate of 1.0 inch per hour is required for the proposed sump condition basins located in the landscape setback fronting Lincoln Avenue.

According to the project-specific WQMP, the proposed sump condition basins to where the project site is designed to direct flow will infiltrate the maximum volume of runoff feasible and will fully address all drainage management areas; Low Impact Development (LID) Principles and LID BMPs have been incorporated into the project design to ensure the Design Capture Volume of the proposed infiltration/bioretention facilities located in the landscape setback fronting Lincoln Avenue and through permeable pavement proposed in the southern and western portions of the project site is sufficient (Appendix F). Implementation of **Mitigation Measure HYD-1** will ensure the performance of the sump condition basins will be consistent with the rates reported in the infiltration report (1.0 inch per hour) (Appendix G), and proposed project will not create or contribute runoff water exceeding capacity of existing or planned storm water drainage systems.

General Plan 2025 Policies PF 4.1 and PF 4.3 require the City to continue to routinely monitor its storm drain system and to fund and improve those systems as identified in the City's Capital Improvement Plan. Implementation of these policies will ensure that the City is adequately served by drainage systems. Though implementation of **Mitigation Measure HYD-1**, General Plan 2025 policies, and compliance with existing codes and regulations, the project will have a **less than significant** impact on the construction of new storm water drainage facilities or expansion of existing facilities.

d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐

18d. Response: (*Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.16-3 – Water Service Areas, Figure 5.16-4 – Water Facilities, Table 5.16-E – RPU Projected Domestic Water Supply (AC-FT/YR, Table 5.16-F – Projected Water Demand, Table 5.16-G – General Plan Projected Water Demand for RPU including Water Reliability for 2025, Table 5.16-H – Current and Projected Domestic Water Supply (AC-FT/YR) Western Municipal Water District, Table 5.16-I – Current and Projected Water Use for Western Municipal Water District, Table 5.16-J – General Plan Projected Water Demand for Western Municipal Water District Including Water Reliability 2025*)

Less Than Significant Impact. Water service is provided by Riverside Public Utilities. Projected domestic water demand in the City is expected to increase from 77,767 acre-feet per year in 2005 to 99,835 acre-feet per year in 2025 in normal water years, and Riverside Public Utilities anticipates a water supply of 112,671 acre-feet per year in the year 2025 with a projected water surplus of approximately 12,836 acre-feet per year[15] under a Typical Growth Scenario.[16] During single dry year conditions, supply is expected to exceed demand by 9,528 acre-feet, and under multiple dry year conditions, supply is expected to exceed demand by

[15] 112,671 acre-feet per year (projected 2025 supply) – 99,835 acre-feet per year (projected 2025 demand) = 12,836 acre-feet per year (projected 2025 surplus).
[16] *Section 5.16 Utilities and Service Systems*, Riverside General Plan and Supporting Documents Environmental Impact Report. Page 5.16-33. November 2007.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

14,786 acre feet. According to the Riverside General Plan and Supporting Documents Environmental Impact Report, Riverside Public Utilities would adequately serve the City under a Typical Growth Scenario through 2025 but may not meet the estimated water demand for Maximum build-out or Maximum build-out with Planned Residential Development without purchasing excess water from the Western Municipal Water District, which is expected to have 123,784 acre-feet annually to sell to other agencies like Riverside Public Utilities. Although water supply may be available for purchase from the Western Municipal Water District under Maximum build-out or Maximum build-out with Planned Residential Development scenarios, the Riverside Public Utilities currently does not have contracts to purchase excess water from the Western Municipal Water District, and new or expanded entitlements would be needed in the unlikely event population levels grew to Maximum build-out or Maximum build-out with Planned Residential Development levels.

The General Plan 2025 land use designation for the project site is Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park Zone (BMP). The proposed project is consistent with the City General Plan 2025 and zoning ordinance and will construct a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet). Since the proposed project consists of a speculative warehouse, the actual uses of the proposed warehouse facilities, and therefore the amount of employment generated, could vary depending on the building occupants. As detailed in checklist response 9b, the proposed project is expected to generate between 93 and 233 new jobs depending on the ultimate use of the proposed warehouse facilities.

Although the potential exists for the proposed project to result in temporary population growth through employment opportunities, the proposed uses are consistent with the General Plan 2025 and zoning ordinance and, therefore, population increase as a result of the proposed project is not considered substantial. As a result, the proposed project will not induce a population increase above that which has been planned for by the City, and the proposed project will remain consistent with the Typical Growth Scenario of the General Plan 2025 where future water generation was determined to be adequate (see Tables 5.16-E, 5.16-F, 5.16-G, 5.16-H, 5.16-I and 5.16-J of the Riverside General Plan and Supporting Documents Environmental Impact Report). With a City projected water surplus of approximately 12,836 acre-feet per year[17] under a Typical Growth Scenario, the proposed project will have a **less than significant** impact to water supplies, and no new or expanded entitlements are needed. No mitigation is required.

e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐

18e. Response: ***(Source: Riverside General Plan and Supporting Documents Environmental Impact Report Figure 5.16-5 – Sewer Service Areas, Figure 5.16-6 -Sewer Infrastructure, Table 5.16-K – Estimated Future Wastewater Generation for the City of Riverside's Sewer Service Area, and Wastewater Integrated Master Plan and Certified EIR)***

Less Than Significant Impact. Wastewater collection and treatment service is provided by the City of Riverside Public Works Department. More than 800 miles of public sewers convey wastewater from residences and businesses to the Riverside Regional Water Quality Control Plant. The proposed project will connect to the existing municipal sewer system via sewer laterals from the project site. If an existing sewer lateral will be utilized, video inspection prior to connection will be required in accordance with the City's Municipal Separate Sewer Permit (MS4). Additionally, as part of the City's Development Review Process through the Public Works Department, the applicant must submit a Wastewater Discharge Survey for industrial site and be approved by the City Environmental Compliance Section prior to the issuance of building permits. If the City determines that an interceptor or wastewater treatment system needs to be installed or replaced for a specific tenant, this requirement must be complied with prior to opening the business or by the date determined by the City's Environmental Compliance Section.

As of 2005, the Riverside Regional Water Quality Control Plant had a wastewater treatment capacity of 40 million gallons per day, with capacity anticipated to be reached not before 2025, and a planned expansion of the facility to increase capacity to 52.2 million gallons per day. According to the Riverside General Plan and Supporting Documents Environmental Impact Report, the Riverside Regional Water Quality Control Plant would adequately serve the City under a Typical Growth Scenario through 2025 but would not meet the estimated wastewater treatment demand of 55.3 million gallons per day for Maximum build-out or 64.0 million gallons per day for Maximum build-out with Planned Residential Development.

The General Plan 2025 land use designation for the project site is Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park Zone (BMP). The proposed project is consistent with the City General Plan 2025

[17] 112,671 acre-feet per year (projected 2025 supply) – 99,835 acre-feet per year (projected 2025 demand) = 12,836 acre-feet per year (projected 2025 surplus).

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

and Zoning Ordinance and will construct a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet). Since the proposed project consists of a speculative warehouse, the actual uses of the proposed warehouse facilities, and therefore the amount of employment generated, could vary depending on the building occupants. As detailed in checklist response 9b, the proposed project is expected to generate between 93 and 233 new jobs depending on the ultimate use of the proposed warehouse facilities.

Although the potential exists for the proposed project to result in temporary population growth through employment opportunities, the proposed uses are consistent with the General Plan 2025 and zoning ordinance and, therefore, population increase as a result of the proposed project is not considered substantial. As a result, the proposed project will not induce a population increase above that which has been planned for by the City, and the proposed project will remain consistent with the Typical Growth Scenario of the General Plan 2025 where future wastewater capacity was determined to be adequate (see Table 5.16-K of the Riverside General Plan and Supporting Documents Environmental Impact Report). Through the payment of applicable development impact and hook-up fees, the project will have a **less than significant** impact to wastewater treatment facilities. No mitigation is required.

f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐

18f. Response: (*Source: Riverside General Plan and Supporting Documents Environmental Impact Report Table 5.16-A – Existing Landfills and Table 5.16-M – Estimated Future Solid Waste Generation from the Planning Area, California Green Building Code, Public Resource Code – Section 41780*)

Less Than Significant Impact. The proposed project includes the development of light industrial uses. Solid waste from construction and future operations will be transported to the Badlands Landfill, located east of the City of Moreno Valley. Badlands Landfill has a current remaining capacity of 8.289 million tons, maximum daily load of 4,000 tons per day, and an average daily load of 2,195 tons per day. Construction of the project will generate waste, at least 50 percent of which will be diverted in accordance with the California Green Building Code. In addition, the proposed project will continuously generate waste from operation of the proposed warehouse facility and associated offices.

According to the Riverside General Plan and Supporting Documents Environmental Impact Report, the increase in solid waste generated under the Typical Growth Scenario of the General Plan 2025 is not anticipated to exceed the capacity of landfills serving the City as an isolated contributor. Additionally, in accordance with Public Resource Code Section 41780, the City diverts at least 50 percent of generated waste from landfills. However, if landfill capacity and expansion does not keep pace with growth in the region, or if growth within the City exceeds the Typical Growth Scenario, there is potential for cumulative impacts to landfill capacity to be significant and unavoidable.

The General Plan 2025 land use designation for the project site is Business/Office Park (B/OP). The existing zoning for the project site is Business and Manufacturing Park Zone (BMP). The proposed project is consistent with the City General Plan 2025 and Zoning Ordinance and will construct a multi-tenant light industrial building with four attached units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet). Since the proposed project consists of a speculative warehouse, the actual uses of the proposed warehouse facilities, and therefore the amount of employment generated, could vary depending on the building occupants. As detailed in checklist response 9b, the proposed project is expected to generate between 93 and 233 new jobs depending on the ultimate use of the proposed warehouse facilities.

According to Table 5.16-M of the Riverside General Plan and Supporting Documents Environmental Impact Report, light industrial uses generate approximately six (6) pounds of solid waste per 1,000 square feet of use. Therefore, the proposed project will generate approximately 606 pounds of solid waste per day.[18] Based on an average daily load of 2,195 tons (4,390,000 pounds) per day capacity of the Badlands Landfill, the proposed project will contribute approximately 0.0138 percent of the average daily load of solid waste to the Badlands Landfill.[19]

Although the potential exists for the proposed project to result in temporary population growth through employment opportunities, the proposed uses are consistent with the General Plan 2025 and zoning ordinance and, therefore, population increase as a result of the proposed project is not considered substantial. As a result, the proposed project will not induce a population increase above that which has been planned for by the City, and the proposed project will remain consistent with the Typical Growth Scenario of the General Plan 2025 where permitted landfill capacity was determined to be adequate (see Tables

[18] 100,974 square feet ÷ 1,000 = 100.974 × 6 pounds of solid waste per day = 606 pounds of solid waste per day from the proposed project.

[19] 606 pounds of solid waste per day from the proposed project ÷ 4,390,000 pounds of average daily load of solid waste = 0.0138 percent of average daily load.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
5.16-A and 5.16-M of the Riverside General Plan and Supporting Documents Environmental Impact Report). Through the payment of applicable development impact fees, the proposed project will have a **less than significant** impact to landfill capacity. No mitigation is required.				
g. Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒
18g. Response: ***(Source: California Integrated Waste Management Board 2002 Landfill Facility Compliance Study, Public Resource Code – Section 41780)*** **No Impact.** The California Integrated Waste Management Act under Public Resource Code Section 41780 requires local jurisdictions to divert at least 50 percent of all solid waste generated. The City is currently achieving a 60 percent diversion rate, well above state requirements. In addition, the California Green Building Code requires all developments to divert 50 percent of non-hazardous construction and demolition debris for all projects and 100 percent of excavated soil and land clearing debris for all non-residential projects. The proposed project must comply with the City's waste disposal requirements as well as the California Green Building Code. For these reasons, the project will not conflict with any federal, state, or local regulations related to solid waste. Therefore, **no impact** related to solid waste statutes will occur. No mitigation is required.				
19. MANDATORY FINDINGS OF SIGNIFICANCE.				
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or an endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
19a. Response: ***(Appendix B – MSHCP Consistency Analysis and Habitat Assessment, Appendix C – Cultural Resources Assessment)*** **Less Than Significant with Mitigation Incorporated.** No endangered or threatened species were identified on the project site. Development of the proposed project will not cause fish or wildlife populations to drop below self-sustaining levels or restrict the movement/distribution of a rare or endangered species. The proposed project will not affect any threatened or endangered species or associated habitat. The project site is within the MSHCP burrowing owl survey area. Potential impacts to special status species, such as burrowing owl, or to migratory and nesting birds will be mitigated to **less than significant** levels with implementation of **Mitigation Measures BIO-1** and **BIO-2**. Development of the proposed project will not affect known historic, archaeological, or paleontological resources. There are no known unique ethnic or cultural values associated with the project site, nor are known religious or sacred uses associated with the project site. **Mitigation Measure CUL-1** and **Mitigation Measure CUL-2** have been identified to address potential impacts if subsurface cultural or paleontological resources are encountered during construction operations. Additionally, **Standard Condition C-1** requires the project applicant to comply with California Code of Regulations (CCR) Section 15064.5(e), California Health and Safety Code Section 7050.5, and Public Resources Code (PRC) Section 5097.98 in the event human remains are encountered at any time. Adherence to these measures and regulations will reduce potential impacts to cultural and paleontological resources to **less than significant** levels.				
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☐	☒	☐
19b. Response: ***(Appendix A – Air Quality and Greenhouse Gas Impact Analysis and Health Risk Assessment, Appendix H – Traffic Impact Analysis)*** **Less Than Significant Impact with Mitigation Incorporated.** The proposed project has either no impact, a less than significant impact, or a less than significant impact with mitigation incorporated with respect to all environmental issues pursuant to CEQA. Due to the limited scope of direct physical impacts to the environment associated with the proposed project, the project's impacts				

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

are primarily project-specific in nature.

The project-specific TIA (Appendix H) evaluated five cumulative projects, and this Initial Study determined the proposed project will not generate significant amounts of cumulative traffic, air pollutants, or GHG emissions. Implementation of **Standard Conditions A-1, A-2,** and **G-1** will ensure cumulative considerable impacts to the environment remain **less than significant**. No mitigation is required.

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

19c. Response: ***(Appendix A – Air Quality and Greenhouse Gas Impact Analysis and Health Risk Assessment, Appendix D – Geotechnical Investigation, Appendix F – Water Quality Management Plan, Appendix G – Infiltration Report, Appendix H – Traffic Impact Analysis)***

Less Than Significant With Mitigation Incorporated. Impacts to human beings that require mitigation as a result of the proposed project regard geology and soils, hydrology and water quality, and noise.

The South Coast Air Basin is currently designated as a non-attainment area for ozone, PM_{10}, and $PM_{2.5}$. Development of the project will contribute to air pollutant emissions on a short-term basis. The project will be required to comply with regional rules that assist in reducing short-term air pollutant emissions. The purpose of SDAQMD Rule 403 is to reduce the amount of particulate matter in the atmosphere resulting from man-made fugitive dust sources. Adherence to these measures through implementation of **Standard Conditions A-1** and **A-2** will ensure short-term construction air quality impacts remain less than significant.

Like all of Southern California, the project site could be subject to strong ground shaking resulting from large earthquakes. Additionally, the proposed project could experience adverse effects from unstable or expansive soils. Implementation of **Standard Condition GS-1** will ensure site-specific seismic design parameters in accordance with the 2013 CBC are implemented during construction and operation of the proposed project. **Mitigation Measure GEO-1** will ensure the grading recommendations outlined in the project-specific geotechnical investigation (Appendix E) are implemented during construction of the proposed project in accordance with the 2013 CBC and the City Grading Code (Title 17). **Mitigation Measure GEO-2** will test the soluble sulfate concentrations of the soils present at pad grade within the building area to ensure these soils do not require specialized concrete mix designs for sulfate protection purposes. **Mitigation Measure GEO-3** will test the expansion index of the soils present at pad grade within the building area to ensure these soils are not subject to significant expansion as defined in Table 18-1-B of the Uniform Building Code (1994). With implementation of **Standard Condition GS-1** and **Mitigation Measures GEO-1** through **GEO-3** will ensure potential impacts related to geologic and soil conditions are reduced to **less than significant** levels.

Although potential hydrology and water quality impacts could result from the proposed project, implementation of NPDES permits ensures the state's mandatory standards for the maintenance of clean water and the federal minimums are met. Additionally, implementation of **Mitigation Measure HYD-1** will identify the soil classification at the base of the proposed sump condition basins to ensure they correspond with those identified in the project-specific infiltration report (Appendix G) and the proposed bioretention facilities are adequate for addressing drainage conditions at all drainage management areas. **Mitigation Measure HYD-1** will ensure also that the proposed project will not create or contribute runoff water exceeding capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. Through compliance with NPDES requirements and implementation of **Mitigation Measure HYD-1**, impacts to hydrology and water quality will be reduced to **less than significant** levels.

Construction and operation of the proposed project has the potential to expose persons to noise levels in excess of standards in the local General Plan and Noise Ordinance. As specified in **Standard Condition N-1**, the proposed project is required to comply with the construction hours specified in the City's Noise Ordinance to ensure noise impacts to nearby sensitive receptors from earthmoving equipment remains less than significant. **Mitigation Measure NOI-1** will direct delivery truck movement into, out of, and within the project site to ensure operation noise impacts to the multifamily residences east of the project site remain less than significant as specified in the Noise Impact Analysis (Appendix I). With implementation of **Standard Condition N-1** and **Mitigation Measure NOI-1**, short-term construction and long-term operation noise impacts to nearby sensitive receptors will remain **less than significant**.

The proposed project will contribute traffic to local roadways, intersections, and regional freeways. The project-specific TIA (Appendix H) determined project-related traffic on local roadways, intersections, and regional freeways will **be less than significant.**

APPENDIX A

AIR QUALITY, GREENHOUSE GAS EMISSIONS, AND HEALTH RISK ASSESSMENT CALCULATIONS

AIR QUALITY, GREENHOUSE GAS, AND HEALTH RISK ASSESSMENTS

LINCOLN AVENUE INDUSTRIAL WAREHOUSE PROJECT

CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, CALIFORNIA

LSA

November 2016

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AIR QUALITY, GREENHOUSE GAS, AND HEALTH RISK ASSESSMENTS

LINCOLN AVENUE INDUSTRIAL WAREHOUSE PROJECT

CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, CALIFORNIA

Submitted to:

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563 Spoleto Drive
Pacific Palisades, California 90272

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LSA

November 2016

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EXECUTIVE SUMMARY

LSA was retained by Riverside Lincoln, LLC to prepare an air quality, greenhouse gas (GHG), and health risk assessments for the proposed Lincoln Avenue Industrial Warehouse Project (proposed project) to be located in the City of Riverside (City) in the County of Riverside (County), California.

The air quality study provides a discussion of the proposed project, the physical setting of the project area, and the regulatory framework for air quality. The report provides data on existing air quality and evaluates potential air quality impacts associated with the proposed project. Modeled air quality levels are based on trip generations identified in the *Traffic Impact Analysis* prepared for the proposed project (LSA 2016).

Emissions with regional effects during project construction, calculated with the California Emissions Estimator Model (CalEEMod) Version 2016.3.1, would not exceed criteria pollutant thresholds established by the South Coast Air Quality Management District (SCAQMD). Compliance with SCAQMD rules and regulations during construction will reduce construction-related air quality impacts from fugitive dust emissions and construction equipment emissions. Standard dust suppression measures recommended by the SCAQMD have been identified. The proposed project would not exceed the localized significance thresholds (LSTs).

The proposed project is located in the County of Riverside, which does not have serpentine and ultramafic rock in its soil. Therefore, the potential risk for naturally occurring asbestos (NOA) during project construction is less than significant.

Operational emissions for the entire project would not exceed the daily screening level thresholds for any of the criteria pollutants. The proposed project would not result in the degradation of signalized roadway intersections to a level of service (LOS) E or worse, and under cumulative conditions, emissions of carbon monoxide (CO) would not exceed State or federal standards that would result in a CO hot spot. An evaluation of potential odors from construction activities and project operations indicate that the project would not expose substantial numbers of people to objectionable odors.

A health risk assessments were conducted to assess impacts to sensitive receptors (i.e., residences) from toxic air contaminants (TACs) during construction activities as well as operation of the proposed project. Both construction and operational TAC impacts were found to be less than significant.

The potential of the project to affect global climate change (GCC) is also addressed. Short-term construction and long-term operational emissions of the principal GHGs, including carbon dioxide (CO_2) and methane (CH_4), are quantified, and their significance relative to the California Air Resources Board (ARB) Scoping Plan and City's Climate Action Plan are discussed.

The project-related construction activities are estimated to generate approximately 455 metric tons (MT) of carbon dioxide equivalent (CO_2e) emissions. Construction emissions are amortized over 30 years, such that the proposed construction activities would contribute an average of 15.16 MT of CO_2e per year (MT CO_2e/yr). The project-related operational and amortized construction GHG emissions are estimated to generate emissions of approximately 2,479 MT CO_2e/yr, which is less than the SCAQMD GHG emissions threshold of 10,000 MT CO_2e/yr for an industrial sector. Because no project-level or cumulative significant GHG impacts are anticipated for the project, no mitigation measures are required.

The proposed uses are consistent with the City of Riverside General Plan (2007) and Climate Action Plan (2016) at the project site. The City's General Plan is consistent with the 2016 Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) and the SCAQMD 2016 draft Air Quality Management Plan (AQMP). Therefore, the proposed project is consistent with the General Plans and the regional AQMP.

The evaluation was prepared in conformance with appropriate standards, utilizing procedures and methodologies in the SCAQMD *CEQA Air Quality Handbook* (SCAQMD 1993) and associated updates. Air quality data posted on the ARB and United States Environmental Protection Agency (EPA) websites are included to document the local air quality environment.

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LIST OF ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
°C	degrees Celsius
$\mu g/m^3$	micrograms per cubic meter
AAQS	ambient air quality standards
AB	Assembly Bill
ac	acres
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
Basin	South Coast Air Basin
CAA	Clean Air Act
CAAQS	California ambient air quality standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CALGreen	California Green Building Code
CAPCOA	California Air Pollution Control Officers Association
CAT	Climate Action Team
CCAA	California Clean Air Act
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CH_4	methane
City	Riverside
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CO_2e/yr	carbon dioxide equivalent per year
County	Riverside County
Diesel RRP	Diesel Risk Reduction Plan
DPM	diesel particulate matter
EO	Executive Order
EPA	United States Environmental Protection Agency
ft	feet
GCC	global climate change
GHG	greenhouse gas
GWP	global warming potential
H_2S	hydrogen sulfide
HFCs	hydrofluorocarbons

HI	hazard index
HRA	health risk assessment
IGR	Intergovernmental Review
IPCC	Intergovernmental Panel on Climate Change
lbs/day	pounds per day
LOS	level of service
LSTs	localized significance thresholds
m	meters
MATES	Multiple Air Toxics Exposure Study
mg/m^3	milligrams per cubic meter
mi	miles
MMT	million metric tons
MMT CO_2e	million metric tons of carbon dioxide equivalent
mpg	miles per gallon
mph	miles per hour
MPO	Metropolitan Planning Organization
MT	metric tons
MT CO_2e	metric tons of carbon dioxide equivalent
MT CO_2e/yr	metric tons of carbon dioxide equivalent per year
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAST	National Assessment Synthesis Team
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NO	nitric oxide
NO_2	nitrogen dioxide
NOA	naturally occurring asbestos
NO_X	nitrogen oxides
O_3	ozone (or smog)
OEHHA	Office of Environmental Health Hazard Assessment
OMB	White House Office of Management and Budget
OPR	Governor's Office of Planning and Research
PFCs	perfluorocarbons
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in size
$PM_{2.5}$	particulate matter less than 2.5 microns in size
ppm	parts per million
PRC	Public Resources Code
RCP	Regional Comprehensive Plan
REL	reference exposure level
ROCs	reactive organic compounds

ROGs	reactive organic gases
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
sf	square feet
SF_6	sulfur hexafluoride
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
sq mi	square miles
SRA	Source Receptor Area
State	State of California
TACs	toxic air contaminants
T-BACT	toxics best available control technology
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
Update	First Update to the Scoping Plan
USC	United States Code
VMT	vehicle miles traveled
VOCs	volatile organic compounds
Working Group	GHG CEQA Significance Threshold Working Group

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INTRODUCTION

This air quality and greenhouse gas (GHG) analysis has been prepared to evaluate the potential air quality impacts and mitigation measures associated with the proposed Lincoln Avenue Industrial Warehouse Project (proposed project) to be located in the City of Riverside (City) in the County of Riverside (County), California. This report provides a project-specific air quality and GHG analysis by examining the impacts of the proposed uses on adjacent sensitive uses as well as the impacts on the proposed uses on the project site, and evaluating the mitigation measures required as part of the project design. Guidelines identified by the South Coast Air Quality Management District (SCAQMD) in its *CEQA Air Quality Handbook* (SCAQMD 1993) and associated updates will be followed in this air quality and GHG analysis.

PROJECT LOCATION AND DESCRIPTION

The Lincoln Avenue Industrial Warehouse Project is located on approximately 5.9 gross acres located at the southwest corner of Lincoln Avenue and Grace Drive, approximately 0.5 mile south of the 91 Freeway, as shown on Figure 1. The Project consists of the development of construction of one building totaling 12,000 square feet of office uses and 88,974 square feet of warehouse (total of 100,974 square feet) and a total of 195 parking stalls on all four sides of the proposed project site. The project site is currently undeveloped. Construction activity would involve site clearing, rough grading and compaction, pouring of concrete and asphalt, and construction of a single structure. Figure 2 presents the conceptual site plan. The proposed project will have a 77’-10” building setback from Lincoln Avenue and a 74’ building setback from Grace Street. There will be three main entrances to the project site, two located on Lincoln Avenue and one on Grace Street. The two main freight truck entrance/exits to the proposed warehouse will be on the northwest and southeast side of the building, and the main passenger vehicle entrance will be north of the proposed warehouse on Lincoln Avenue. The project is not proposed for 24-hour operation.

Sensitive Land Uses in the Project Vicinity

Currently, the project site is surrounded by warehouse uses to the south, west and north. Due north across the intersection of Lincoln Avenue and Grace Street are single-family residential uses, and to the east across Grace Street are multi-family residential uses, which are located approximately 82 feet from the project site.

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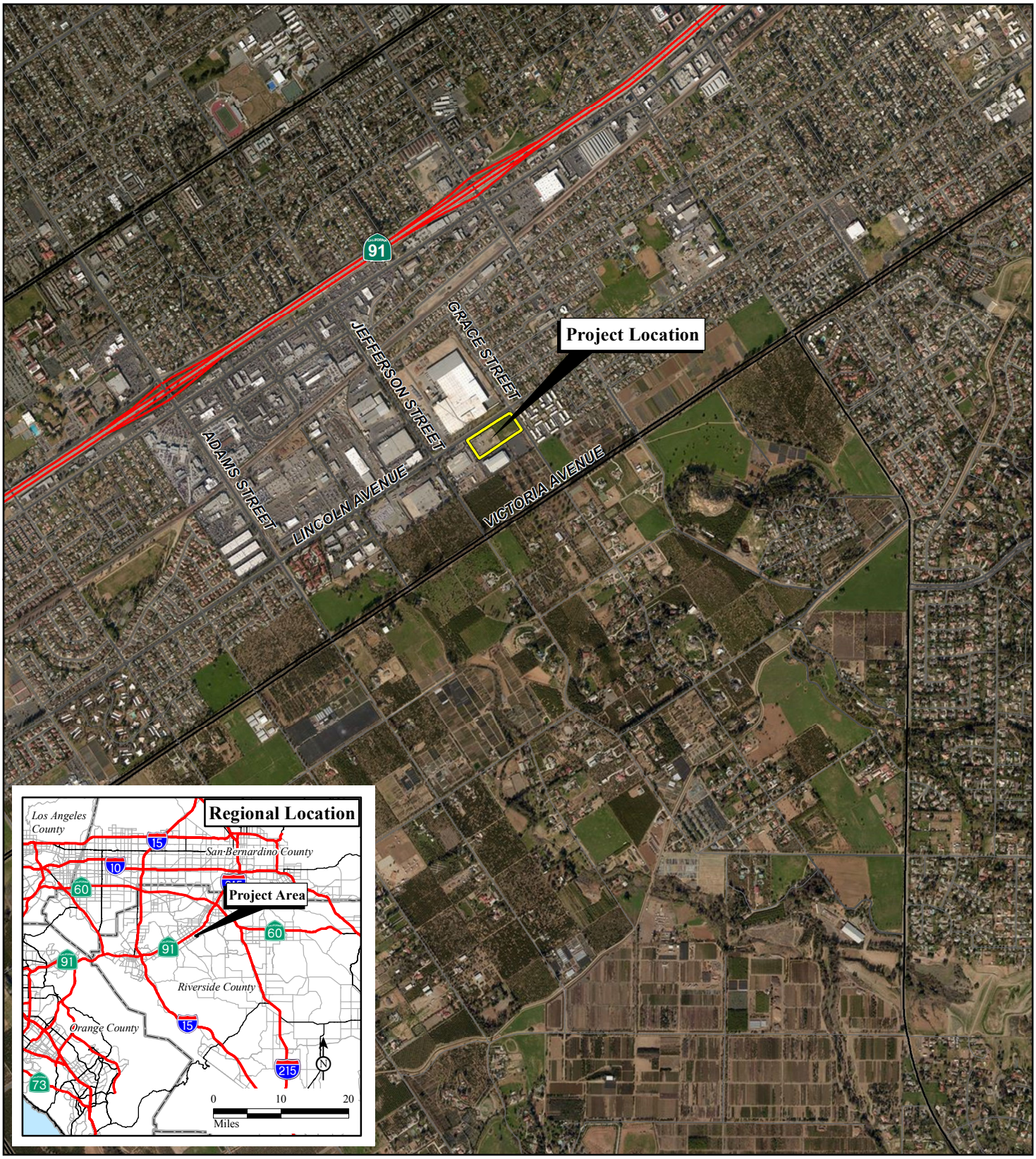

LSA

FIGURE 1

N

0 1000 2000
FEET

SOURCE: Bing Aerial, 2016.

Lincoln Avenue Industrial Warehouse
Air Quality Impact Analysis

Regional and Project Location

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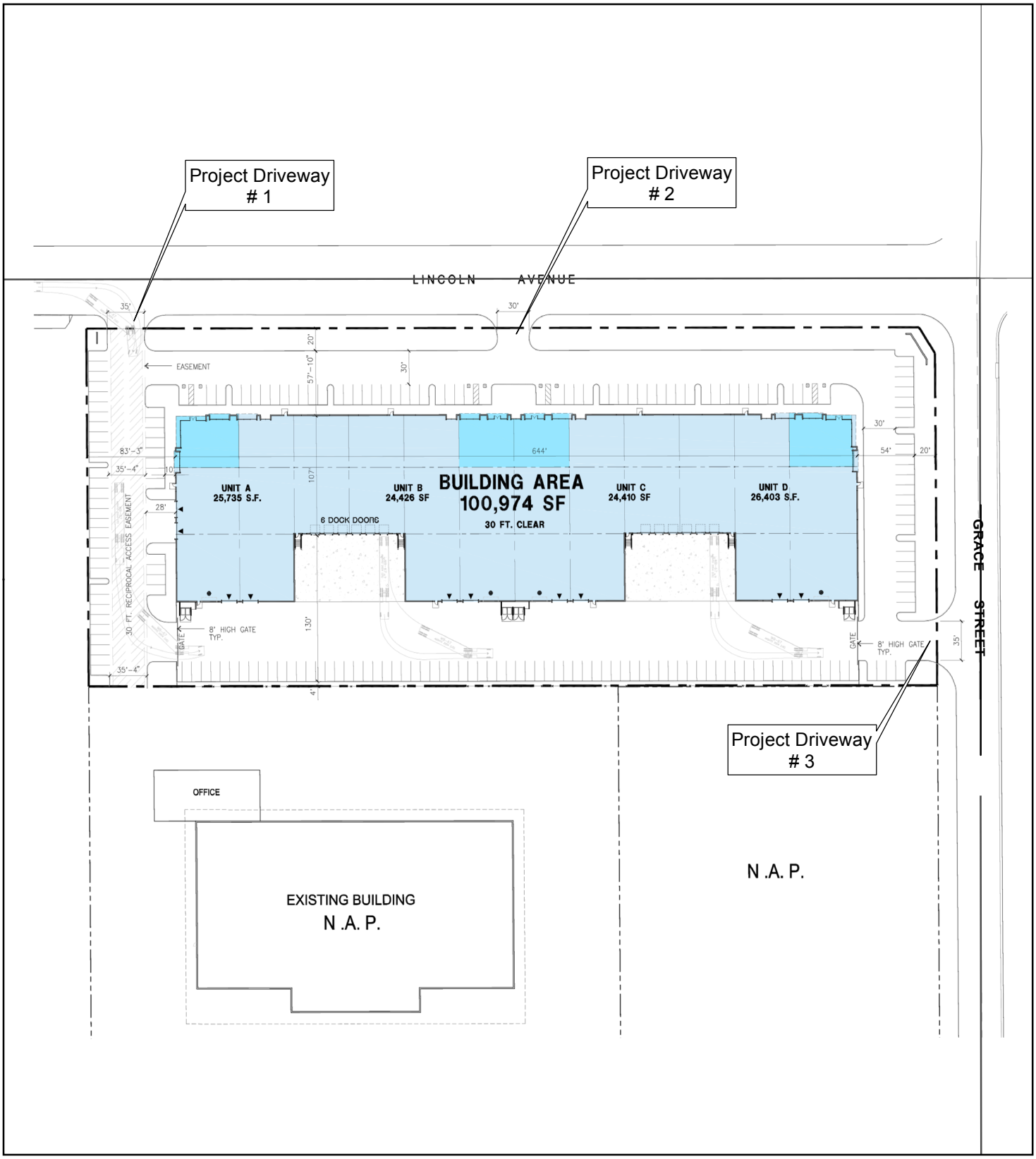

LSA

FIGURE 2

0 60 120
FEET

SOURCE: HPA Architechture, May 11, 2016.

Lincoln Avenue Industrial Warehouse
Air Quality Impact Analysis

Conceptual Site Plan

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PROJECT SETTING

REGIONAL AIR QUALITY

The proposed project is located within the South Coast Air Basin (Basin), an approximately 6,745-square-mile (sq mi) area bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Basin includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, in addition to the San Gorgonio Pass area in Riverside County. The terrain and geographical location determine the distinctive climate of the Basin because the Basin is a coastal plain with connecting broad valleys and low hills.

The Southern California region lies in the semi-permanent high-pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. The usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds. The extent and severity of the air pollution problem in the Basin is a function of the area's natural physical characteristics (weather and topography), as well as man-made influences (development patterns and lifestyle). Factors such as wind, sunlight, temperature, humidity, rainfall, and topography all affect the accumulation and dispersion of pollutants throughout the Basin, making it an area of high pollution potential.

The project site is under the jurisdiction of the SCAQMD. The air quality assessment for the proposed project includes estimating emissions associated with short-term construction and long-term operation of the proposed project. A number of air quality modeling tools are available to assess the air quality impacts of projects. In addition, certain air districts (e.g., the SCAQMD) have created guidelines and requirements to conduct air quality analyses. The current SCAQMD guidelines, which are included in its *CEQA Air Quality Handbook* (1993) and associated updates, were followed in the assessment of air quality impacts for the proposed project.

Both the State of California (State) and the federal government have established health-based ambient air quality standards (AAQS) for seven air pollutants. As detailed in Table A, these pollutants include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in size (PM_{10}), particulate matter less than 2.5 microns in size ($PM_{2.5}$), and lead. In addition, the State has set standards for sulfates, hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety.

Table B summarizes the primary health effects and sources of common air pollutants. Because the concentration standards were set at a level that protects public health with an adequate margin of safety, these health effects will not occur unless the standards are exceeded by a large margin or for a prolonged period of time. State AAQS are more stringent than federal AAQS. Among the pollutants, O_3 and particulate matter ($PM_{2.5}$ and PM_{10}) are considered pollutants with regional effects, while the others have more localized effects.

Table A: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone[8] (O_3)	1-Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM_{10})[9]	24-Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		–		
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	–	–	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	–	Non-Dispersive Infrared Photometry (NDIR)
	8-Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	–	
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–	–	
Nitrogen Dioxide (NO_2)[10]	1-Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	–	Gas Phase Chemi-luminescence
	Annual Arithmetic Mean	0.03 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1-Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	–	Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method)
	3-Hour	–		–	0.5 ppm (1300 µg/m^3)	
	24-Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[11]	–	
Lead[12,13]	30-Day Average	1.5 µg/m^3	Atomic Absorption	–	–	High Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 µg/m^3 (for certain areas)[13]	Same as Primary Standard	
	Rolling 3-Month Average	–		0.15 µg/m^3		
Visibility-Reducing Particles[14]	8-Hour	See footnote 14.	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24-Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24-Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: Ambient Air Quality Standards (ARB 2016).

Footnotes are provided on the following page.

[1] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current national policies.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

[8] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 ppm to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM_{10} standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national standards to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

[12] The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[13] The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[14] In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are “extinction of 0.23 per kilometer” and “extinction of 0.07 per kilometer” for the statewide and Lake Tahoe Air Basin standards, respectively.

°C = degrees Celsius
$\mu g/m^3$ = micrograms per cubic meter
ARB = California Air Resources Board
EPA = United States Environmental Protection Agency
mg/m^3 = milligrams per cubic meter
ppb = parts per billion
ppm = parts per million

Table B: Summary of Health Effects of the Major Criteria Air Pollutants

Pollutant	Health Effects	Examples of Sources
Particulate matter ($PM_{2.5}$ and PM_{10}: less than or equal to 2.5 or 10 microns, respectively)	• Hospitalizations for worsened heart diseases • Emergency room visits for asthma • Premature death	• Cars and trucks (especially diesels) • Fireplaces, wood stoves • Windblown dust from roadways, agriculture, and construction
Ozone (O_3)	• Cough, chest tightness • Difficulty taking a deep breath • Worsened asthma symptoms • Lung inflammation	• Precursor sources[1]: motor vehicles, industrial emissions, and consumer products
Carbon monoxide (CO)	• Chest pain in heart patients[2] • Headaches, nausea[2] • Reduced mental alertness[2] • Death at very high levels[2]	• Any source that burns fuel, such as cars, trucks, construction and farming equipment, and residential heaters and stoves
Nitrogen dioxide (NO_2)	• Increased response to allergens	• See carbon monoxide sources
Toxic air contaminants	• Cancer • Chronic eye, lung, or skin irritation • Neurological and reproductive disorders	• Cars and trucks (especially diesels) • Industrial sources, such as chrome platers • Neighborhood businesses, such as dry cleaners and service stations • Building materials and products

Source: California Air Resources Board. ARB Fact Sheet: Air Pollution and Health. Website: http://www.arb.ca.gov/research/health/fs/fs1/fs1.htm, accessed October 2016.

[1] Ozone is not generated directly by these sources. Rather, chemicals emitted by these precursor sources react with sunlight to form ozone in the atmosphere.

[2] Health effects from CO exposures occur at levels considerably higher than ambient.

The California Clean Air Act (CCAA) provides the SCAQMD and other air districts with the authority to manage transportation activities at indirect sources. Indirect sources of pollution include any facility, building, structure, or installation, or combination thereof, which attracts or generates mobile source activity that results in emissions of any pollutant. In addition, area sources that are generated when minor sources collectively emit a substantial amount of pollution are also managed by the local air districts. Examples of this would be the motor vehicles at an intersection, a mall, and on highways. The SCAQMD also regulates stationary sources of pollution throughout its jurisdictional area. Direct emissions from motor vehicles are regulated by the California Air Resources Board (ARB).

Climate/Meteorology

Air quality in the Basin is affected by various emission sources (e.g., mobile and industry) as well as atmospheric conditions (e.g., wind speed, wind direction, temperature, and rainfall). The combination of topography, low mixing height, abundant sunshine, and emissions from the second largest urban area in the United States gives the Basin some of the highest pollutant concentrations in the nation.

The annual average temperature varies throughout the Basin, ranging from the low- to middle-60s measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, inland areas, including the City of Riverside, show more variability in annual minimum and maximum

temperatures than coastal areas. The monthly average maximum temperature at Riverside ranges from 67.3°F in December to 94.1°F in August. The monthly average minimum temperature ranges from 39.9°F in December to 62.3°F in July.[1] December is typically the coldest month and July and August typically the warmest months in this area of the Basin.

The majority of annual rainfall in the Basin occurs between November and April. Summer rainfall is minimal and is generally limited to scattered thunderstorms in inland regions and slightly heavier showers in the eastern portion of the Basin and along the coastal side of the mountains. The monthly average rainfall at Riverside typically varies from 2.43 inches in January to 0.01 inch in July with an annual total of 7.12 inches. Patterns in monthly and yearly rainfall totals are unpredictable due to fluctuations in the weather.

The Basin experiences a persistent temperature inversion (increasing temperature with increasing altitude) as a result of the Pacific high, which is the semi-permanent high pressure area of the north Pacific Ocean and is the dominating factor in California weather. This inversion limits the vertical dispersion of air contaminants, holding them relatively near the ground. As the sun warms the ground and the lower air layer, the temperature of the lower air layer approaches the temperature of the base of the inversion (upper) layer until the inversion layer finally breaks, allowing vertical mixing with the lower layer. This phenomenon is observed in mid-afternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by midmorning.

Winds at Riverside Municipal Airport (which is located approximately 3 miles [mi] northwest of the project site) blow predominantly from the west, with relatively low velocities.[2] Wind speeds in Riverside each average between 4 and 5 miles per hour (mph). Summer wind speeds average slightly higher than winter wind speeds. Low average wind speeds, together with a persistent temperature inversion, limit the vertical dispersion of air pollutants throughout the Basin. Strong, dry, north or northeasterly winds, known as Santa Ana winds, occur during the fall and winter months and disperse air contaminants. The Santa Ana conditions tend to last for several days at a time.[3]

The combination of stagnant wind conditions and low inversions produces the greatest pollutant concentrations. On days of no inversion or high wind speeds, ambient air pollution concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas are transported predominantly onshore into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are CO and nitrogen oxides (NO_X) because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog or ozone (O_3).

1 Western Regional Climate Center. Website: http://www.wrcc.dri.edu/, accessed October 2016.
2 Ibid.
3 Ibid.

Description of Global Climate Change and its Sources

Global climate change (GCC) is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other significant changes in climate (e.g., precipitation or wind) that last for an extended period of time. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred to "global warming" because it helps convey that there are other changes in addition to rising temperatures.

Climate change refers to any change in measures of weather (e.g., temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from natural factors (e.g., changes in the sun's intensity), natural processes within the climate system (e.g., changes in ocean circulation), or human activities (e.g., the burning of fossil fuels, land clearing, or agriculture). The primary observed effect of GCC has been a rise in the average global tropospheric[1] temperature of 0.36°F per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling shows that further warming may occur, which in turn may induce additional changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and the environment of the State could include higher sea levels, drier or wetter weather, changes in ocean salinity, changes in wind patterns, or more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and increased intensity of tropical cyclones. Specific effects in the State might include a decline in the Sierra Nevada snowpack, erosion of the State's coastline, and seawater intrusion in the San Joaquin Delta.

Global surface temperatures have risen by 1.33°F ± 0.32°F over the last 100 years (1906 to 2005). The rate of warming over the last 50 years is almost double that over the last 100 years (IPCC 2013). The latest projections, based on state-of-the art climate models, indicate that temperatures in the State are expected to rise 3–10.5°F by the end of the century (State of California 2013). The prevailing scientific opinion on climate change is that "most of the warming observed over the last 60 years is attributable to human activities" (IPCC 2013). Increased amounts of carbon dioxide (CO_2) and other GHGs are the primary cause of the human-induced component of warming. The observed warming effect associated with the presence of GHGs in the atmosphere (from either natural or human sources) is often referred to as the greenhouse effect.[2]

GHGs are present in the atmosphere naturally, are released by natural sources, or are formed from secondary reactions taking place in the atmosphere. The gases that are widely seen as the principal contributors to human-induced GCC are:[3]

---

1 The troposphere is the zone of the atmosphere characterized by water vapor, weather, winds, and decreasing temperature with increasing altitude.

2 The temperature on Earth is regulated by a system commonly known as the "greenhouse effect." Just as the glass in a greenhouse lets heat from sunlight in and reduces the amount of heat that escapes, GHGs like CO_2, CH_4, and N_2O in the atmosphere keep the Earth at a relatively even temperature. Without the greenhouse effect, the Earth would be a frozen globe; thus, the *naturally occurring* greenhouse effect is necessary to keep our planet at a comfortable temperature.

3 The GHGs listed are consistent with the definition in Assembly Bill 32 (Government Code 38505), as discussed later in this section.

- CO_2
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)

Over the last 200 years, human activities have caused substantial quantities of GHGs to be released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere and enhancing the natural greenhouse effect, which some scientists believe can cause causing global warming. While GHGs produced by human activities include naturally occurring GHGs (e.g., CO_2, CH_4, and N_2O), some gases, like HFCs, PFCs, and SF_6, are completely new to the atmosphere. Certain other gases (e.g., water vapor) are short-lived in the atmosphere as compared to these GHGs, which remain in the atmosphere for significant periods of time, thereby contributing to climate change in the long term. Water vapor is generally excluded from the list of GHGs because its presence is short lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes (e.g., oceanic evaporation). For the purposes of this air quality study, the term "GHGs" will refer collectively to the six gases identified in the bulleted list provided above.

These gases vary considerably in terms of global warming potential (GWP), which is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. GWP is based on several factors, including the relative effectiveness of a gas in absorbing infrared radiation and the length of time the gas remains in the atmosphere ("atmospheric lifetime"). The GWP of each gas is measured relative to CO_2, which is the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of metric tons[1] (MT) of "CO_2 equivalents" (MT CO_2e). For example, N_2O is 298 times more potent at contributing to global warming than CO_2. Table C identifies the GWP for each type of GHG analyzed in this report.

Table C: Global Warming Potential of Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100-year Time Horizon)
Carbon Dioxide (CO_2)	~100	1
Methane (CH_4)	12	25
Nitrous Oxide (N_2O)	121	298

Source: *First Update to the Climate Change Scoping Plan: Building on the Framework Pursuant to AB 32* (ARB 2014). Website: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf, accessed October 2016.
ARB = California Air Resources Board

[1] A metric ton is equivalent to approximately 1.1 tons.

The following discussion summarizes the characteristics of the six primary GHGs.

Carbon Dioxide. In the atmosphere, carbon generally exists in its oxidized form as CO_2. Natural sources of CO_2 include the respiration (breathing) of humans, animals, and plants; volcanic outgassing; decomposition of organic matter; and evaporation from the oceans. Human-caused sources of CO_2 include the combustion of fossil fuels and wood, waste incineration, mineral production, and deforestation. The Earth maintains a natural carbon balance, and when concentrations of CO_2 are upset, the system gradually returns to its natural state through natural processes. Natural changes to the carbon cycle work slowly, especially compared to the rapid rate at which humans are adding CO_2 to the atmosphere. Natural removal processes, such as photosynthesis by land- and ocean-dwelling plant species, cannot keep pace with this extra input of human-made CO_2; consequently, the gas is building up in the atmosphere. The concentration of CO_2 in the atmosphere has risen approximately 30 percent since the late 1800s (NAST 2001).

The transportation sector remains the largest source of GHG emissions in 2012 with 36 percent of the State's GHG emission inventory. The largest emissions category within the transportation sector is on-road, which consists of passenger vehicles (e.g., cars, motorcycles, and light-duty trucks) and heavy-duty trucks and buses. On-road emissions constitute over 92 percent of the transportation sector total. Industry and electricity generation were the State's second and third largest categories of GHG emissions, respectively.

Methane. CH_4 is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources of CH_4 include fires, geologic processes, and bacteria that produce CH_4 in a variety of settings (most notably, wetlands) (EPA 2010). Anthropogenic sources include rice cultivation, livestock, landfills and waste treatment, biomass burning, and fossil fuel combustion (e.g., burning of coal, oil, and natural gas). As with CO_2, the major removal process of atmospheric CH_4—a chemical breakdown in the atmosphere—cannot keep pace with source emissions, and CH_4 concentrations in the atmosphere are increasing.

Nitrous Oxide. N_2O is produced naturally by a wide variety of biological sources, particularly microbial action in soils and water. Tropical soils and oceans account for the majority of natural source emissions. N_2O is also a product of the reaction that occurs between nitrogen and oxygen during fuel combustion. Both mobile and stationary combustion sources emit N_2O. The quantity of N_2O emitted varies according to the type of fuel, technology, and pollution control device used, as well as maintenance and operating practices. Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N_2O emissions in the State.

Hydrofluorocarbons, Perfluorocarbons, and Sulfur Hexafluoride. HFCs are primarily used as substitutes for O_3-depleting substances regulated under the Montreal Protocol.[1] PFCs and SF_6 are emitted from various industrial processes, including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting. There is no aluminum or magnesium production in the State; however, the rapid growth in the semiconductor industry, which is active in the State, has led to greater use of PFCs. Activities associated with the project are not expected to result in the emissions of these three GHGs; therefore, these substances are not discussed further in this analysis.

Emissions Sources and Inventories

An emissions inventory that identifies and quantifies the primary human-generated sources and sinks of GHGs is a well-recognized and useful tool for addressing climate change. This section summarizes the latest information on global, national, State, and local GHG emission inventories. However, because GHGs persist for a long time in the atmosphere (see Table C), accumulate over time, and are generally well mixed, their impact on the atmosphere and climate cannot be tied to a specific point of emission.

Global Emissions. Worldwide emissions of GHGs in 2012 totaled 29 billion MT of CO_2e per year (MT CO_2e/yr) (UNFCCC 2015). Global estimates are based on country inventories developed as part of the programs of the United Nations Framework Convention on Climate Change (UNFCCC).

United States Emissions. In 2013, the United States emitted approximately 6.7 billion MT CO_2e, down from 7.3 billion MT CO_2e in 2007. Of the six major sectors nationwide (i.e., electric power industry, transportation, industry, agriculture, commercial, and residential), the electric power industry and transportation sectors combined account for approximately 70 percent of the GHG emissions. The majority of the electric power industry and all of the transportation emissions are generated from direct fossil fuel combustion. In 2013, the total United States GHG emissions were approximately 9.0 percent less than the 2005 levels.[2]

State of California Emissions. According to ARB emission inventory estimates, the State emitted approximately 441.5 million metric tons (MMT) of CO_2e (MMT CO_2e) emissions in 2013, which is a decrease of 2.8 MMT CO_2e from 2013 and a 9.4 percent decrease since 2004 (ARB 2016b).

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1 The Montreal Protocol is an international treaty that was approved on January 1, 1989, and was designated to protect the ozone layer by phasing out the production of several groups of halogenated hydrocarbons believed to be responsible for O_3 depletion and which are also potent GHGs.

2 United States Environmental Protection Agency. U.S. Greenhouse Gas Inventory Report: 1990-2014. Website: http://www3.epa.gov/climatechange/ghgemissions/usinventoryreport.html, accessed October 2016.

The ARB estimates that transportation was the source of approximately 37 percent of the State's GHG emissions in 2013, followed by electricity generation (both in-State and out-of-State) at 20 percent and industrial sources at 20 percent. The remaining sources of GHG emissions were residential and commercial activities at 9 percent, agriculture at 8 percent, high-GWP gases at 4 percent, and recycling and waste at 2 percent (ARB 2016b).

The ARB is responsible for developing the State GHG Emission Inventory. This inventory estimates the amount of GHGs emitted to and removed from the atmosphere by human activities within the State and supports the Assembly Bill (AB) 32 Climate Change Program. The ARB's current GHG emission inventory covers the years 1990–2013 and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, and agricultural lands).

The ARB staff has projected Statewide unregulated GHG emissions for 2020 at 509 MMT CO_2e, which represents the emissions that would be expected to occur in the absence of any GHG reduction actions. GHG emissions from the transportation and electricity sectors as a whole are expected to increase but remain at approximately 30 percent and 32 percent of total CO_2e emissions, respectively (ARB 2014).

Air Pollution Constituents and Attainment Status

The ARB coordinates and oversees both State and federal air pollution control programs in the State. The ARB oversees activities of local air quality management agencies and maintains air quality monitoring stations throughout the State in conjunction with the United States Environmental Protection Agency (EPA) and local air districts. The ARB has divided the State into 15 air basins based on meteorological and topographical factors of air pollution. Data collected at these stations are used by the ARB and EPA to classify air basins as attainment, nonattainment, nonattainment-transitional, or unclassified, based on air quality data for the most recent three calendar years compared with the AAQS.

Attainment areas may be:

- Attainment/Unclassified ("Unclassifiable" in some lists), which have never violated the air quality standard of interest or do not have enough monitoring data to establish attainment or nonattainment status; or
- Attainment-Maintenance (national ambient air quality standards [NAAQS] only), which violated a NAAQS that is currently in use (was Nonattainment) in or after 1990, but now attains the standard and is officially redesignated to Attainment by the EPA with a Maintenance State Implementation Plan (SIP); or
- Attainment (usually only for California ambient air quality standards [CAAQS], but sometimes for NAAQS), which have adequate monitoring data to show attainment, have never been nonattainment, or, for NAAQS, have completed the official Maintenance period.

Nonattainment areas are imposed with additional restrictions as required by the EPA. The air quality data are also used to monitor progress in attaining air quality standards. Table D lists the attainment status for the criteria pollutants in the Basin.

Table D: Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
O_3 1-hour	Nonattainment	N/A
O_3 8-hour	Nonattainment	Extreme Nonattainment
PM_{10}	Nonattainment	Attainment/Maintenance
$PM_{2.5}$	Nonattainment	Nonattainment
CO	Attainment	Attainment/Maintenance
NO_2	Nonattainment	Attainment/Maintenance
SO_2	Attainment	Attainment
Lead	Attainment	Attainment
All others	Attainment/Unclassified	Attainment/Unclassified

Source: California Air Resources Board. Air Quality Standards and Area Designations. Website: http://www.arb.ca.gov/desig/desig.htm, accessed October 2016.
CO = carbon monoxide
N/A = not applicable
NO_2 = nitrogen dioxide
O_3 = ozone
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_2 = sulfur dioxide

Ozone. O_3 (smog) is formed by photochemical reactions between oxides of nitrogen and reactive organic gases (ROGs) rather than being directly emitted. O_3 is a pungent, colorless gas typical of Southern California smog. Elevated O_3 concentrations result in reduced lung function, particularly during vigorous physical activity. This health problem is particularly acute in sensitive receptors (e.g., the sick, the elderly, and young children). O_3 levels peak during summer and early fall. (The entire Basin is designated as a nonattainment area for the State 1-hour and 8-hour O_3 standards. The EPA has officially designated the status for most of the Basin regarding the 8-hour O_3 standard as extreme nonattainment, which means the Basin has until 2024 to attain the federal 8-hour O_3 standard.)

Carbon Monoxide. CO is formed by the incomplete combustion of fossil fuels, almost entirely from automobiles. It is a colorless, odorless gas that can cause dizziness, fatigue, and impairment of the central nervous system functions. The entire Basin is in attainment for the State standards for CO. The Basin is designated as an attainment/maintenance area under the federal CO standards.

Nitrogen Oxides. NO_2, a reddish brown gas, and nitric oxide (NO), a colorless, odorless gas, are formed from fuel combustion under high temperature or pressure. These compounds are referred to as nitrogen oxides, or NO_X. NO_X is a primary component of the photochemical smog reaction. It also contributes to other pollution problems, including a high concentration of fine particulate matter, poor visibility, and acid deposition (i.e., acid rain). NO_2 decreases lung function and may reduce resistance to infection. The entire Basin is designated as nonattainment for the State NO_2 standard and as an attainment/maintenance area under the federal NO_2 standard.

Sulfur Dioxide. SO_2 is a colorless irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels. SO_2 irritates the

respiratory tract, can injure lung tissue when combined with fine particulate matter, and reduces visibility and the level of sunlight. The entire Basin is in attainment with both federal and State SO_2 standards.

Lead. Lead is found in old paints and coatings, plumbing, and a variety of other materials. Once in the blood stream, lead can cause damage to the brain, nervous system, and other body systems. Children are highly susceptible to the effects of lead. The Los Angeles County portion of the Basin was redesignated as nonattainment for the State and federal standards for lead in 2010.

Particulate Matter. Particulate matter (PM) is the term used for a mixture of solid particles and liquid droplets found in the air. Coarse particles (PM_{10}) are derived from a variety of sources, including windblown dust and grinding operations. Fuel combustion and resultant exhaust from power plants and diesel buses and trucks are primarily responsible for fine particle ($PM_{2.5}$) levels. Fine particles can also be formed in the atmosphere through chemical reactions. PM_{10} can accumulate in the respiratory system and aggravate health problems such as asthma. The EPA's scientific review concluded that $PM_{2.5}$, which penetrate deeply into the lungs, are more likely than coarse particles to contribute to the health effects listed in a number of recently published community epidemiological studies at concentrations that extend well below those allowed by the current PM_{10} standards. These health effects include premature death and increased hospital admissions and emergency room visits (primarily the elderly and individuals with cardiopulmonary disease); increased respiratory symptoms and disease (children and individuals with cardiopulmonary disease such as asthma); decreased lung functions (particularly in children and individuals with asthma); and alterations in lung tissue and structure and in respiratory tract defense mechanisms. The Basin is designated nonattainment for the federal and State $PM_{2.5}$ standards and State PM_{10} standard, and attainment/maintenance for the federal PM_{10} standard.

Volatile Organic Compounds. Volatile organic compounds (VOCs), also known as ROGs, and reactive organic compounds (ROCs) are formed from the combustion of fuels and the evaporation of organic solvents. VOCs are not defined as criteria pollutants; however, because VOCs accumulate in the atmosphere more quickly during the winter when sunlight is limited and photochemical reactions are slower, they are a prime component of the photochemical smog reaction. There are no attainment designations for VOCs.

Sulfates. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently is converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of the State due to regional meteorological features. The entire Basin is in attainment for the State standard for sulfates.

Hydrogen Sulfide. H_2S is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. In addition, it can be present in sewer gas and some natural gas and can be emitted as the result of geothermal energy exploitation. In 1984, an ARB committee concluded that the ambient standard for H_2S is adequate to protect public health and to significantly reduce odor annoyance. The entire Basin is unclassified for the State standard for H_2S.

Visibility-Reducing Particles. Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size, and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt. The statewide standard is intended to limit the frequency and severity of visibility impairment due to regional haze. The entire Basin is unclassified for the State standard for visibility-reducing particles.

Hazardous Air Pollutants

The public's exposure to toxic air contaminants (TACs) is a significant environmental health issue in the State. In 1983, the State Legislature enacted a program to identify the health effects of TACs and to reduce exposure to these contaminants to protect the public health. The Health and Safety Code defines a TAC as "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health." A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the Federal Act (42 United States Code [USC] Section 7412[b]) is a TAC. Under State law, the California Environmental Protection Agency (CalEPA), acting through the ARB, is authorized to identify a substance as a TAC if it determines the substance is an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or that may pose a present or potential hazard to human health.

The State regulates TACs primarily through AB 1807 (Tanner Air Toxics Act) and AB 2588 (Air Toxics "Hot Spot" Information and Assessment Act of 1987). The Tanner Air Toxics Act sets forth a formal procedure for ARB to designate substances as TACs. Once a TAC is identified, the ARB adopts an "airborne toxics control measure" for sources that emit designated TACs. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate toxics best available control technology (T-BACT) to minimize emissions.

Air toxics from stationary sources are also regulated in the State under the Air Toxics "Hot Spot" Information and Assessment Act of 1987. Under AB 2588, TAC emissions from individual facilities are quantified and prioritized by the air quality management district or air pollution control district. High priority facilities are required to perform a health risk assessment and, if specific thresholds are exceeded, required to communicate the results to the public in the form of notices and public meetings.

To date, the ARB has designated nearly 200 compounds as TACs. Additionally, the ARB has implemented control measures for a number of compounds that pose high risks and show

potential for effective control. The majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines (DPM).

LOCAL AIR QUALITY

The SCAQMD, together with the ARB, maintains ambient air quality monitoring stations in the Basin. The air quality monitoring station closest to the site is the Riverside station at 5888 Mission Blvd., Rubidoux, which monitors most air pollutant data, except SO_2, which were obtained from the Fontana station at 14360 Arrow Boulevard. The air quality trends from these two stations are used to represent the ambient air quality in the project area. The pollutants monitored are O_3, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$.[1,2] The ambient air quality data in Table E show that NO_2, SO_2, federal 24-hour PM_{10} standard, federal and State annual average $PM_{2.5}$ standards, and CO levels are below the applicable State and federal standards.

The State 1-hour O_3 standard was exceeded up to 73 times per year in the past 3 years. The federal 8-hour O_3 standard was exceeded 106 days in the past 3 years, and the State 8-hour O_3 standard was exceeded 166 times in the past 3 years. The State 24-hours and annual PM_{10} standards were exceeded each year in the past 3 years. The federal 24-hours $PM_{2.5}$ standard was exceeded 20 times in the past 3 years.

Multiple Air Toxics Exposure Study IV

The Multiple Air Toxics Exposure Study (MATES) is a monitoring and evaluation study on ambient concentrations of TACs that estimated the potential health risks from air toxics in the Basin. The MATES was aimed at estimating the cancer risk from toxic air pollutant emissions throughout the Basin by conducting a comprehensive monitoring program, an updated emissions inventory of TACs, and a modeling effort to fully characterize health risks for those living in the Basin. In 2008, the SCAQMD conducted its third update to the MATES (MATES III). The study concluded that the average carcinogenic risk from air pollution in the Basin is approximately 1,200 in 1 million. Mobile sources (e.g., cars, trucks, trains, ships, and aircraft) represent the greatest contributors. Approximately 85 percent of the risk is attributed to diesel particulate emissions, approximately 10 percent to other toxics associated with mobile sources (including benzene, butadiene, and formaldehyde), and approximately 5 percent of all carcinogenic risk is attributed to stationary sources, including industries and other businesses (e.g., dry cleaners and chrome plating operations).

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1 United States Environmental Protection Agency. 2013–2015 Air Quality Data. Website: http://www.epa.gov/airquality/airdata, accessed October 2016.

2 California Air Resources Board. 2013–2015 Air Quality Data. Website: http://www.arb.ca.gov, accessed October 2016.

Table E: Ambient Air Quality Monitored in the Project Vicinity

Pollutant	Standard	2013	2014	2015
Ozone (O_3) – Riverside Monitoring Station				
Maximum 1-hr concentration (ppm)		0.123	0.141	0.132
Number of days exceeded:	State: > 0.09 ppm	13	29	31
Maximum 8-hr concentration (ppm)		0.104	0.105	0.106
Number of days exceeded:	State: > 0.07 ppm	38	69	59
	Federal: > 0.075 ppm[1]	26	41	39
Carbon Monoxide (CO) – Riverside Monitoring Station				
Maximum 1-hr concentration (ppm)		2.1	2.1	1.9
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8-hr concentration (ppm)		1.6	1.8	1.5
Number of days exceeded:	State: ≥ 9.0 ppm	0	0	0
	Federal: ≥ 9 ppm	0	0	0
Nitrogen Dioxide (NO_2) – Riverside Monitoring Station				
Maximum 1-hr concentration (ppm)		0.059	0.059	0.057
Number of days exceeded:	State: > 0.18 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.016	0.015	0.014
Exceeded for the year:	State: > 0.030 ppm	0	0	0
	Federal: > 0.053 ppm	0	0	0
Sulfur Dioxide (SO_2) – Fontana Monitoring Station				
Maximum 24-hr concentration (ppm)		0.002	0.001	0.001
Number of days exceeded:	State: > 0.04 ppm	0	0	0
	Federal: > 0.14 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.0004	0.0002	0.0003
Exceeded for the year:	Federal: > 0.030 ppm	0	0	0
Coarse Particulates (PM_{10}) – Riverside Monitoring Station				
Maximum 24-hr concentration (µg/m3)		199.2	122.7	107.4
Number of days exceeded:	State: > 50 µg/m^3	86	119	87
	Federal: > 150 µg/m^3	0	0	0
Annual arithmetic average concentration (µg/m^3)		34.6	44.8	40.0
Exceeded for the year:	State: > 20 µg/m^3	Yes	Yes	Yes
Fine Particulates ($PM_{2.5}$) – Riverside Monitoring Station				
Maximum 24-hr concentration (µg/m^3)		170.8	50.6	61.1
Number of days exceeded:	Federal: > 35 µg/m^3	6	5	9
Annual arithmetic average concentration (µg/m3)		17.1	16.8	15.4
Exceeded for the year:	State: > 12 µg/m^3	1	1	1
	Federal: > 15 µg/m^3	1	1	1

Source 1: United States Environmental Protection Agency (EPA). AirData Monitor Values Reports. Website: https://www3.epa.gov/airdata/ad_rep_mon.html, accessed October 2016.
Source 2: California Air Resources Board (ARB). iADAM: Air Quality Data Statistics. Website: http://www.arb.ca.gov/adam/, accessed October 2016.

[1] The exceedances of the federal 8-hr O_3 standard are based on the old 0.075 ppm standard. In October 2015, the EPA revised the standard to 0.070 ppm.

[2] ND = No data available.

µg/m^3 = micrograms per cubic meter
hr = hour
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ppm = parts per million

In May 2015, the SCAQMD released MATES IV, the final report of the fourth update. The results showed that the overall monitored risk for excess cancer from a lifetime exposure to ambient levels of air toxics decreased to approximately 418 in 1 million. Compared to the previous update released in 2008 (MATES III), monitored excess cancer risks decreased by approximately 65 percent. Approximately 90 percent of the risk is attributed to mobile sources while 10 percent is attributed to TACs from stationary sources (e.g., refineries, metal processing facilities, gas stations, and chrome plating facilities). The largest contributor to this risk was diesel exhaust, accounting for approximately 68 percent of the air toxics risk. Compared to MATES III, MATES IV found substantial improvement in air quality and associated decrease in air toxics exposure. As a result, the estimated basin-wide population-weighted risk decreased by approximately 57 percent compared to the analysis done for the MATES III time period.

In the vicinity of Riverside in Riverside County, MATES III's estimated population-weighted average risk was 573 per million (SCAQMD 2008) while MATES IV's estimated population-weighted average risk was 657 per million (SCAQMD 2015).

It should be noted that the Office of Environmental Health Hazard Assessment (OEHHA) has updated the methods for estimating cancer risks. The new method includes utilizing higher estimates of cancer potency during early life exposures. There are also differences in the assumptions on breathing rates and length of residential exposures. When these two assumptions are combined, the SCAQMD estimates that risks for a given inhalation exposure level will be about 2.7 times higher using the proposed updated methods identified in MATES IV (SCAQMD 2015).

Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Sensitive population groups include children, the elderly, the acutely ill, and the chronically ill, especially those with cardiorespiratory diseases.

Residential areas are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods, resulting in sustained exposure to any pollutants present. Other sensitive receptors include retirement facilities, hospitals, and schools. Recreational land uses are considered moderately sensitive to air pollution. Although exposure periods are generally short, exercise places a high demand on respiratory functions, which can be impaired by air pollution. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial, commercial, retail, and office areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent, because the majority of the workers tend to stay indoors most of the time. In addition, the workforce is generally the healthiest segment of the population.

REGULATORY SETTINGS

Federal Regulations/Standards

Pursuant to the Clean Air Act (CAA) of 1970, the EPA established the NAAQS. The NAAQS were established for six major pollutants, termed "criteria" pollutants. Criteria pollutants are

defined as those pollutants for which the federal and State governments have established AAQS, or criteria, for outdoor concentrations in order to protect public health.

Data collected at permanent monitoring stations are used by the EPA to classify regions as "attainment" or "nonattainment," depending on whether the regions meet the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. The EPA has designated the Southern California Association of Governments (SCAG) as the Metropolitan Planning Organization (MPO) responsible for ensuring compliance with the requirements of the CAA for the Basin.

In an effort to help federal agencies ensure the integrity of their environmental reviews and promote sound governmental decision making, the Council on Environmental Quality (CEQ) issued on January 14, 2011, final guidance on the "Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact." This guidance was developed as part of CEQ's effort to modernize and reinvigorate federal agency implementation of the National Environmental Policy Act (NEPA). The EPA established new national air quality standards for ground-level O_3 and fine particulate matter in 1997. On May 14, 1999, the Court of Appeals for the District of Columbia Circuit issued a decision ruling that the CAA, as applied in setting the new public health standards for O_3 and particulate matter, was unconstitutional as an improper delegation of legislative authority to the EPA. On February 27, 2001, the United States Supreme Court upheld the way the government sets air quality standards under the CAA. The court unanimously rejected industry arguments that the EPA must consider financial cost, as well as health benefits, in writing standards. The justices also rejected arguments that the EPA took too much lawmaking power from Congress when it set tougher standards for O_3 and soot in 1997. Nevertheless, the court threw out the EPA's policy for implementing new O_3 rules, saying that the agency ignored a section of the law that restricts its authority to enforce such rules.

In April 2003, the EPA was cleared by the White House Office of Management and Budget (OMB) to implement the 8-hour ground-level O_3 standard. The EPA issued the proposed rule implementing the 8-hour O_3 standard in April 2003. The EPA completed final 8-hour nonattainment status on April 15, 2004. The EPA revoked the 1-hour O_3 standard on June 15, 2005, and lowered the 8-hour O_3 standard from 0.08 ppm to 0.075 ppm on April 1, 2008.

The EPA issued the final $PM_{2.5}$ implementation rule in fall 2004. The EPA lowered the 24-hour $PM_{2.5}$ standard from 65 to 35 $\mu g/m^3$ and revoked the annual PM_{10} standard on December 17, 2006. The EPA issued final designations for the 2006 24-hour $PM_{2.5}$ standard on December 12, 2008.

The United States has historically had a voluntary approach to reducing GHG emissions. However, on April 2, 2007, the United States Supreme Court ruled that the EPA has the authority to regulate CO_2 emissions under the CAA. While there currently are no adopted federal regulations for the control or reduction of GHG emissions, the EPA commenced several actions in 2009 that are required to implement a regulatory approach to GCC.

On September 30, 2009, the EPA announced a proposal that focuses on large facilities emitting over 25,000 tons of GHG emissions per year. These facilities would be required to obtain permits

that would demonstrate they are using the best practices and technologies to minimize GHG emissions.

On December 7, 2009, the EPA Administrator signed a final action under the CAA, finding that six GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) constitute a threat to public health and welfare, and that the combined emissions from motor vehicles cause and contribute to GCC. This EPA action does not impose any requirements on industry or other entities. However, the findings are a prerequisite to finalizing the GHG emission standards for light-duty vehicles as described below.

On April 1, 2010, the EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) announced a final joint rule to establish a national program consisting of new standards for model year 2012 through 2016 light-duty vehicles that will reduce GHG emissions and improve fuel economy. The EPA is finalizing the first-ever national GHG emissions standards under the CAA, and NHTSA is finalizing Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act. The EPA GHG standards require these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile in model year 2016, equivalent to 35.5 miles per gallon (mpg).

State Regulations and Standards

In 1967, the State Legislature passed the Mulford-Carrell Act, which combined two Department of Health bureaus, the Bureau of Air Sanitation and the Motor Vehicle Pollution Control Board, to establish the ARB. Since its formation, the ARB has worked with the public, the business sector, and local governments to find solutions to the State's air pollution problems.

California adopted the CCAA in 1988. The ARB administers CAAQS for the 10 air pollutants designated in the CCAA. The 10 State air pollutants are the six criteria pollutants designated by the CAA plus visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride.

The ARB identified DPM as a TAC in August 1998. Following the identification process, the ARB was required by law to determine whether there was a need for further control. In September 2000, the ARB adopted the Diesel Risk Reduction Plan (Diesel RRP), which recommends many control measures to reduce the risks associated with DPM and to achieve goals of 75 percent DPM reduction by 2010 and 85 percent by 2020.

The public's exposure to TACs is a significant environmental health issue in California. In 1983, the California Legislature enacted a program to identify the health effects of TACs and to reduce exposure to these contaminants to protect the public health. Under State law, CalEPA, acting through the ARB, is authorized to identify a substance as a TAC if it determines the substance is an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or that may pose a present or potential hazard to human health.

- **Cancer Risk:** One of the primary health risks of concern due to exposure to TACs is the risk of contracting cancer. The carcinogenic potential of TACs is a particular public health concern because it is currently believed by many scientists that there is no "safe" level of exposure to carcinogens; that is, any exposure to a carcinogen poses some risk of causing

cancer. Health statistics show that one in four people will contract cancer over their lifetime, or 250,000 in 1 million, from all causes, including diet, genetic factors, and lifestyle choices.

- **Non-Cancer Health Risks:** Unlike carcinogens, it is believed that there is a threshold level of exposure to most noncarcinogens below which they will not pose a health risk. CalEPA and the OEHHA have developed reference exposure levels (RELs) for non-carcinogenic TACs that are health-conservative estimates of the levels of exposure at or below which health effects are not expected. The non-cancer health risk due to exposure to a TAC is assessed by comparing the estimated level of exposure to the REL. The comparison is expressed as the ratio of the estimated exposure level to the REL, called the hazard index (HI).

Climate Action Team Report: California Climate Action Milestones. In 1988, AB 4420 directed the California Energy Commission (CEC) to report on "how global warming trends may affect the State's energy supply and demand, economy, environment, agriculture, and water supplies" and offer "recommendations for avoiding, reducing and addressing the impacts." This marked the first statutory direction to a State agency to address climate change.

The California Climate Action Registry was created to encourage voluntary reporting and early reductions of GHG emissions with the adoption of Senate Bill (SB) 1771 in 2000. The CEC was directed to assist by developing metrics and identifying and qualifying third-party organizations to provide technical assistance and advice to GHG emission reporters. The next year, SB 527 amended SB 1771 to emphasize third-party verification.

SB 1711 also contained several additional requirements for the CEC. These included updating the State's GHG inventory from an existing 1998 report and continuing to update it every 5 years; acquiring, developing, and distributing information on GCC to agencies and businesses; establishing a State interagency taskforce to ensure policy coordination; and establishing a climate change advisory committee to make recommendations on the most equitable and efficient ways to implement climate change requirements. In 2006, AB 1803 transferred preparation of the inventory from the CEC to the ARB. The ARB updates the inventory annually.

AB 1493, authored by Assembly Member Fran Pavley in 2002, directed the ARB to adopt regulations to achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles. The so-called "Pavley" regulations, or clean car regulations, were approved by the ARB in 2004. The ARB submitted a request to the EPA to implement the regulations in December 2005. After several years of requests to the federal government, and accompanying litigation, this waiver request was granted on June 30, 2009. The ARB has since combined the control of smog-causing pollutants and GHG emissions to develop a single coordinated package of standards known as Low Emission Vehicles III. It was expected that these regulations would reduce GHG emissions from State-passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016, all while improving fuel efficiency and reducing motorists' costs. AB 1493 also directed the State's Climate Action Registry to adopt protocols for reporting reductions in GHG emissions from mobile sources prior to the operative date of the regulations.

SB 812 added forest management practices to the State's Climate Action Registry members' reportable emissions actions. It also directed the Registry to adopt forestry procedures and

protocols to monitor, estimate, calculate, report, and certify CO stores and CO_2 emissions that resulted from the conservation and conservation-based management of forests in the State.

The California Renewable Portfolio Standard Program, which requires electric utilities and other entities under the jurisdiction of the California Public Utilities Commission to meet 20 percent of their retail sales with renewable power by 2017, was established by SB 1078 in 2002. The renewable portfolio standard was accelerated to 20 percent by 2010 by SB 107 in 2006. The program was subsequently expanded by the renewable electricity standard approved by the ARB in September 2010, requiring all utilities to meet a 33 percent target by 2020. The renewable electricity standard is projected to reduce GHG emissions from the electricity sector by at least 12 MMT CO_2e in 2020.

In December 2004, Governor Arnold Schwarzenegger signed Executive Order (EO) S-20-04, which set a goal of reducing energy use in State-owned buildings by 20 percent by 2015 (from a 2003 baseline) and encouraged cities, counties, schools, and the private sector to take all cost-effective measures to reduce building electricity use. This action built upon the State's strong history of energy efficiency efforts that have saved Californians and the State businesses energy and money for decades. They are a cornerstone of GHG reduction efforts.

EO S-3-05 (June 2005) established GHG targets for the State such as returning to year 2000 emission levels by 2010; 1990 levels by 2020; and 80 percent below 1990 levels by 2050. It directed the Secretary of CalEPA to coordinate efforts to meet the targets with the heads of other State agencies. This group became the Climate Action Team (CAT).

The California Global Warming Solutions Act of 2006, best known by its bill number AB 32, created a first-in-the country comprehensive program to achieve real, quantifiable, and cost-effective reductions in GHGs. The law set an economy-wide cap on the State's GHG emissions at 1990 levels by 2020. It directed the ARB to prepare, approve, and implement a Scoping Plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions. EO S-20-06, signed in October 2006, directed the Secretary for Environmental Protection to establish a Market Advisory Committee of national and international experts. The committee made recommendations to the ARB on the design of a market-based program for GHG emissions reduction. The ARB adopted the first Scoping Plan, describing a portfolio of measures to achieve the target, in December 2008. All of the major regulatory measures necessary for meeting the 2020 emissions target were adopted by December 2010.

The ARB approved the First Update to the Scoping Plan (Update) on May 22, 2014. The Update identifies the next steps for California's climate change strategy and shows how California continues on its path to meet the near-term 2020 GHG limit, but also sets a path toward long-term, deep GHG emission reductions. The report establishes a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050. The Update identifies progress made to meet the near-term objectives of AB 32 and defines California's climate change priorities and activities for the next several years. The Update does not set new targets for the State, but describes a path that would achieve the long-term 2050 goal of EO S-05-03 for emissions to decline to 80 percent below 1990 levels by 2050.

The Governors of California, Arizona, New Mexico, Oregon, and Washington entered into a memorandum of understanding in February 2007 establishing the Western Climate Initiative. The governors agreed to set a regional goal for emissions reductions consistent with state-by-state goals; develop a design for a regional market-based multi-sector mechanism to achieve the goal; and participate in a multi-state GHG registry. The Initiative has since grown to include Montana, Utah, and the Canadian provinces of British Columbia, Manitoba, Ontario, and Québec.

California is implementing the world's first Low Carbon Fuel Standard for transportation fuels, pursuant to both EO S-01-07, signed January 2007, and AB 32. The standard requires a reduction of at least 10 percent in the CO intensity of the State's transportation fuels by 2020. This reduction is expected to reduce GHG emissions in 2020 by 17.6 MMT CO_2e. Also in 2007, AB 118 created the Alternative and Renewable Fuel and Vehicle Technology Program. The CEC and the ARB administer the program. This act provides funding for alternative fuel and vehicle technology research, development, and deployment in order to attain the State's climate change goals, achieve the State's petroleum reduction objectives and clean air and GHG emission reduction standards, develop public-private partnerships, and ensure a secure and reliable fuel supply.

In addition to vehicle emissions regulations and the low carbon fuel standard, the third effort reducing GHG emissions from transportation is the reduction in the demand for personal vehicle travel (i.e., vehicle miles traveled or VMT). This measure was addressed in September 2008 through the Sustainable Communities and Climate Protection Act of 2008, or SB 375. The enactment of SB 375 initiated an important new regional land use planning process to mitigate GHG emissions by integrating and aligning planning for housing, land use, and transportation for California's 18 MPOs. The bill directed the ARB to set regional GHG emission reduction targets for most areas of the State. It also contained important elements related to federally mandated regional transportation plans and the alignment of State transportation and housing planning processes.

Also codified in 2008, SB 97 required the Governor's Office of Planning and Research (OPR) to develop GHG emissions criteria to be used in determining project impacts under the California Environmental Quality Act (CEQA). These criteria were developed in 2009 and went into effect in 2010.

EO S-13-08 launched a major initiative for improving the State's adaptation to climate impacts from sea level rise, increased temperatures, shifting precipitation, and extreme weather events. It ordered a California Sea Level Rise Assessment Report to be requested from the National Academy of Sciences. It also ordered the development of a Climate Adaptation Strategy. The strategy, published in December 2009, assesses the State's vulnerability to climate change impacts and outlines possible solutions that can be implemented within and across State agencies to promote resiliency. The Strategy focused on seven areas: public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture, forestry, and transportation and energy infrastructure.

On April 29, 2015, Governor Edmund G. Brown Jr. issued EO B-30-15, which established a California GHG reduction target of 40 percent below 1990 levels by 2030. EO B-30-15 aligns California's GHG reduction targets with those of leading international governments ahead of the United Nations Climate Change Conference in Paris in late 2015. EO B-30-15 sets a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050, and directs the ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of MM CO_2e. EO B-30-15 also requires the State's climate adaptation plan to be updated every 3 years and for the State to continue its climate change research program, among other provisions. As with EO S-3-05, EO B-30-15 is not legally enforceable against local governments and the private sector. Legislation that would update AB 32 to make post-2020 targets and requirements a mandate is in process in the State Legislature.

The initiatives, executive orders, and statutes outlined above comprise the major milestones in California's efforts to address climate change through coordinated action on climate research, GHG mitigation, and climate change adaptation. Numerous other related efforts have been undertaken by State agencies and departments to address specific questions and programmatic needs. The CAT coordinates these efforts and others, which comprise the State's climate program. The rest of the report describes these efforts.

Regional Air Quality Planning Framework

The 1976 Lewis Air Quality Management Act established the SCAQMD and other air districts throughout the State. The CAA Amendments of 1977 required that each state adopt an implementation plan outlining pollution control measures to attain the federal standards in nonattainment areas.

The ARB is responsible for incorporating Air Quality Management Plans (AQMPs) for local air basins into an SIP for EPA approval. Significant authority for air quality control within them has been given to local air districts that regulate stationary-source emissions and develop local nonattainment plans.

Regional Air Quality Management Plan

The SCAQMD and SCAG are responsible for formulating and implementing the AQMP for the Basin. The main purpose of an AQMP is to bring the area into compliance with federal and State air quality standards. Every 3 years, the SCAQMD is required to prepare an AQMP that updates the previous AQMP and includes an emission forecast out to a 20-year horizon. The SCAQMD adopted the 2012 AQMP in December 2012, and the ARB approved it on January 23, 2013, and forwarded it to the EPA. The SCAQMD has released the Draft 2016 AQMP on June 2016.

The 2016 AQMP incorporates the latest scientific and technological information and planning assumptions, including the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and updated emission inventory methodologies for various source categories. The 2016 AQMP included the new and changing federal requirements, implementation of new

technology measures, and the continued development of economically sound, flexible compliance approaches.

Local Regulations/Standards

The City adopted its Riverside Restorative Growthprint (RRG) Economic Prosperity Action Plan (RRG-EPAP) and Climate Action Plan (RRG-CAP) in January 2016. In 2014, the City was 1 of 12 that collaborated with the Western Riverside Council of Governments (WRCOG) on a Subregional Climate Action Plan (Subregional CAP) that includes 36 measures to guide the City's GHG reduction efforts through 2020. Through the WRCOG Subregional CAP process, the City has committed to a 2020 emissions target of 2,224,908 MT CO2e, which is 26.4 percent below the City's 2007 baseline and 15 percent below 2010 emissions. This represents a reduction of 779,304 MT CO2e from the City's 2020 business-as-usual (BAU) forecast. The City is aiming for a 2035 emissions target of 1,542,274 MT CO2e, which is 49 percent below the 2007 baseline and represents a reduction of 2,120,931 MT CO2e from the 2035 BAU forecast.

The RRG-CAP expands upon the efforts of the WRCOG Subregional CAP, employing local measures to help the City achieve deep GHG reductions through the year 2035. To further develop local GHG reduction measures for the RRG-CAP, the City conducted a detailed assessment of local strategies and actions related to the measures identified in the Subregional CAP and expanded the discussion and analysis with respect to implementation (particularly post-2020), costs and funding, performance metrics, and local cobenefits. Importantly, the discussions identify local economic and entrepreneurship opportunities that can be integrated with local, regional, and global GHG reductions (e.g., the development of green enterprise zones).

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THRESHOLDS OF SIGNIFICANCE

A number of modeling tools are available to assess the air quality impacts of projects. In addition, certain air districts, such as the SCAQMD, have created guidelines and requirements to conduct air quality analysis. The SCAQMD's current guidelines, the *CEQA Air Quality Handbook* (SCAQMD 1993) with associated updates, and the City of Riverside General Plan (2007) were followed in the assessment of air quality impacts for the proposed project. The current air quality model (California Emissions Estimator Model [CalEEMod] Version 2016.3.1) was used to estimate project-related mobile- and stationary-source emissions in this analysis.

This air quality and GHG analysis includes estimated emissions associated with short-term construction and long-term operation of the proposed project. Criteria pollutants with regional impacts would be emitted by project-related vehicular trips, as well as by emissions associated with stationary sources used on site. Localized air quality impacts (i.e., higher CO concentrations [CO hot spots] near intersections or roadway segments in the project vicinity) would be small and less than significant due to the generally low ambient CO concentrations in the project area.

The net increase in pollutant emissions determines the significance and impact on regional air quality as a result of the proposed project. The results also allow the local government to determine whether the proposed project will deter the region from achieving the goal of reducing pollutants in accordance with the AQMP in order to comply with the NAAQS and CAAQS.

Based on *State CEQA Guidelines*, Appendix G, Public Resources Code (PRC) Sections 15000–15387, a project would normally be considered to have a significant effect on air quality if the project would violate any CAAQS, contribute substantially to an existing air quality violation, expose sensitive receptors to substantial pollutants concentrations, or conflict with adopted environmental plans and goals of the community in which it is located.

POLLUTANTS WITH REGIONAL EFFECTS

The SCAQMD has established daily emissions thresholds for construction and operation for the evaluation of the proposed project in the Basin. It should be noted that the emissions thresholds were established based on the attainment status of the air basin in regard to air quality standards for specific criteria pollutants. Because the concentration standards were set at a level that protects public health with an adequate margin of safety (ARB 2016a), these emissions thresholds are regarded as conservative and would overstate an individual project's contribution to health risks.

Regional Thresholds for Construction and Operational Emissions

Table F presents the significance thresholds for construction and operational emissions have been established by the SCAQMD.

Table F: SCAQMD Significance Thresholds

Air Pollutant	Construction Phase	Operational Phase
VOCs	75 lbs/day	55 lbs/day
CO	550 lbs/day	550 lbs/day
NO_X	100 lbs/day	55 lbs/day
SO_X	150 lbs/day	150 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day

Source: South Coast Air Quality Management District (2016).

CO = carbon monoxide
lbs = pounds
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
VOCs = volatile organic compounds
SCAQMD = South Coast Air Quality Management District
SO_X = sulfur oxides

Projects in the Basin with operational emissions that exceed any of these emission thresholds are considered to be significant under the SCAQMD guidelines.

THRESHOLDS FOR LOCALIZED IMPACTS

The SCAQMD published its *Final Localized Significance Threshold Methodology* in June 2003, recommending that all air quality analyses include an assessment of both construction and operational impacts on the air quality of nearby sensitive receptors. Localized significance thresholds (LSTs) represent the maximum emissions from a project site that are not expected to result in an exceedance of the CO NAAQS or CAAQS, as previously shown in Table C. LSTs are based on the ambient concentrations of that pollutant within the project Source Receptor Area (SRA) and the distance to the nearest sensitive receptor. For this project, the appropriate SRA for the LST is the Metropolitan Riverside County area (SRA 23).

In the case of CO and NO_2, if ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a State or federal standard, then project emissions are considered significant if they increase ambient concentrations by a measurable amount. This would apply to PM_{10} and $PM_{2.5}$, both of which are nonattainment pollutants. For these two, the significance criteria are the pollutant concentration thresholds presented in SCAQMD Rules 403 and 1301. The Rule 403 threshold of 10.4 $\mu g/m^3$ applies to construction emissions. The Rule 1301 threshold of 2.5 $\mu g/m^3$ applies to operational activities.

To avoid the need for every air quality analysis to perform air dispersion modeling, the SCAQMD performed air dispersion modeling for a range of construction sites less than or equal to 5 acres (ac) and created look-up tables that correlate pollutant emissions rates with project size to screen out projects that are unlikely to generate enough emissions to result in a locally

significant concentration of any criteria pollutant. These look-up tables can also be used as screening criteria for larger projects to determine whether dispersion modeling may be required.

For construction and operational emissions, the localized significance for a project smaller than 5 ac can be determined by performing the screening-level analysis before using the dispersion modeling because the screening-level analysis is more conservative, and if no exceedance of the screening-level thresholds is identified, then the chance of operational LST exceeding concentration standards is small. The total gross area for the project site is slightly larger than 5 ac; thus, LST screening thresholds for the 5 ac tables were used in this analysis. Since the project is not an aggregate handling facility, operational LSTs are assessed with the SCAQMD screening thresholds.

Sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to adverse air quality. Existing sensitive receivers nearest to the project site are approximately 82 ft, or approximately 25 meters (m), from the project site. Using the operations LST thresholds for receptors at 25 m from a 5 ac site for this project would result in a conservative analysis. Therefore, Table G presents the emissions thresholds apply during project operations.

Table G: SCAQMD LST Thresholds (lbs/day)

	NOx	**CO**	**PM_{10}**	**$PM_{2.5}$**
Construction	270	1,577	13.0	8.0
Operations	270	1,577	4.0	2.0

Source: SCAQMD 2008.
Note: SRA 23 – Metropolitan Riverside County, 5 acres, 25-meter distance.

TOXIC AIR CONTAMINANTS

The ARB has developed an *Air Quality and Land Use Handbook* (ARB 2005), which is intended to serve as a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process. According to the ARB Handbook, recent air pollution studies have shown an association between respiratory and other non-cancer health effects and proximity to high-traffic roadways. Other studies have shown that diesel exhaust and other cancer-causing chemicals emitted from diesel-powered construction equipment, automobiles, trailer trucks, marine vessels, and locomotives are responsible for much of the overall cancer risk from airborne toxics in California. The ARB Handbook recommends that planning agencies strongly consider proximity to these sources when finding new locations for “sensitive” land uses such as homes, medical facilities, daycare centers, schools, and playgrounds.

Air pollution sources of concern include freeways, rail yards, ports, refineries, distribution centers, chrome plating facilities, dry cleaners, and large gasoline service stations. Key recommendations in the ARB *Air Quality and Land Use Handbook* include taking steps to avoid siting new, sensitive land uses:

- Within 500 ft of a freeway, urban roads with 100,000 vehicles/day or rural roads with 50,000 vehicles/day;
- Within 1,000 ft of a major service and maintenance rail yard;
- Immediately downwind of ports (in the most heavily impacted zones) and petroleum refineries;
- Within 300 ft of any dry cleaning operation (for operations with two or more machines, provide 500 ft); or
- Within 300 ft of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater).

The ARB *Air Quality and Land Use Handbook* specifically states that its recommendations are advisory and acknowledges that land use agencies have to balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues.

POLLUTANTS THAT AFFECT GLOBAL CLIMATE CHANGE

State CEQA Guidelines Section 15064(b) provides that the "determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data," and, further, states that an "ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting."

The thresholds for GHG emission impact analysis are consistent with Appendix G of the *State CEQA Guidelines*. A project would normally have a significant effect on the environment if the project would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

On December 30, 2009, the Natural Resources Agency adopted amendments to the *State CEQA Guidelines* that became effective on March 18, 2010. The amendments to the *State CEQA Guidelines* include new requirements to evaluate GHG emissions. Pursuant to the amended *State CEQA Guidelines*, a lead agency should consider the following when assessing the significance of impacts from GHG emissions on the environment:

1. The extent to which the project may increase (or reduce) GHG emissions compared to the existing environmental setting
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project

3. The extent to which the project complies with regulations or requirements adopted to implement an adopted statewide, regional, or local plan for the reduction or mitigation of GHG emissions

Currently, there is no statewide GHG emissions threshold that has been used to determine potential GHG emissions impacts of a project. Threshold methodology and thresholds are still being developed and revised by air districts in the State. Therefore, this environmental issue remains unsettled and must be evaluated on a case-by-case basis until the SCAQMD adopts significance thresholds and GHG emissions impact methodology. In addition to the climate action plan, SCAQMD thresholds would apply to future commercial development in the City.

To provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents, the SCAQMD convened a GHG CEQA Significance Threshold Working Group (Working Group). Based on the last Working Group meeting (Meeting No. 15) held in September 2010, the SCAQMD has proposed to adopt a tiered approach for evaluating GHG emissions for development projects where the SCAQMD is not the lead agency. [1] For a industrial warehouse development sector, the applicable tier for this project would be Tier 3 if GHG emissions are less than 10,000 MT CO_2e/yr.

[1] South Coast Air Quality Management District (SCAQMD). GHG CEQA Significance Threshold Stakeholder Working Group Meeting No. 15 Minutes, September 28, 2010. Website: http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-15/ghg-meeting-15-minutes.pdf, accessed October 2016.

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IMPACTS AND MITIGATION

Air pollutant emissions associated with the project would occur over the short term from construction activities (e.g., fugitive dust from site preparation and grading, and emissions from equipment exhaust). There would be long-term regional emissions associated with project-related vehicular trips as well as energy consumption (e.g., electricity usage) by the proposed land uses.

CONSTRUCTION IMPACTS

Equipment Exhausts and Related Construction Activities

Construction activities produce combustion emissions from various sources (e.g., grading, site preparation, utility engines, tenant improvements, and motor vehicles transporting the construction crew). Exhaust emissions from construction activities would vary daily as construction activity levels change. The use of construction equipment on site would result in localized exhaust emissions. Table H lists the tentative project construction schedule for the proposed project based on a probable start date in early 2017, with a planned opening in fall 2018, and the assumption that the architectural coatings would be applied during the latter portion of the building construction phase. Table I lists the potential construction equipment to be used during project construction during each project phase.

The most recent version of CalEEMod (Version 2016.3.1) was used to calculate the construction emissions. Results from the model are shown in Appendix A. Table J shows the construction emissions from the CalEEMod output tables listed as “Mitigated Construction,” even though the only measures that have been applied to the analysis are the SCAQMD-required construction emissions control measures or standard conditions. The results in the table show the combination of the on- and off-site emissions.

Table H: Tentative Project Construction Schedule

Task	Phase Name	Phase Start Date	Phase End Date	Number of Days/Week	Number of Days
1	Site Preparation	3/1/2017	3/3/2017	5	3
2	Grading	3/4/2017	3/13/2017	5	8
3	Building Construction	3/14/2017	1/15/2018	5	230
4	Paving	1/16/2018	1/29/2018	5	18
5	Architectural Coating	1/30/2018	2/12/2018	5	18

Source: Compiled by LSA Associates, Inc. using CalEEMod defaults for phasing and assuming Fall 2018 opening (2016).
CalEEMod = California Emissions Estimator Model

Table I: Diesel Construction Equipment Utilized by Construction Phase

Construction Phase	Off-Road Equipment Type	Off-Road Equipment Unit Amount	Hours Used per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	3	8	247	0.40
	Tractors/Loaders/Backhoes	4	8	97	0.37
Grading	Excavators	1	8	158	0.38
	Graders	1	8	187	0.41
	Rubber Tired Dozers	1	8	247	0.40
	Tractors/Loaders/Backhoes	3	8	97	0.37
Building Construction	Cranes	1	7	231	0.29
	Forklifts	3	8	89	0.20
	Generator Sets	1	8	84	0.74
	Tractors/Loaders/Backhoes	3	7	97	0.37
	Welders	1	8	46	0.45
Paving	Cement and Mortar Mixers	2	6	9	0.56
	Pavers	2	8	130	0.42
	Paving Equipment	2	8	132	0.36
	Rollers	2	8	80	0.38
Architectural Coating	Air Compressors	1	6	78	0.48

Source: Compiled by LSA Associates, Inc. using CalEEMod defaults (2016).

Table J: Estimated Construction Emissions

Construction Phase	Total Daily Maximum Pollutant Emissions (lbs/day)							
	VOC	NO_X	CO	SO_X	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$
2017 Construction Phase								
Site Preparation	5.08	52.36	24.47	0.04	8.33	0.71	4.52	0.71
Grading	3.17	33.96	17.95	0.03	3.12	0.58	1.56	0.58
Building Construction	3.74	30.67	23.16	0.04	1.02	0.72	0.28	0.72
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak Daily	**5.08**	**52.36**	**24.47**	**0.04**	**9.04**		**5.23**	
SCAQMD Thresholds	**75**	**100**	**550**	**150**	**150**		**55**	
Significant Emissions?	**No**	**No**	**No**	**No**	**No**		**No**	
2018 Construction Phase								
Site Preparation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Construction	3.74	30.67	23.16	0.04	1.02	0.72	0.28	0.72
Paving	1.80	14.60	13.42	0.02	0.22	0.42	0.06	0.42
Architectural Coating	53.60	2.07	2.60	0.00	0.17	0.07	0.04	0.07
Peak Daily	**53.60**	**30.67**	**23.16**	**0.04**	**1.74**		**1.00**	
SCAQMD Thresholds	**75**	**100**	**550**	**150**	**150**		**55**	
Significant Emissions?	**No**	**No**	**No**	**No**	**No**		**No**	

Source: Compiled by LSA Associates, Inc. (2016).
Note: Peak daily emissions are based on daily maximum.
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
lbs/day = pounds per day
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District
SO_X = sulfur oxides
VOC = volatile organic compounds

Since no exceedances of any criteria pollutants are expected, no significant impacts would occur for project construction. The required construction emissions control measures from SCAQMD

are discussed below. Details of the emission factors and other assumptions are included in Appendix A.

Fugitive Dust

Fugitive dust emissions are generally associated with land clearing and the exposure of soils to air and wind as well as cut-and-fill grading operations. Dust generated during construction varies substantially on a project-by-project basis, depending on the level of activity, the specific operations, and the weather conditions at the time of construction. The proposed project is required to comply with SCAQMD Rule 403 to control fugitive dust.

As discussed above, Table J lists total construction emissions (i.e., fugitive-dust emissions and construction-equipment exhausts) that have incorporated a number of feasible control measures. These measures, which include using a minimum Tier 2 equipment engine standard with particulate control devices and on-site watering at least two times daily, are required by ARB and can be reasonably implemented to significantly reduce PM_{10} emissions from construction.

Architectural Coatings

Architectural coatings contain VOCs that are similar to ROCs and are part of the O_3 precursors. As shown in Table J, it is estimated that application of the architectural coatings for the proposed peak construction day will result in 54 lbs/day of VOC. Therefore, this VOC emission will not exceed the SCAQMD VOC threshold of 75 lbs/day.

Localized Impacts Analysis

The SCAQMD has issued guidance on applying CalEEMod results to localized impacts analyses (SCAQMD 2010). Sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to adverse air quality. There are several existing sensitive receptors near the project site, the closest of which is approximately 1,200 ft (366 m) from the southern boundary. Using the LST guidance from SCAQMD, the results of the LST analysis are shown in Table K. Table K shows that the emissions of the pollutants on the peak day of construction will result in concentrations of pollutants at these nearest residences that are all below the SCAQMD thresholds of significance.

Toxic Air Contaminants

Mobile source TAC emissions would be generated by heavy-duty equipment during construction. DPM is known to contain high concentrations of carcinogenic compounds from diesel-fueled equipment. The risks associated with exposure to substances with carcinogenic effects are typically evaluated based on a lifetime of chronic exposure, which is defined in the *CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines* (CAPCOA 1993).

Table K: Construction Localized Impacts Analysis

Emissions Sources	NO_X	CO	PM_{10}	$PM_{2.5}$
On-Site Emissions (lbs/day)	52	23	8.8	5.2
LST Thresholds (lbs/day)	**270**	**1,577**	**13.0**	**8.0**
Significant Emissions?	**No**	**No**	**No**	**No**

Source: Compiled by LSA Associates, Inc. (2016).
Note: SRA 23 – Metropolitan Riverside County, 5 acres, 25-meter distance
CO = carbon monoxide
lbs/day = pounds per day
LST = local significance threshold
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SRA = Source Receptor Area

The risks associated with carcinogenic effects are typically evaluated based on a lifetime of chronic exposure (i.e., 24 hours per day, 7 days per week, 365 days per year for 30 years). Because the construction-related emissions of diesel exhaust would occur for up to 10 months and sensitive receptors (i.e., single-family homes) are located more than 1,000 ft from the project site, the construction activities would not result in long-term chronic lifetime exposure to diesel exhaust from heavy-duty diesel equipment. Therefore, air quality impacts related to the exposure of sensitive receptors to substantial TAC concentrations would be less than adverse.

Therefore, construction of the proposed project is not anticipated to result in an elevated health risk to exposed persons given the short-term and transitory nature of construction-related diesel exposure. The project may create a nuisance for residences during hours of construction, but this impact is considered minimal because of the short-term and transitory nature of the construction period. Consequently, the human health impact of DPM risks associated with construction activities is considered to be less than significant.

Odors

Heavy-duty equipment in the project area during construction would emit odors, primarily from the equipment exhaust. However, the construction activity would cease to occur after construction is completed. No other sources of objectionable odors have been identified for the proposed project and no mitigation measures are required.

SCAQMD Rule 402 regarding nuisances states: “A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.” The proposed uses are not anticipated to emit any objectionable odors. Therefore, objectionable odors posing a health risk to potential on-site and existing off-site uses would not occur as a result of the proposed project.

Naturally Occurring Asbestos

The proposed project is located in County of Riverside, which is not among the counties found to have serpentine and ultramafic rock in their soils.[1] Therefore, the potential risk for naturally occurring asbestos (NOA) during project construction is less than significant.

Construction Emissions Summary

Tables J and K show that daily regional and localized construction emissions would not exceed the thresholds of any criteria pollutant emission thresholds established by the SCAQMD, and during construction, there would be no locally significant impacts. Additionally, construction of the project would not expose sensitive receptors to substantial pollutant concentrations related to the exposure of DPM emissions during construction.

REGIONAL AIR QUALITY IMPACTS

Project Operational Emissions

Operational air pollutant emission impacts are those associated with stationary sources and mobile sources involving any project-related changes. The proposed project would result in net increases in area-source and mobile-source emissions. The area-source emissions would come from natural gas appliances, consumer products, landscaping equipment, and solid waste disposal. Mobile source emissions would come from patrons/employee vehicles and supply/ delivery trucks.

Area Sources. Area sources of air pollutant emissions include indirect emissions associated with fuel combustion used to generate electricity and provide space and water heating; from the embodied energy required to supply, treat, and distribute water, and treat the resulting wastewater; from combustion emissions from landscaping equipment; and from use of architectural coatings. Landscaping equipment powered by fossil fuels is also a source of emissions.

Mobile Sources. Based on trip generation estimates provided in the *Traffic Impact Study* (LSA 2016) prepared for the proposed project, the projected 647 weekday daily trips was used as input in the CalEEMod analysis.

Table L shows the estimated operational emissions associated with the proposed project.

[1] California Department of Conservation, California Geological Survey. Asbestos. Website: http://www.conservation.ca.gov/cgs/minerals/hazardous_minerals/asbestos/Pages/index.aspx, accessed October 2016.

Table L: Estimated Operational Emissions

Source	Pollutant Emissions (lbs/day)					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Proposed Project						
Area Sources	2.29	<0.01	0.03	0	<0.01	<0.01
Energy Sources	0.10	0.88	0.74	<0.01	0.07	0.07
Mobile Sources	1.79	27.67	25.86	0.14	9.25	2.64
Total Project Emissions	**4.18**	**28.55**	**26.63**	**0.14**	**9.32**	**2.71**
SCAQMD Thresholds	**55**	**55**	**550**	**150**	**150**	**55**
Significant?	**No**	**No**	**No**	**No**	**No**	**No**

Source: Compiled by LSA Associates, Inc. (2016).
CO = carbon monoxide
CO_2 = carbon dioxide
lbs/day = pounds per day
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SCAQMD = South Coast Air Quality Management District
SO_X = sulfur oxides
VOC = volatile organic compounds

Results from the CalEEMod analysis, as shown in Table L, indicate that all criteria pollutants resulting from the proposed project would not exceed the corresponding SCAQMD daily emission thresholds for any criteria pollutants. Therefore, project-related operational air quality impacts would be less than significant.

Localized Impacts Analysis

Table M shows the calculated emissions for the proposed operational activities compared with the appropriate LSTs. By design, the localized impacts analysis only includes on-site sources; however, the CalEEMod outputs do not separate on-site and off-site emissions for mobile sources. For a worst-case scenario assessment, the emissions shown in Table M include all on-site project-related stationary sources and 5 percent of the project-related new mobile sources, which is an estimate of the amount of project-related new vehicle traffic that will occur on site.

A total of 5 percent is considered conservative because the average trip lengths assumed are 24.11 mi from home to work, 8.4 mi from home to shopping, and 6.9 mi for other types of trips. It is unlikely that the average on-site distance driven will be even 1,000 ft, which is approximately 2.2 percent of the total miles traveled. Considering the total trip length included in CalEEMod, the 5 percent assumption is conservative.

Table M: Estimated Operational Localized Impacts Analysis

Emissions Sources	NO_X	CO	PM_{10}	$PM_{2.5}$
On-Site Emissions[1]	1.38	1.32	0.46	0.13
LST Thresholds	**270**	**1,577**	**4.0**	**2.0**
Significant Emissions?	**No**	**No**	**No**	**No**

Source: Compiled by LSA Associates, Inc. (2016).
Note: SRA 23 – Metropolitan Riverside County, 5 acres, 25-meter distance, on-site traffic 5 percent of total mobile source trips within the project area (i.e., driveways and parking lots).
[1] CalEEMod clearly delineates the on-site and off-site emissions; thus, this includes all on-site emissions without having to include a percentage of the mobile source emissions.
CalEEMod = California Emissions Estimator Model
CO = carbon monoxide
LST = local significance thresholds
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SRA = Source Receptor Area

Table M shows that the operational emission rates would not exceed the LSTs for receptors at 1,200 ft (366 m). Therefore, the proposed operational activity would not result in a locally significant air quality impact.

Carbon Monoxide Hot Spots

Areas with high vehicle density (e.g., congested intersections and parking garages) have the potential to create high concentrations of CO known as CO "hot spots." A project's localized air quality impact is considered significant if CO emissions create a hot spot where either the California 1-hour standard of 20 ppm or the federal and State 8-hour standard of 9.0 ppm is exceeded. This typically occurs at severely congested intersections (level of service [LOS] E or worse). Based on the *Traffic Impact Analysis* (LSA 2016), the project would not significantly change the LOS at any intersection or roadway segment, and is not anticipated to create a CO hot spot. The currently proposed project is estimated to generate 647 trips and therefore is not anticipated to generate a CO hot spot. Potential impacts from CO emissions are considered less than significant, and no mitigation is required.

OPERATIONAL TOXIC AIR CONTAMINANTS ASSESSMENT

The proposed project would develop an industrial warehouse. The primary source of air contaminant emissions would be from mobile sources; no substantial emissions from stationary sources are anticipated. As illustrated in Table K, the proposed project is anticipated to have a relatively low net increase in air pollutants and is well below the significance thresholds for criteria pollutants. Furthermore, the project would not result in significant emissions of TACs. Therefore, it is unlikely that the project would release substantial quantities of air contaminants beyond the boundaries of the premises on which the source of the contaminants is located. Impacts would be less than significant, and no mitigation measures are required.

IMPACTS FROM ODORS

Odors are not expected to substantially increase from existing conditions in the area due to the proposed project. Typically, odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from the psychological (i.e., irritation, anger, or anxiety) to the physiological, including circulatory and respiratory effects, nausea, vomiting, and headaches.

The proposed project involves construction of an industrial warehouse. These land uses are not identified as major sources of odor emissions according to the ARB *Air Quality and Land Use Handbook*. The proposed project would not be a source of nuisance odors associated with operations. Odor impacts are therefore less than significant, and no mitigation measures are required.

GREENHOUSE GAS EMISSIONS

This section evaluates potential significant impacts to global climate change (GCC) that could result from implementation of the proposed project. Because it is not possible to tie specific GHG emissions to actual changes in climate, this evaluation focuses on the project's emission of GHGs. Mitigation measures are identified as appropriate.

Construction and operation of project development would generate GHG emissions, with the majority of energy consumption (and the associated generation of GHG emissions) occurring during the project's operation, as opposed to during its construction.

Overall, the following activities associated with the proposed project could contribute directly or indirectly to the generation of GHG emissions:

- **Construction Activities:** During construction of the project, GHGs would be emitted through the operation of construction equipment and from worker and vendor vehicles, each of which typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs such as CO_2, CH_4, and N_2O. Furthermore, CH_4 is emitted during the fueling of heavy equipment.
- **Gas, Electricity, and Water Use:** Natural gas use results in the emission of two GHGs: CH_4 (the major component of natural gas) and CO_2 (from the combustion of natural gas). Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. California's water conveyance system is energy intensive. Preliminary estimates indicate that the total energy used to pump and treat this water exceeds 6.5 percent of the total electricity used in the State per year (CEC 2006).
- **Solid Waste Disposal:** Solid waste generated by the project could contribute to GHG emissions in a variety of ways. Landfilling and other methods of disposal use energy for transporting and managing the waste, and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of CH_4 from the anaerobic decomposition of organic materials. CH_4 is 25 times more potent a GHG than CO_2. However, landfill CH_4 can also be a source of energy. In addition, many materials in

landfills do not decompose fully and the carbon that remains is sequestered in the landfill and not released into the atmosphere.

- **Motor Vehicle Use:** Transportation associated with the proposed project would result in GHG emissions from the combustion of fossil fuels in daily automobile and truck trips.

GHG emissions associated with the project construction would occur over the short term from construction activities, and would consist primarily of emissions from equipment exhaust. There would also be long-term regional emissions associated with project-related new vehicular trips and stationary-source emissions (e.g., natural gas used for heating and electricity usage for lighting). Preliminary guidance from the OPR and recent letters from the Attorney General critical of CEQA documents that have taken different approaches indicate that lead agencies should calculate, or estimate, emissions from vehicular traffic, energy consumption, water conveyance and treatment, waste generation, and construction activities. The calculation presented below includes construction emissions in terms of CO_2 and annual CO_2e GHG emissions from increased energy consumption, water usage, solid waste disposal, and estimated GHG emissions from vehicular traffic that would result from implementation of the project.

GHG emissions generated by the proposed project would predominantly consist of CO_2. In comparison to criteria air pollutants such as O_3 and PM_{10}, CO_2 emissions persist in the atmosphere for a substantially longer period. While emissions of other GHGs (e.g., CH_4) are important with respect to GCC, the emission levels of other GHGs are less dependent on the land use and circulation patterns associated with the proposed land use development project than are levels of CO_2.

Construction Greenhouse Gas Emissions

Construction activities produce combustion emissions from various sources (e.g., site grading, utility engines, on-site heavy-duty construction vehicles, equipment hauling materials to and from the site, asphalt paving, and motor vehicles transporting the construction crew). Exhaust emissions from on-site construction activities would vary daily as construction activity levels change. Table N lists the annual CO_2 emissions for each of the planned construction phases.

Table N: Estimated Construction GHG Emissions

Construction Phase	Peak Annual Emissions (MT/yr)				Total Emissions per Phase (MT of CO_2e)
	CO_2	CH_4	N_2O	Total CO_2e	
2017					
Site Preparation	5.57	<0.01	0.00	5.61	**422.20**
Grading	8.72	<0.01	0.00	8.78	
Building Construction	406.12	0.06	0.00	407.81	
Paving	0.00	0.00	0.00	0.00	
Architectural Coating	0.00	0.00	0.00	0.00	
2018					
Site Preparation	0.00	0.00	0.00	0.00	**32.74**
Grading	0.00	0.00	0.00	0.00	
Building Construction	21.09	<0.01	0.00	21.19	
Paving	9.47	<0.01	0.00	9.54	
Architectural Coating	2.01	<0.01	0.00	2.01	
Total Construction Emissions					**454.94**
Total Construction Emissions Amortized over 30 years					**15.16**

Table N: Estimated Construction GHG Emissions

Construction Phase	Peak Annual Emissions (MT/yr)				Total Emissions per Phase (MT of CO_2e)
	CO_2	CH_4	N_2O	Total CO_2e	

Source: Compiled by LSA Associates, Inc. (2016).
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
MT CO_2e = metric tons of carbon dioxide equivalent
MT/yr = metric tons per year
N_2O = nitrous oxide

See the CalEEMod modeling output in Appendix A for details.

Architectural coatings used in construction of the project may contain VOCs that are similar to ROGs and are part of O_3 precursors. However, there are no significant emissions of GHGs from architectural coatings. The construction phase in Table N shows GHG emissions from equipment exhaust and energy use. Results indicate that project construction would generate approximately 454.94 MT CO_2e/yr. Amortized over 30 years, the total construction emissions would generate approximately 15.16 MT CO_2e/yr.

Operational Greenhouse Gas Emissions

Operation of the proposed project would generate GHG emissions from area and mobile sources and indirect emissions from stationary sources associated with energy consumption. Mobile-source emissions of GHGs would include project-generated vehicle trips associated with on-site facilities and customers/visitors to the project site. Area-source emissions would be associated with activities such as landscaping and maintenance of proposed land uses, natural gas for cooking and heating, and other sources. Increases in stationary-source emissions would also occur at off-site utility providers as a result of demand for electricity, natural gas, and water by the proposed uses.

The GHG emission estimates presented in Table O show the emissions associated with the level of development envisioned by the proposed project at opening. Appendix A includes the CalEEMod outputs. Area sources include architectural coatings, consumer products, and landscaping. Energy sources include natural gas consumption for heating and cooking.

Table O: Estimated Operational Greenhouse Gas Emissions

Source	Pollutant Emissions (MT/yr)					
	Bio-CO_2	**NBio-CO_2**	**CO_2**	**CH_4**	**N_2O**	**Total CO_2e**
Construction emissions amortized over 30 years						15.16
Operational Emissions						
Area Sources	0.00	<0.01	<0.01	<0.01	0.00	0.01
Energy Sources	0.00	529.98	529.98	0.02	<0.01	532.29
Mobile Sources	0.00	1,737.44	1,737.44	0.07	0.00	1,739.29
Waste Sources	25.41	0.00	25.41	1.50	0.00	62.96
Water Usage	7.41	96.87	104.28	0.76	<0.01	128.99
Total Project Emissions	32.82	2,364.29	2,397.11	2.36	0.02	2,478.71

Source: Compiled by LSA Associates, Inc. (2016).
Note: Numbers in table may not appear to add up correctly due to rounding.
Bio-CO_2 = biologically generated CO_2
MT/yr = metric tons per year
CH_4 = methane
N_2O = nitrous oxide
CO_2 = carbon dioxide
NBio-CO_2 = Non-biologically generated CO_2
CO_2e = carbon dioxide equivalent

As shown in Table M, the project will result in a net increase of 2,479 MT CO_2e/yr.

The emissions level of 2,479 MT CO_2e/yr is less than the SCAQMD Tier 3 threshold of 10,000 MT CO_2e/yr for industrial projects; thus, project-level and cumulative GHG emissions would be less than significant.

HEALTH RISK ASSESSMENT

This HRA has been prepared following the SCAQMD guidelines to produce conservative estimates of risk posed by exposure to DPM associated with the proposed project. The conservative nature of this analysis is due primarily to the following factors:

The CARB-adopted diesel exhaust unit risk factor (URF) of 300 in one million per $\mu g/m^3$ is based upon the upper 95 percentile of estimated risk for each of the epidemiological studies utilized to develop the URF. Therefore the risk factor is already representative of the conservative risk posed by DPM.

The risk estimates assume sensitive receptors will be subject to DPM for 24 hours a day, 350 days a year. As a conservative measure, the SCAQMD does not recognize indoor adjustments for residents. However, the typical person spends the majority of their time indoors versus remaining outdoors for 24 hours a day, 350 days a year.[1]

[1] In May, 1991 the California Air Resources Board (CARB) Research Division in association with the University of California, Berkeley published research findings entitled: *Activity Patterns of California Residents*. The findings of that study indicate that on average, adults and adolescents in California spent almost 15 hours per day inside their homes, and six hours in other indoor locations, for a total of 21 hours (87% of the day). About 2 hours per day were spent in transit, and just over 1 hour per day was spent in outdoor locations.

The exposure to DPM is assumed to be constant for the given period analyzed (i.e., 70 years). It should be noted however that emissions from DPM are expected to substantially decrease in the future with the implementation of standard regulatory requirements and technological advancement to reduce DPM.

The emissions derived for the project assume that every truck accessing the project site will idle for 15 minutes. This is a 200 percent overestimation of actual idling times and thus conservative because CARB requires that idling be limited to 5 minutes.[1]

EMISSIONS ESTIMATION

Vehicle DPM emissions were estimated using emission factors for particulate matter less than 10μm in diameter (PM_{10}) generated with the 2014 version of the Emission Factor model (EMFAC) developed by the ARB. EMFAC 2014 is a mathematical model that was developed to calculate emission rates from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the ARB to project changes in future emissions from on-road mobile sources. The most recent version of this model, EMFAC 2014, incorporates regional motor vehicle data, information and estimates regarding the distribution of vehicle miles traveled (VMT) by speed, and number of starts per day.

The most important improvement in EMFAC 2014 is the integration of the new data and methods to estimate emissions from diesel trucks and buses. The model includes the emissions benefits of the truck and bus rule and the previously adopted rules for other on-road diesel equipment. Finally, the impacts of the recession on emissions that were quantified as part of the truck and bus rulemaking are included.

Several distinct emission processes are included in EMFAC 2014. Emission factors calculated using EMFAC 2014 are expressed in units of grams per vehicle miles traveled (g/VMT) or grams per idle-hour (g/idle-hr), depending on the emission process. The emission processes and corresponding emission factor units associated with diesel particulate exhaust for this Project are presented below.

For this Project, annual average PM_{10} emission factors were generated by running EMFAC 2014 in EMFAC Mode for vehicles in the SCAQMD district. The EMFAC Mode generates emission factors in terms of grams of pollutant emitted per vehicle activity and can calculate a matrix of emission factors at specific values of temperature, relative humidity, and vehicle speed. The model was run for speeds traveled in the vicinity of the Project. The vehicle travel speeds for each segment modeled are summarized below.

- Idling – on-site loading/unloading and truck gate
- 5 miles per hour – on-site vehicle movement including driving and maneuvering

[1] Although the Project is required to comply with CARB's idling limit of 5 minutes, staff at SCAQMD recommends that the on-site idling emissions should be estimated for 15 minutes of truck idling, which would take into account on-site idling which occurs while the trucks are waiting to pull up to the truck bays, idling at the bays, idling at check-in and check-out, etc.

- 25 miles per hour – off-site vehicle movement including driving and maneuvering.

The average PM_{10} emission factors for each type of vehicle were calculated based on the annual average emission factors from different model years for various exposure periods associated with assumptions for evaluating exposure to residential receptors in the neighborhood.

Calculated emission factors for each of these scenarios are shown in Table 2-1. The emission factors for model years beyond 2050 were assumed to be the same as emission factors in 2050 due to the fact that EMFAC 2014 only contains emission factors for the model year from 2000 through 2050. This is a conservative measure as it assumes no fleet turnover or cleaner technology with lower emissions could be incorporated after 2050. Also, this analysis is conservative by assuming that residents will live in the same home (and thus be exposed to emissions) for 70 years, and that workers will work in the same location for 40 years.

The vehicle DPM exhaust emissions were calculated for running exhaust emissions. The running exhaust emissions were calculated by applying the running exhaust PM10 emission factor (g/VMT) from EMFAC over the total distance traveled. The following equation was used to estimate off-site emissions for each of the different vehicle classes comprising the mobile sources:

$Emissions_{speedA}$ (g/s) = $EF_{RunExhaust}$ (g/VMT) * Distance (VMT/trip) * Number of Trips (trips/day) / seconds per day

Where:

$Emissions_{speedA}$ (g/s): Vehicle emissions at a given speed A;

$EF_{RunExhaust}$ (g/VMT): EMFAC running exhaust PM_{10} emission factor at speed A;

Distance (VMT/trip): Total distance traveled per trip.

Similar to off-site traffic, on-site vehicle running emissions were calculated by applying the running exhaust PM_{10} emission factor (g/VMT) from EMFAC and the total vehicle trip number over the length of the driving path using the same formula presented above for on-site emissions. In addition, on-site vehicle idling exhaust emissions were calculated by applying the idle exhaust PM_{10} emission factor (g/idle-hr) from EMFAC and the total truck trip over the total idle time (15 minutes). The following equation was used to estimate the on-site vehicle idling emissions for each of the different vehicle classes:

$Emissions_{idle}$ (g/s) = EF_{idle} (g/hr) * Number of Trips (trips/day) * Idling Time (min/trip) * 60 minutes per hour / seconds per day

Where:

$Emissions_{idle}$ (g/s): Vehicle emissions during idling;

EF_{idle}(g/s): EMFAC idle exhaust PM_{10} emission factor.

Each roadway was modeled as a line source (made up of multiple adjacent volume sources). Due to the large number of volume sources modeled for this analysis, the corresponding coordinates of each volume source have not been included in this report, but are included in Appendix. The DPM emission rate for each volume source was calculated by multiplying the emission factor (based on the average travel speed along the roadway) by the number of trips and the distance traveled along each roadway segment and dividing the result by the number of volume sources along that roadway. The modeled emission sources are illustrated on Figure 3. The modeled truck travel routes included in the HRA are based on the truck trip distributions (inbound and outbound) available from the Project's Traffic Impact Analysis (TIA), which is approximately .

On-site truck idling was estimated to occur as trucks enter and travel through the facility. Although the project is required to comply with CARB's idling limit of 5 minutes, staff at SCAQMD recommends that the on-site idling emissions should be estimated for 15 minutes of truck idling, which would take into account on-site idling which occurs while the trucks are waiting to pull up to the truck bays, idling at the bays, idling at check-in and check-out, etc. As such, this analysis estimated truck idling at 15 minutes, consistent with SCAQMD's recommendation.

Trip characteristics available from the report, *Lincoln Avenue Industrial Warehouse Traffic Impact Analysis* (LSA October 2016) were utilized in this analysis. project operational vehicular impacts are dependent on both overall daily vehicle trip generation and the effect of the project on peak hour traffic volumes and traffic operations. Project-related operational air quality impacts derive predominantly from mobile sources (vehicles). It should be noted that the project's traffic study presents the total project vehicle trips in terms of Passenger Car Equivalents (PCEs) and actual vehicles in an effort to recognize and acknowledge the effects of heavy vehicles at the study area intersections. Notwithstanding, for purposes of the health risk assessment study, the PCE trips were not used. Rather, to more accurately estimate and model vehicular-source emissions, the actual number of vehicles, separated by vehicle classification (e.g., passenger cars, light trucks, and heavy trucks) was used in the analysis.

Notwithstanding, for purposes of the air quality study, the PCE trips were not used. Rather, to more accurately estimate and model vehicular-source emissions, the actual number of vehicles, by vehicle classification (e.g., passenger cars (including light trucks), heavy trucks) were used in the analysis. The vehicle fleet mix, in terms of actual vehicles, as derived from the traffic study for the proposed project is comprised of approximately 79.55 percent passenger cars and approximately 20.45 percent total trucks. For analysis purposes 3.40 percent of all vehicles are assumed to be Light-Heavy-Duty (LHD), 4.69 percent of all vehicles are assumed to be Medium-Heavy-Duty (MHD), and 12.36 percent of all vehicles are assumed to be Heavy-Heavy-Duty (HHD).

A technical deficiency inherent in calculating the projected vehicle emissions associated with any project is related to the estimation of trip length and vehicle miles traveled (VMT). VMT for a given project is calculated by the total number of vehicle trips to/from the Project x average trip length. This method of estimating VMT for use in calculating vehicle emissions likely results in the over-estimation and double-counting of emissions because, for an industrial warehouse, the land use is likely to attract (divert) existing vehicle trips that are already on the circulation system as opposed to generating new trips. In this regard, the proposed project would, to a large extent,

redistribute existing mobile-source emissions rather than generate additional emissions within the Basin. As such, the estimation of the project's mobile source emissions is likely overstated in that no credit for, or reduction in, emissions is assumed based on diversion of existing trips. Provided below is a summary of the VMT recommendations of the SCAQMD and SCAG, followed by a description of the methodology used to calculate the VMT rates used in this analysis.

SCAQMD Recommendation

In the last five years, the SCAQMD has provided numerous comments on the trip length for warehouse and industrial land use projects. The SCAQMD asserts that the model-default trip length in CalEEMod and the URBan EMISsions (URBEMIS) 2007 model (version 9.2.4) would underestimate emissions. The SCAQMD asserts that for warehouse, distribution center, and industrial land use projects, most of the heavy-duty trucks would be hauling consumer goods, often from the Ports of Long Beach and Los Angeles (POLA and POLB) and/or to destinations outside of California. The SCAQMD states that for this reason, the CalEEMod and the URBEMIS model default trip length (approximately 16.6 miles) would not be representative of activities at like facilities. The SCAQMD generally recommends the use of a 40-mile one-way trip length. It should be noted that most of the POLA and POLB tenants CEQA projects in the last ten years have already analyzed the 40-mile truck trips in their CEQA analyses, and therefore, repeating this 40-mile trip length for the proposed project would be considered as double counting the truck emissions in Basin.

Southern California Association of Government (SCAG) Heavy Duty Truck Model

SCAG is comprised of six counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura) and 190 cities in Southern California, and is the organization charged with addressing and resolving short- and long-term regional policy issues. The SCAG region also consists of 14 subregional entities recognized by the Regional Council as partners in the regional policy planning process. The SCAG region has more than 19 million residents and encompasses more than 38,000 square miles, representing the largest and most diverse region in the country. SCAG maintains a regional transportation model. In its most recent (2016) transportation validation for the 2008 Regional Model, SCAG indicates the average internal truck trip length for the SCAG region is 5.92 miles for Light Duty Trucks, 13.06 miles for Medium Duty Trucks, and 24.11 miles for Heavy Duty Trucks.

Vehicle Trip Length Approach for Mobile Source Emission Analysis

The use of the average travel distance of 24.11 miles as the vehicle trip length for all vehicles is deemed to be the most applicable for the proposed project. This same methodology is employed in analyses for similar projects in the City and other jurisdictions within the County, and is considered by the Lead Agency to be appropriate and accurate.

Exposure Quantification

The analysis herein has been conducted in accordance with the guidelines in the Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis (SCAQMD 2003). SCAQMD recommends using the Environmental Protection Agency's (U.S. EPA's) AERMOD model. For purposes of this analysis, the model was used to calculate annual average particulate concentrations associated with site operations.

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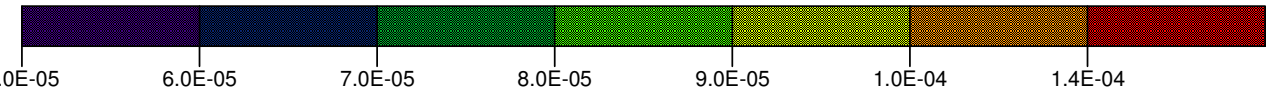
PROJECT TITLE:

C:\Lakes\AERMOD View\Lincoln Avenue Industrial Warehouse\Lincoln Ave

PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

Max: 1.4E-04 [ug/m^3] at (462844.21, 3754030.49)



COMMENTS:	SOURCES:	COMPANY NAME:	
Figure 3 Modeled Emission Sources	**5**	**LSA Associates**	
	RECEPTORS: **11**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:29,245 0 1 km	
	MAX: **1.4E-04 ug/m^3**		PROJECT NO.: **RVL1601**

AERMOD View - Lakes Environmental Software

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The model offers additional flexibility by allowing the user to assign an initial release height and vertical dispersion parameters for mobile sources representative of a roadway. For this HRA, the roadways were modeled as adjacent volume sources. According to the AERMOD user's guide, the initial horizontal standard deviation (σy) of individual volume sources should be estimated as the distance between adjacent volume sources divided by 2.15. In a similar manner, the AERMOD user guide specifies that the source initial vertical standard deviation (σz) for a surface-based source should be estimated as the height of the source divided by a factor of 2.15. The release height of 4 meters was assumed for the diesel trucks, consistent with the methodology used in the Diesel Particulate Matter Exposure Assessment Study for the Ports of Los Angeles and Long Beach prepared by CARB in April 2006, and the vertical (sigma z) dispersion parameter of 1.86 meters was utilized in the AERMOD model (8).

The model requires additional input parameters including emission data and local meteorology. Meteorological data from the SCAQMD's Riverside monitoring station (Riverside Municipal Airport), located approximately 3 mile northwest of the Project site was used to represent local weather conditions and prevailing winds.

Universal Transverse Mercator (UTM) coordinates for North American Datum (NAD) 83 were used to locate the project boundaries, each volume source location, and receptor locations in the project vicinity. The AERMOD dispersion model summary output files for the proposed facility are presented in Appendix

Modeled sensitive receptors were placed at discrete residential locations for the applicable residential scenarios.

Discrete variants for daily breathing rates, exposure frequency, and exposure duration were obtained from relevant distribution profiles presented in the OEHHA guidance document entitled Air Toxic Hot Spots Program Risk Assessment Guidelines Technical Support Document for Exposure Assessment and Stochastic Analysis and guidance from SCAQMD. Appendix C includes the detailed emissions and risk calculation outputs.

Carcinogenic Chemical Risk

The SCAQMD *CEQA Air Quality Handbook* (1993) states that emissions of toxic air contaminants (TACs) are considered significant if a HRA shows an increased risk of greater than ten in one million. Based on guidance from the SCAQMD in the document Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis ((1), for purposes of this analysis, ten (10) in one million is used as the cancer risk threshold for the proposed Project.

Excess Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. Under a deterministic approach (i.e., point estimate methodology), the cancer risk probability is determined by multiplying the chemical's annual concentration by its unit risk factor (URF). The URF is a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It represents an upper bound estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one

microgram per cubic meter (µg/m^3) over a 70 year lifetime. The URFs utilized in the assessment and corresponding cancer potency factor were obtained from the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values.

Guidance from CARB and the California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA) recommends a refinement to the standard point estimate approach when alternate human body weights and breathing rates are utilized to assess risk for susceptible subpopulations such as children. For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose.

Once determined, contaminant dose is multiplied by the cancer potency factor (CPF) in units of inverse dose expressed in milligrams per kilogram per day (mg/kg/day)-1 to derive the cancer risk estimate. Therefore, to assess exposures, the following dose algorithm was utilized.

DOSEair = (Cair x [BR/BW] x A x EF) x (1 x 10^{-6})

Where:

DOSEair	= chronic daily intake (mg/kg/day)
Cair	= concentration of contaminant in air (ug/m^3)
[BR/BW]	= daily breathing rate normalized to body weight (L/kg BW-day)
A	= inhalation absorption factor
EF	= exposure frequency (days/365 days)
BW	= body weight (kg)
1 x 10^{-6}	= conversion factors (ug to mg, L to m^3)

RISKair = DOSEair x CPF x ED/AT

Where:

DOSEair	= chronic daily intake (mg/kg/day)
CPF	= cancer potency factor
ED	= number of years within particular age group
AT	= averaging time

Non-Carcinogenic Exposures

An evaluation of the potential noncarcinogenic effects of chronic exposures was also conducted. Adverse health effects are evaluated by comparing a compound's annual concentration with its toxicity factor or Reference Exposure Level (REL). The REL for diesel particulates was obtained from OEHHA for this analysis. The chronic reference exposure level (REL) for DPM was established by OEHHA as 5 µg/m^3 (OEHHA Toxicity Criteria Database, http://www.oehha.org/risk/chemicaldb/index.asp).

The non-cancer hazard index of DPM was calculated (consistent with SCAQMD methodology) as follows:

$$HI_{DPM} = C_{DPM}/REL_{DPM}$$

Where:

HI_{DPM} = Hazard Index; an expression of the potential for non-cancer health effects.
C_{DPM} = Annual average DPM concentration ($\mu g/m^3$).
REL_{DPM} = Reference exposure level (REL) for DPM; the DPM concentration at which no adverse health effects are anticipated.

For purposes of this analysis the hazard index for the respiratory endpoint totaled less than one for all receptors in the project vicinity, and thus is less than significant.

POTENTIAL PROJECT-RELATED DPM SOURCE CANCER AND NON-CANCER RISKS

Residential Exposure Scenario:
The residential land use with the greatest potential exposure to Project DPM source emissions is residential dwelling unit located immediately adjacent to the Project site approximately 82 feet northeast of the Project site across Grace Drive. At the maximally exposed individual receptor (MEIR), the maximum incremental cancer risk attributable to Project DPM source emissions is estimated at 0.52 in one million, which is less than the threshold of 10 in one million. At this same location, non-cancer risks were estimated to be 0.0003 which would not exceed the applicable threshold of 1.0.

Therefore, sensitive receptors are not expected to be exposed to substantial pollutant concentrations from operational emission associated with the proposed project. Impacts related to exposure of sensitive receptors to substantial pollutant concentrations would be less than significant, and no mitigation is required.

AIR QUALITY MANAGEMENT PLAN CONSISTENCY

A consistency determination plays an essential role in local agency project review by linking local planning and unique individual projects to the air quality plans. It fulfills the CEQA goal of fully informing local agency decision-makers of the environmental costs of the project under consideration at a stage early enough to ensure that air quality concerns are addressed. Only new or amended General Plan elements, Specific Plans, and significantly unique projects need to undergo a consistency review due to the air quality plan strategy being based on projections from local General Plans.

The AQMP is based on regional growth projections developed by SCAG. The proposed project is an industrial warehouse development and is not defined as a regionally significant project under CEQA; therefore, it does not meet the SCAG Intergovernmental Review (IGR) criteria.

The proposed uses are consistent with the zoning designation for the project site, which is consistent with the General Plan of the City. The City's General Plan is consistent with the SCAG Regional Comprehensive Plan (RCP) Guidelines and the SCAQMD AQMP. Pursuant to the methodology provided in Chapter 12 of the 1993 SCAQMD *CEQA Air Quality Handbook*, consistency with the Basin 2016 draft AQMP is affirmed when a project (1) does not increase the

frequency or severity of an air quality standards violation or cause a new violation; and (2) is consistent with the growth assumptions in the AQMP. Consistency review is presented below:

1. The project would result in short-term construction and long-term pollutant emissions that are less than the CEQA significance emissions thresholds established by the SCAQMD with control measures incorporated, as demonstrated above; therefore, the project would not result in an increase in the frequency or severity of any air quality standards violation and will not cause a new air quality standard violation.
2. The *CEQA Air Quality Handbook* indicates that consistency with AQMP growth assumptions must be analyzed for new or amended General Plan elements, Specific Plans, and significant projects. Significant projects include airports, electrical generating facilities, petroleum and gas refineries, designation of oil drilling districts, water ports, solid waste disposal sites, and offshore drilling facilities; therefore, the proposed project is not defined as significant.

Based on the consistency analysis presented above, the proposed project is consistent with the General Plans and the regional AQMP.

CONSISTENCY WITH CLIMATE ACTION PLAN

Project implementation would not conflict with any applicable climate action plan, policy, or regulation of an agency adopted for the purpose of reducing the GHG emissions. With implementation of applicable sustainable features such as compliance with energy efficiency, water conservation, and solid waste reduction and recycling program, this impact would be less than significant. The proposed project would be required to comply with CALGreen building standards, as well as implement various sustainability features with which the project applicant is required to comply. These features would foster, among other benefits, reductions in energy consumption, waste generation, and associated pollution. In addition, newer construction materials and practices, current energy efficiency requirements, and newer appliances tend to emit lower levels of air pollutant emissions, including GHGs, as compared to materials and equipment used years ago.

Accordingly, all project-related operational GHG emissions would be less than significant.

CUMULATIVE IMPACTS

The project would contribute criteria pollutants to the area during temporary project construction. A number of individual projects in the area may be under construction simultaneously with the proposed project. Depending on construction schedules and actual implementation of projects in the area, the generation of fugitive dust and pollutant emissions during construction could result in substantial short-term increases in air pollutants. However, each project would be required to comply with the SCAQMD standard construction measures. The proposed project's short-term construction emissions would not exceed the significance thresholds. Therefore, it will not have a significant cumulative impact.

The project's operational emissions would not exceed the SCAQMD criteria pollutant thresholds. Because climate change impacts are cumulative in nature, no typical single project can result in

emissions of such magnitude that it, in and of itself, would be significant on a project basis. Therefore, because the net change in GHG emissions would not exceed the SCAQMD threshold of 10,000 MT CO_2e/yr, the proposed project would result in less than significant cumulative impacts on GCC. Therefore, the proposed project would not result in a significant cumulative impact.

Cumulative Toxic Air Contaminants Emissions Impacts

There are no state or federal ambient air quality standards applicable to TAC emissions. Preparing a cumulative assessment for TACs is complicated by the fact that site-specific impacts can be far different from average impacts over a larger geographic area. Impacts from TAC emissions are highest closest to sources of TACs, but the sources are often spread over a large area. For example, emissions from diesel engines, the largest source of risk from TACs, are operated on roads, businesses, and construction sites throughout the air basin. Locations where large numbers of TAC sources are concentrated such as freeways, rail yards, and ports may pose a higher level of risk to sensitive receptors near these facilities. Examination of the risk from TACs at national, state, regional, and local levels is useful for providing context, but site-specific evaluation is ultimately necessary to determine existing conditions for development projects.

Ambient TAC Impacts Presumed Cumulatively Significant

The SCAQMD has conducted an in-depth analysis of the toxic air contaminants and their resulting health risks for all of Southern California. This study, the *Multiple Air Toxics Exposure Study in the South Coast Air Basin, MATES IV,"* shows that cancer risk has decreased more than 50 percent between MATES III (SCAQMD 2005) and MATES IV (SCAQMD 2015).

MATES-IV is the most comprehensive dataset documenting the ambient air toxic levels and health risks associated with the South Coast Air Basin emissions. Therefore, MATES-IV study represents the baseline health risk for a cumulative analysis. These model estimates were based on monitoring data collected at 10 fixed sites within the South Coast Air Basin. None of the fixed monitoring sites are within the local area of the Project site. However, MATES-IV has extrapolated the excess cancer risk levels throughout the basin by modeling the specific grids. MATES-IV modeling predicted an excess cancer risk of 657 in one million for the Project area. DPM is included in this cancer risk along with all other TAC sources. DPM accounts for 68% of the total risk shown in MATES-IV.

The SCAQMD has established a significance threshold for incremental project-level TAC impacts. Specifically, if a given project would generate TACs resulting in or causing an increase in cancer risks of 10 or more incidents per million population, that project's incremental cancer risk would be considered significant. This same significance threshold (10 in one million) is applied by SCAQMD in determining whether a given project's incremental contribution to ambient TAC source cancer risks is cumulatively considerable. The SCAQMD has not however established a significance threshold for ambient cumulative TAC impacts affecting the Basin. Likewise, the City of Riverside (the Lead Agency) has no adopted cumulative TAC impacts significance threshold.

Absent an established threshold for cumulative TAC impacts, the following discussion assesses whether, in the light of other available existing information, the ambient cumulative TAC-source impacts affecting the Basin and the area encompassing the Project site could be characterized as significant.

STANDARD SCAQMD CONSTRUCTION CONTROL MEASURES

The project applicant shall include these standard construction measures for construction plans and shall require the construction contractor to implement the following measures:

- **Dust Control**
  - Apply soil stabilizers to inactive areas.
  - Prepare a high wind dust control plan and implement plan elements and terminate soil disturbance when winds exceed 25 mph.
  - Stabilize previously disturbed areas if subsequent construction is delayed.
  - Water exposed surfaces and haul roads three times/day.
  - Cover all stockpiles with tarps.
  - Replace groundcover in disturbed areas quickly.
  - Reduce speeds on unpaved roads to less than 15 mph.
- **Exhaust Emissions**
  - Require 90-day low-NO_X tune-ups for off-road equipment.
  - Require use of Tier 2-rated engines during site grading for all equipment exceeding 100 horsepower if available.
  - Utilize diesel particulate filter, if possible.
  - Give preference to contractors using equipment with oxidation catalysts, soot traps, or other modern control technology.
  - Use low emission mobile construction equipment. The property owner/developer shall comply with ARB requirements for heavy construction equipment.
  - Maintain construction equipment engines by keeping them tuned.
  - Avoid unnecessary idling by shutting off engines that are expected to idle for more than 5 minutes.
  - Utilize existing power sources (i.e., power poles) when available.
  - Configure construction parking to minimize traffic interference.
  - Schedule construction operations affecting traffic for off-peak hours to the best extent when possible.
  - Develop a traffic plan to minimize traffic flow interference from construction activities.

- **VOC Control Measures**
  - Minimize the amount of paint used by using pre-coated, pre-colored and naturally colored building materials.
  - Use high transfer efficiency painting methods such as HVLP (High Volume Low Pressure) sprayers and brushes/rollers where possible.
  - Use SCAQMD-required low-VOC coatings where practical.

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APPENDIX A

CALEEMOD MODEL PRINTOUTS

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Lincoln Warehouse

Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	100.97	1000sqft	2.32	100,974.00	0
Parking Lot	195.00	Space	1.75	78,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase -

Grading -

Vehicle Trips - Based on SCAG Regional Travel Demand Model, an average vehicle trip length is 24.11 for Riverside County.

Construction Off-road Equipment Mitigation - All construction equipment will have Tier 2 engine with Level 1 diesel particulate filter.

Area Mitigation -

Fleet Mix - Porportional vehicle and truck mix by axle type is based on information provided in the Project's traffic study.

Lincoln Warehouse - Riverside-South Coast County, Winter

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tblProjectCharacteristics	OperationalYear	2018	2019
tblVehicleTrips	CW_TL	16.60	24.11
tblVehicleTrips	CW_TL	16.60	24.11

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	5.0782	52.3573	24.2793	0.0425	18.2675	2.8799	21.1473	9.9840	2.6495	12.6335	0.0000	4,244.9283	4,244.9283	1.1998	0.0000	4,263.8936
2018	53.5935	27.2081	21.3817	0.0422	1.0240	1.5350	2.5591	0.2758	1.4434	1.7192	0.0000	4,189.8029	4,189.8029	0.7396	0.0000	4,208.2934
Maximum	**53.5935**	**52.3573**	**24.2793**	**0.0425**	**18.2675**	**2.8799**	**21.1473**	**9.9840**	**2.6495**	**12.6335**	**0.0000**	**4,244.9283**	**4,244.9283**	**1.1998**	**0.0000**	**4,263.8936**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	1.6976	33.8033	23.7840	0.0425	8.3310	0.7203	9.0419	4.5222	0.7183	5.2330	0.0000	4,244.9283	4,244.9283	1.1998	0.0000	4,263.8936
2018	53.4087	27.3725	21.6750	0.0422	1.0240	0.7128	1.7368	0.2758	0.7111	0.9869	0.0000	4,189.8029	4,189.8029	0.7396	0.0000	4,208.2934
Maximum	**53.4087**	**33.8033**	**23.7840**	**0.0425**	**8.3310**	**0.7203**	**9.0419**	**4.5222**	**0.7183**	**5.2330**	**0.0000**	**4,244.9283**	**4,244.9283**	**1.1998**	**0.0000**	**4,263.8936**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**6.08**	**23.11**	**0.44**	**0.00**	**51.51**	**67.54**	**54.53**	**53.24**	**65.08**	**56.66**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.2922	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Energy	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Mobile	1.5950	27.6696	22.1723	0.1331	9.0264	0.2224	9.2488	2.4274	0.2115	2.6389		13,691.0123	13,691.0123	0.6141		13,706.3636
Total	**3.9843**	**28.5530**	**22.9446**	**0.1384**	**9.0264**	**0.2897**	**9.3160**	**2.4274**	**0.2787**	**2.7061**		**14,750.7752**	**14,750.7752**	**0.6345**	**0.0194**	**14,772.4281**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	3.8366	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Energy	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Mobile	1.5950	27.6696	22.1723	0.1331	9.0264	0.2224	9.2488	2.4274	0.2115	2.6389		13,691.0123	13,691.0123	0.6141		13,706.3636
Total	**5.5287**	**28.5530**	**22.9446**	**0.1384**	**9.0264**	**0.2897**	**9.3160**	**2.4274**	**0.2787**	**2.7061**		**14,750.7752**	**14,750.7752**	**0.6345**	**0.0194**	**14,772.4281**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**-38.76**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/1/2017	3/3/2017	5	5	
2	Grading	Grading	3/4/2017	3/13/2017	5	8	
3	Building Construction	Building Construction	3/14/2017	1/15/2018	5	230	
4	Paving	Paving	1/16/2018	1/29/2018	5	18	
5	Architectural Coating	Architectural Coating	1/30/2018	2/12/2018	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 1.75

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 151,461; Non-Residential Outdoor: 50,487; Striped Parking Area: 4,680 (Architectural Coating – sqft)

OffRoad Equipment

Lincoln Warehouse - Riverside-South Coast County, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	75.00	29.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.9608	52.2754	23.4554	0.0380		2.8786	2.8786		2.6483	2.6483		3,894.9500	3,894.9500	1.1934		3,924.7852
Total	**4.9608**	**52.2754**	**23.4554**	**0.0380**	**18.0663**	**2.8786**	**20.9448**	**9.9307**	**2.6483**	**12.5790**		**3,894.9500**	**3,894.9500**	**1.1934**		**3,924.7852**

3.2 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1174	0.0819	0.8240	1.9600e-003	0.2012	1.2900e-003	0.2025	0.0534	1.1900e-003	0.0546		195.0554	195.0554	6.3900e-003		195.2150
Total	**0.1174**	**0.0819**	**0.8240**	**1.9600e-003**	**0.2012**	**1.2900e-003**	**0.2025**	**0.0534**	**1.1900e-003**	**0.0546**		**195.0554**	**195.0554**	**6.3900e-003**		**195.2150**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1298	0.0000	8.1298	4.4688	0.0000	4.4688			0.0000			0.0000
Off-Road	1.2097	33.7214	22.9600	0.0380		0.7096	0.7096		0.7096	0.7096	0.0000	3,894.9500	3,894.9500	1.1934		3,924.7852
Total	**1.2097**	**33.7214**	**22.9600**	**0.0380**	**8.1298**	**0.7096**	**8.8394**	**4.4688**	**0.7096**	**5.1784**	**0.0000**	**3,894.9500**	**3,894.9500**	**1.1934**		**3,924.7852**

3.2 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1174	0.0819	0.8240	1.9600e-003	0.2012	1.2900e-003	0.2025	0.0534	1.1900e-003	0.0546		195.0554	195.0554	6.3900e-003		195.2150
Total	**0.1174**	**0.0819**	**0.8240**	**1.9600e-003**	**0.2012**	**1.2900e-003**	**0.2025**	**0.0534**	**1.1900e-003**	**0.0546**		**195.0554**	**195.0554**	**6.3900e-003**		**195.2150**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

3.3 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0978	0.0682	0.6866	1.6300e-003	0.1677	1.0700e-003	0.1687	0.0445	9.9000e-004	0.0455		162.5462	162.5462	5.3200e-003		162.6792
Total	**0.0978**	**0.0682**	**0.6866**	**1.6300e-003**	**0.1677**	**1.0700e-003**	**0.1687**	**0.0445**	**9.9000e-004**	**0.0455**		**162.5462**	**162.5462**	**5.3200e-003**		**162.6792**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	1.0093	26.2791	18.9906	0.0297		0.5794	0.5794		0.5794	0.5794	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**1.0093**	**26.2791**	**18.9906**	**0.0297**	**2.9486**	**0.5794**	**3.5279**	**1.5154**	**0.5794**	**2.0947**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

3.3 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0978	0.0682	0.6866	1.6300e-003	0.1677	1.0700e-003	0.1687	0.0445	9.9000e-004	0.0455		162.5462	162.5462	5.3200e-003		162.6792
Total	**0.0978**	**0.0682**	**0.6866**	**1.6300e-003**	**0.1677**	**1.0700e-003**	**0.1687**	**0.0445**	**9.9000e-004**	**0.0455**		**162.5462**	**162.5462**	**5.3200e-003**		**162.6792**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

3.4 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1275	3.7778	0.8777	7.4200e-003	0.1857	0.0373	0.2230	0.0535	0.0357	0.0891		781.2177	781.2177	0.0789		783.1898
Worker	0.4892	0.3412	3.4332	8.1700e-003	0.8383	5.3700e-003	0.8437	0.2223	4.9600e-003	0.2273		812.7308	812.7308	0.0266		813.3960
Total	**0.6167**	**4.1190**	**4.3108**	**0.0156**	**1.0241**	**0.0426**	**1.0667**	**0.2758**	**0.0406**	**0.3164**		**1,593.9485**	**1,593.9485**	**0.1055**		**1,596.5858**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0809	23.5544	17.8738	0.0269		0.6777	0.6777		0.6777	0.6777	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**1.0809**	**23.5544**	**17.8738**	**0.0269**		**0.6777**	**0.6777**		**0.6777**	**0.6777**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

3.4 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1275	3.7778	0.8777	7.4200e-003	0.1857	0.0373	0.2230	0.0535	0.0357	0.0891		781.2177	781.2177	0.0789		783.1898
Worker	0.4892	0.3412	3.4332	8.1700e-003	0.8383	5.3700e-003	0.8437	0.2223	4.9600e-003	0.2273		812.7308	812.7308	0.0266		813.3960
Total	**0.6167**	**4.1190**	**4.3108**	**0.0156**	**1.0241**	**0.0426**	**1.0667**	**0.2758**	**0.0406**	**0.3164**		**1,593.9485**	**1,593.9485**	**0.1055**		**1,596.5858**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6795	23.3900	17.5804	0.0269		1.4999	1.4999		1.4099	1.4099		2,620.9351	2,620.9351	0.6421		2,636.9883
Total	**2.6795**	**23.3900**	**17.5804**	**0.0269**		**1.4999**	**1.4999**		**1.4099**	**1.4099**		**2,620.9351**	**2,620.9351**	**0.6421**		**2,636.9883**

3.4 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1119	3.5206	0.7862	7.4000e-003	0.1857	0.0299	0.2156	0.0535	0.0286	0.0821		779.3291	779.3291	0.0741		781.1826
Worker	0.4406	0.2976	3.0151	7.9300e-003	0.8383	5.2400e-003	0.8436	0.2223	4.8300e-003	0.2272		789.5386	789.5386	0.0234		790.1226
Total	**0.5525**	**3.8181**	**3.8013**	**0.0153**	**1.0240**	**0.0351**	**1.0592**	**0.2758**	**0.0334**	**0.3092**		**1,568.8678**	**1,568.8678**	**0.0975**		**1,571.3051**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0809	23.5544	17.8738	0.0269		0.6777	0.6777		0.6777	0.6777	0.0000	2,620.9351	2,620.9351	0.6421		2,636.9883
Total	**1.0809**	**23.5544**	**17.8738**	**0.0269**		**0.6777**	**0.6777**		**0.6777**	**0.6777**	**0.0000**	**2,620.9351**	**2,620.9351**	**0.6421**		**2,636.9883**

3.4 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1119	3.5206	0.7862	7.4000e-003	0.1857	0.0299	0.2156	0.0535	0.0286	0.0821		779.3291	779.3291	0.0741		781.1826
Worker	0.4406	0.2976	3.0151	7.9300e-003	0.8383	5.2400e-003	0.8436	0.2223	4.8300e-003	0.2272		789.5386	789.5386	0.0234		790.1226
Total	**0.5525**	**3.8181**	**3.8013**	**0.0153**	**1.0240**	**0.0351**	**1.0592**	**0.2758**	**0.0334**	**0.3092**		**1,568.8678**	**1,568.8678**	**0.0975**		**1,571.3051**

3.5 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4239	14.5184	12.4333	0.0189		0.8370	0.8370		0.7718	0.7718		1,872.5505	1,872.5505	0.5672		1,886.7312
Paving	0.2547					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6787**	**14.5184**	**12.4333**	**0.0189**		**0.8370**	**0.8370**		**0.7718**	**0.7718**		**1,872.5505**	**1,872.5505**	**0.5672**		**1,886.7312**

3.5 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1175	0.0794	0.8040	2.1100e-003	0.2236	1.4000e-003	0.2250	0.0593	1.2900e-003	0.0606		210.5436	210.5436	6.2300e-003		210.6994
Total	**0.1175**	**0.0794**	**0.8040**	**2.1100e-003**	**0.2236**	**1.4000e-003**	**0.2250**	**0.0593**	**1.2900e-003**	**0.0606**		**210.5436**	**210.5436**	**6.2300e-003**		**210.6994**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7524	16.0849	13.5323	0.0189		0.4201	0.4201		0.4201	0.4201	0.0000	1,872.5505	1,872.5505	0.5672		1,886.7312
Paving	0.2547					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0071**	**16.0849**	**13.5323**	**0.0189**		**0.4201**	**0.4201**		**0.4201**	**0.4201**	**0.0000**	**1,872.5505**	**1,872.5505**	**0.5672**		**1,886.7312**

3.5 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1175	0.0794	0.8040	2.1100e-003	0.2236	1.4000e-003	0.2250	0.0593	1.2900e-003	0.0606		210.5436	210.5436	6.2300e-003		210.6994
Total	**0.1175**	**0.0794**	**0.8040**	**2.1100e-003**	**0.2236**	**1.4000e-003**	**0.2250**	**0.0593**	**1.2900e-003**	**0.0606**		**210.5436**	**210.5436**	**6.2300e-003**		**210.6994**

3.6 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	53.2067					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.1171
Total	**53.5053**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.1171**

3.6 Architectural Coating - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0881	0.0595	0.6030	1.5900e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		157.9077	157.9077	4.6700e-003		158.0245
Total	**0.0881**	**0.0595**	**0.6030**	**1.5900e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**157.9077**	**157.9077**	**4.6700e-003**		**158.0245**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	53.2067					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1139	2.3524	1.8324	2.9700e-003		0.0713	0.0713		0.0713	0.0713	0.0000	281.4485	281.4485	0.0267		282.1171
Total	**53.3206**	**2.3524**	**1.8324**	**2.9700e-003**		**0.0713**	**0.0713**		**0.0713**	**0.0713**	**0.0000**	**281.4485**	**281.4485**	**0.0267**		**282.1171**

3.6 Architectural Coating - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0881	0.0595	0.6030	1.5900e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		157.9077	157.9077	4.6700e-003		158.0245
Total	**0.0881**	**0.0595**	**0.6030**	**1.5900e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**157.9077**	**157.9077**	**4.6700e-003**		**158.0245**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.5950	27.6696	22.1723	0.1331	9.0264	0.2224	9.2488	2.4274	0.2115	2.6389		13,691.0123	13,691.0123	0.6141		13,706.3636
Unmitigated	1.5950	27.6696	22.1723	0.1331	9.0264	0.2224	9.2488	2.4274	0.2115	2.6389		13,691.0123	13,691.0123	0.6141		13,706.3636

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	703.76	133.28	68.66	3,153,202	3,153,202
Parking Lot	0.00	0.00	0.00		
Total	703.76	133.28	68.66	3,153,202	3,153,202

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	24.11	8.40	6.90	59.00	28.00	13.00	92	5	3
Parking Lot	24.11	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.560907	0.041525	0.193068	0.000000	0.034000	0.000000	0.046800	0.123600	0.000000	0.000000	0.000000	0.000000	0.000000
Parking Lot	0.560907	0.041525	0.193068	0.000000	0.034000	0.000000	0.046800	0.123600	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
NaturalGas Unmitigated	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	9007.43	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0971**	**0.8831**	**0.7418**	**5.3000e-003**		**0.0671**	**0.0671**		**0.0671**	**0.0671**		**1,059.6981**	**1,059.6981**	**0.0203**	**0.0194**	**1,065.9954**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	9.00743	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0971**	**0.8831**	**0.7418**	**5.3000e-003**		**0.0671**	**0.0671**		**0.0671**	**0.0671**		**1,059.6981**	**1,059.6981**	**0.0203**	**0.0194**	**1,065.9954**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.8366	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Unmitigated	2.2922	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2624					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.0269					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.8900e-003	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Total	**2.2922**	**2.8000e-004**	**0.0305**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0648**	**0.0648**	**1.8000e-004**		**0.0692**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2624					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.5713					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.8900e-003	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Total	**3.8366**	**2.8000e-004**	**0.0305**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0648**	**0.0648**	**1.8000e-004**		**0.0692**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Lincoln Warehouse

Riverside-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	100.97	1000sqft	2.32	100,974.00	0
Parking Lot	195.00	Space	1.75	78,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase -

Grading -

Vehicle Trips - Based on SCAG Regional Travel Demand Model, an average vehicle trip length is 24.11 for Riverside County.

Construction Off-road Equipment Mitigation - All construction equipment will have Tier 2 engine with Level 1 diesel particulate filter.

Area Mitigation -

Fleet Mix - Porportional vehicle and truck mix by axle type is based on information provided in the Project's traffic study.

Lincoln Warehouse - Riverside-South Coast County, Summer

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	11.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblFleetMix	HHD	0.07	0.12
tblFleetMix	HHD	0.07	0.12
tblFleetMix	LDA	0.53	0.56
tblFleetMix	LDA	0.53	0.56
tblFleetMix	LDT1	0.04	0.04
tblFleetMix	LDT1	0.04	0.04
tblFleetMix	LDT2	0.18	0.19
tblFleetMix	LDT2	0.18	0.19
tblFleetMix	LHD1	0.02	0.03
tblFleetMix	LHD1	0.02	0.03
tblFleetMix	LHD2	5.5610e-003	0.00
tblFleetMix	LHD2	5.5610e-003	0.00
tblFleetMix	MCY	4.6770e-003	0.00

tblFleetMix	MCY	4.6770e-003	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MH	1.2110e-003	0.00
tblFleetMix	MH	1.2110e-003	0.00
tblFleetMix	MHD	0.02	0.05
tblFleetMix	MHD	0.02	0.05
tblFleetMix	OBUS	1.3450e-003	0.00
tblFleetMix	OBUS	1.3450e-003	0.00
tblFleetMix	SBUS	9.7400e-004	0.00
tblFleetMix	SBUS	9.7400e-004	0.00
tblFleetMix	UBUS	1.2470e-003	0.00
tblFleetMix	UBUS	1.2470e-003	0.00
tblLandUse	BuildingSpaceSquareFeet	100,970.00	100,974.00
tblLandUse	LandUseSquareFeet	100,970.00	100,974.00
tblProjectCharacteristics	OperationalYear	2018	2019
tblVehicleTrips	CW_TL	16.60	24.11
tblVehicleTrips	CW_TL	16.60	24.11

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	5.0811	52.3543	24.4658	0.0437	18.2675	2.8799	21.1473	9.9840	2.6495	12.6335	0.0000	4,367.3217	4,367.3217	1.2007	0.0000	4,386.1968
2018	53.5956	27.2007	21.9714	0.0434	1.0240	1.5347	2.5587	0.2758	1.4430	1.7188	0.0000	4,310.3706	4,310.3706	0.7358	0.0000	4,328.7649
Maximum	**53.5956**	**52.3543**	**24.4658**	**0.0437**	**18.2675**	**2.8799**	**21.1473**	**9.9840**	**2.6495**	**12.6335**	**0.0000**	**4,367.3217**	**4,367.3217**	**1.2007**	**0.0000**	**4,386.1968**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	1.7046	33.8003	23.9704	0.0437	8.3310	0.7199	9.0419	4.5222	0.7179	5.2330	0.0000	4,367.3217	4,367.3217	1.2007	0.0000	4,386.1968
2018	53.4109	27.3650	22.2647	0.0434	1.0240	0.7124	1.7365	0.2758	0.7108	0.9866	0.0000	4,310.3706	4,310.3706	0.7358	0.0000	4,328.7648
Maximum	**53.4109**	**33.8003**	**23.9704**	**0.0437**	**8.3310**	**0.7199**	**9.0419**	**4.5222**	**0.7179**	**5.2330**	**0.0000**	**4,367.3217**	**4,367.3217**	**1.2007**	**0.0000**	**4,386.1968**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**6.07**	**23.12**	**0.43**	**0.00**	**51.51**	**67.55**	**54.53**	**53.24**	**65.09**	**56.67**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.2922	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Energy	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Mobile	1.7914	27.2732	25.8567	0.1419	9.0264	0.2208	9.2472	2.4274	0.2099	2.6374		14,566.9305	14,566.9305	0.5913		14,581.7137
Total	**4.1808**	**28.1565**	**26.6290**	**0.1472**	**9.0264**	**0.2881**	**9.3144**	**2.4274**	**0.2772**	**2.7046**		**15,626.6934**	**15,626.6934**	**0.6118**	**0.0194**	**15,647.7783**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	3.8366	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Energy	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Mobile	1.7914	27.2732	25.8567	0.1419	9.0264	0.2208	9.2472	2.4274	0.2099	2.6374		14,566.9305	14,566.9305	0.5913		14,581.7137
Total	**5.7252**	**28.1565**	**26.6290**	**0.1472**	**9.0264**	**0.2881**	**9.3144**	**2.4274**	**0.2772**	**2.7046**		**15,626.6934**	**15,626.6934**	**0.6118**	**0.0194**	**15,647.7783**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**-36.94**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/1/2017	3/3/2017	5	5	
2	Grading	Grading	3/4/2017	3/13/2017	5	8	
3	Building Construction	Building Construction	3/14/2017	1/15/2018	5	230	
4	Paving	Paving	1/16/2018	1/29/2018	5	18	
5	Architectural Coating	Architectural Coating	1/30/2018	2/12/2018	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 1.75

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 151,461; Non-Residential Outdoor: 50,487; Striped Parking Area: 4,680 (Architectural Coating – sqft)

OffRoad Equipment

Lincoln Warehouse - Riverside-South Coast County, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	75.00	29.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.9608	52.2754	23.4554	0.0380		2.8786	2.8786		2.6483	2.6483		3,894.9500	3,894.9500	1.1934		3,924.7852
Total	**4.9608**	**52.2754**	**23.4554**	**0.0380**	**18.0663**	**2.8786**	**20.9448**	**9.9307**	**2.6483**	**12.5790**		**3,894.9500**	**3,894.9500**	**1.1934**		**3,924.7852**

3.2 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1204	0.0789	1.0104	2.1900e-003	0.2012	1.2900e-003	0.2025	0.0534	1.1900e-003	0.0546		217.3450	217.3450	7.3000e-003		217.5275
Total	**0.1204**	**0.0789**	**1.0104**	**2.1900e-003**	**0.2012**	**1.2900e-003**	**0.2025**	**0.0534**	**1.1900e-003**	**0.0546**		**217.3450**	**217.3450**	**7.3000e-003**		**217.5275**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1298	0.0000	8.1298	4.4688	0.0000	4.4688			0.0000			0.0000
Off-Road	1.2097	33.7214	22.9600	0.0380		0.7096	0.7096		0.7096	0.7096	0.0000	3,894.9500	3,894.9500	1.1934		3,924.7852
Total	**1.2097**	**33.7214**	**22.9600**	**0.0380**	**8.1298**	**0.7096**	**8.8394**	**4.4688**	**0.7096**	**5.1784**	**0.0000**	**3,894.9500**	**3,894.9500**	**1.1934**		**3,924.7852**

3.2 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1204	0.0789	1.0104	2.1900e-003	0.2012	1.2900e-003	0.2025	0.0534	1.1900e-003	0.0546		217.3450	217.3450	7.3000e-003		217.5275
Total	**0.1204**	**0.0789**	**1.0104**	**2.1900e-003**	**0.2012**	**1.2900e-003**	**0.2025**	**0.0534**	**1.1900e-003**	**0.0546**		**217.3450**	**217.3450**	**7.3000e-003**		**217.5275**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

3.3 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1003	0.0657	0.8420	1.8200e-003	0.1677	1.0700e-003	0.1687	0.0445	9.9000e-004	0.0455		181.1209	181.1209	6.0800e-003		181.2729
Total	**0.1003**	**0.0657**	**0.8420**	**1.8200e-003**	**0.1677**	**1.0700e-003**	**0.1687**	**0.0445**	**9.9000e-004**	**0.0455**		**181.1209**	**181.1209**	**6.0800e-003**		**181.2729**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	1.0093	26.2791	18.9906	0.0297		0.5794	0.5794		0.5794	0.5794	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**1.0093**	**26.2791**	**18.9906**	**0.0297**	**2.9486**	**0.5794**	**3.5279**	**1.5154**	**0.5794**	**2.0947**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

3.3 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1003	0.0657	0.8420	1.8200e-003	0.1677	1.0700e-003	0.1687	0.0445	9.9000e-004	0.0455		181.1209	181.1209	6.0800e-003		181.2729
Total	**0.1003**	**0.0657**	**0.8420**	**1.8200e-003**	**0.1677**	**1.0700e-003**	**0.1687**	**0.0445**	**9.9000e-004**	**0.0455**		**181.1209**	**181.1209**	**6.0800e-003**		**181.2729**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

3.4 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1222	3.7735	0.7693	7.7000e-003	0.1857	0.0368	0.2226	0.0535	0.0352	0.0887		810.7376	810.7376	0.0715		812.5246
Worker	0.5015	0.3287	4.2100	9.1100e-003	0.8383	5.3700e-003	0.8437	0.2223	4.9600e-003	0.2273		905.6043	905.6043	0.0304		906.3644
Total	**0.6237**	**4.1022**	**4.9793**	**0.0168**	**1.0241**	**0.0422**	**1.0663**	**0.2758**	**0.0402**	**0.3160**		**1,716.3419**	**1,716.3419**	**0.1019**		**1,718.8890**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0809	23.5544	17.8738	0.0269		0.6777	0.6777		0.6777	0.6777	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**1.0809**	**23.5544**	**17.8738**	**0.0269**		**0.6777**	**0.6777**		**0.6777**	**0.6777**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

3.4 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1222	3.7735	0.7693	7.7000e-003	0.1857	0.0368	0.2226	0.0535	0.0352	0.0887		810.7376	810.7376	0.0715		812.5246
Worker	0.5015	0.3287	4.2100	9.1100e-003	0.8383	5.3700e-003	0.8437	0.2223	4.9600e-003	0.2273		905.6043	905.6043	0.0304		906.3644
Total	**0.6237**	**4.1022**	**4.9793**	**0.0168**	**1.0241**	**0.0422**	**1.0663**	**0.2758**	**0.0402**	**0.3160**		**1,716.3419**	**1,716.3419**	**0.1019**		**1,718.8890**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6795	23.3900	17.5804	0.0269		1.4999	1.4999		1.4099	1.4099		2,620.9351	2,620.9351	0.6421		2,636.9883
Total	**2.6795**	**23.3900**	**17.5804**	**0.0269**		**1.4999**	**1.4999**		**1.4099**	**1.4099**		**2,620.9351**	**2,620.9351**	**0.6421**		**2,636.9883**

3.4 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1069	3.5235	0.6816	7.6800e-003	0.1857	0.0295	0.2153	0.0535	0.0283	0.0817		809.4819	809.4819	0.0669		811.1533
Worker	0.4515	0.2872	3.7093	8.8400e-003	0.8383	5.2400e-003	0.8436	0.2223	4.8300e-003	0.2272		879.9536	879.9536	0.0268		880.6233
Total	**0.5584**	**3.8106**	**4.3910**	**0.0165**	**1.0240**	**0.0348**	**1.0588**	**0.2758**	**0.0331**	**0.3089**		**1,689.4355**	**1,689.4355**	**0.0936**		**1,691.7766**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0809	23.5544	17.8738	0.0269		0.6777	0.6777		0.6777	0.6777	0.0000	2,620.9351	2,620.9351	0.6421		2,636.9883
Total	**1.0809**	**23.5544**	**17.8738**	**0.0269**		**0.6777**	**0.6777**		**0.6777**	**0.6777**	**0.0000**	**2,620.9351**	**2,620.9351**	**0.6421**		**2,636.9883**

3.4 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1069	3.5235	0.6816	7.6800e-003	0.1857	0.0295	0.2153	0.0535	0.0283	0.0817		809.4819	809.4819	0.0669		811.1533
Worker	0.4515	0.2872	3.7093	8.8400e-003	0.8383	5.2400e-003	0.8436	0.2223	4.8300e-003	0.2272		879.9536	879.9536	0.0268		880.6233
Total	**0.5584**	**3.8106**	**4.3910**	**0.0165**	**1.0240**	**0.0348**	**1.0588**	**0.2758**	**0.0331**	**0.3089**		**1,689.4355**	**1,689.4355**	**0.0936**		**1,691.7766**

3.5 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4239	14.5184	12.4333	0.0189		0.8370	0.8370		0.7718	0.7718		1,872.5505	1,872.5505	0.5672		1,886.7312
Paving	0.2547					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6787**	**14.5184**	**12.4333**	**0.0189**		**0.8370**	**0.8370**		**0.7718**	**0.7718**		**1,872.5505**	**1,872.5505**	**0.5672**		**1,886.7312**

3.5 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1204	0.0766	0.9892	2.3600e-003	0.2236	1.4000e-003	0.2250	0.0593	1.2900e-003	0.0606		234.6543	234.6543	7.1400e-003		234.8329
Total	**0.1204**	**0.0766**	**0.9892**	**2.3600e-003**	**0.2236**	**1.4000e-003**	**0.2250**	**0.0593**	**1.2900e-003**	**0.0606**		**234.6543**	**234.6543**	**7.1400e-003**		**234.8329**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7524	16.0849	13.5323	0.0189		0.4201	0.4201		0.4201	0.4201	0.0000	1,872.5505	1,872.5505	0.5672		1,886.7312
Paving	0.2547					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0071**	**16.0849**	**13.5323**	**0.0189**		**0.4201**	**0.4201**		**0.4201**	**0.4201**	**0.0000**	**1,872.5505**	**1,872.5505**	**0.5672**		**1,886.7312**

3.5 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1204	0.0766	0.9892	2.3600e-003	0.2236	1.4000e-003	0.2250	0.0593	1.2900e-003	0.0606		234.6543	234.6543	7.1400e-003		234.8329
Total	**0.1204**	**0.0766**	**0.9892**	**2.3600e-003**	**0.2236**	**1.4000e-003**	**0.2250**	**0.0593**	**1.2900e-003**	**0.0606**		**234.6543**	**234.6543**	**7.1400e-003**		**234.8329**

3.6 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	53.2067					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.1171
Total	**53.5053**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.1171**

3.6 Architectural Coating - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0903	0.0574	0.7419	1.7700e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		175.9907	175.9907	5.3600e-003		176.1247
Total	**0.0903**	**0.0574**	**0.7419**	**1.7700e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**175.9907**	**175.9907**	**5.3600e-003**		**176.1247**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	53.2067					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1139	2.3524	1.8324	2.9700e-003		0.0713	0.0713		0.0713	0.0713	0.0000	281.4485	281.4485	0.0267		282.1171
Total	**53.3206**	**2.3524**	**1.8324**	**2.9700e-003**		**0.0713**	**0.0713**		**0.0713**	**0.0713**	**0.0000**	**281.4485**	**281.4485**	**0.0267**		**282.1171**

3.6 Architectural Coating - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0903	0.0574	0.7419	1.7700e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		175.9907	175.9907	5.3600e-003		176.1247
Total	**0.0903**	**0.0574**	**0.7419**	**1.7700e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**175.9907**	**175.9907**	**5.3600e-003**		**176.1247**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.7914	27.2732	25.8567	0.1419	9.0264	0.2208	9.2472	2.4274	0.2099	2.6374		14,566.9305	14,566.9305	0.5913		14,581.7137
Unmitigated	1.7914	27.2732	25.8567	0.1419	9.0264	0.2208	9.2472	2.4274	0.2099	2.6374		14,566.9305	14,566.9305	0.5913		14,581.7137

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	703.76	133.28	68.66	3,153,202	3,153,202
Parking Lot	0.00	0.00	0.00		
Total	703.76	133.28	68.66	3,153,202	3,153,202

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	24.11	8.40	6.90	59.00	28.00	13.00	92	5	3
Parking Lot	24.11	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.560907	0.041525	0.193068	0.000000	0.034000	0.000000	0.046800	0.123600	0.000000	0.000000	0.000000	0.000000	0.000000
Parking Lot	0.560907	0.041525	0.193068	0.000000	0.034000	0.000000	0.046800	0.123600	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
NaturalGas Unmitigated	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	9007.43	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0971**	**0.8831**	**0.7418**	**5.3000e-003**		**0.0671**	**0.0671**		**0.0671**	**0.0671**		**1,059.6981**	**1,059.6981**	**0.0203**	**0.0194**	**1,065.9954**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	9.00743	0.0971	0.8831	0.7418	5.3000e-003		0.0671	0.0671		0.0671	0.0671		1,059.6981	1,059.6981	0.0203	0.0194	1,065.9954
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0971**	**0.8831**	**0.7418**	**5.3000e-003**		**0.0671**	**0.0671**		**0.0671**	**0.0671**		**1,059.6981**	**1,059.6981**	**0.0203**	**0.0194**	**1,065.9954**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.8366	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Unmitigated	2.2922	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2624					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.0269					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.8900e-003	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Total	**2.2922**	**2.8000e-004**	**0.0305**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0648**	**0.0648**	**1.8000e-004**		**0.0692**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2624					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.5713					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.8900e-003	2.8000e-004	0.0305	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0648	0.0648	1.8000e-004		0.0692
Total	**3.8366**	**2.8000e-004**	**0.0305**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0648**	**0.0648**	**1.8000e-004**		**0.0692**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Lincoln Warehouse

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	100.97	1000sqft	2.32	100,974.00	0
Parking Lot	195.00	Space	1.75	78,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase -

Grading -

Vehicle Trips - Based on SCAG Regional Travel Demand Model, an average vehicle trip length is 24.11 for Riverside County.

Construction Off-road Equipment Mitigation - All construction equipment will have Tier 2 engine with Level 1 diesel particulate filter.

Area Mitigation -

Fleet Mix - Porportional vehicle and truck mix by axle type is based on information provided in the Project's traffic study.

Lincoln Warehouse - Riverside-South Coast County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	DPF	No Change	Level 1
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	11.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblFleetMix	HHD	0.07	0.12
tblFleetMix	HHD	0.07	0.12
tblFleetMix	LDA	0.53	0.56
tblFleetMix	LDA	0.53	0.56
tblFleetMix	LDT1	0.04	0.04
tblFleetMix	LDT1	0.04	0.04
tblFleetMix	LDT2	0.18	0.19
tblFleetMix	LDT2	0.18	0.19
tblFleetMix	LHD1	0.02	0.03
tblFleetMix	LHD1	0.02	0.03
tblFleetMix	LHD2	5.5610e-003	0.00
tblFleetMix	LHD2	5.5610e-003	0.00
tblFleetMix	MCY	4.6770e-003	0.00

tblFleetMix	MCY	4.6770e-003	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MH	1.2110e-003	0.00
tblFleetMix	MH	1.2110e-003	0.00
tblFleetMix	MHD	0.02	0.05
tblFleetMix	MHD	0.02	0.05
tblFleetMix	OBUS	1.3450e-003	0.00
tblFleetMix	OBUS	1.3450e-003	0.00
tblFleetMix	SBUS	9.7400e-004	0.00
tblFleetMix	SBUS	9.7400e-004	0.00
tblFleetMix	UBUS	1.2470e-003	0.00
tblFleetMix	UBUS	1.2470e-003	0.00
tblLandUse	BuildingSpaceSquareFeet	100,970.00	100,974.00
tblLandUse	LandUseSquareFeet	100,970.00	100,974.00
tblProjectCharacteristics	OperationalYear	2018	2019
tblVehicleTrips	CW_TL	16.60	24.11
tblVehicleTrips	CW_TL	16.60	24.11

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.4029	3.3933	2.4536	4.6400e-003	0.1528	0.2009	0.3538	0.0536	0.1886	0.2422	0.0000	420.3134	420.3134	0.0758	0.0000	422.2081
2018	0.2944	0.2334	0.1970	3.6000e-004	7.4600e-003	0.0134	0.0209	2.0100e-003	0.0126	0.0146	0.0000	32.5781	32.5781	6.4200e-003	0.0000	32.7386
Maximum	**0.4029**	**3.3933**	**2.4536**	**4.6400e-003**	**0.1528**	**0.2009**	**0.3538**	**0.0536**	**0.1886**	**0.2422**	**0.0000**	**420.3134**	**420.3134**	**0.0758**	**0.0000**	**422.2081**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.1785	3.0291	2.4262	4.6400e-003	0.1271	0.0781	0.2052	0.0399	0.0778	0.1177	0.0000	420.3131	420.3131	0.0758	0.0000	422.2078
2018	0.2814	0.2438	0.2040	3.6000e-004	7.4600e-003	6.3900e-003	0.0139	2.0100e-003	6.3800e-003	8.3800e-003	0.0000	32.5781	32.5781	6.4200e-003	0.0000	32.7385
Maximum	**0.2814**	**3.0291**	**2.4262**	**4.6400e-003**	**0.1271**	**0.0781**	**0.2052**	**0.0399**	**0.0778**	**0.1177**	**0.0000**	**420.3131**	**420.3131**	**0.0758**	**0.0000**	**422.2078**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**34.05**	**9.75**	**0.77**	**0.00**	**16.04**	**60.60**	**41.53**	**24.72**	**58.13**	**50.89**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**3-1-2017**	**5-31-2017**	1.1646	0.9642
2	**6-1-2017**	**8-31-2017**	1.1301	0.9647
3	**9-1-2017**	**11-30-2017**	1.1181	0.9545
4	**12-1-2017**	**2-28-2018**	0.9043	0.8461
		Highest	1.1646	0.9647

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4182	4.0000e-005	3.8100e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.3500e-003	7.3500e-003	2.0000e-005	0.0000	7.8400e-003
Energy	0.0177	0.1612	0.1354	9.7000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	529.9785	529.9785	0.0180	6.2400e-003	532.2895
Mobile	0.2186	3.8583	3.1349	0.0186	1.2208	0.0304	1.2512	0.3288	0.0289	0.3577	0.0000	1,737.4355	1,737.4355	0.0740	0.0000	1,739.2863
Waste						0.0000	0.0000		0.0000	0.0000	25.4145	0.0000	25.4145	1.5020	0.0000	62.9633
Water						0.0000	0.0000		0.0000	0.0000	7.4077	96.8709	104.2786	0.7648	0.0188	128.9997
Total	**0.6545**	**4.0195**	**3.2741**	**0.0196**	**1.2208**	**0.0427**	**1.2635**	**0.3288**	**0.0412**	**0.3699**	**32.8221**	**2,364.2923**	**2,397.1144**	**2.3588**	**0.0250**	**2,463.5466**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4182	4.0000e-005	3.8100e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.3500e-003	7.3500e-003	2.0000e-005	0.0000	7.8400e-003
Energy	0.0177	0.1612	0.1354	9.7000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	529.9785	529.9785	0.0180	6.2400e-003	532.2895
Mobile	0.2186	3.8583	3.1349	0.0186	1.2208	0.0304	1.2512	0.3288	0.0289	0.3577	0.0000	1,737.4355	1,737.4355	0.0740	0.0000	1,739.2863
Waste						0.0000	0.0000		0.0000	0.0000	25.4145	0.0000	25.4145	1.5020	0.0000	62.9633
Water						0.0000	0.0000		0.0000	0.0000	7.4077	96.8709	104.2786	0.7648	0.0188	128.9997
Total	**0.6545**	**4.0195**	**3.2741**	**0.0196**	**1.2208**	**0.0427**	**1.2635**	**0.3288**	**0.0412**	**0.3699**	**32.8221**	**2,364.2923**	**2,397.1144**	**2.3588**	**0.0250**	**2,463.5466**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/1/2017	3/3/2017	5	5	
2	Grading	Grading	3/4/2017	3/13/2017	5	8	
3	Building Construction	Building Construction	3/14/2017	1/15/2018	5	230	
4	Paving	Paving	1/16/2018	1/29/2018	5	18	
5	Architectural Coating	Architectural Coating	1/30/2018	2/12/2018	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 1.75

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 151,461; Non-Residential Outdoor: 50,487; Striped Parking Area: 4,680 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	75.00	29.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0271	0.0000	0.0271	0.0149	0.0000	0.0149	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4400e-003	0.0784	0.0352	6.0000e-005		4.3200e-003	4.3200e-003		3.9700e-003	3.9700e-003	0.0000	5.3002	5.3002	1.6200e-003	0.0000	5.3408
Total	**7.4400e-003**	**0.0784**	**0.0352**	**6.0000e-005**	**0.0271**	**4.3200e-003**	**0.0314**	**0.0149**	**3.9700e-003**	**0.0189**	**0.0000**	**5.3002**	**5.3002**	**1.6200e-003**	**0.0000**	**5.3408**

3.2 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6000e-004	1.3000e-004	1.3000e-003	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2722	0.2722	1.0000e-005	0.0000	0.2725
Total	**1.6000e-004**	**1.3000e-004**	**1.3000e-003**	**0.0000**	**3.0000e-004**	**0.0000**	**3.0000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.2722**	**0.2722**	**1.0000e-005**	**0.0000**	**0.2725**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0122	0.0000	0.0122	6.7000e-003	0.0000	6.7000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.8100e-003	0.0506	0.0344	6.0000e-005		1.0600e-003	1.0600e-003		1.0600e-003	1.0600e-003	0.0000	5.3002	5.3002	1.6200e-003	0.0000	5.3408
Total	**1.8100e-003**	**0.0506**	**0.0344**	**6.0000e-005**	**0.0122**	**1.0600e-003**	**0.0133**	**6.7000e-003**	**1.0600e-003**	**7.7600e-003**	**0.0000**	**5.3002**	**5.3002**	**1.6200e-003**	**0.0000**	**5.3408**

3.2 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6000e-004	1.3000e-004	1.3000e-003	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2722	0.2722	1.0000e-005	0.0000	0.2725
Total	**1.6000e-004**	**1.3000e-004**	**1.3000e-003**	**0.0000**	**3.0000e-004**	**0.0000**	**3.0000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.2722**	**0.2722**	**1.0000e-005**	**0.0000**	**0.2725**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.2100e-003	0.1017	0.0513	9.0000e-005		5.3300e-003	5.3300e-003		4.9100e-003	4.9100e-003	0.0000	8.2678	8.2678	2.5300e-003	0.0000	8.3312
Total	**9.2100e-003**	**0.1017**	**0.0513**	**9.0000e-005**	**0.0197**	**5.3300e-003**	**0.0250**	**0.0101**	**4.9100e-003**	**0.0150**	**0.0000**	**8.2678**	**8.2678**	**2.5300e-003**	**0.0000**	**8.3312**

3.3 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	2.1000e-004	2.1700e-003	1.0000e-005	4.9000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4537	0.4537	1.0000e-005	0.0000	0.4541
Total	**2.7000e-004**	**2.1000e-004**	**2.1700e-003**	**1.0000e-005**	**4.9000e-004**	**0.0000**	**5.0000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4537**	**0.4537**	**1.0000e-005**	**0.0000**	**0.4541**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					8.8500e-003	0.0000	8.8500e-003	4.5500e-003	0.0000	4.5500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.0300e-003	0.0788	0.0570	9.0000e-005		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003	0.0000	8.2678	8.2678	2.5300e-003	0.0000	8.3312
Total	**3.0300e-003**	**0.0788**	**0.0570**	**9.0000e-005**	**8.8500e-003**	**1.7400e-003**	**0.0106**	**4.5500e-003**	**1.7400e-003**	**6.2900e-003**	**0.0000**	**8.2678**	**8.2678**	**2.5300e-003**	**0.0000**	**8.3312**

3.3 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	2.1000e-004	2.1700e-003	1.0000e-005	4.9000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4537	0.4537	1.0000e-005	0.0000	0.4541
Total	**2.7000e-004**	**2.1000e-004**	**2.1700e-003**	**1.0000e-005**	**4.9000e-004**	**0.0000**	**5.0000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4537**	**0.4537**	**1.0000e-005**	**0.0000**	**0.4541**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3255	2.7750	1.9001	2.8100e-003		0.1868	0.1868		0.1755	0.1755	0.0000	251.3150	251.3150	0.0619	0.0000	252.8629
Total	**0.3255**	**2.7750**	**1.9001**	**2.8100e-003**		**0.1868**	**0.1868**		**0.1755**	**0.1755**	**0.0000**	**251.3150**	**251.3150**	**0.0619**	**0.0000**	**252.8629**

3.4 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0130	0.4011	0.0857	7.9000e-004	0.0191	3.8700e-003	0.0230	5.5200e-003	3.7000e-003	9.2200e-003	0.0000	75.6832	75.6832	7.0800e-003	0.0000	75.8603
Worker	0.0473	0.0369	0.3778	8.8000e-004	0.0861	5.6000e-004	0.0867	0.0229	5.2000e-004	0.0234	0.0000	79.0212	79.0212	2.6100e-003	0.0000	79.0863
Total	**0.0603**	**0.4380**	**0.4635**	**1.6700e-003**	**0.1053**	**4.4300e-003**	**0.1097**	**0.0284**	**4.2200e-003**	**0.0326**	**0.0000**	**154.7044**	**154.7044**	**9.6900e-003**	**0.0000**	**154.9467**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1130	2.4614	1.8678	2.8100e-003		0.0708	0.0708		0.0708	0.0708	0.0000	251.3147	251.3147	0.0619	0.0000	252.8626
Total	**0.1130**	**2.4614**	**1.8678**	**2.8100e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**	**0.0000**	**251.3147**	**251.3147**	**0.0619**	**0.0000**	**252.8626**

3.4 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0130	0.4011	0.0857	7.9000e-004	0.0191	3.8700e-003	0.0230	5.5200e-003	3.7000e-003	9.2200e-003	0.0000	75.6832	75.6832	7.0800e-003	0.0000	75.8603
Worker	0.0473	0.0369	0.3778	8.8000e-004	0.0861	5.6000e-004	0.0867	0.0229	5.2000e-004	0.0234	0.0000	79.0212	79.0212	2.6100e-003	0.0000	79.0863
Total	**0.0603**	**0.4380**	**0.4635**	**1.6700e-003**	**0.1053**	**4.4300e-003**	**0.1097**	**0.0284**	**4.2200e-003**	**0.0326**	**0.0000**	**154.7044**	**154.7044**	**9.6900e-003**	**0.0000**	**154.9467**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0147	0.1287	0.0967	1.5000e-004		8.2500e-003	8.2500e-003		7.7500e-003	7.7500e-003	0.0000	13.0772	13.0772	3.2000e-003	0.0000	13.1573
Total	**0.0147**	**0.1287**	**0.0967**	**1.5000e-004**		**8.2500e-003**	**8.2500e-003**		**7.7500e-003**	**7.7500e-003**	**0.0000**	**13.0772**	**13.0772**	**3.2000e-003**	**0.0000**	**13.1573**

3.4 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.0000e-004	0.0197	4.0200e-003	4.0000e-005	1.0100e-003	1.6000e-004	1.1700e-003	2.9000e-004	1.6000e-004	4.5000e-004	0.0000	3.9757	3.9757	3.5000e-004	0.0000	3.9845
Worker	2.2400e-003	1.6900e-003	0.0175	4.0000e-005	4.5300e-003	3.0000e-005	4.5600e-003	1.2000e-003	3.0000e-005	1.2300e-003	0.0000	4.0406	4.0406	1.2000e-004	0.0000	4.0436
Total	**2.8400e-003**	**0.0214**	**0.0215**	**8.0000e-005**	**5.5400e-003**	**1.9000e-004**	**5.7300e-003**	**1.4900e-003**	**1.9000e-004**	**1.6800e-003**	**0.0000**	**8.0163**	**8.0163**	**4.7000e-004**	**0.0000**	**8.0281**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.9400e-003	0.1296	0.0983	1.5000e-004		3.7300e-003	3.7300e-003		3.7300e-003	3.7300e-003	0.0000	13.0772	13.0772	3.2000e-003	0.0000	13.1573
Total	**5.9400e-003**	**0.1296**	**0.0983**	**1.5000e-004**		**3.7300e-003**	**3.7300e-003**		**3.7300e-003**	**3.7300e-003**	**0.0000**	**13.0772**	**13.0772**	**3.2000e-003**	**0.0000**	**13.1573**

3.4 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.0000e-004	0.0197	4.0200e-003	4.0000e-005	1.0100e-003	1.6000e-004	1.1700e-003	2.9000e-004	1.6000e-004	4.5000e-004	0.0000	3.9757	3.9757	3.5000e-004	0.0000	3.9845
Worker	2.2400e-003	1.6900e-003	0.0175	4.0000e-005	4.5300e-003	3.0000e-005	4.5600e-003	1.2000e-003	3.0000e-005	1.2300e-003	0.0000	4.0406	4.0406	1.2000e-004	0.0000	4.0436
Total	**2.8400e-003**	**0.0214**	**0.0215**	**8.0000e-005**	**5.5400e-003**	**1.9000e-004**	**5.7300e-003**	**1.4900e-003**	**1.9000e-004**	**1.6800e-003**	**0.0000**	**8.0163**	**8.0163**	**4.7000e-004**	**0.0000**	**8.0281**

3.5 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.1200e-003	0.0726	0.0622	9.0000e-005		4.1800e-003	4.1800e-003		3.8600e-003	3.8600e-003	0.0000	8.4938	8.4938	2.5700e-003	0.0000	8.5581
Paving	1.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.3900e-003**	**0.0726**	**0.0622**	**9.0000e-005**		**4.1800e-003**	**4.1800e-003**		**3.8600e-003**	**3.8600e-003**	**0.0000**	**8.4938**	**8.4938**	**2.5700e-003**	**0.0000**	**8.5581**

3.5 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	4.1000e-004	4.2300e-003	1.0000e-005	1.1000e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	0.9795	0.9795	3.0000e-005	0.0000	0.9803
Total	**5.4000e-004**	**4.1000e-004**	**4.2300e-003**	**1.0000e-005**	**1.1000e-003**	**1.0000e-005**	**1.1100e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**0.9795**	**0.9795**	**3.0000e-005**	**0.0000**	**0.9803**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.7600e-003	0.0804	0.0677	9.0000e-005		2.1000e-003	2.1000e-003		2.1000e-003	2.1000e-003	0.0000	8.4937	8.4937	2.5700e-003	0.0000	8.5581
Paving	1.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**5.0300e-003**	**0.0804**	**0.0677**	**9.0000e-005**		**2.1000e-003**	**2.1000e-003**		**2.1000e-003**	**2.1000e-003**	**0.0000**	**8.4937**	**8.4937**	**2.5700e-003**	**0.0000**	**8.5581**

3.5 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	4.1000e-004	4.2300e-003	1.0000e-005	1.1000e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	0.9795	0.9795	3.0000e-005	0.0000	0.9803
Total	**5.4000e-004**	**4.1000e-004**	**4.2300e-003**	**1.0000e-005**	**1.1000e-003**	**1.0000e-005**	**1.1100e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**0.9795**	**0.9795**	**3.0000e-005**	**0.0000**	**0.9803**

3.6 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2660					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.4900e-003	0.0100	9.2700e-003	1.0000e-005		7.5000e-004	7.5000e-004		7.5000e-004	7.5000e-004	0.0000	1.2766	1.2766	1.2000e-004	0.0000	1.2797
Total	**0.2675**	**0.0100**	**9.2700e-003**	**1.0000e-005**		**7.5000e-004**	**7.5000e-004**		**7.5000e-004**	**7.5000e-004**	**0.0000**	**1.2766**	**1.2766**	**1.2000e-004**	**0.0000**	**1.2797**

3.6 Architectural Coating - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.1000e-004	3.1000e-004	3.1800e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.3000e-004	2.2000e-004	0.0000	2.2000e-004	0.0000	0.7347	0.7347	2.0000e-005	0.0000	0.7352
Total	**4.1000e-004**	**3.1000e-004**	**3.1800e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.3000e-004**	**2.2000e-004**	**0.0000**	**2.2000e-004**	**0.0000**	**0.7347**	**0.7347**	**2.0000e-005**	**0.0000**	**0.7352**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2660					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.7000e-004	0.0118	9.1600e-003	1.0000e-005		3.6000e-004	3.6000e-004		3.6000e-004	3.6000e-004	0.0000	1.2766	1.2766	1.2000e-004	0.0000	1.2797
Total	**0.2666**	**0.0118**	**9.1600e-003**	**1.0000e-005**		**3.6000e-004**	**3.6000e-004**		**3.6000e-004**	**3.6000e-004**	**0.0000**	**1.2766**	**1.2766**	**1.2000e-004**	**0.0000**	**1.2797**

3.6 Architectural Coating - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.1000e-004	3.1000e-004	3.1800e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.3000e-004	2.2000e-004	0.0000	2.2000e-004	0.0000	0.7347	0.7347	2.0000e-005	0.0000	0.7352
Total	**4.1000e-004**	**3.1000e-004**	**3.1800e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.3000e-004**	**2.2000e-004**	**0.0000**	**2.2000e-004**	**0.0000**	**0.7347**	**0.7347**	**2.0000e-005**	**0.0000**	**0.7352**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2186	3.8583	3.1349	0.0186	1.2208	0.0304	1.2512	0.3288	0.0289	0.3577	0.0000	1,737.4355	1,737.4355	0.0740	0.0000	1,739.2863
Unmitigated	0.2186	3.8583	3.1349	0.0186	1.2208	0.0304	1.2512	0.3288	0.0289	0.3577	0.0000	1,737.4355	1,737.4355	0.0740	0.0000	1,739.2863

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	703.76	133.28	68.66	3,153,202	3,153,202
Parking Lot	0.00	0.00	0.00		
Total	703.76	133.28	68.66	3,153,202	3,153,202

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	24.11	8.40	6.90	59.00	28.00	13.00	92	5	3
Parking Lot	24.11	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.560907	0.041525	0.193068	0.000000	0.034000	0.000000	0.046800	0.123600	0.000000	0.000000	0.000000	0.000000	0.000000
Parking Lot	0.560907	0.041525	0.193068	0.000000	0.034000	0.000000	0.046800	0.123600	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	354.5336	354.5336	0.0146	3.0300e-003	355.8020
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	354.5336	354.5336	0.0146	3.0300e-003	355.8020
NaturalGas Mitigated	0.0177	0.1612	0.1354	9.7000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	175.4449	175.4449	3.3600e-003	3.2200e-003	176.4875
NaturalGas Unmitigated	0.0177	0.1612	0.1354	9.7000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	175.4449	175.4449	3.3600e-003	3.2200e-003	176.4875

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	3.28771e+006	0.0177	0.1612	0.1354	9.7000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	175.4449	175.4449	3.3600e-003	3.2200e-003	176.4875
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0177**	**0.1612**	**0.1354**	**9.7000e-004**		**0.0123**	**0.0123**		**0.0123**	**0.0123**	**0.0000**	**175.4449**	**175.4449**	**3.3600e-003**	**3.2200e-003**	**176.4875**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	3.28771e+006	0.0177	0.1612	0.1354	9.7000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	175.4449	175.4449	3.3600e-003	3.2200e-003	176.4875
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0177**	**0.1612**	**0.1354**	**9.7000e-004**		**0.0123**	**0.0123**		**0.0123**	**0.0123**	**0.0000**	**175.4449**	**175.4449**	**3.3600e-003**	**3.2200e-003**	**176.4875**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	1.04407e+006	332.6634	0.0137	2.8400e-003	333.8536
Parking Lot	68640	21.8702	9.0000e-004	1.9000e-004	21.9484
Total		**354.5336**	**0.0146**	**3.0300e-003**	**355.8020**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	1.04407e+006	332.6634	0.0137	2.8400e-003	333.8536
Parking Lot	68640	21.8702	9.0000e-004	1.9000e-004	21.9484
Total		**354.5336**	**0.0146**	**3.0300e-003**	**355.8020**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4182	4.0000e-005	3.8100e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.3500e-003	7.3500e-003	2.0000e-005	0.0000	7.8400e-003
Unmitigated	0.4182	4.0000e-005	3.8100e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.3500e-003	7.3500e-003	2.0000e-005	0.0000	7.8400e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0479					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.6000e-004	4.0000e-005	3.8100e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.3500e-003	7.3500e-003	2.0000e-005	0.0000	7.8400e-003
Total	**0.4182**	**4.0000e-005**	**3.8100e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**7.3500e-003**	**7.3500e-003**	**2.0000e-005**	**0.0000**	**7.8400e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0479					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.6000e-004	4.0000e-005	3.8100e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.3500e-003	7.3500e-003	2.0000e-005	0.0000	7.8400e-003
Total	**0.4182**	**4.0000e-005**	**3.8100e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**7.3500e-003**	**7.3500e-003**	**2.0000e-005**	**0.0000**	**7.8400e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	104.2786	0.7648	0.0188	128.9997
Unmitigated	104.2786	0.7648	0.0188	128.9997

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	23.3493 / 0	104.2786	0.7648	0.0188	128.9997
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**104.2786**	**0.7648**	**0.0188**	**128.9997**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	23.3493 / 0	104.2786	0.7648	0.0188	128.9997
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**104.2786**	**0.7648**	**0.0188**	**128.9997**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	25.4145	1.5020	0.0000	62.9633
Unmitigated	25.4145	1.5020	0.0000	62.9633

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	125.2	25.4145	1.5020	0.0000	62.9633
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**25.4145**	**1.5020**	**0.0000**	**62.9633**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	125.2	25.4145	1.5020	0.0000	62.9633
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**25.4145**	**1.5020**	**0.0000**	**62.9633**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX B

AERMOD MODEL PRINTOUTS

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```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Lincoln Avenue Industrial Warehouse\Lincoln Ave
***        10/28/16
 *** AERMET - VERSION  14134 ***   ***
***        13:34:37

PAGE   1
 **MODELOPTs:   NonDFAULT CONC      FLAT      RURAL

                                              ***     MODEL SETUP OPTIONS SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses RURAL Dispersion Only.

 **Model Allows User-Specified Options:
        1. Stack-tip Downwash.
        2. Model Assumes Receptors on FLAT Terrain.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.

 **Other Options Specified:
        TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  PM_10

 **Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages
```

```
 **This Run Includes:   1847 Source(s);       6 Source Group(s); and      11 Receptor(s)

               with:      0 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:   1847 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)


 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs External File(s) of Concurrent Values for Postprocessing (POSTFILE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                 m for Missing Hours
                                                                 b for Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   250.00 ;  Decay Coef. =    0.000     ;  Rot.
Angle =     0.0
                  Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =
0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      4.3 MB of RAM.

 **Detailed Error/Message File:   Lincoln Avenue Industrial Warehouse.err
 **File for Summary of Results:   Lincoln Avenue Industrial Warehouse.sum
```

**MODELOPTs: NonDFAULT CONC FLAT RURAL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1
1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1
1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1
1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1
1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1
1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1
1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1
1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Lincoln Avenue Industrial Warehouse\Lincoln Ave
***        10/28/16
 *** AERMET - VERSION  14134 ***   ***
***        13:34:37

PAGE   3
 **MODELOPTs:   NonDFAULT CONC      FLAT      RURAL

                                    *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

   Surface file:   rivr8.sfc                                                                    Met
Version:  14134
   Profile file:   rivr8.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:        0                  Upper air station no.:     3190
                  Name: UNKNOWN                                     Name: UNKNOWN
                  Year:   2008                                      Year:   2008

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS   WD     HT
REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - -
 08 01 01   1 01  -64.0  0.616 -9.000 -9.000 -999. 1157.    319.6  0.31   1.00   1.00    5.40   27.    9.1
287.5    5.5
 08 01 01   1 02  -54.0  0.502 -9.000 -9.000 -999.  866.    204.9  0.31   1.00   1.00    4.50   40.    9.1
287.5    5.5
 08 01 01   1 03  -16.4  0.152 -9.000 -9.000 -999.  347.     18.8  0.31   1.00   1.00    2.20   62.    9.1
287.0    5.5
 08 01 01   1 04 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.31   1.00   1.00    3.10   67.    9.1
287.0    5.5
 08 01 01   1 05 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.31   1.00   1.00    4.90   96.    9.1
286.4    5.5
 08 01 01   1 06 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.31   1.00   1.00    3.10  342.    9.1
286.4    5.5
 08 01 01   1 07 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.31   1.00   1.00    4.00   38.    9.1
287.0    5.5
```

```
 08 01 01   1 08  -35.7  0.448 -9.000 -9.000 -999.  719.    220.9  0.31   1.00   0.53    4.00   62.    9.1
287.0    5.5
 08 01 01   1 09   26.7  0.649  0.357  0.005   59. 1253.   -895.5  0.31   1.00   0.32    5.40  294.    9.1
288.1    5.5
 08 01 01   1 10   76.5  0.503  0.700  0.009  157.  879.   -146.3  0.31   1.00   0.25    4.00   42.    9.1
289.2    5.5
 08 01 01   1 11  123.5  0.418  1.124  0.012  404.  655.    -51.7  0.31   1.00   0.22    3.10   30.    9.1
290.9    5.5
 08 01 01   1 12  130.9  0.715  1.311  0.005  605. 1451.   -245.0  0.31   1.00   0.21    5.80   37.    9.1
290.9    5.5
 08 01 01   1 13   81.1  0.560  1.174  0.006  701. 1033.   -189.8  0.31   1.00   0.21    4.50    4.    9.1
290.9    5.5
 08 01 01   1 14   76.4  0.604  1.171  0.005  739. 1124.   -252.5  0.31   1.00   0.23    4.90   13.    9.1
290.9    5.5
 08 01 01   1 15   52.3  0.805  1.043  0.005  762. 1730.   -875.8  0.31   1.00   0.26    6.70   39.    9.1
290.9    5.5
 08 01 01   1 16   11.1  0.377  0.624  0.011  767.  800.   -422.2  0.31   1.00   0.35    3.10  346.    9.1
290.4    5.5
 08 01 01   1 17  -43.3  0.441 -9.000 -9.000 -999.  705.    173.6  0.31   1.00   0.63    4.00    9.    9.1
290.4    5.5
 08 01 01   1 18  -29.0  0.400 -9.000 -9.000 -999.  608.    192.9  0.31   1.00   1.00    3.60   45.    9.1
289.9    5.5
 08 01 01   1 19  -49.6  0.505 -9.000 -9.000 -999.  860.    227.3  0.31   1.00   1.00    4.50   25.    9.1
289.9    5.5
 08 01 01   1 20  -64.0  0.730 -9.000 -9.000 -999. 1496.    533.1  0.31   1.00   1.00    6.30   60.    9.1
289.9    5.5
 08 01 01   1 21  -29.1  0.400 -9.000 -9.000 -999.  736.    192.1  0.31   1.00   1.00    3.60  238.    9.1
288.8    5.5
 08 01 01   1 22  -41.2  0.562 -9.000 -9.000 -999. 1010.    378.5  0.31   1.00   1.00    4.90   87.    9.1
287.5    5.5
 08 01 01   1 23  -53.8  0.733 -9.000 -9.000 -999. 1504.    642.6  0.31   1.00   1.00    6.30   95.    9.1
287.0    5.5
 08 01 01   1 24  -29.5  0.399 -9.000 -9.000 -999.  738.    189.5  0.31   1.00   1.00    3.60   37.    9.1
285.4    5.5


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 08 01 01 01    5.5 0 -999.  -99.00   287.6   99.0  -99.00  -99.00
```

```
08 01 01 01    9.1 1   27.    5.40  -999.0   99.0  -99.00  -99.00
```

F indicates top of profile (=1) or below (=0)

**MODELOPTs: NonDFAULT CONC FLAT RURAL

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

NETWORK GROUP ID GRID-ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE
SLINE1	1ST HIGHEST VALUE IS	0.00002 AT (	462844.21,	3754030.49,	250.00,	250.00,	0.00)	DC
	2ND HIGHEST VALUE IS	0.00001 AT (	462866.56,	3753994.31,	250.00,	250.00,	0.00)	DC
	3RD HIGHEST VALUE IS	0.00001 AT (	462817.60,	3754074.66,	250.00,	250.00,	0.00)	DC
	4TH HIGHEST VALUE IS	0.00001 AT (	462800.58,	3754095.95,	250.00,	250.00,	0.00)	DC
	5TH HIGHEST VALUE IS	0.00001 AT (	462866.56,	3754059.23,	250.00,	250.00,	0.00)	DC
	6TH HIGHEST VALUE IS	0.00001 AT (	462846.87,	3754084.77,	250.00,	250.00,	0.00)	DC
	7TH HIGHEST VALUE IS	0.00001 AT (	462787.80,	3754110.84,	250.00,	250.00,	0.00)	DC
	8TH HIGHEST VALUE IS	0.00001 AT (	462783.02,	3754119.89,	250.00,	250.00,	0.00)	DC
	9TH HIGHEST VALUE IS	0.00001 AT (	462757.47,	3754165.65,	250.00,	250.00,	0.00)	DC
	10TH HIGHEST VALUE IS	0.00000 AT (	462734.59,	3754193.86,	250.00,	250.00,	0.00)	DC
SLINE2	1ST HIGHEST VALUE IS	0.00000 AT (	462787.80,	3754110.84,	250.00,	250.00,	0.00)	DC
	2ND HIGHEST VALUE IS	0.00000 AT (	462800.58,	3754095.95,	250.00,	250.00,	0.00)	DC
	3RD HIGHEST VALUE IS	0.00000 AT (	462783.02,	3754119.89,	250.00,	250.00,	0.00)	DC
	4TH HIGHEST VALUE IS	0.00000 AT (	462817.60,	3754074.66,	250.00,	250.00,	0.00)	DC
	5TH HIGHEST VALUE IS	0.00000 AT (	462844.21,	3754030.49,	250.00,	250.00,	0.00)	DC
	6TH HIGHEST VALUE IS	0.00000 AT (	462866.56,	3753994.31,	250.00,	250.00,	0.00)	DC
	7TH HIGHEST VALUE IS	0.00000 AT (	462757.47,	3754165.65,	250.00,	250.00,	0.00)	DC
	8TH HIGHEST VALUE IS	0.00000 AT (	462734.59,	3754193.86,	250.00,	250.00,	0.00)	DC

```
          9TH HIGHEST VALUE IS       0.00000 AT (  462846.87,  3754084.77,   250.00,   250.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.00000 AT (  462866.56,  3754059.23,   250.00,   250.00,    0.00)  DC

SLINE3    1ST HIGHEST VALUE IS       0.00000 AT (  462800.58,  3754095.95,   250.00,   250.00,    0.00)  DC
          2ND HIGHEST VALUE IS       0.00000 AT (  462787.80,  3754110.84,   250.00,   250.00,    0.00)  DC
          3RD HIGHEST VALUE IS       0.00000 AT (  462783.02,  3754119.89,   250.00,   250.00,    0.00)  DC
          4TH HIGHEST VALUE IS       0.00000 AT (  462817.60,  3754074.66,   250.00,   250.00,    0.00)  DC
          5TH HIGHEST VALUE IS       0.00000 AT (  462846.87,  3754084.77,   250.00,   250.00,    0.00)  DC
          6TH HIGHEST VALUE IS       0.00000 AT (  462798.45,  3754192.26,   250.00,   250.00,    0.00)  DC
          7TH HIGHEST VALUE IS       0.00000 AT (  462866.56,  3754059.23,   250.00,   250.00,    0.00)  DC
          8TH HIGHEST VALUE IS       0.00000 AT (  462757.47,  3754165.65,   250.00,   250.00,    0.00)  DC
          9TH HIGHEST VALUE IS       0.00000 AT (  462844.21,  3754030.49,   250.00,   250.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.00000 AT (  462734.59,  3754193.86,   250.00,   250.00,    0.00)  DC

VOL1      1ST HIGHEST VALUE IS       0.00003 AT (  462844.21,  3754030.49,   250.00,   250.00,    0.00)  DC
          2ND HIGHEST VALUE IS       0.00003 AT (  462866.56,  3753994.31,   250.00,   250.00,    0.00)  DC
          3RD HIGHEST VALUE IS       0.00003 AT (  462817.60,  3754074.66,   250.00,   250.00,    0.00)  DC
          4TH HIGHEST VALUE IS       0.00003 AT (  462800.58,  3754095.95,   250.00,   250.00,    0.00)  DC
          5TH HIGHEST VALUE IS       0.00003 AT (  462787.80,  3754110.84,   250.00,   250.00,    0.00)  DC
          6TH HIGHEST VALUE IS       0.00003 AT (  462783.02,  3754119.89,   250.00,   250.00,    0.00)  DC
          7TH HIGHEST VALUE IS       0.00003 AT (  462866.56,  3754059.23,   250.00,   250.00,    0.00)  DC
          8TH HIGHEST VALUE IS       0.00003 AT (  462846.87,  3754084.77,   250.00,   250.00,    0.00)  DC
          9TH HIGHEST VALUE IS       0.00002 AT (  462757.47,  3754165.65,   250.00,   250.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.00002 AT (  462734.59,  3754193.86,   250.00,   250.00,    0.00)  DC
```

**MODELOPTs: NonDFAULT CONC FLAT RURAL

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

NETWORK GROUP ID GRID-ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE
VOL2	1ST HIGHEST VALUE IS	0.00009 AT (	462844.21,	3754030.49,	250.00,	250.00,	0.00)	DC
	2ND HIGHEST VALUE IS	0.00008 AT (	462817.60,	3754074.66,	250.00,	250.00,	0.00)	DC
	3RD HIGHEST VALUE IS	0.00008 AT (	462866.56,	3753994.31,	250.00,	250.00,	0.00)	DC
	4TH HIGHEST VALUE IS	0.00007 AT (	462800.58,	3754095.95,	250.00,	250.00,	0.00)	DC
	5TH HIGHEST VALUE IS	0.00006 AT (	462787.80,	3754110.84,	250.00,	250.00,	0.00)	DC
	6TH HIGHEST VALUE IS	0.00006 AT (	462866.56,	3754059.23,	250.00,	250.00,	0.00)	DC
	7TH HIGHEST VALUE IS	0.00006 AT (	462783.02,	3754119.89,	250.00,	250.00,	0.00)	DC
	8TH HIGHEST VALUE IS	0.00006 AT (	462846.87,	3754084.77,	250.00,	250.00,	0.00)	DC
	9TH HIGHEST VALUE IS	0.00004 AT (	462757.47,	3754165.65,	250.00,	250.00,	0.00)	DC
	10TH HIGHEST VALUE IS	0.00003 AT (	462734.59,	3754193.86,	250.00,	250.00,	0.00)	DC
ALL	1ST HIGHEST VALUE IS	0.00014 AT (	462844.21,	3754030.49,	250.00,	250.00,	0.00)	DC
	2ND HIGHEST VALUE IS	0.00013 AT (	462817.60,	3754074.66,	250.00,	250.00,	0.00)	DC
	3RD HIGHEST VALUE IS	0.00013 AT (	462866.56,	3753994.31,	250.00,	250.00,	0.00)	DC
	4TH HIGHEST VALUE IS	0.00012 AT (	462800.58,	3754095.95,	250.00,	250.00,	0.00)	DC
	5TH HIGHEST VALUE IS	0.00011 AT (	462787.80,	3754110.84,	250.00,	250.00,	0.00)	DC
	6TH HIGHEST VALUE IS	0.00010 AT (	462866.56,	3754059.23,	250.00,	250.00,	0.00)	DC
	7TH HIGHEST VALUE IS	0.00010 AT (	462783.02,	3754119.89,	250.00,	250.00,	0.00)	DC
	8TH HIGHEST VALUE IS	0.00010 AT (	462846.87,	3754084.77,	250.00,	250.00,	0.00)	DC

```
         9TH HIGHEST VALUE IS       0.00007 AT (  462757.47,  3754165.65,   250.00,   250.00,    0.00)  DC
        10TH HIGHEST VALUE IS       0.00006 AT (  462734.59,  3754193.86,   250.00,   250.00,    0.00)  DC


*** RECEPTOR TYPES:  GC = GRIDCART
                     GP = GRIDPOLR
                     DC = DISCCART
                     DP = DISCPOLR
```

**MODELOPTs: NonDFAULT CONC FLAT RURAL

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

NETWORK GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
SLINE1	HIGH 1ST HIGH VALUE IS	0.00018	ON 12031522:	AT (462844.21, 3754030.49, 250.00, 250.00, 0.00)	DC	
SLINE2	HIGH 1ST HIGH VALUE IS	0.00001	ON 10080722:	AT (462783.02, 3754119.89, 250.00, 250.00, 0.00)	DC	
SLINE3	HIGH 1ST HIGH VALUE IS	0.00002	ON 09021003:	AT (462783.02, 3754119.89, 250.00, 250.00, 0.00)	DC	
VOL1	HIGH 1ST HIGH VALUE IS	0.00046	ON 10082823:	AT (462800.58, 3754095.95, 250.00, 250.00, 0.00)	DC	
VOL2	HIGH 1ST HIGH VALUE IS	0.00102	ON 10021722:	AT (462817.60, 3754074.66, 250.00, 250.00, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	0.00154	ON 10021722:	AT (462817.60, 3754074.66, 250.00, 250.00, 0.00)	DC	

```
*** RECEPTOR TYPES:  GC = GRIDCART
                     GP = GRIDPOLR
                     DC = DISCCART
                     DP = DISCPOLR
```

**MODELOPTs: NonDFAULT CONC FLAT RURAL

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

NETWORK GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
SLINE1	HIGH 1ST HIGH VALUE IS 0.00006m	ON 11013124:	AT (462844.21, 3754030.49, 250.00, 250.00, 0.00)	DC	
SLINE2	HIGH 1ST HIGH VALUE IS 0.00000m	ON 11013124:	AT (462787.80, 3754110.84, 250.00, 250.00, 0.00)	DC	
SLINE3	HIGH 1ST HIGH VALUE IS 0.00001m	ON 10120124:	AT (462798.45, 3754192.26, 250.00, 250.00, 0.00)	DC	
VOL1	HIGH 1ST HIGH VALUE IS 0.00012m	ON 10090624:	AT (462866.56, 3753994.31, 250.00, 250.00, 0.00)	DC	
VOL2	HIGH 1ST HIGH VALUE IS 0.00030m	ON 10090624:	AT (462844.21, 3754030.49, 250.00, 250.00, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS 0.00043m	ON 10121424:	AT (462844.21, 3754030.49, 250.00, 250.00, 0.00)	DC	

```
*** RECEPTOR TYPES:  GC = GRIDCART
                     GP = GRIDPOLR
                     DC = DISCCART
                     DP = DISCPOLR
```

```
 **MODELOPTs:   NonDFAULT CONC      FLAT      RURAL

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            0 Warning Message(s)
 A Total of         2006 Informational Message(s)

 A Total of        43848 Hours Were Processed

 A Total of            7 Calm Hours Identified

 A Total of         1999 Missing Hours Identified (  4.56 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
               ***  NONE  ***
```

APPENDIX C

HEALTH RISKS ASSESSMENT CALCULATIONS

Lincoln Avenue Industrial Warehouse -- DPM Cancer Risk Estimates from Truck Activities

DPM Cancer Risk Values at maximum concentrations on residential receptors

Pollutant*	Sensitive Receptor Type	Sensitive Receptor Age Group	25 meters		
			Estimated Concentration ($\mu g/m^3$)*	Cancer Risk (per million)**	Chronic Hazard Quotient***
DPM	Residential	16 < 70 year	0.001	2.75E-07	2.89E-04
		16 < 30 year	0.001	7.98E-08	NA
		2 < 16 year	0.001	5.24E-07	NA
		2 < 9 Year	0.001	2.89E-07	NA
		0 < 2 year	0.001	4.76E-07	NA
		3rd trimester	0.001	1.97E-08	NA

Notes:

* Based on the estimated 5-year meterological average annual ground-level concentrations

** Regulatory acceptable threshold is 10 per million, or 1.00E-05.

***Chronic hazard quotient calculated for the maximally exposed individual. This is assumed to be the 30 to 70 year residential exposure. Average annual exposure concentration is used.

Acronymes and abbreviations:

NA	Not applicable
DPM	diesel particulate matter
($\mu g/m^3$)	micrograms per cubic meter
	Unacceptable cancer risk level, greater than 1.00E-5
	Unacceptable chronic hazard quotient, greater than 1.0E+0
UTM	Universal Transverse Mercator coordinate system (standard system to locate objects

Lincoln Avenue Industrial Warehouse -- DPM Cancer Risk Estimates from Truck Activities Construction DPM Cancer Risk Values at Different Distances from Construction Area fenceline Diesel Particulate Matter (DPM) Cancer Risk Calculations (assuming DPM = 100% PM10 exhaust emissions from project)									Palmdale Station -- DPM Cancer Risk Estimates
Receptor Age Categories			**3rd trimester**	**0<2 years**	**2<9 years**	**2<16 years**	**16<30 years**	**16<70 years**	**Chronic Hazard Quotient**
Cancer Risk$_{inh:}$ (1) - Residential			1.97E-08	4.76E-07	2.89E-07	5.24E-07	7.98E-08	2.75E-07	2.89E-04
Equations used in calculating Cancer Risk: **Cancer Risk$_{inh}$ = Dose$_{air}$ * CPF * ASF * ED/AT * FAH** **Dose$_{air}$ = C$_{air}$ * {BR/BW} * A * EF * 10^{-6}**			**Acceptable Risk: 1.00E-05** **(ten in a million, SCAQMD and CARB)**						**Equation uesd in calculating Chronic Hazard Quotient:** **Hazard Quotient= C$_{air}$/REL$_{DPM}$** **The hazard quotient is for the maximally exposed individual: assumed 16 to 70 year resident.**
Definition of terms									**Reference Source**
CPF	Inhalation Cancer Potency Factor	(mg/kg-day)$^{-1}$	1.1	1.1	1.1	1.1	1.1	1.1	
C$_{air}$	25 meters from source area: Concentration in air (from AERMOD model results, receptor analysis)	µg/m^3 (Residential)	0.00145	0.00145	0.00145	0.00145	0.00145	0.00145	Using Annual Average C$_{air}$ from AERMOD output data file for applicable receptor
		µg/m^3 (Recreational)	0.00145	0.00145	0.00145	0.00145	0.00145	0.00145	
		µg/m^3 (School)	0.00145	0.00145	0.00145	0.00145	0.00145	0.00145	
{BR/BW}	Daily Breathing Rate normalized to body weight	L/kg-day (Residential)	361	1090	631	572	261	233	OEHHA 2015, Table 5.6, 95th percentile for 3rd trimester – 2 yrs old; 80th percentile for other age groups
		L/kg-day (Recreational)	0	1200	640	520	240	230	OEHHA 2015, Table 5.8 (95th, moderate) for all age bins but 3rd trimester; assume no 3rd trimester receptors
		L/kg-day (School)	0	1200	640	520	240	230	Same as recreational
A	Inhalation absorption factor	unitless	1	1	1	1	1	1	Constant
EF	Exposure Frequency, (Fraction of time exposed)	days/365 days (Residential)	0.96	0.96	0.96	0.96	0.96	0.96	OEHHA 2015, page 5-24, 350 days/year
		days/365 days (Recreational)	0.08	0.08	0.08	0.08	0.08	0.08	Yearly, based on estimated 350 day/yr, 2 hrs/day exposure
		days/365 days (School)	0.12	0.12	0.12	0.12	0.12	0.12	Based on 180 days/yr, 6 hrs/day
ED	Exposure duration for a specified age	years (Residential - 70 years)	0.25	2		14		54	Equation 8.2.4 A, OEHHA 2015
		years (Residential - 30 years)	0.25	2		14	14	0	Equation 8.2.4 A, OEHHA 2015
		years (Residential - 9 years)	0.25	2	7				Equation 8.2.4 A, OEHHA 2015
		years (Recreational)		2	7	2	6		Equation 8.2.4 A, OEHHA 2015
		years (School - 9 years))		0	7	7			BAAQMD Health Risk Screening Analysis Guidelines, Jan 2010, page 3
AT	Averaging time for lifetime cancer risk	years	70	70	70	70	70	70	Exposure years for lifetime cancer risk (years), (construction period)
FAH	Fraction of time spent at home	unitless	1.00	1.00	1.00	1.00	1.00	1.00	Table 8.4, OEHHA 2015 (only for residential, but worst-case to assume 1.0; recreation assumed to be 1.0)
ASF	Age sensitivity Factor	unitless	10	10	3	3	1	1	OEHHA 2015, Table 8.3
WAF	Worker Adjustment Factor	unitless					1	1	Source is constant; WAF of 1 assumed per OEHHA 2015 page 5-31
1.00E-06	Conversion Factor	unitless	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	Micrograms to milligrams and liters to cubic meters conversion factor
REL$_{DPM}$	Chronic Reference Exposure Level (DPM REL)	µg/m^3	5.00E+00	5.00E+00	5.00E+00	5.00E+00	5.00E+00	5.00E+00	OEHHA 2015
NOTES:									
(1)	(Estimated Inhalation Cancer Risk from Construction Phase)								

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APPENDIX B

BIOLOGICAL RESOURCES ASSESSMENT

MSHCP CONSISTENCY ANALYSIS AND HABITAT ASSESSMENT

MULTI-TENANT WAREHOUSE PROJECT AT 7820 LINCOLN AVENUE

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

LSA

October 2016

MSHCP CONSISTENCY ANALYSIS AND HABITAT ASSESSMENT

MULTI-TENANT WAREHOUSE PROJECT AT 7820 LINCOLN AVENUE

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

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LSA Project No. RVL1601

October 2016

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A: PLANT AND WILDLIFE SPECIES OBSERVED

1.0 INTRODUCTION

LSA Associates, Inc. (LSA) has conducted a Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) consistency analysis for the approximately 5.9-acre Multi-Tenant Warehouse Project site located in the City of Riverside, Riverside County, California. Specifically, this report includes a habitat assessment and focused survey for burrowing owl (*Athene cunicularia hypugea*) and analysis of other constraints, specifically with regard to nesting birds.

2.0 PROJECT LOCATION AND DESCRIPTION

The project site is associated with Assessor's Parcel Number (APN) 237-040-020 and is located at 7820 Lincoln Avenue in the City of Riverside, Riverside County, California. Specifically, the site is located at the southwest corner of Lincoln Avenue and Grace Street, as depicted on the U.S. Geological Survey (USGS) 7.5-minute *Riverside West, California* quadrangle in Township 3 South, Section 9, Range 5 West (Figure 1).

The proposed project is a light industrial development including four units totaling 12,000 square feet of office uses and 88,974 square feet of warehouse for a total of 100,974 square feet. Figure 2 depicts the proposed project site plan.

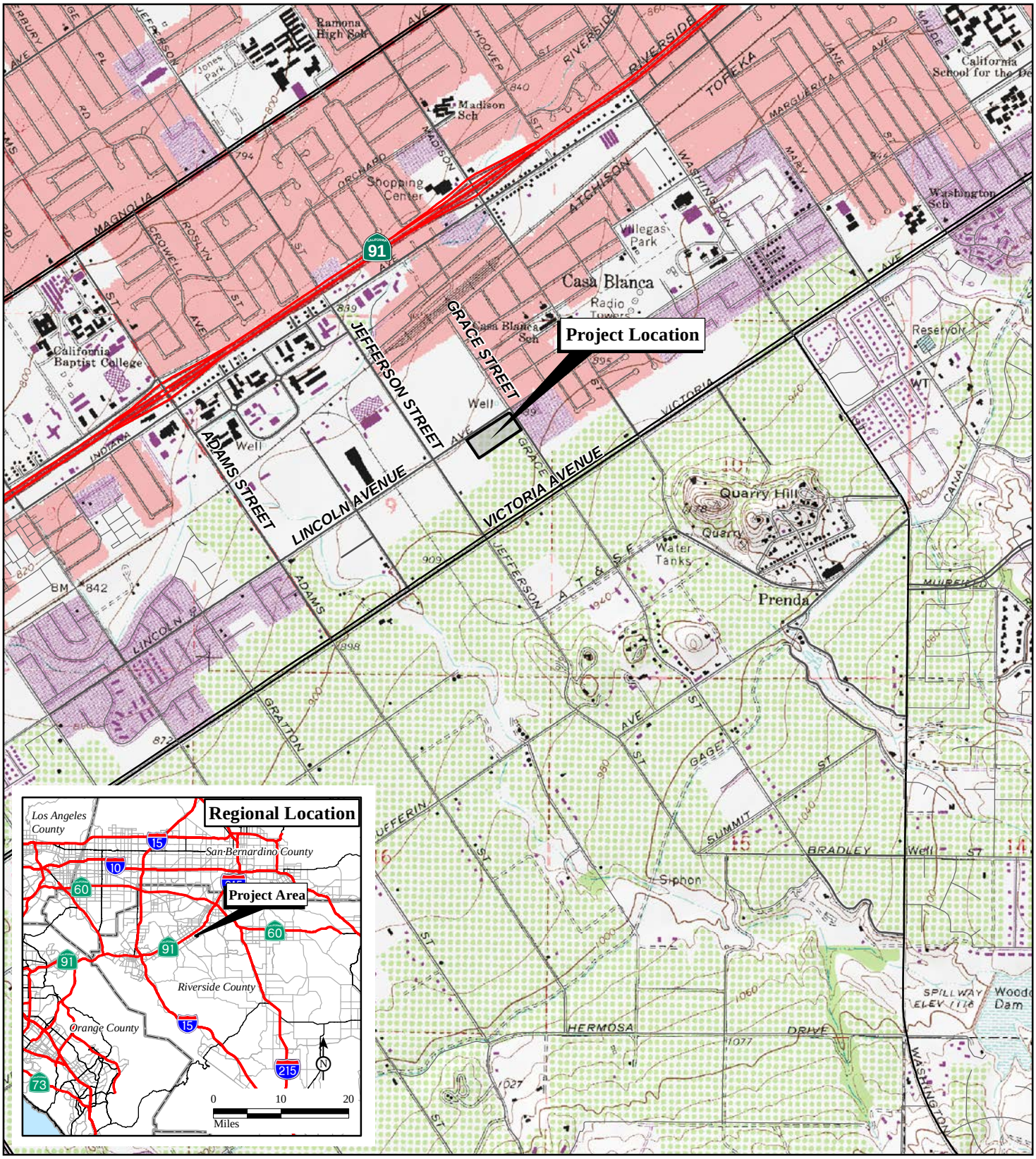
3.0 BACKGROUND

3.1 Western Riverside County Multiple Species Habitat Conservation Plan

The MSHCP provides for the assembly of a Conservation Area consisting of Core Areas and Linkages for the conservation of Covered Species (Riverside County 2003). Covered Species are 146 species of plants and animals of various federal and state listing statuses. The Conservation Area is to be assembled from portions of the MSHCP Criteria Area, which consists of quarter-section (i.e., 160-acre) Criteria Cells, each with specific criteria for species conservation within that cell. The MSHCP provides an incentive-based program, the Habitat Evaluation and Acquisition Negotiation Strategy (HANS) for adding land to the MSHCP Conservation Area. If it is determined that all or a portion of the property is needed for inclusion in the MSHCP Conservation Area, then various incentives may be available to the property owner in exchange for the conveyance of a property interest.

The MSHCP requires focused surveys for certain plant and animal species for project sites located within designated plant and animal survey areas when potential suitable habitat is present. For instance, surveys for Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) may be required in areas having Delhi soils. The MSHCP also requires that an assessment be completed to determine the effects of the project on riparian/riverine areas and vernal pools, and associated protected species in accordance with MSHCP Section 6.1.2, Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools.

Projects located in proximity to an MSHCP Conservation Area may result in edge effects that could adversely affect biological resources within the MSHCP Conservation area. These edge effects must be addressed according to the Urban/Wildlands Interface Guidelines (MSHCP Section 6.1.4).



LSA

FIGURE 1

N

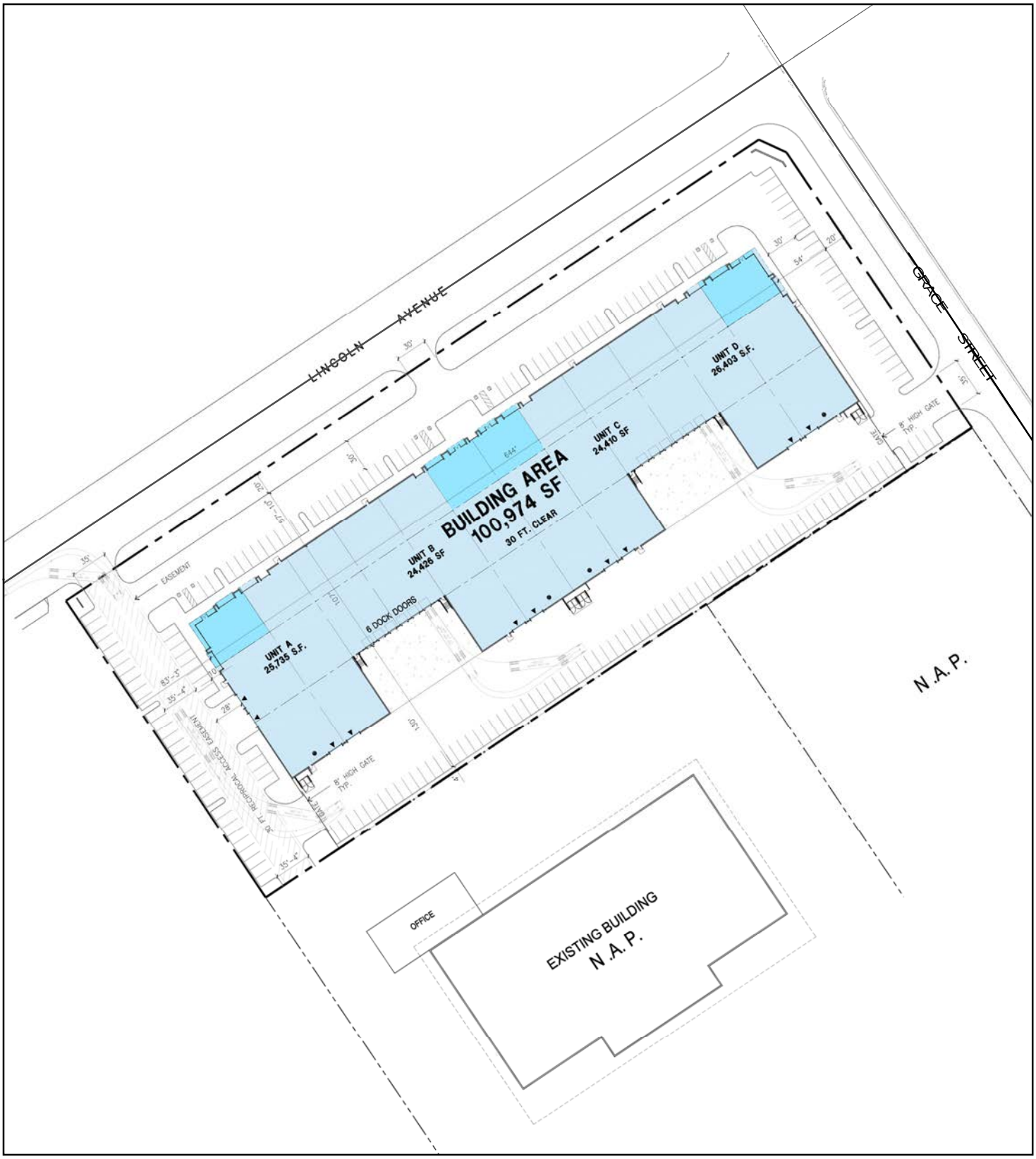
0 1000 2000
FEET

Lincoln Avenue & Grace Street Warehouse

Regional and Project Location

SOURCE: USGS 7.5' Quad: Riverside West, 1980, CA; 2013/Riverside County, 2015.

I:\RVL1601\Reports\MSHCP_ConsisRpt\fig1_RegLocTopo.mxd (8/17/2016)



LSA

FIGURE 2

N

0 60 120
FEET

SOURCE: HPA Architechture, May 11, 2016.

Lincoln Avenue & Grace Street Warehouse

Conceptual Site Plan

I:\RVL1601\Reports\MSHCP_ConsisRpt\fig2_Concept_SitePlan.mxd (8/17/2016)

3.2 Jurisdictional Waters and Streambeds

The U.S. Army Corps of Engineers (USACE), under Section 404 of the Federal Clean Water Act (CWA), regulates discharges of dredged or fill material into "waters of the United States." These waters include wetlands and non-wetland bodies of water that meet specific criteria, including a connection to interstate or foreign commerce. This connection may be direct (through a tributary system linking a stream channel with traditional navigable waters used in interstate or foreign commerce) or it may be indirect (through a connection identified in USACE regulations). The USACE typically regulates as non-wetland waters of the U.S. any body of water displaying an "ordinary high water mark" or OHWM. In order to be considered a jurisdictional wetland under Section 404, an area must possess hydrophytic vegetation, hydric soils, and wetland hydrology.

The California Department of Fish and Wildlife (CDFW), under Sections 1600 et seq. of the California Fish and Game Code, regulates alterations to lakes, rivers, and streams. A stream is defined by the presence of a channel bed and banks, and at least an occasional flow of water. The CDFW also regulates habitat associated with the streambed, such as wetland, riparian shrub, and woodlands.

The Regional Water Quality Control Board (RWQCB) is responsible for the administration of Section 401 of the CWA, through water quality certification of any activity that may result in a discharge to jurisdictional waters of the U.S. The RWQCB may also regulate discharges to "waters of the State," including wetlands, under the California Porter-Cologne Water Quality Control Act.

3.3 Migratory/Nesting Birds

Burrowing owl and other nesting bird species are protected by California Fish and Game Code Sections 3503 and 3503.5 and by the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–711), which make it unlawful to take, possess, or needlessly destroy the nest or eggs of any migratory bird or bird of prey.

4.0 METHODS

4.1 Literature Review

A literature review was conducted to determine the existence or potential occurrence of special-status plant and animal species on the project site and in the project vicinity. Database records for the *Riverside West, California* USGS 7.5-minute series quadrangle and surrounding quadrangles were searched on August 10, 2016, using the CDFW Natural Diversity Data Base *Rarefind 5* online application (https://map.dfg.ca.gov/rarefind/) and the Native Plant Society's *Inventory of Rare and Endangered Plants* (http://www.cnps.org/inventory). The Riverside County Integrated Project (RCIP) Conservation Summary Report (http://onlineservices.rctlma.org/content/rcip_report_generator.aspx) was queried to determine habitat assessment and potential survey requirements for the site, as well as Volume 1, Parts 1 and 2 of the MSHCP (Riverside County Transportation and Land Management Agency 2003). Soil information was taken from electronic data provided by Soil Data Mart (Natural Resource Conservation Service 2003). Current and historical aerial photographs were also reviewed (Google Earth 2016).

4.2 Field Surveys

A general reconnaissance-level field survey was conducted on August 11, 2016, by LSA Senior Biologist Claudia Bauer between the hours of 0910 and 0945. The weather during the survey was mild with clear skies and winds less than 5 miles per hour. The temperature ranged from 70 to 71 degrees Fahrenheit. During the survey, Ms. Bauer assessed habitat for the burrowing owl and other special status species identified in the literature review. The survey area/project site included the proposed project footprint as shown in previously referenced Figure 2.

The entire survey area was surveyed on foot. Notes were taken on general site conditions, vegetation, and suitability of habitat for various special-interest elements. All plant and animal species observed or otherwise detected during this field survey were noted and are listed in Appendix A.

Burrowing Owl Habitat Suitability Assessment. A habitat suitability assessment (HSA) was conducted for the burrowing owl and other nesting birds, discussed below, during the August 11, 2016, field survey. The habitat assessment was conducted by walking over the entire project site in transects spaced at approximately 50 feet, which allowed for 100 percent visual coverage. Any potential burrowing owl burrows encountered during the survey were examined for owl sign (e.g., feathers, pellets, whitewash, and prey remnants).

Migratory Birds. The project site and areas in the immediate vicinity of the project contain shrubs and trees that provide suitable nesting habitat for a number of migratory bird species known to nest in the project area. Further recommendations regarding nesting birds and the project site are provided in Section 6.1 of this report.

5.0 EXISTING SETTING

5.1 Existing and Adjacent Land Use

The project site is bounded by Lincoln Avenue to the northwest, Grace Street to the northeast, and existing commercial businesses to the southeast and southwest. Apartments and single-family residences are located to the north and east of the site, while commercial businesses and related equipment yards are located to the south and west of the site. Historically, the site was utilized for agriculture purposes, specifically citrus groves. Based on review of historical aerial photographs, the citrus groves were cleared from the site sometime between 1967 and 1994. Since the mid- to late 1990s, the project site has been used as a staging yard for construction and industrial equipment and is currently in a biologically blighted condition.

5.2 Topography and Soils

The topography of the project site is flat and the elevation is approximately 890 feet above mean sea level, however, the topography of the general area is slightly sloped from north to south. The soils within the project site, as shown in Figure 3, consist entirely of Hanford fine sandy loam (HgA), 0 to 2 percent slopes. Soils observed on site were consistent with this mapping and were highly disturbed with evidence of disking, likely related to weed abatement.

LSA

Legend

Project Boundary

Soils

HgA: Hanford fine sandy loam, 0-2 % slopes

FIGURE 3

N

0 60 120
FEET

SOURCE: Bing Aerial, 2016, Soil Data Mart.

Lincoln Avenue & Grace Street Warehouse

Soils Map

I:\RVL1601\Reports\MSHCP_ConsisRpt\fig3_Soils.mxd (8/18/2016)

5.3 Vegetation

The project site is highly disturbed due to historic and current land use practices. As a result of the disturbance caused by the historic agricultural practices and the current weed abatement activity and recent use as a vehicular storage yard, native plant communities are absent. The vegetation present on the project site is sparse and ruderal in nature and is best described as non-native grasslands. The specific vegetative species observed on site consists almost solely of newly emergent Russian thistle (*Salsola tragus*). Lamb's quarters (*Chenopodium album*) and puncture vine (*Tribulus terrestris*) were also observed on site. A Mexican fan palm (*Washingtonia robusta*) and an arroyo willow (*Salix lasiolepis*) were observed on the site.

Figure 4 shows vegetation and land use. Site photographs are provided in Figure 5.

5.4 Wildlife

Wildlife common to developed areas was observed using the study area. Bird species observed were mourning dove (*Zenaida macroura*) and common raven (*Corvus corax*). Remnant small mammal burrows (3 inches or less in diameter) were also observed on site. They are likely associated with Botta's pocket gophers (*Thomomys bottae*).

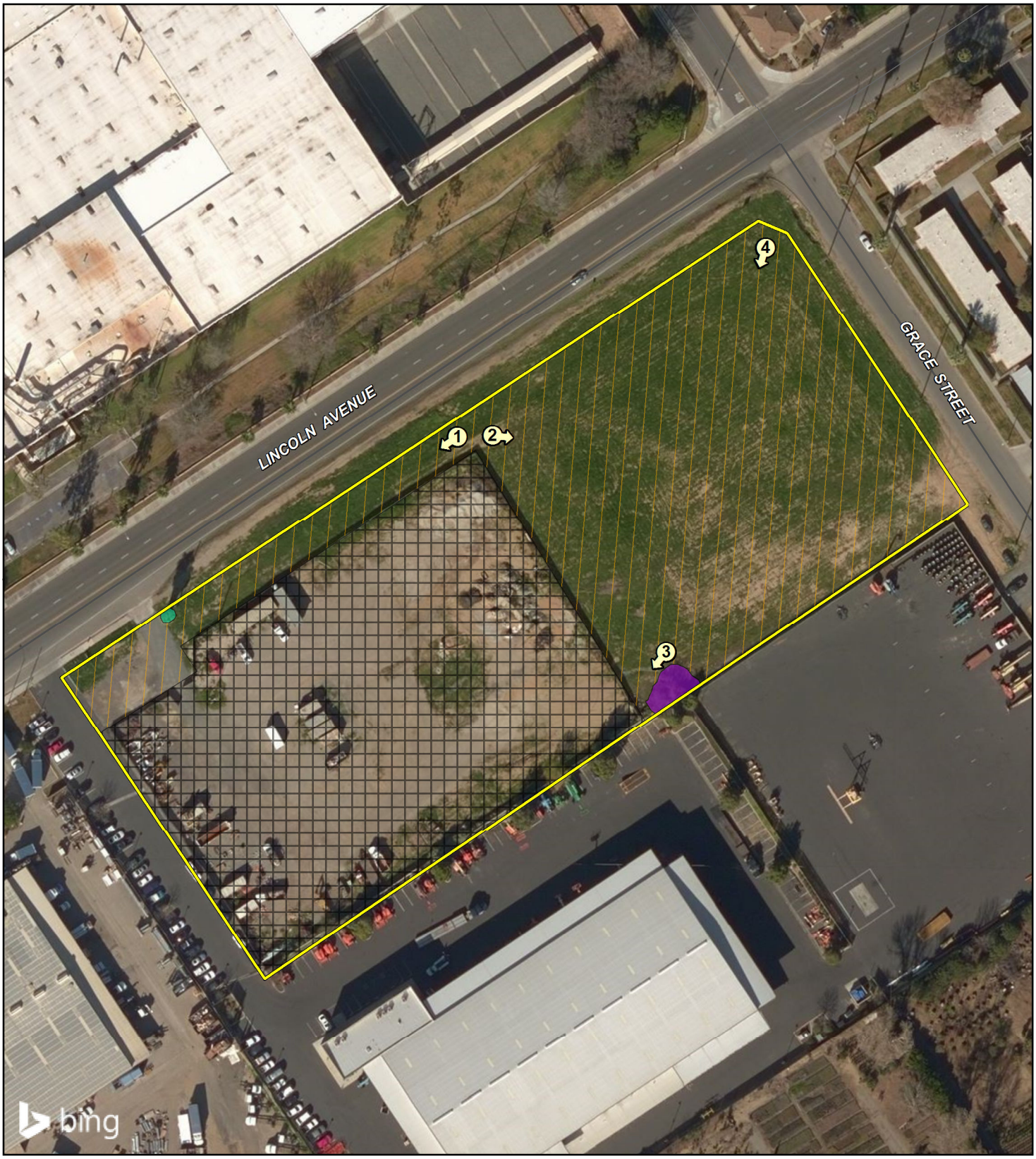
6.0 RESULTS AND RECOMMENDATIONS

6.1 MSHCP Consistency Analysis

The project site is located within the Cities of Riverside and Norco Area Plan area of the MSHCP, but is not located within a Criteria Area or adjacent to a Criteria Area or Conservation Area. Thus, the project will have no effects to Criteria Areas and the project is not subject to the Urban/Wildlands Interface Guidelines. No riparian/riverine/vernal pool resources are present and the project will have no effects to these MSHCP resources. As Figure 6 shows, the project site is within the MSHCP survey areas for the burrowing owl and results of the burrowing owl habitat assessment are discussed in detail below. Table A provides a checklist showing project-specific requirements necessary for consistency with the MSHCP.

Table A: MSHCP Consistency Checklist

MSHCP Compliance	Yes	No
Is Project a covered activity?		✓
Is Project in a Criteria Area or Public/Quasi-Public Land?		✓
Located in Criteria Area Plant Survey Area?		✓
Located in Criteria Area Amphibian Survey Area?		✓
Located in Criteria Area Mammal Survey Area?		✓
Is the project located adjacent to MSHCP Conservation Areas?		✓
Is Project located in Narrow Endemic Survey Area?		✓
Are riverine/riparian/wetland habitats or vernal pools present?		✓
Is the Project located in Burrowing Owl Survey Area?	✓	



LSA

Legend

Project Boundary

Photograph Location

Vegetation

Ruderal/Non-native Grasslands

Developed

Arroyo Willow

Mexican Fan Palm

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SOURCE: Bing Aerial, 2016.

FIGURE 4

Lincoln Avenue & Grace Street Warehouse

Vegetation, Land Use, and Photograph Locations

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Photograph 1: *View facing southwest along Lincoln Avenue.*

Photograph 2: *View facing east across the center of the site.*

Photograph 3: *View facing south at arroyo willow located in the southern corner of the site.*

Photograph 4: *View facing south across the center of the site.*

LSA

FIGURE 5

Lincoln Avenue & Grace Street Warehouse

Site Photographs

LSA

Legend

Project Boundary

MSHCP Burrowing Owl Survey Area

FIGURE 6

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SOURCE: Bing Aerial, MSHCP Survey Areas, 2005.

Lincoln Avenue & Grace Street Warehouse

MSHCP Survey Areas

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Burrowing Owl Habitat Assessment. The project site is within the MSHCP burrowing owl survey area. Burrowing owls are found in open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals. They can also inhabit grass, forb, and shrub stages of pinyon, and ponderosa pine habitats. They nest in abandoned burrows of ground squirrels or other animals, in pipes, under piles of rock or debris, and in other similar features.

A habitat suitability assessment (HSA) for burrowing owl was conducted on August 11, 2016. The project site does not contain suitable habitat for the burrowing owl due to the absence of potential nesting sites as described above. No burrowing owls or burrowing owl sign (e.g., whitewash, pellets, scat, tracks, and/or feathers) were observed during the HSA.

Focused burrowing owl surveys were not conducted for the proposed project due to the absence of suitable habitat for the burrowing owl on the proposed project site at this time. Per the MSHCP 30-day Pre-Construction Burrowing Owl Survey Guidelines (revised August 17, 2006), an additional pre-construction survey may be required within 30 days prior to beginning of site grading in the event that site conditions change (e.g., establishment of ground squirrel burrows) and create suitable habitat. If burrowing owls are found to be present, for compliance with the MSHCP, project-specific mitigation would be developed and authorized through consultation with the County of Riverside and the CDFW.

6.2 Jurisdictional Waters and Streambeds

No potential jurisdictional waters were identified on the proposed project site. Thus, the project is not subject to the regulatory authority of the USACE under Section 404 of the CWA, the RWQCB under Section 401 of the CWA, or the CDFW under Sections 1600 et seq. of the California Fish and Game Code.

6.3 Migratory/Nesting Birds

The arroyo willow and Mexican fan palm on the project site provide potential roosting and nesting habitat for migratory birds. Additionally, the site is suitable for ground nesting species, such as killdeer (*Charadrius vociferous*). To avoid any potential effects to nesting birds protected by the MBTA and the California Fish and Game Code, vegetation-clearing and preliminary ground-disturbance work should be completed outside of bird breeding season (typically February 1 through August 31). In the event that initial groundwork cannot be conducted outside the bird breeding season, pre-construction surveys would be required within 30 days prior to construction. Should nesting birds be found, an exclusionary buffer will be established by the project biologist. The buffer may be up to 500 feet in diameter, depending on the species of nesting bird found. This buffer will be clearly marked in the field by construction personnel under guidance of the biologist, and construction or clearing will not be conducted within this zone until the biologist determines that the young have fledged or the nest is no longer active.

7.0 CONCLUSIONS

The following measures will be required for compliance with the MSHCP:

- To avoid potential effects to the burrowing owl, the avoidance and minimization measures identified in Section 6.1 would need to be implemented.
- To avoid potential effects to nesting migratory birds protected by the MBTA and the California Fish and Game Code, vegetation-clearing and preliminary ground-disturbance work should be completed outside of bird breeding season (typically February 1 through August 31). In the event that initial groundwork cannot be conducted outside the bird breeding season, focused nest surveys would be required. Should nesting birds be found, an exclusionary buffer will be established by the project biologist.

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APPENDIX A

LIST OF PLANT AND WILDLIFE SPECIES OBSERVED

Appendix A: List of Plant and Wildlife Species Observed

Scientific Name	Common Name
MAGNOLIOPHYTA: MAGNOLIOPSIDA	**DICOT FLOWERING PLANTS**
Chenopodiaceae	**Saltbush family**
Chenopodium album (non-native species)	Lamb's quarters
Salsola tragus (non-native species)	Russian thistle
Salicaceae	**Willow family**
Salix lasiolepis	Arroyo willow
Zygophyllaceae	**Creosote-bush family**
Tribulus terrestris (non-native species)	Puncture vine
MAGNOLIOPHYTA: LILIOPSIDA	**MONOCOT FLOWERING PLANTS**
Arecaceae	**Palm family**
Washingtonia robusta	Mexican fan palm
AVES	**BIRDS**
Columbidae	**Pigeons and Doves**
Zenaida macroura	Mourning dove
Corvidae	**Crows and Ravens**
Corvus corax	Common raven
MAMMALIA	**MAMMALS**
Geomyidae	**Pocket gophers**
Thomomys bottae	Botta's pocket gopher

APPENDIX C

CULTURAL RESOURCES ASSESSMENT

CULTURAL RESOURCES ASSESSMENT

LINCOLN AVENUE WAREHOUSE PROJECT

7820 LINCOLN AVENUE

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

LSA

September 2016

CULTURAL RESOURCES ASSESSMENT

LINCOLN AVENUE WAREHOUSE PROJECT

7820 LINCOLN AVENUE

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

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Prepared by:

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LSA Associates, Inc.
1500 Iowa Avenue, Suite 200
Riverside, California 92507

LSA Project No. RVL1601

National Archaeological Database Information:

Type of Study: Assessment (Records search and reconnaissance survey)
Sites Recorded: None
USGS Quadrangle: Riverside West, California 7.5'
Acreage: Approximately 6 acres
Key Words: Phase I Survey, no resources

LSA

September 2016

MANAGEMENT SUMMARY

LSA Associates, Inc. is under contract to Riverside Lincoln, LLC to prepare a Cultural Resources Assessment for the Lincoln Avenue Warehouse Project (project) located at 7820 Lincoln Avenue, City of Riverside, California (approximately 6 acres). This work was completed pursuant to the California Environmental Quality Act (CEQA). The proposed project is for commercial development.

A cultural resources records search and survey were conducted for the project. Results of the records search and survey indicate no archaeological or historic resources were identified within or near the project. The project area has been developed, disturbed, and obscured; and the sensitivity of the project for potential subsurface resources is low. Therefore, no further cultural resources investigations or monitoring are recommended. In the event any archaeological resources are identified during earthmoving activities, work in the area should be halted until the nature and significance of the find can be assessed by a qualified archaeologist.

If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

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INTRODUCTION

LSA Associates, Inc. (LSA) is under contract to Riverside Lincoln, LLC to prepare a Cultural Resources Assessment for the Lincoln Avenue Warehouse Project (project) located at 7820 Lincoln Avenue in the City and County of Riverside, California (approximately 6 acres). This work was completed pursuant to the California Environmental Quality Act (CEQA; as amended January 1, 2016): Public Resources Code (PRC), Division 13 (Environmental Quality), Chapter 2.6 Section 21083.2 (Archaeological Resources) and Section 21084.1 (Historical Resources); and the Guidelines for CEQA (as amended December 1, 2015), California Code of Regulations Title 14, Chapter 3, Article 5 Section 15064.5 (Determining the Significance of Impacts on Historical and Unique Archaeological Resources).

The project is located on the southwest side of the intersection of Lincoln Avenue and Grace Street. The project site is depicted on the United States Geological Survey (USGS) *Riverside West*, *California* 7.5-minute topographic quadrangle in Township 4 South, Range 4 West, Section 9, San Bernardino Base Line and Meridian (USGS 1988; Figure 1).

NATURAL SETTING

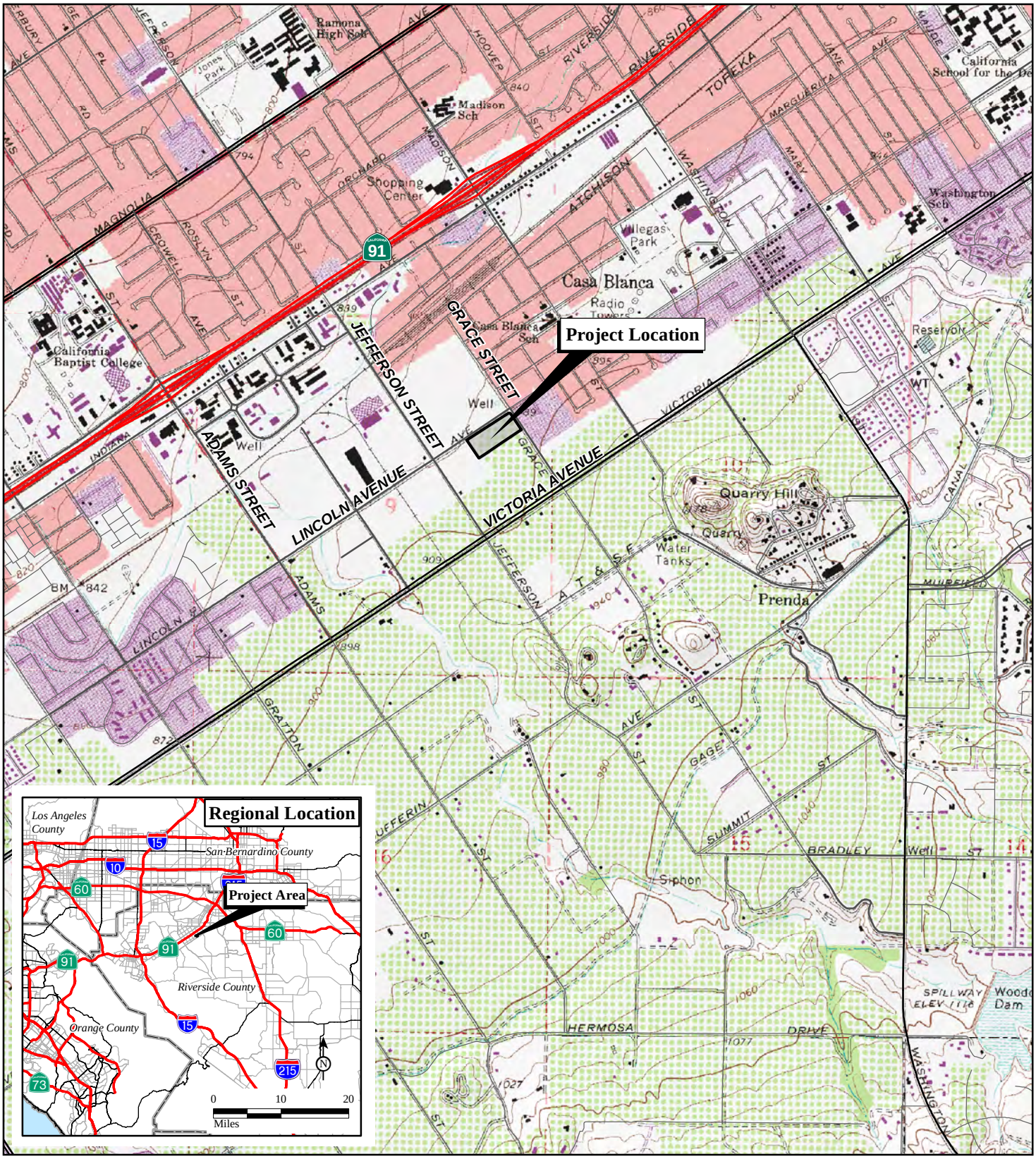
The natural setting of the project vicinity is presented based on the underlying theoretical assumption that humans and human societies are in continual interaction with the physical environment. Being an integral and major part of the ecological system, humans respond to the limits imposed by the environment by technological and behavioral adaptation. Locations of archaeological sites are based on the constraints of these interactions, whether it is proximity to a particular resource, topographical restrictions, or shelter and protection. Sites will also contain an assemblage of artifacts and ecofacts consistent with the particular interaction.

Biology

At an elevation of approximately 900 feet about mean sea level (amsl), the project falls within the Lower Sonoran Life Zone (Bean 1977). This zone ranges from below sea level to an elevation of approximately 3,500 feet asml and is represented in the Mojave and Colorado Deserts. Plants common to the area include cacti, desert agave, cheesebrush, catclaw, acacia, and seasonal grasses. Animals typically found within this zone include deer, coyote, foxes, rabbits, rodents, ravens, reptiles, and insects.

Geology

The entire study area is within the north central Peninsular Ranges Geomorphic Province of California. This geomorphic province is characterized by a series of mountain ranges separated by northwest-trending valleys, sub-parallel to branching faults from the San Andreas Fault. The Peninsular Ranges Province extends 900 miles from the Transverse Ranges to the north and southward to the tip of Baja California (Norris and Webb 1976). The parcel is southwest of the San Jacinto Fault Zone and southwest of the Box Springs Mountains. The natural topography of the study area is characterized as valley lowland intersected by rolling hills and surrounded by mountain ranges. Mt. Rubidoux is approximately four miles northeast of the project (Norris and Webb 1976).



LSA

FIGURE 1

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Lincoln Avenue & Grace Street Warehouse

Regional and Project Location

SOURCE: USGS 7.5' Quad: Riverside West, 1980, CA; 2013/Riverside County, 2015.

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Hydrology

The nearest water source is the Santa Ana River, which is within three miles north of the project. This river is the largest stream system in Southern California, extending from its headwaters in the San Bernardino Mountains over 100 miles southwest to the Pacific. Average annual precipitation ranges from 12 inches per year in the coastal plain to 40 inches per year in the San Bernardino Mountains to the north (Beck and Haase 1974). Precipitation usually occurs in the form of winter rain, with warm monsoonal showers in summer. Winter and spring floods commonly result from storms during wet years. Before European American settlement, the Santa Ana River was a perennial stream flowing from the San Bernardino and San Gabriel Mountains to the Pacific Ocean. Many springs, marshes, swamps, and bogs were interspersed throughout the watershed (Beck and Haase 1974).

CULTURAL SETTING

Prehistory

The description of various prehistoric stages or chronologies identifying cultural evolution in the Southern California area has been attempted numerous times. Several of these chronologies are reviewed in Moratto (1984). No single description is universally accepted. The various chronologies are based primarily on material developments identified by researchers familiar with sites in a region, and variation exists essentially due to the differences in those items found at the sites. Small differences occur over time and space, which combine to form patterns that are variously interpreted.

Currently, two primary regional culture chronology syntheses are commonly referenced in the archaeological literature. The first, Wallace (1955), describes four cultural horizons or time periods: Horizon I – Early Man (9000–6500 BC), Horizon II – Milling Stone Assemblages (6500–2000 BC), Horizon III – Intermediate Cultures (2000 BC–AD 200), and Horizon IV – Late Prehistoric Cultures (AD 200–historic contact). This chronology was refined (Wallace 1978) using absolute chronological dates unavailable in 1955.

The second cultural chronology (Warren 1968) is based broadly on Southern California prehistoric cultures, and was also revised (Warren 1984; Warren and Crabtree 1986). Warren's chronology includes five periods in prehistory: Lake Mojave (7000–5000 BC), Pinto (4000–3000 BC), Gypsum (1000 BC–AD 1), Saratoga Springs (AD 500–1000), and Protohistoric (AD 1500–historic contact). Changes in settlement pattern and subsistence focus are viewed as cultural adaptations to a changing environment, which begins with gradual environmental warming in the late Pleistocene, continues with the desiccation of the desert lakes, followed by a brief return to pluvial conditions, and concludes with a general warming and drying trend, with periodic reversals that continue to the present (Warren 1986).

ETHNOGRAPHY

The project area is situated near the intersection of the traditional tribal boundaries of the Cahuilla, Gabrielino, and Luiseño (Bean and Smith 1978; Kroeber 1925). According to Bean (1978), the Cahuilla probably occupied the project area at the time of Spanish contact.

Typically, the native culture groups in Southern California were named after nearby Spanish period missions, and such is the case for these coastal Takic populations. For instance, the term "Gabrielino" is applied to the natives inhabiting the region around Mission San Gabriel, and "Luiseño" was given to those native people living within the "ecclesiastical jurisdiction of Mission San Luis Rey... [and who shared] an ancestral relationship which is evident in their cosmogony, and oral tradition, common language, and reciprocal relationship in ceremonies" (Oxendine 1983). The Cahuilla are one exception to this naming convention, as their territory was distant enough from the missions for them to be only marginally affected and assimilated by the missions in the last few years of the Spanish period.

The territory of the Cahuilla included most of Riverside County and portions of San Bernardino, San Diego, and Imperial Counties (Bean 1978). The territory of the Gabrielino included portions of Los Angeles, Orange, and San Bernardino Counties during ethnohistoric times, and also extended inland into northwestern Riverside County (Kroeber 1925; Heizer 1968). The territory of the Luiseño included portions of San Diego, Riverside, and Orange Counties (Kroeber 1925; Heizer 1978).

The Gabrielino, Cahuilla, and Luiseño were all hunters and gatherers; these Native American groups shared similar semi-sedentary lifestyles. They caught and collected seasonally available food resources, living in permanent communities along watercourses. Individuals from these villages took advantage of the varied resources available. Seasonally, as foods became available, native groups moved to temporary camps to collect plant foods and to conduct communal rabbit and deer hunts. Unlike the landlocked Cahuilla, the territories of the Gabrielino and Luiseño included coastline, allowing them to establish seasonal camps along the coast and near bays and estuaries to gather shellfish and hunt waterfowl (Hudson 1971).

Gabrielino

The Gabrielino were hunters and gatherers who utilized food resources along the coast as well as inland areas of Los Angeles, Orange, San Bernardino and Riverside Counties during ethnographic times (Kroeber 1925; Heizer 1968).

The lifestyle of the Gabrielino was considered semi-sedentary, living in permanent communities near inland watercourses and coastal estuaries. They caught and collected seasonally available food, and moved to temporary camps to collect plant resources such as acorns, buckwheat, berries, and fruit as well as conducting communal rabbit and deer hunts. Seasonal camps were also established along the coast and near estuaries where they would gather shellfish and hunt waterfowl (Hudson 1971).

Social organization for the Gabrielinos was focused on families living in small communities. Patrilineally organized, extended families would occupy villages; both clans and villages would marry outside of the clan or village (Heizer 1968). The villages were administered by a chief whose position was patrilineal, passed from the father to the son. Spiritual and medical activities were guided by a shaman; group hunting and fishing were supervised by individually appointed male leaders (Bean and Smith 1978).

Cahuilla

The other Native American tribe inhabiting the Santa Ana River area was the Cahuilla, whose traditional territory encompassed diverse topography ranging from the Salton Sink to the San

Bernardino Mountains and San Gorgonio Pass (Bean 1978; Kroeber 1925). The Cahuilla were generally divided into three groups: Desert Cahuilla, Mountain Cahuilla, and Pass Cahuilla (Kroeber 1925). Like other Southern California Native American tribes, the Cahuilla were semi-nomadic peoples leaving their villages and using temporary camps near available plant and animal resources.

Cahuilla villages usually were in canyons or near adequate sources of water and food plants. The immediate village territory was owned in common by a lineage group or band. The other lands were divided into tracts owned by clans, families, or individuals. Trails used for hunting, trading, and social interaction connected the villages. Each village was near numerous sacred sites that included rock art panels (Bean and Shipek 1978).

Social organization of the Cahuilla was patrilineal clans and kinships groups known as moieties. Lineages within a clan cooperated in defense, subsistence activities, and religious ceremonies. Most lineages owned their own village sites and resource plots; although the majority of their territory was open to all Cahuilla people (Bean 1978).

Luiseño

Prior to Spanish occupation of California, the territory of the Luiseño extended along the coast from Agua Hedionda Creek to the south, Aliso Creek to the northwest, and the Elsinore Valley and Palomar Mountain to the east. These territorial boundaries were somewhat fluid and changed through time. They encompassed an extremely diverse environment that included coastal beaches, lagoons and marshes, inland river valleys and foothills, and mountain groves of oaks and evergreens (Bean 1978; Bean and Shipek 1978).

The Luiseño lived in small communities that were the focus of family life. Patrilineally linked, extended families occupied each village (Kroeber 1925; Bean and Shipek 1978). The Luiseño believed in the idea of private property. Property rights covered items and land owned by the village as well as items (houses, gardens, ritual equipment, trade beads, eagle nests, and songs) owned by individuals. Trespass against any property was punished (Bean and Shipek 1978). Luiseño villages were politically independent, and were administered by a chief, who inherited his position from his father.

Luiseño subsistence was based primarily on seeds such as acorns, grass seed, manzanita, sunflower, sage, chía, and pine nuts and game animals such as deer, rabbit, jackrabbit, wood rat, mice, antelope, and many types of birds (Bean and Shipek 1978). Seeds were dried and ground to be cooked into a mush. The Luiseño utilized fire for crop management and communal rabbit drives (Bean and Shipek 1978).

HISTORIC CONTEXT

In California, the historic era is generally divided into three periods: the Spanish Period (1769 to 1821), the Mexican Period (1821 to 1848), and the American Period (1848 to present). Early exploration of the Riverside County area began slowly until 1772 when Lieutenant Pedro Fages, then the military governor of San Diego, crossed through the San Jacinto Valley.

Spanish Period

On January 8, 1774, the Juan Bautista de Anza expedition crossed the Colorado River and entered California. Bautista de Anza's second excursion into Riverside County included 29 soldiers and their wives and children, who would form the new community at the Presidio of San Francisco (Beattie 1925).

With the Spanish intrusion of the late 18th century came a drastic change in lifestyle for the natives of Southern California. Incorporation of the indigenous populations into the mission system generally led to the disruption of native cultures and changes in subsistence and land use practices (Harley 1988).

Mexican Period

In 1821, Mexico overthrew Spanish rule, and the missions began to decline. By 1833, the Mexican government passed the Secularization Act, and the missions, reorganized as parish churches, lost their vast land holdings, and released their neophytes. In 1834, a prominent group of Californians, including the Lugos, the Vallejos, the Picos, and the Ortegas, coerced Governor Figueroa into creating the "Provisional Regulations." These regulations made mission lands available for their occupation (Beattie and Beattie 1939).

During the Mexican Period, the ranchos were predominantly devoted to cattle, with great tracts of land used for grazing. Until the Gold Rush of 1849, livestock and horticulture dominated the economics of California (Ingersoll 1904; Beattie 1925; Beattie and Beattie 1951). Sixteen ranchos were granted in Riverside County; one of these was the Jurupa Rancho, granted in 1838 by then-Governor Alvarado to Juan Bandini. Another rancho, Sobrante de San Jacinto, was granted to Miguel de Pedrorena and Rosario Estudillo de Agüirre, comprising over one hundred thousand acres. The project area is on the southwestern corner of these former rancho lands. The other nearby rancho from which the Riverside community and project development takes its name is La Sierra (meaning "the saw-toothed mountain range"). La Sierra was granted by Mexican Governor Pio Pico to Vicente Yorba in 1846.

American Period

As travel along the Santa Fe Trail during the early American Period brought more settlers, the pattern of settlement developed along the Santa Ana and San Jacinto waterways. The Southern Pacific Railroad completed its line from Los Angeles through the San Gorgonio Pass in 1876. The trains were eventually used to transport settlers into the area, creating a period of agricultural and land development, ultimately resulting in the establishment of Riverside County in 1893. Transportation, agriculture, and the control of water have continued to be central themes in the settlement, development, and growth of Riverside County (Robinson 1979).

The City of Riverside. In 1870, the Southern California Colony Association was established on an 8,600-acre plot of land in what would become the City of Riverside. A map was drawn to subdivide a mile square area near the center of the Colony into blocks approximately 2½ acres each. This was designated as the "Town of Riverside" and was intended for urban development consisting of a commercial core surrounded by residential blocks. Northeast and southwest of the mile square, Colony lands were divided into farm lots, each approximately 10 acres in size. Five years later, the

Riverside Land and Irrigating Company gained control over the original Colony, adding some 15,000 acres to the original Colony's lands (Lech 2004). After experimenting with various agricultural crops, many of which failed, growers within this area began cultivating citrus crops. The success of a new strain of orange, the Washington Navel, quickly landed Riverside on the map as a producer of high-quality citrus (Lech 2004).

METHODS

Records Search

On August 15, 2016, LSA archaeologist Gini Austerman completed a records search at the Eastern Information Center (EIC), located at the University of California, Riverside. It included a review of all recorded historic and prehistoric archaeological sites within one mile of the project, as well as a review of known cultural resource survey and excavation reports. In addition, the California State Historic Property Data File (HPD), which includes the National Register of Historic Places (National Register), California Register of Historical Resources (California Register), California Historical Landmarks (CHL), California Points of Historical Interest (CPHI), and various local historic registers and historic maps were examined.

Additional Research

Historic aerial photographs and topographic maps were reviewed for information relating to the historic use of the parcel.

Field Survey

On August 31, 2016, Ms. Austerman completed a pedestrian survey of all accessible exposed areas of the project parcel. Portions of the property were surveyed in systematic parallel transects spaced by approximately 10 meters (approximately 30 feet), where possible. Special attention was given to areas of exposed soil for surface artifacts and features and to stratigraphy and rodent burrows for evidence of buried midden. The purpose of this survey was to identify and document - prior to the beginning of ground-disturbing activities - any cultural resources, and thus also to identify any area(s) that might be sensitive for buried cultural resources.

RESULTS

Records Search

Data from the EIC noted 22 cultural resources within one mile of the project; none of which is located within the project parcel. These resources include 6 water conveyance and citrus industry-related resources, 11 historic-period residences, 3 commercial properties, 2 historic roads, and the Casa Blanca School. No prehistoric resources were noted within the one-mile research area. The nearest resource to the project is Victoria Avenue, one of the historic roads. It is approximately 0.2 mile south of the project.

Table A lists the cultural resources and reports within a one-mile radius of the project site that are mapped, documented on Department of Parks and Recreation forms, and on file at the EIC. A more detailed discussion of these reports and resources is provided below.

Table A: Cultural Resources within One Mile of the Project Site

Primary #	Site Description
33-004495	Riverside Lower Canal
33-004768	Gage Canal
33-005577	2612 Madison Street; 1924 residence
33-005820	Citrus grove irrigation features
33-011361	Victoria Avenue
33-011880	3020 Madison Avenue; 1923 Casa Blanca School
33-013219	7265 Indiana Avenue; 1955 residence
33-013220	7293 Indiana Avenue; 1926 residence
33-013293	7275 Indiana Avenue; 1926 residence
33-013294	7259 Indiana Avenue; 1946 residence
33-013530	Lansing Lemon Grover, citrus grove and associated irrigation features
33-014380	3410 Washington Street; 1907 residence
33-014381	3422 Washington Street; 1907 residence
33-017218	Gage Canal extension standpipes
33-017262	3407 Washington Street; 1927 residence
33-018046	7605 Evans Street; 1940s commercial property
33-018047	7615 Evans Street; 1950s utility substation
33-018048	7635 Evans Street; 1940s outbuilding
33-018076	2523 Adams Street; 1893 residence
33-018199	7166 Indiana Avenue; 1925 residence
33-021020	Row of irrigation standpipes
33-021085	9978 Dufferin Avenue; 1962 residence

Reports

Data from the EIC indicate that there have been nine previous cultural resource studies conducted in the records search area, none of which includes the project.

Additional Research

Historic aerial photographs and topographic maps ranging from 1901 through the present were reviewed. Topographic maps indicate that the project area has never been developed. The aerial photographs indicate that the property was used for citrus in 1948, and by 1994 the groves had been removed and the project was vacant. By 2005, the majority of the project was used for equipment storage; however, by 2009, the property was again vacant. By 2012, the western half of the project

area was being utilized again for equipment storage, and this appears consistent with the current use. The eastern half of the project remained vacant (Nationwide Environmental Title Research 1948, 1966, 1994, 2005, 2009, 2010).

Field Survey

The field survey revealed the entire property is undeveloped. The eastern half of the project has been capped with Artificial Fill, and only minimal vegetation was noted (Figure 2). The western portion of the project is currently being used for equipment storage; two utility lines are within this area. The date stamps on the utility lines are 2003 and 2004. A chain link fence separates the two portions. No archaeological or historic resources were identified during the survey.

Figure 2: Site Overview, facing west.

FINDINGS AND RECOMMENDATIONS

A cultural resources records search, historic research, and pedestrian survey were conducted for the project. Results of the records search and survey indicate that no archaeological or historic resources

are present within the project. The entire project is undeveloped; the western half has been used for equipment storage intermittently since 2005, but no buildings or structures have been constructed. The sensitivity of the project area for potential subsurface resources is low. Therefore, no further cultural resources investigations or monitoring are recommended. In the event any archaeological resources are identified during earthmoving activities, work in the area should be halted until the nature and significance of the find can be assessed by a qualified archaeologist.

If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the NAHC, which will determine and notify an MLD. With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

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APPENDIX D

GEOTECHNICAL INVESTIGATION

GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL/INDUSTRIAL BUILDING

South Corner Lincoln Avenue and Grace Street
Riverside, California
for
Vlietco Enterprises, LLC

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

June 14, 2016

Vlietco Enterprises, LLC
c/o Warmington Properties
3090 Pullman Street
Costa Mesa, California 92626

Attention: Mr. David H. Clark
President

Project No.: **16G168-1**

Subject: **Geotechnical Investigation**
Proposed Commercial/Industrial Building
South Corner Lincoln Avenue and Grace Street
Riverside, California

Reference: Geotechnical Investigation Proposed Business Park and Aluminum Body Corporation Building No. 5, SWC Lincoln Avenue and Grace Street Riverside, California prepared for Shook Building Systems, Inc. by Southern California Geotechnical, Inc. (SCG), SCG Project No. 03G174-1, dated June 26, 2003.

Gentlemen:

In accordance with your request, we have performed a geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Joseph Lozano Leon
Staff Engineer

John A. Seminara, GE 2294
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN A. SEMINARA
No. 2294
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (2) Addressee

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1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

Site Preparation.

- Initial site preparation should include stripping of any topsoil, vegetation and organic materials from the site. Based on conditions observed at the time of the subsurface exploration, this will include the removal of moderate grass and weed growth present throughout the subject area. These materials should be disposed of off-site. Demolition should include removal of any pavements that will not remain in place for use with the new development.
- Remedial grading is recommended to be performed within the proposed building area in order to remove all of the artificial fill soils and the upper portion of the alluvial soils. The soils present within the proposed building area should be overexcavated to a depth of 5 feet below existing grade and to a depth of at least 5 feet below proposed building pad subgrade elevation. The depth of the overexcavation should also extend to a depth sufficient to remove any artificial fill soils.
- The proposed foundation influence zones should be overexcavated to a depth of 3 feet below proposed foundation bearing grade.
- Following evaluation of the subgrade by the geotechnical engineer, the exposed subgrade soils should be scarified, moisture conditioned to 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The resulting soils may be replaced as compacted structural fill.
- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Building Foundations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft^2 maximum allowable soil bearing pressure.
- Minimum longitudinal steel reinforcement within strip footings: Two (2) No. 5 rebars (1 top and 1 bottom).

Building Floor Slab

- Conventional Slab-on-Grade, 5 inches thick.
- Minimum slab reinforcement: Not required for geotechnical considerations. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.
- Modulus of Subgrade Reaction: 125 psi/in

Pavements

ASPHALT PAVEMENTS (R = 40)				
Materials	**Thickness (inches)**			
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic		
		TI = 6.0	TI = 7.0	TI = 8.0
Asphalt Concrete	3	3½	4	5
Aggregate Base	4	6	7	8
Compacted Subgrade	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 40)			
Materials	**Thickness (inches)**		
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic	
		TI = 7.0	TI = 8.0
PCC	5	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 16P250, dated May 13, 2016. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located at the south corner of Lincoln Avenue and Grace Street in Riverside, California. The site is bounded to the northwest by Lincoln Avenue, to the northeast by Grace Street, and to the southeast and southwest by existing commercial/industrial buildings. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The site consists of a rectangular shaped parcel, 5.9± acres in size. The site is currently vacant and undeveloped. The southwestern portion of the site is currently being used as a trailer and equipment storage yard. The storage and equipment yard area is surrounded by a chain link fence. A stock pile of concrete and vegetation approximately 15 feet in diameter is located along the southwestern fence line. The ground surface cover in this portion of the site consists of crushed aggregate base (CAB) and exposed soils with sparse native grass and weed growth. The ground surface cover in the northeastern portion of the site consists of exposed soil with extensive native grass and weed growth. Asphaltic concrete pavements are present along the southwestern properly line area. The pavements are generally in fair condition with minor to moderate cracking throughout.

Detailed topographic information was not available at the time of this report. Based on visual observations, the site topography slopes to the southwest at an estimated gradient of approximately 1 to 2 percent. There was estimated to be 5 to 6± feet of elevation differential across the site.

3.2 Proposed Development

Based on a site plan prepared by HPA Architecture, Inc., the site will be developed with a new commercial/industrial building. The building will be located in the central area of the site and will be 107,070± ft² in size. The building will be subdivided into four (4) units/suites and will include two loading docks along the southeast side of the building. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, with some areas of concrete flatwork and landscape planters throughout.

Detailed structural information was not available at the time of this report. It is assumed that the new building will be a single-story structure of concrete tilt-up construction, typically supported on a conventional shallow foundation system with a concrete slab-on-grade floor. Maximum column and wall loads are expected to be on the order of 80 kips and 3 to 5 kips per linear foot, respectively.

3.3 Previous Study

Southern California Geotechnical, Inc. (SCG) previously performed a geotechnical investigation at the subject site and a larger surrounding area, which is referenced above. This report provides information about eleven (11) previous borings drilled at the subject site advanced to depths of 15 to 25± feet below the previously existing site grades. Six (6) of the borings are located on the subject site, and are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. Artificial fill soils were encountered at all of the boring locations extending to a depth of 2½± feet. The fill soils consisted of loose to medium dense silty fine to medium sands with little fine gravel. Native alluvial soils were encountered below the fill soils, which consisted of loose to dense silty fine to medium sands, silty fine sands, fine to medium sands, and fine sandy silts, extending to the maximum depth explored of 25± feet. No groundwater was encountered during the subsurface exploration.

The referenced report states that the existing surficial fill and the near surface native alluvial soils were not suitable for support of the foundations and floor slabs of the structures that were proposed for the site due to their loose relative densities and unfavorable consolidation and collapse characteristics.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of three (3) borings advanced to depths of 25± feet below presently existing site grades. All of the borings were logged during drilling by a member of our staff.

The borings were advanced with hollow-stem augers, by a truck-mounted drilling rig. Representative bulk and in-situ soil samples were taken during drilling. Relatively undisturbed in-situ samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. In-situ samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Artificial Fill

Artificial fill soils were encountered at the surface at all of the three boring locations extending to depths of 1½ to 3± feet below the existing site grades. The fill soils generally consist of loose to medium dense silty fine sands to fine sandy silts with varying amounts of medium sand and fine to coarse gravel. Laboratory test results indicated that these fill soils were generally damp to moist.

Alluvium

Native alluvium was encountered beneath the artificial fill soils at all of the boring locations. The near-surface alluvium generally consists of very loose to loose silty fine sands with trace medium to coarse sand extending to depths of 6 to 7± feet. The borings then encountered loose to medium dense fine sandy silts to silty fine sands with trace calcareous nodules and trace medium sand extending to depths of 12± feet. At greater depths, the borings encountered alluvium that consists of medium dense silty fine sands to fine sandy silts with varying amounts

of medium to coarse sand, silt, and fine gravel extending to the maximum depths explored of 25± feet.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

As part of our research, we reviewed available groundwater data in order to determine regional groundwater depths. Recent water level data was obtained from the California State Water Resources Control Board Website, http://geotracker.waterboards.ca.gov/. Data from a monitoring well approximately 2,700 feet northwest of the subject site indicates that groundwater is present at a depth of approximately 81 feet.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. Field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring Logs and are periodically referenced throughout this report.

Dry Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents were determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Consolidation

Selected soil samples have been tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-4 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample was tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557. These tests are generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil type or soil mixes may be necessary at a later date. The results of the testing are plotted on Plate C-5 in Appendix C of this report.

Soluble Sulfates

A representative sample of the near-surface soils has been submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally

present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-3 @ 0 to 5 feet	0.016	Negligible

Expansion Index

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829. The testing apparatus is designed to accept a 4-inch diameter, 1-in high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water, and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The results of the EI testing are as follows:

Sample Identification	Expansion Index	Expansive Potential
B-1 @ 0 to 5 feet	2	Very Low

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations. The recommendations are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record. The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structures should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, SCG did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

The 2013 California Building Code (CBC) was adopted by all municipalities within Southern California on January 1, 2014. The CBC provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

The 2013 CBC Seismic Design Parameters have been generated using U.S. Seismic Design Maps, a web-based software application developed by the United States Geological Survey. This

software application, available at the USGS web site, calculates seismic design parameters in accordance with the 2013 CBC, utilizing a database of deterministic site accelerations at 0.01 degree intervals. The table below is a compilation of the data provided by the USGS application. A copy of the output generated from this program is included in Appendix E of this report. A copy of the Design Response Spectrum, as generated by the USGS application is also included in Appendix E. Based on this output, the following parameters may be utilized for the subject site:

2013 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.500
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.600
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.500
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.900
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.000
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.600

Liquefaction

Liquefaction is the loss of the strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and grain size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Clayey (cohesive) soils or soils which possess clay particles ($d<0.005$mm) in excess of 20 percent (Seed and Idriss, 1982) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

Based on mapping obtained from the Riverside County TLMA GIS website, the subject site is located within a zone of low liquefaction susceptibility. In addition, the static groundwater table at the subject site does not exist within the upper 25 feet of the subsurface profile. Furthermore, research of available groundwater data indicates that the groundwater table is at a depth of at least 81 feet. Based on these factors, liquefaction is not considered to be a significant design concern for this project.

6.2 Geotechnical Design Considerations

General

The subsurface conditions encountered at the boring locations generally consist of very loose to medium dense silty sands. All of the borings encountered fill soils extending to depths of 1½ to 3± feet. Laboratory testing indicates that the near-surface alluvium is subject to moderate amounts of consolidation when exposed to load increases in the range of those that will be exerted by the foundations of the proposed development, as well as minor amounts of collapse when exposed to moisture infiltration. In addition, the existing fill soils are considered to represent undocumented fill and are not suitable for support of the proposed structure, in their present condition.

Based on existing conditions, remedial grading will be necessary within the proposed building area, in order to provide a subgrade suitable for support of the foundations and floor slab of the new structure. Detailed recommendations regarding these remedial grading procedures are presented in a subsequent section of this report.

Settlement

The recommended remedial grading will remove the existing undocumented fill soils, and the upper portion of the alluvial soils, and replace these materials as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation will not be subject to significant load increases from the foundations of the new structure. Provided that the recommended remedial grading is completed, the post-construction static settlement of the proposed structure is expected to be within tolerable limits.

Soluble Sulfates

The results of the soluble sulfate testing indicate that the selected sample of the on-site soils contains a negligible concentrations of soluble sulfates, in accordance with American Concrete Institute (ACI) guidelines. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building area.

Expansion

Laboratory testing performed on a representative sample of the near surface soils indicates that these materials are very low expansive (EI = 2). Therefore, no design considerations related to expansive soils are considered warranted for this project. However, it is recommended that additional expansion index testing be conducted at the completion of rough grading to verify the expansion potential of the as-graded building pad.

Shrinkage/Subsidence

Removal and recompaction of the near surface fill soils and alluvium is estimated to result in an average shrinkage of 10 to 15 percent. Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.10± feet. This estimate may be used for grading in areas that are underlain by native alluvial soils.

These estimates are based on previous experience and the subsurface conditions encountered at the boring locations. The actual amount of subsidence is expected to be variable and will be dependant on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Grading and Foundation Plan Review

No grading or foundation plans were available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring locations and our understanding of the proposed development. We recommend that all grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Site Stripping and Demolition

Initial site preparation should include stripping of any topsoil, vegetation and organic materials from the site. Based on conditions observed at the time of the subsurface exploration, this will include the removal of moderate grass and weed growth present throughout the subject area. These materials should be disposed of off-site. The actual extent of stripping should be determined in the field by a representative of the geotechnical engineer, based on the organic content and the stability of the encountered materials

Demolition should include removal of any pavements that will not remain in place for use with the new development. Debris resultant from demolition should be disposed of offsite.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building area in order to remove the undocumented fill soils and the upper portion of the existing native soils. Based on conditions encountered at the boring locations, the existing soils within the proposed building area are recommended to be overexcavated to a depth of at least 5 feet below existing grade and to a

depth of at least 5 feet below proposed building pad subgrade elevations, whichever is greater. The depth of the overexcavation should also extend to a depth sufficient to remove all undocumented fill soils. At the boring locations, the fill soils extended to depths of 1½ to 3± feet below existing site grades. The overexcavation areas should extend beyond the building perimeter and foundations at least 5 feet and to a horizontal extent equal to the depth of fill beneath the new foundations. If the proposed structure incorporates any exterior columns (such as for a canopy or overhang) the area of overexcavation should also encompass these areas.

Additional overexcavation should be performed within the influence zones of the new foundations, to provide for a new layer of compacted structural fill extending to a depth of at least 3 feet below proposed bearing grades.

Following completion of the overexcavation, the subgrade soils within the building area should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. This evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if loose, porous, or low density native soils are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches. The subgrade should then be thoroughly moisture conditioned to achieve a moisture content of at least 2 to 4 percent above optimum and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

Treatment of Existing Soils: Parking Areas

Based on economic considerations, overexcavation of the existing soils in the new parking and drive areas is not considered warranted, with the exception of areas where lower strength, or unstable, soils are identified by the geotechnical engineer during grading. Subgrade preparation in the new parking and drive areas should initially consist of removal of all soils disturbed during stripping operations.

The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to at least 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of any proposed retaining walls and non-retaining site walls should be overexcavated to a depth of 3 feet below foundation bearing grades and replaced as compacted structural fill as discussed above for the proposed building pad. Any undocumented fill soils within any of these foundation areas should be removed in their entirety. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to

scarifying, moisture conditioning, and recompacting the upper 12 inches of exposed subgrade soils as described above for the building pad. The previously excavated soils may then be replaced as compacted structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 2 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer. All fill should conform with the recommendations presented in the Grading Guide Specifications, included as Appendix D.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2013 CBC and the grading code of the City of Riverside.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete random locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

All imported structural fill should consist of very low expansive (EI < 20), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, all utility trench backfill should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. It is recommended that materials in excess of 3 inches in size not be used for utility trench backfill. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the City of Riverside. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

6.4 Construction Considerations

Excavation Considerations

The near-surface soils at this site generally consist of sands and silty sands. These materials may be subject to caving within shallow excavations. Where caving occurs within shallow excavations, flattened excavation slopes may be sufficient to provide excavation stability. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. Temporary excavation slopes should be no steeper than 2h:1v. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Groundwater

The static groundwater table at this site is considered to exist at a depth in excess of 25± feet. Therefore, groundwater is not expected to impact grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by new structural fill soils used to replace undocumented fill soils and low strength near-surface alluvial soils. These structural fill soils are expected to extend to depths of at least 3 feet below proposed foundation bearing grades, underlain by 1± foot of additional soil that has been densified and moisture conditioned in place. Based on this subsurface profile, the proposed structure may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Two (2) No. 5 rebars (1 top and 1 bottom).
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on geotechnical considerations; additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should be removed to a depth of suitable bearing compacted structural fill, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 2 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively. Differential movements are expected to occur over a 30-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slabs and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 300 lbs/ft^3
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill. The maximum allowable passive pressure is 2,500 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support the new floor-slab should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floor of the new building may be constructed as a conventional slab-on-grade supported on newly placed structural fill soils, extending to a depth of at least 5 feet below the proposed pad grade. Based on geotechnical considerations, the floor-slab may be designed as follows:

- Minimum slab thickness: 5 inches.

- Modulus of Subgrade Reaction: k = 125 psi/in.

- Minimum slab reinforcement: Not required for geotechnical considerations. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slab which will incorporate such coverings. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 2 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Retaining Wall Design and Construction

Although not indicated on the site plan, some small (less than 3 to 4 feet in height) retaining walls may be required to facilitate the new site grades. Retaining walls up to 5 feet in height will also be required in the loading dock areas. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site soils for retaining wall backfill. The near surface soils generally consist of silty sands. Based on their classifications, the silty sand materials are expected to possess a friction angle of at least 30 degrees when compacted to 90 percent of the ASTM-1557 maximum dry density.

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		**Soil Type** On-Site Soils
Internal Friction Angle (ϕ)		30°
Unit Weight		120 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	40 lbs/ft^3
	Active Condition (2h:1v backfill)	65 lbs/ft^3
	At-Rest Condition (level backfill)	60 lbs/ft^3

Regardless of the backfill type, the walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Seismic Lateral Earth Pressures

In accordance with the 2013 CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to a depth of at least 3 feet below the proposed bearing grade. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, all backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches. The retaining wall backfill materials should be well graded.

It is recommended that a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls be used. If the drainage composite material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The drainage composite should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 4-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and

at an approximate 8-foot on-center spacing. The weep holes should include a pocket of gravel, 2± cubic feet in size, surrounded by a geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system.

6.8 Pavement Design Parameters

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Pavement Subgrades

It is anticipated that the new pavements will be supported on the existing fill and/or native soils that have been scarified, moisture conditioned, and recompacted. These materials generally consist of silty sands. These materials are expected to exhibit good pavement support characteristics. Since R-value testing was not included in the scope of services for the current project, the subsequent pavement designs are based upon a conservatively assumed R-value of 40. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It may be desirable to perform R-value testing after the completion of rough grading to verify the R-value of the as-graded parking subgrade.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20 year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R = 40)				
Materials	**Thickness (inches)**			
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic		
		TI = 6.0	TI = 7.0	TI = 8.0
Asphalt Concrete	3	3½	4	5
Aggregate Base	4	6	7	8
Compacted Subgrade	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the Marshall maximum density, as determined by ASTM D-2726. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within Portland cement concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 40)			
Materials	**Thickness (inches)**		
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic	
		TI = 7.0	TI = 8.0
PCC	5	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. Reinforcing within all pavements should be designed by the structural engineer. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements should be determined by the structural engineer.

7.0 GENERAL COMMENTS

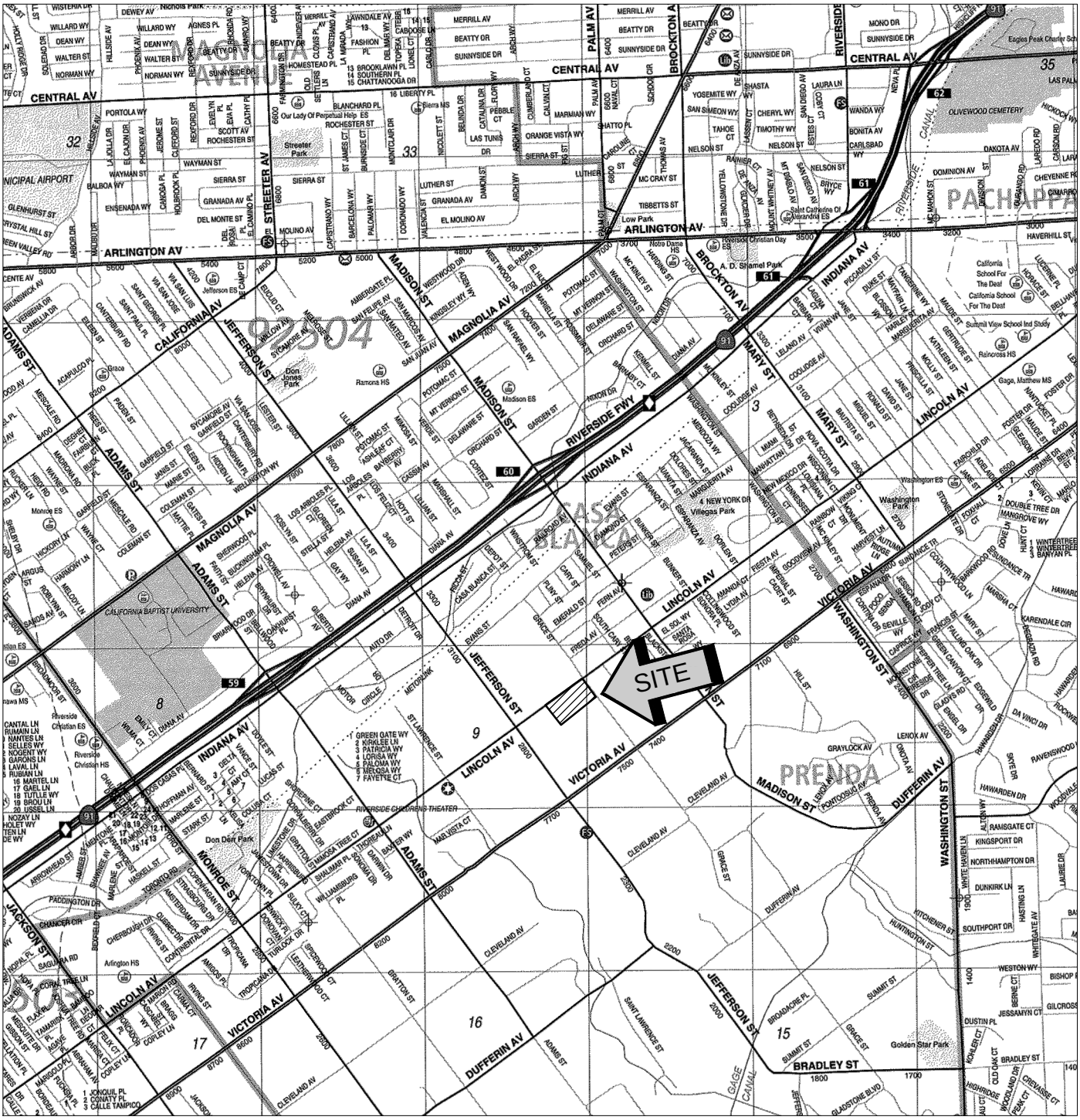
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

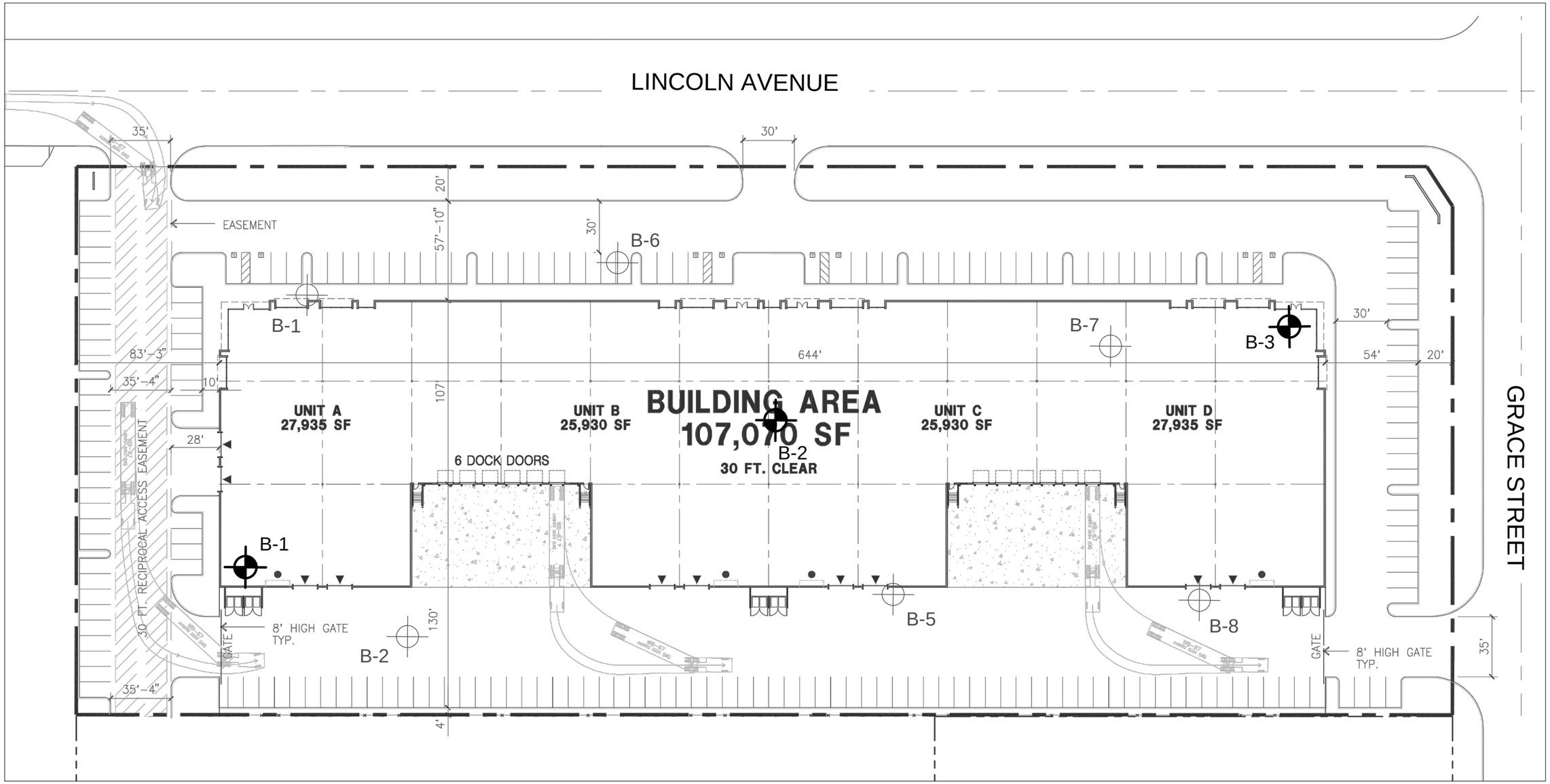
APPENDIX A



SOURCE: RIVERSIDE COUNTY
THOMAS GUIDE, 2013

SITE LOCATION MAP
PROPOSED COMMERCIAL/INDUSTRIAL BUILDING
RIVERSIDE, CALIFORNIA
SCALE: 1" = 2400'
DRAWN: SAM CHKD: JAS
SCG PROJECT 16G168-1
PLATE 1

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

APPROXIMATE BORING LOCATION

APPROXIMATE BORING LOCATION FROM PREVIOUS STUDY (SCG PROJECT NO. 03G174-1)

NORTH

NOTE: BASE MAP PREPARED BY HPA.

BORING LOCATION PLAN

PROPOSED COMMERCIAL/INDUSTRIAL BUILDING

RIVERSIDE, CALIFORNIA

SCALE: 1" = 60'

DRAWN: JLL
CHKD: JAS

SCG PROJECT
16G168-1

PLATE 2

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 16G168
PROJECT: Proposed C/I Bldg
LOCATION: Riverside, California

DRILLING DATE: 5/20/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
	X	12			FILL: Brown Silty fine Sand, trace medium Sand, trace fine Gravel, Micaceous, loose-damp to moist	104	5					EI = 2 @ 0 to 5'
	X	5			ALLUVIUM: Orange Brown Silty fine Sand, trace medium to coarse Sand, very loose to loose-damp	100	3					
5	X	5			Brown Silty fine Sand, trace medium to coarse Sand, very loose-damp	105	5					
	X	14			Brown fine Sandy Silt, trace medium Sand, loose-damp to moist	106	7					
10	X	12			Light Brown Silty fine Sand, trace medium to coarse Sand, trace calcareous veining, loose-moist	106	6					
15	X	14			Light Brown Silty fine Sand, trace medium Sand, trace fine Gravel, medium dense-damp to moist		7					
20	X	10			Brown fine Sandy Silt, trace medium Sand, loose to medium dense-damp to moist		8					
25	X	18			Brown to Light Gray fine to medium Sand, trace coarse Sand, little Silt, medium dense-damp		3					

Boring Terminated at 25'

TBL 16G168.GPJ SOCALGEO.GDT 6/15/16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 16G168
PROJECT: Proposed C/I Bldg
LOCATION: Riverside, California

DRILLING DATE: 5/20/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna

WATER DEPTH: Dry
CAVE DEPTH: 15 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
	X	12			FILL: Light Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, tace fine Gravel, medium dense-damp		3					
	X	5			ALLUVIUM : Light Orange Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, loose-damp		4					
5												
	X	2			@ 6 feet, very loose-damp to moist		7					
	X	8			Light Brown to Brown Silty fine Sand, trace fine Gravel, trace medium to coarse Sand, loose-damp to moist		7					
10												
	X	22			Light Brown Silty fine to coarse Sand, medium dense-damp		6					
15												
	X	18			Brown fine Sandy Silt, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-moist		11					
20												
	X	16					8					
25												
					Boring Terminated at 25'							

TBL 16G168.GPJ SOCALGEO.GDT 6/15/16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 16G168
PROJECT: Proposed C/I Bldg
LOCATION: Riverside, California

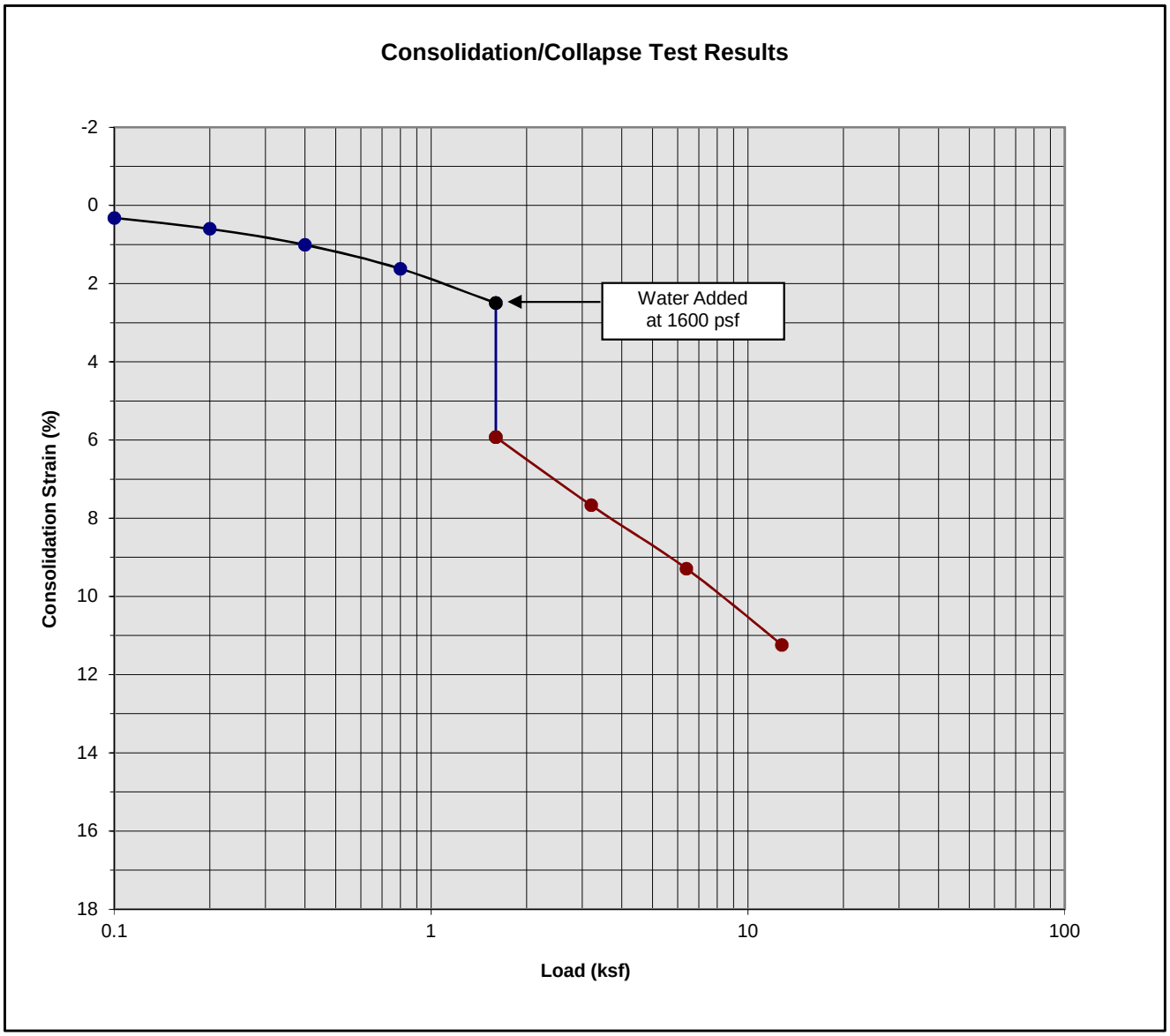
DRILLING DATE: 5/20/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna

WATER DEPTH: Dry
CAVE DEPTH: 20.5 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
	X	13			FILL: Brown Silty fine Sand, trace medium to coarse Sand, loose-damp to moist	102	8					
	X	11			ALLUVIUM: Orange Brown Silty fine Sand, slightly porous, loose-damp	98	6					
5	X	6			Orange Brown Silty fine to coarse Sand, very loose to loose-damp to moist	104	7					
	X	8			Dark Brown fine Sandy Silt, trace medium Sand, trace calcareous nodules, loose-moist	110	9					
10	X	11				108	8					
	X	25			Brown Silty fine Sand to fine Sandy Silt, trace fine Gravel, medium dense-moist		9					
15												
	X	20			Light Gray to Light Brown fine to medium Sand, trace coarse Sand, little Silt, medium dense-damp		4					
20												
	X	16					6					
25												
					Boring Terminated at 25'							

TBL 16G168.GPJ SOCALGEO.GDT 6/15/16

APPENDIX C



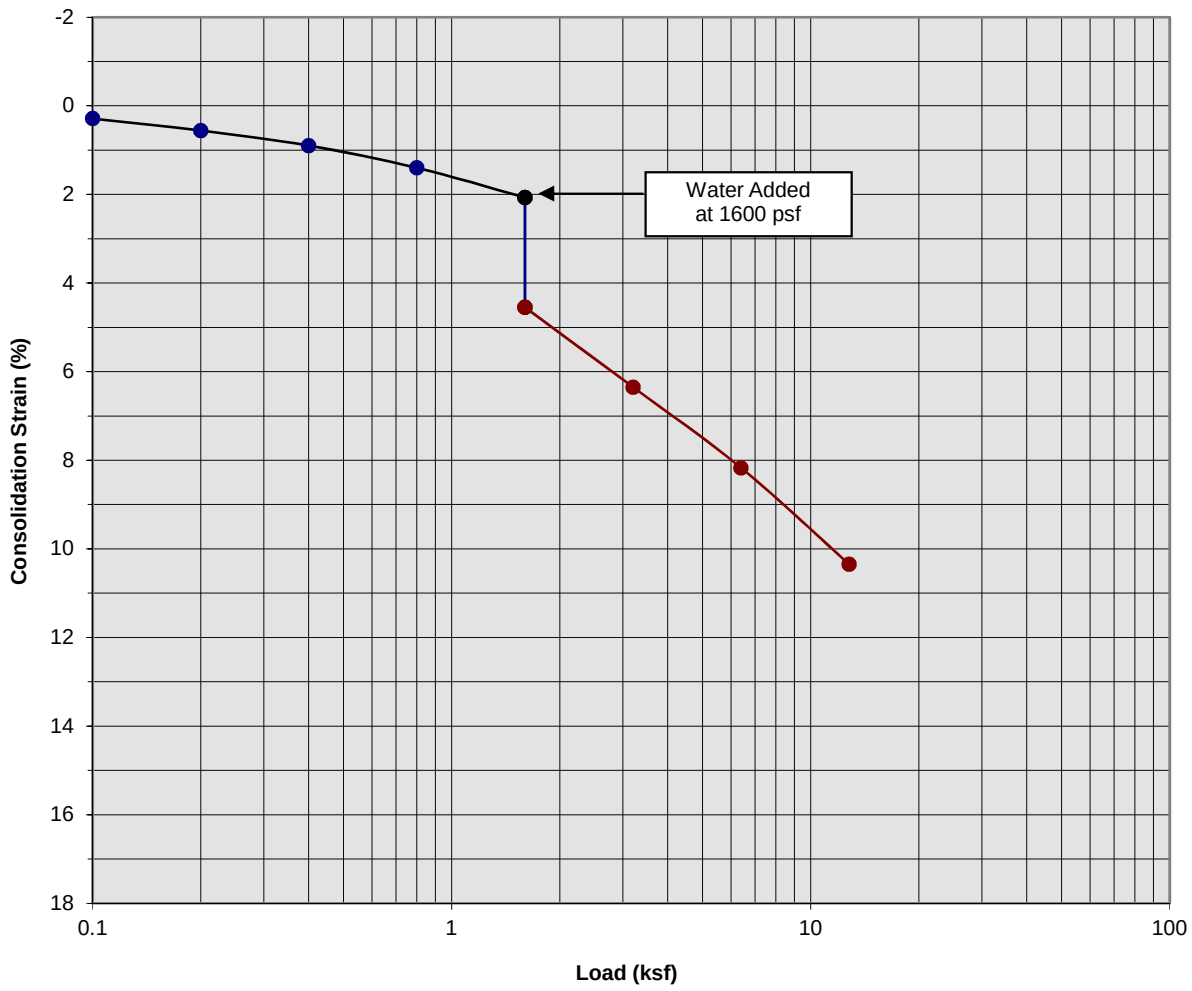
Classification: Orange Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-1	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	1 to 2	Initial Dry Density (pcf)	103.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.43

Proposed C/I Bldg
Riverside, California
Project No. 16G168
PLATE C- 1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Orange Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-1	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	3 to 4	Initial Dry Density (pcf)	101.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.48

Proposed C/I Bldg
Riverside, California
Project No. 16G168
PLATE C- 2

SOUTHERN CALIFORNIA GEOTECHNICAL
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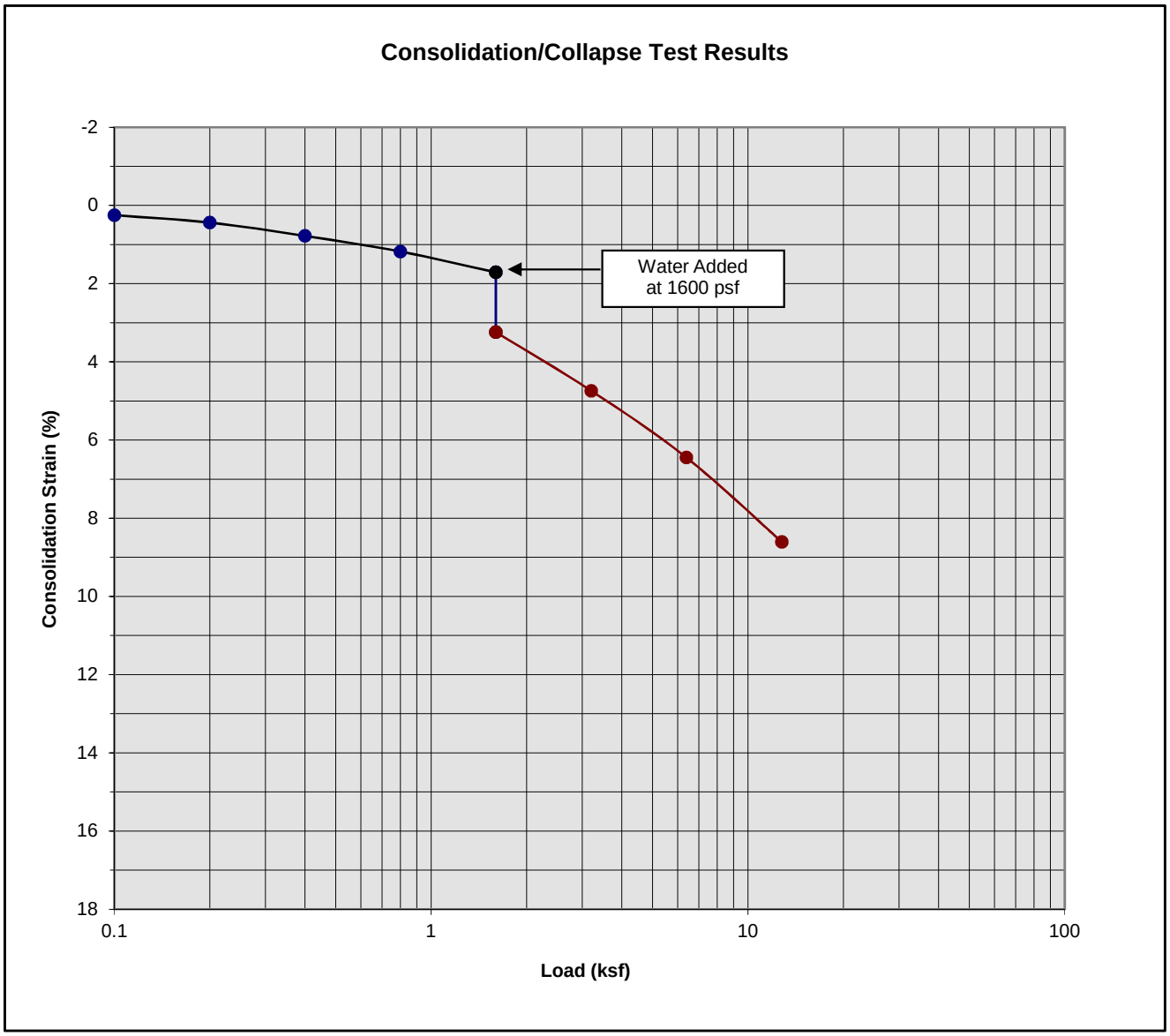
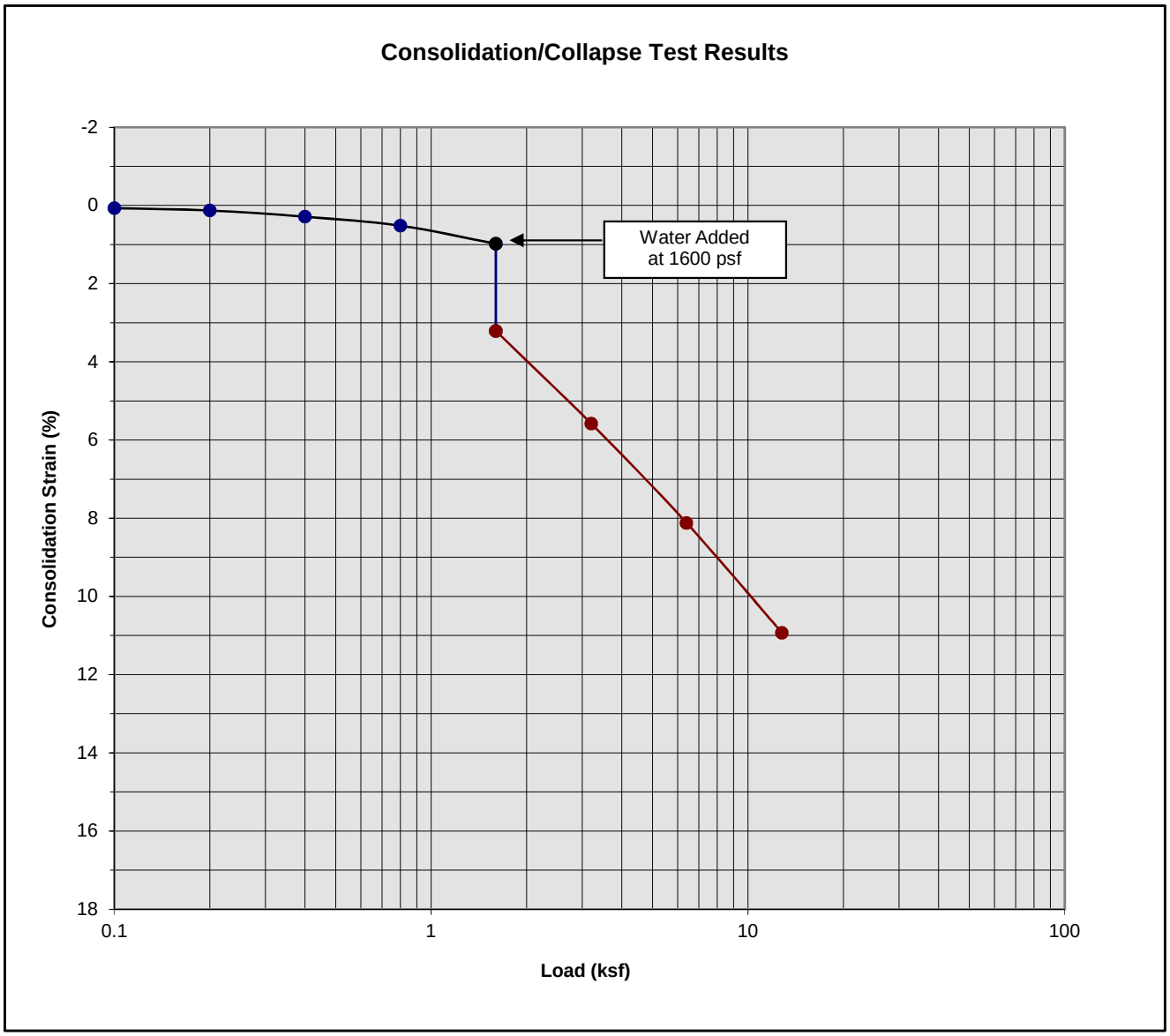


Classification: Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-1	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	5 to 6	Initial Dry Density (pcf)	104.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.53

Proposed C/I Bldg
Riverside, California
Project No. 16G168
PLATE C- 3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

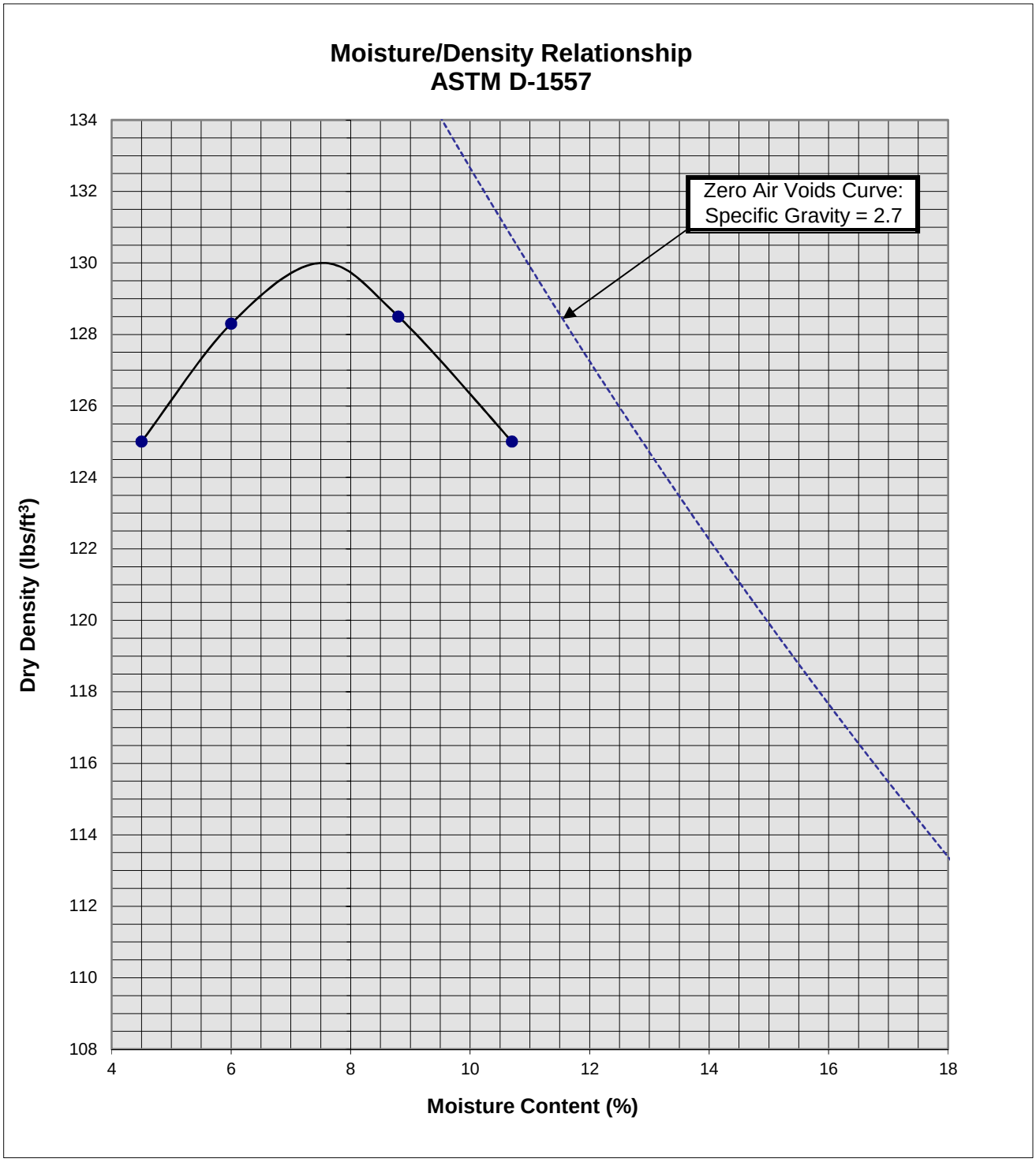


Classification: Brown fine Sandy Silt, trace medium Sand

Boring Number:	B-1	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	7 to 8	Initial Dry Density (pcf)	105.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	119.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.23

Proposed C/I Bldg
Riverside, California
Project No. 16G168
PLATE C- 4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Soil ID Number	B-3 @ 0 to 5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	130
Soil Classification	Brown Silty fine Sand, trace medium to coarse Sand

Proposed C/I Bldg
Riverside, California
Project No. 16G168
PLATE C-5

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

Compacted Fills

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as “contaminated,” and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

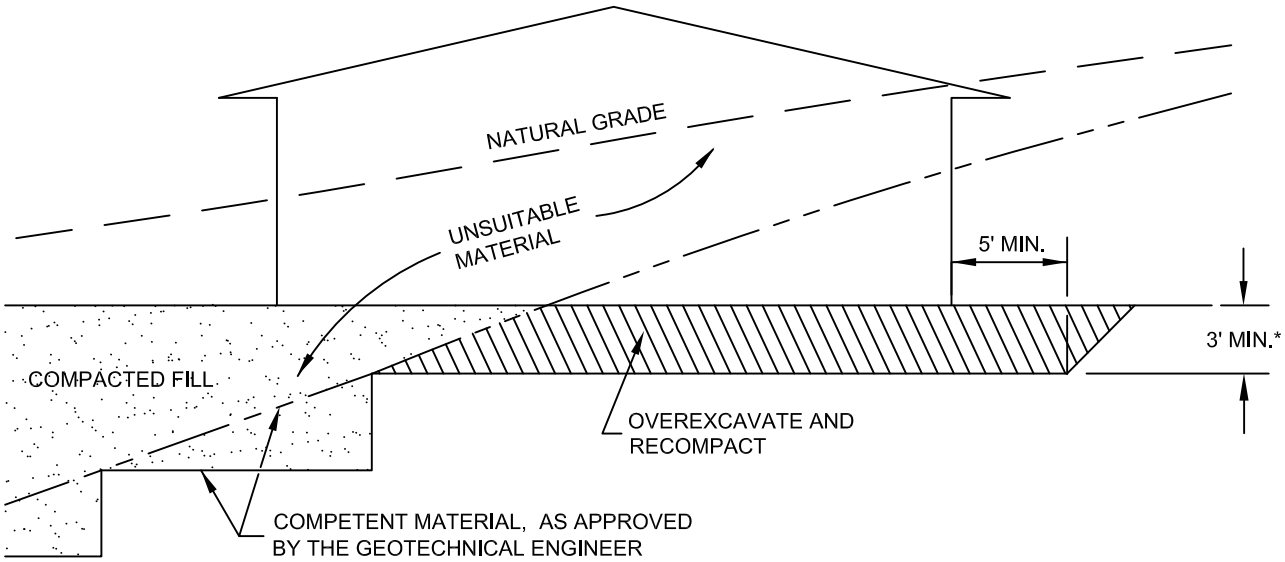
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

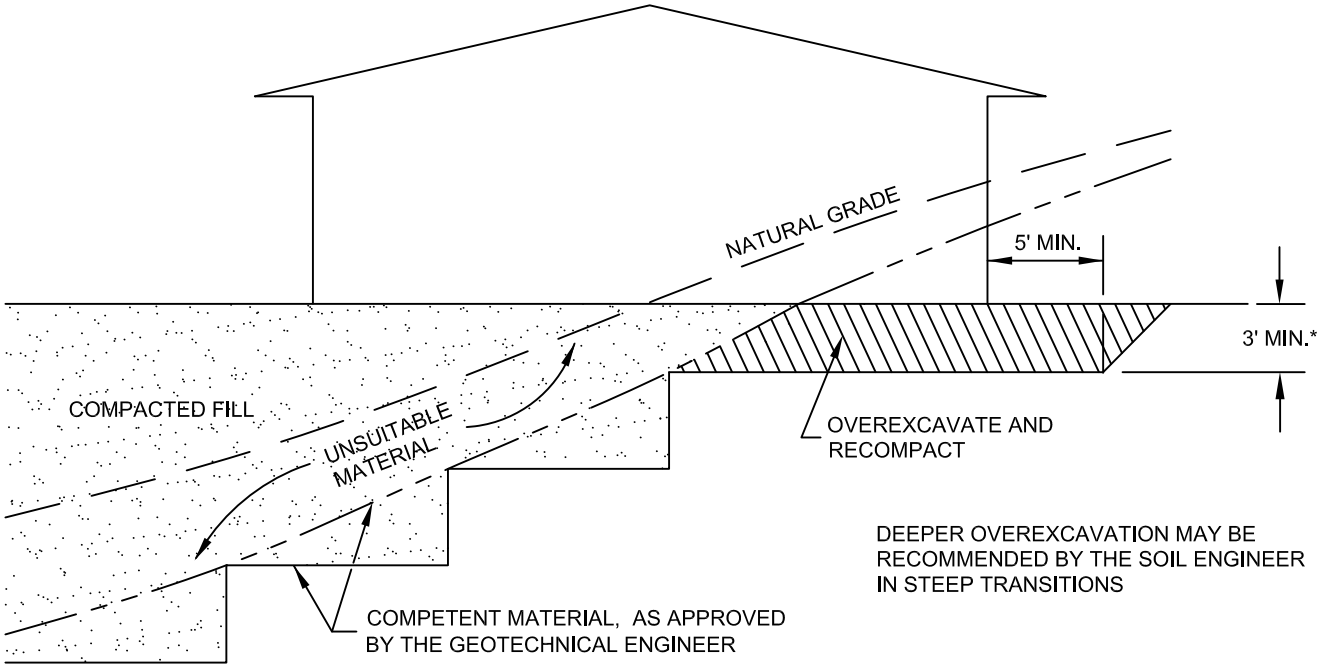
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

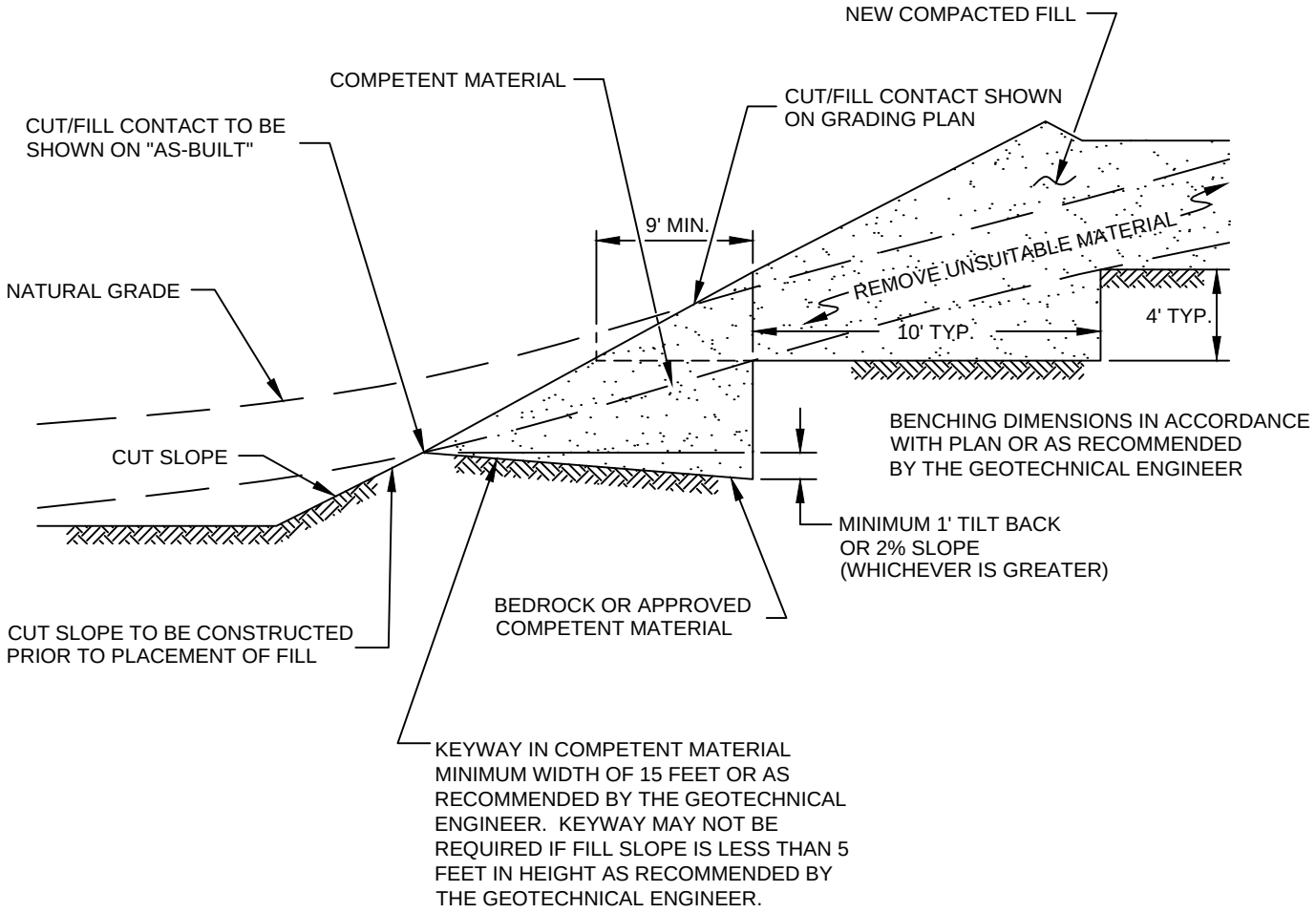
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

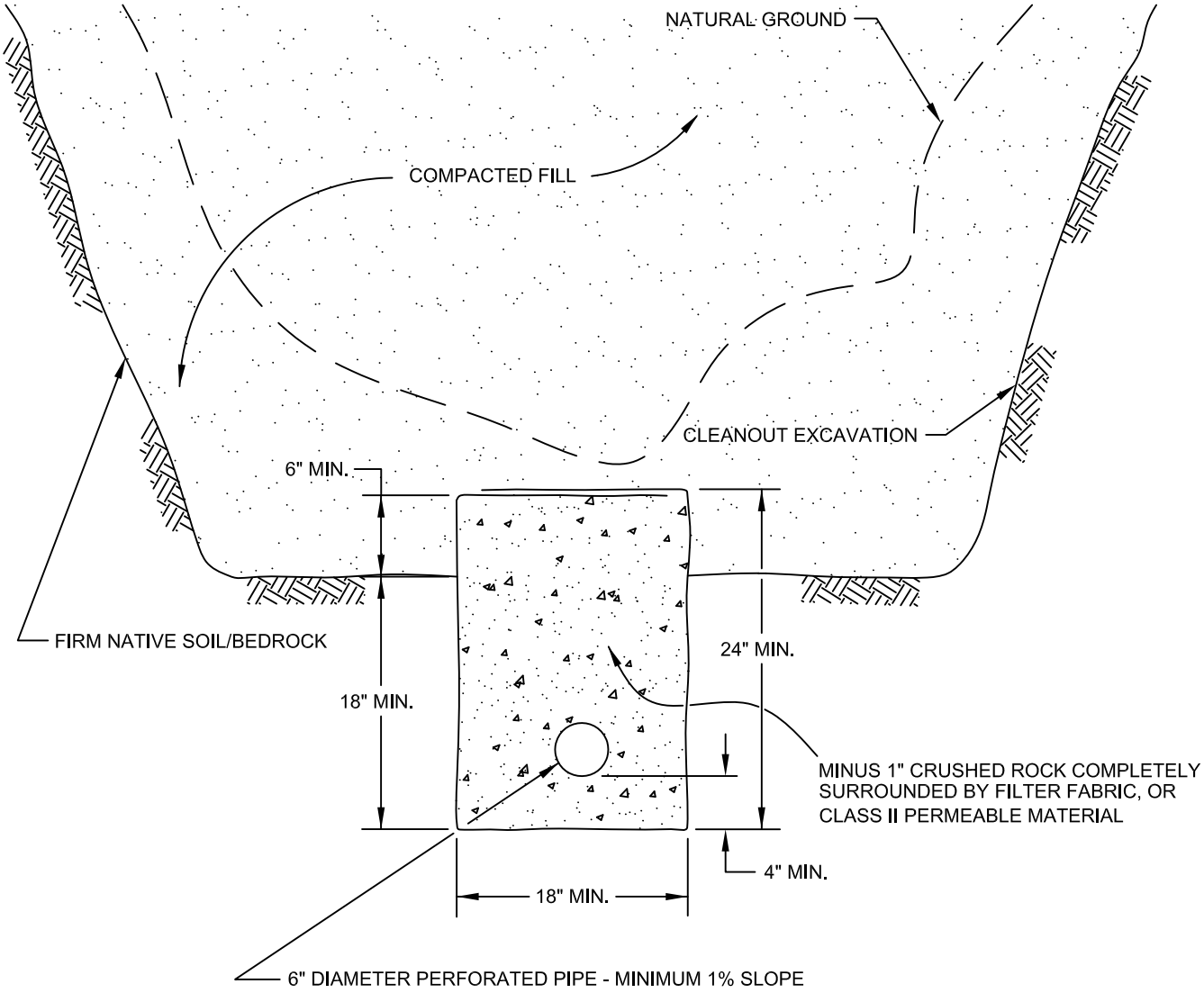
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

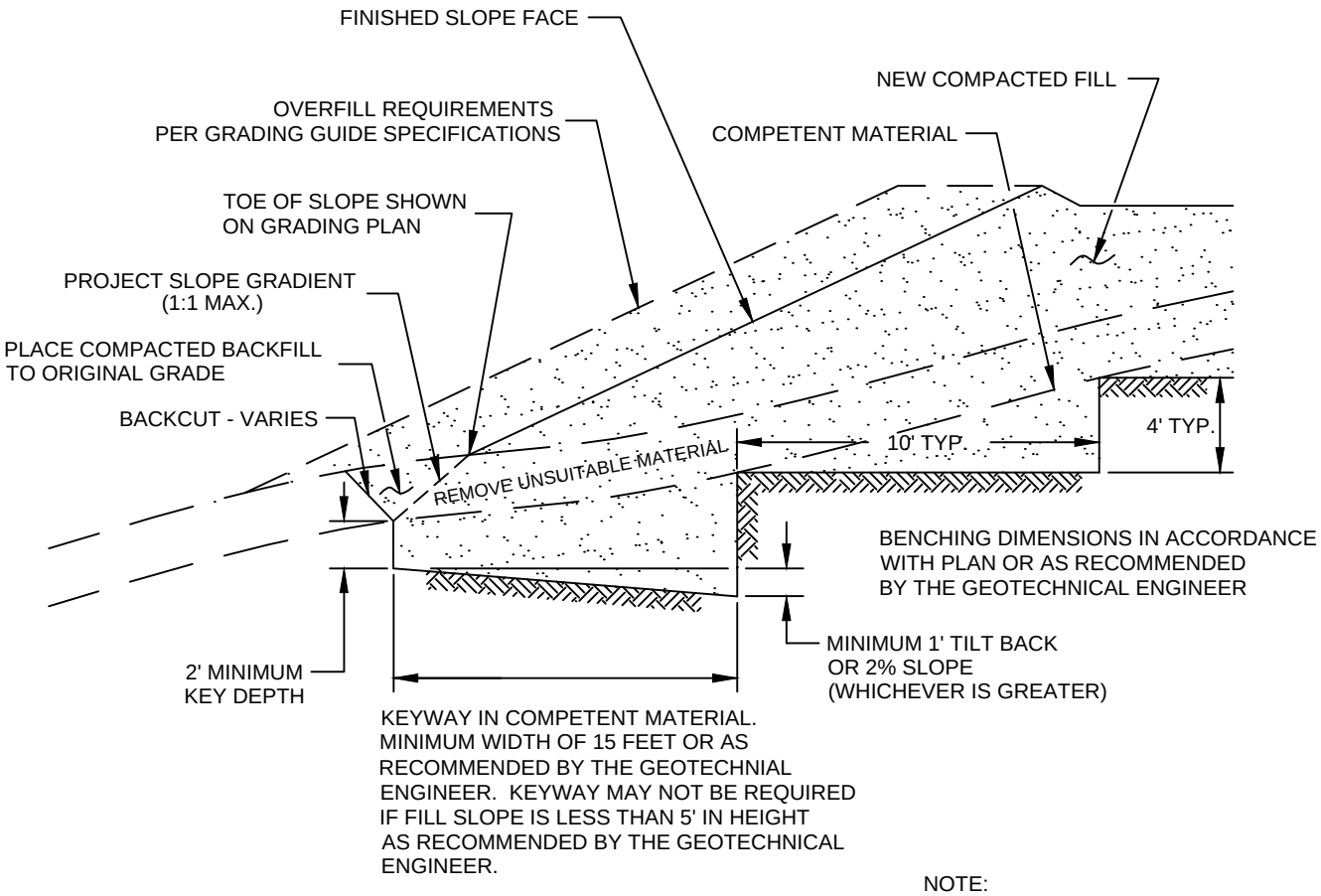
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED
WHEN NATURAL SLOPES ARE
EQUAL TO OR STEEPER THAN 5:1
OR WHEN RECOMMENDED BY
THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

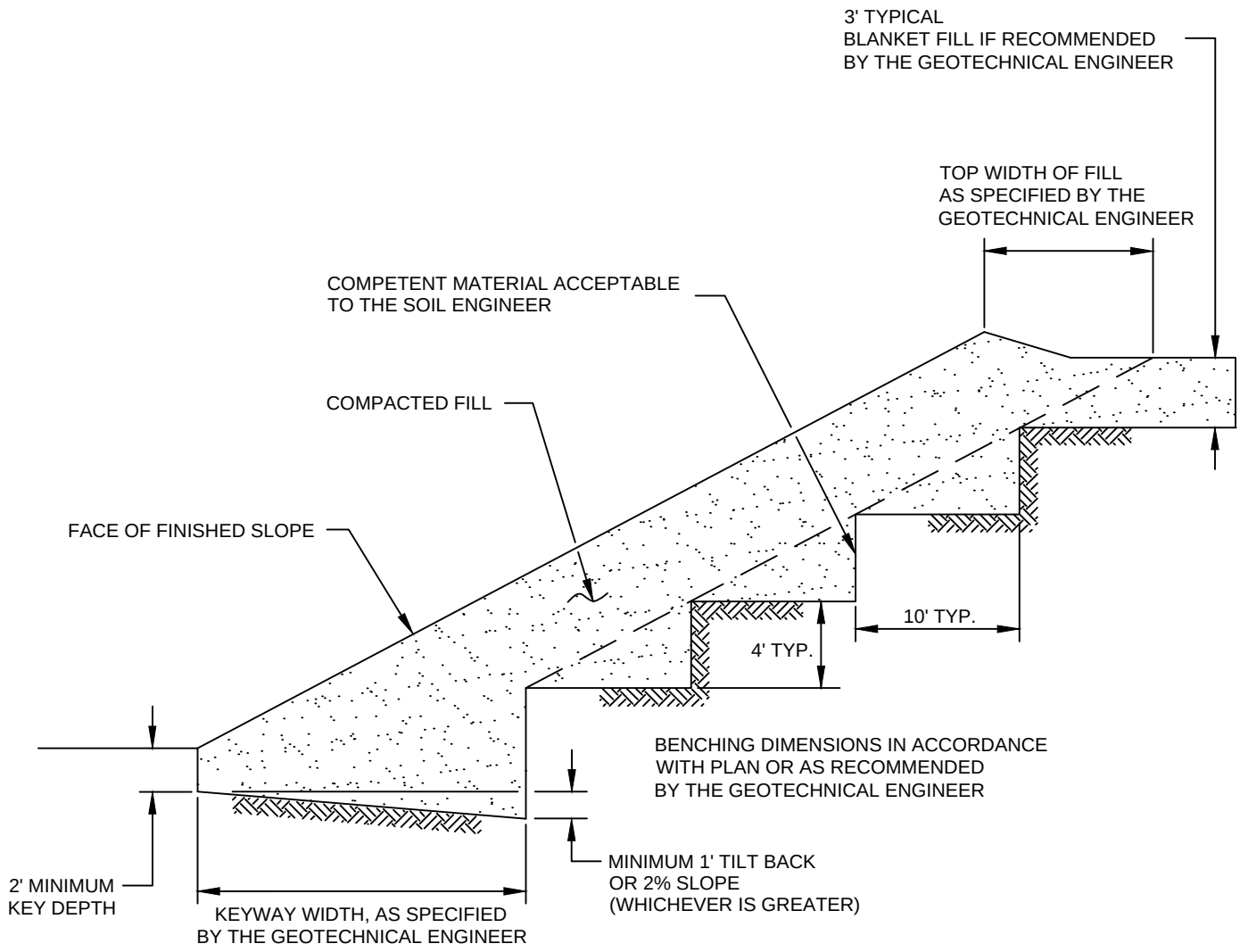
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

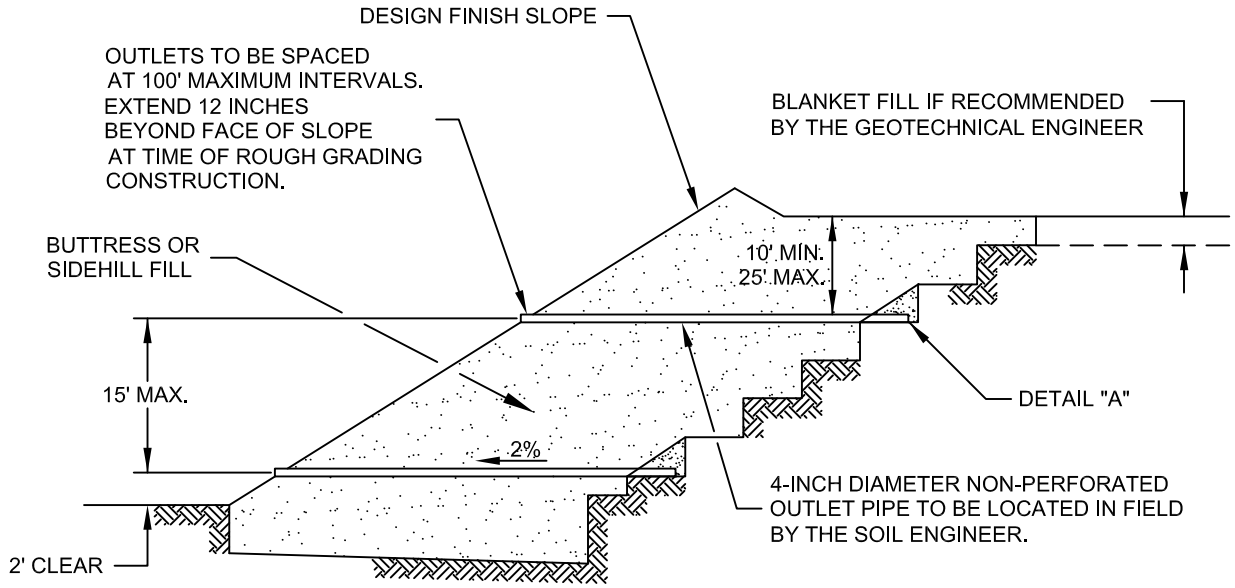
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SOUTHERN CALIFORNIA GEOTECHNICAL



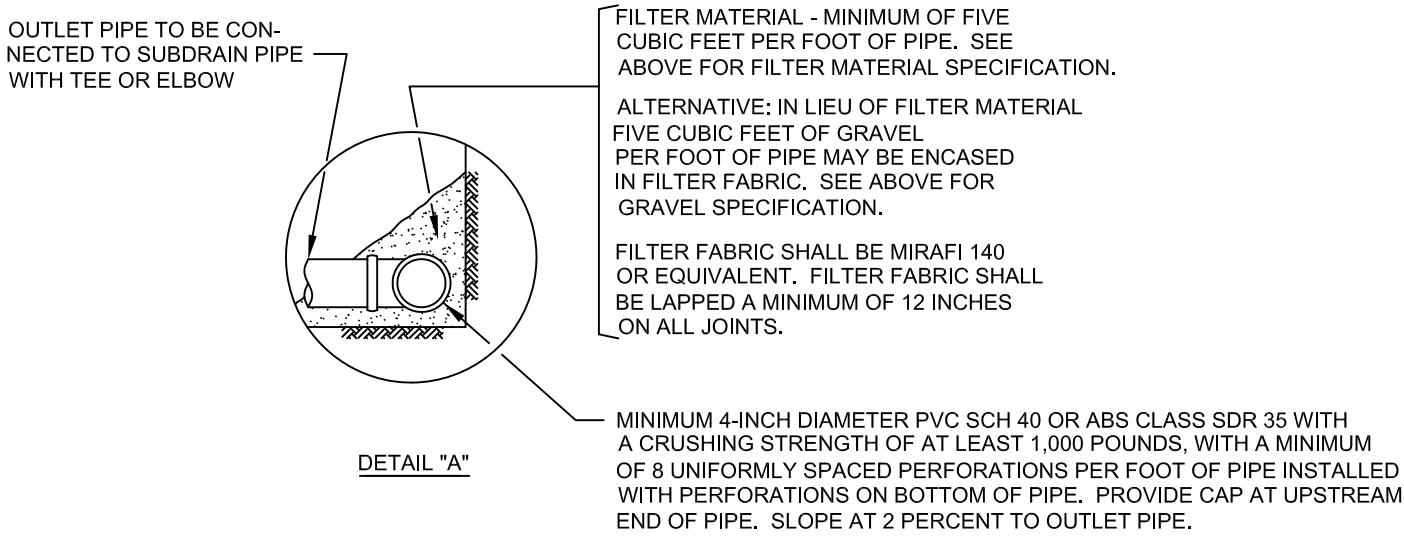
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

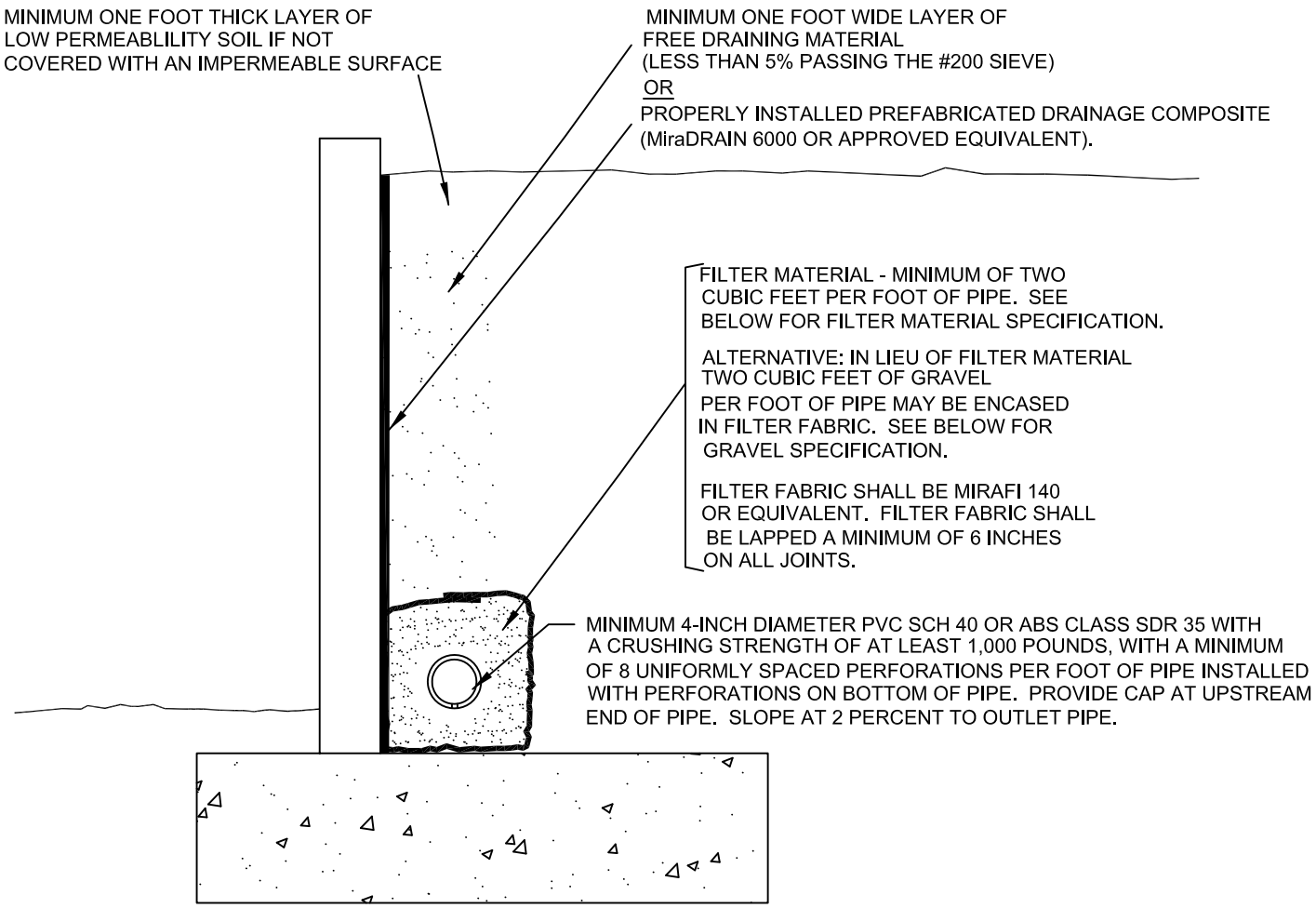
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

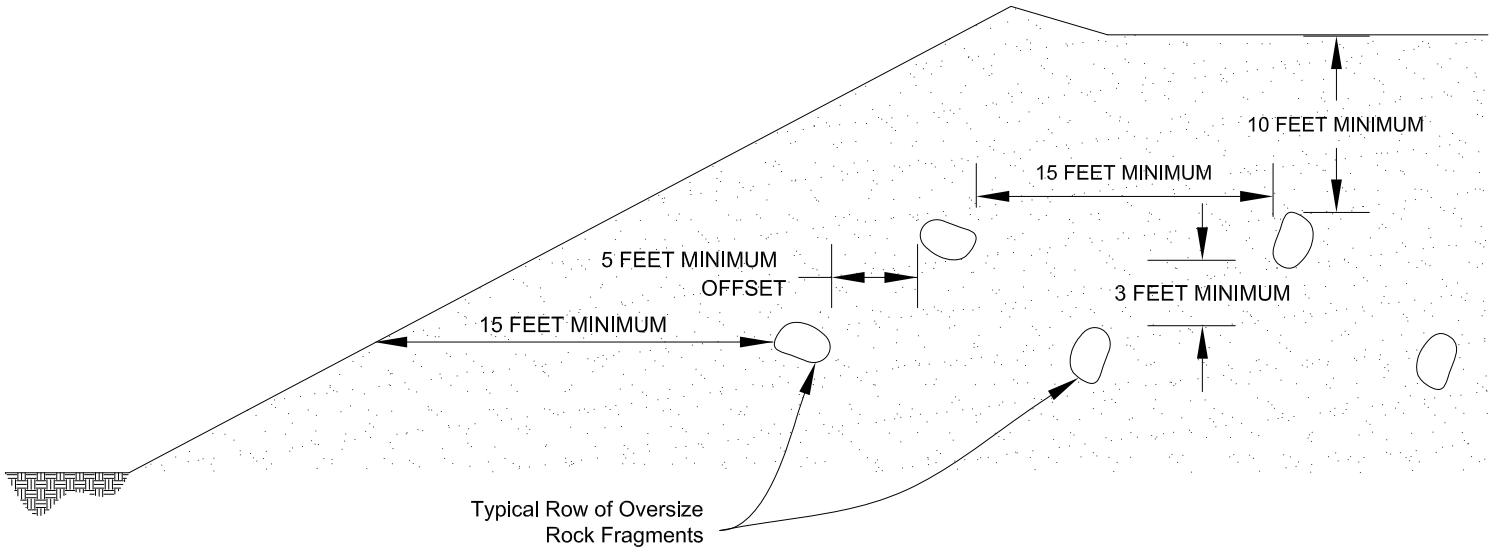
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

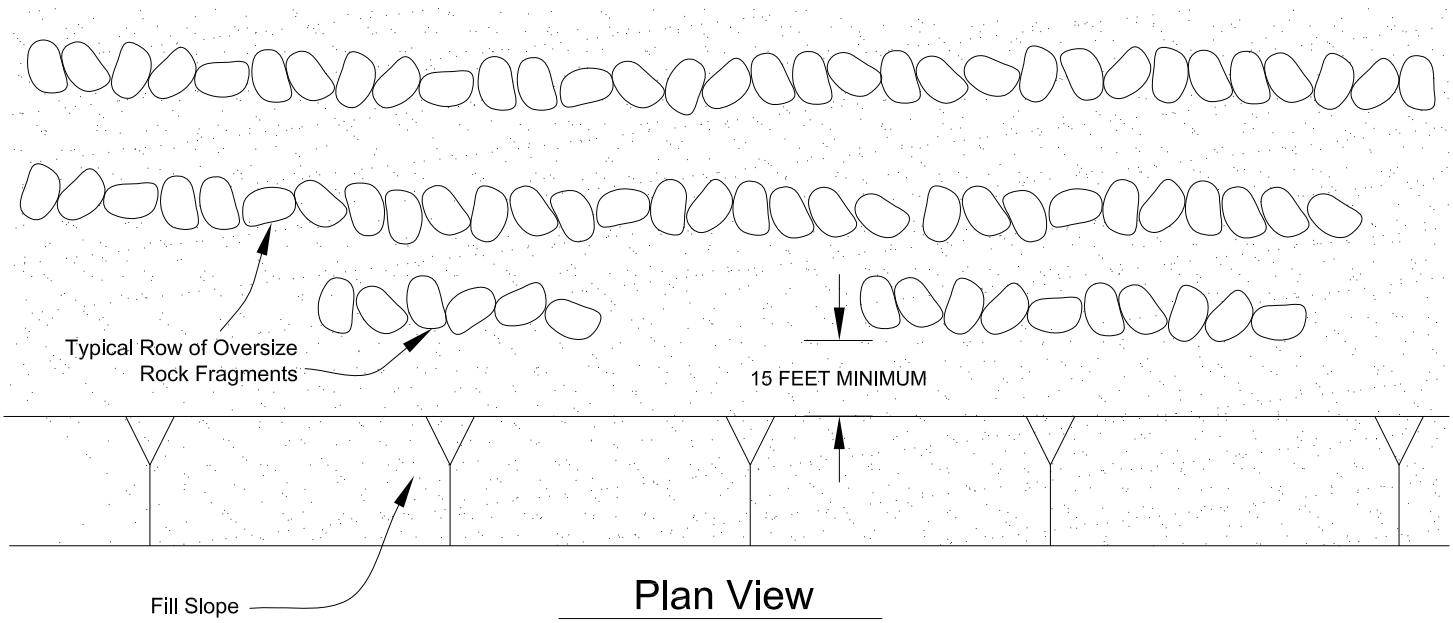
DRAWN: JAS
CHKD: GKM

PLATE D-7

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

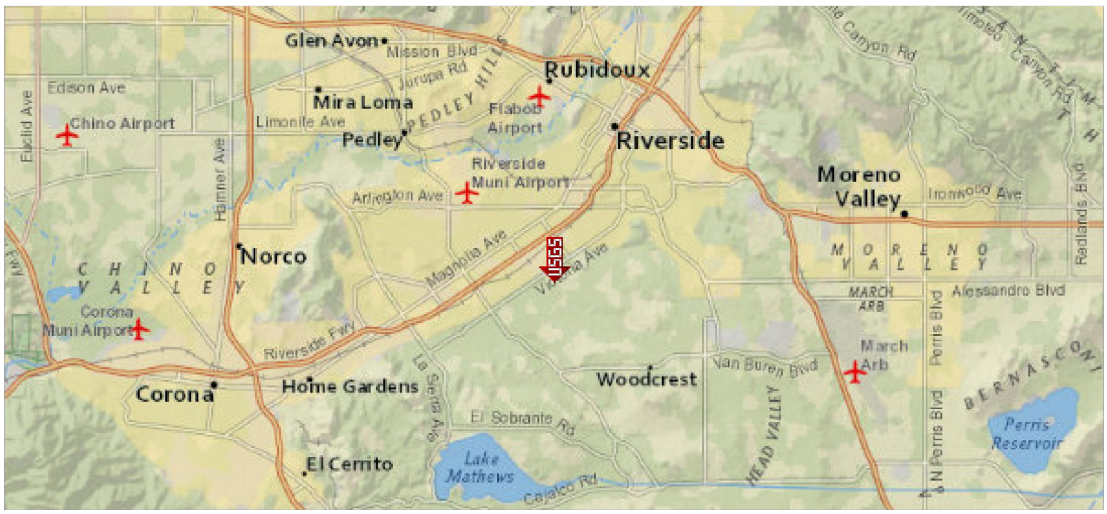
SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

USGS Design Maps Summary Report

User–Specified Input

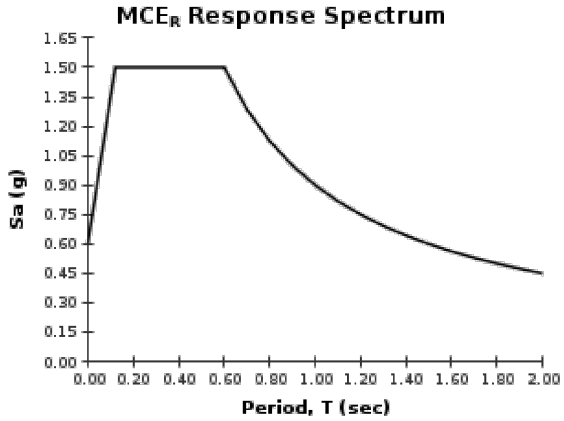
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.92582°N, 117.40365°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

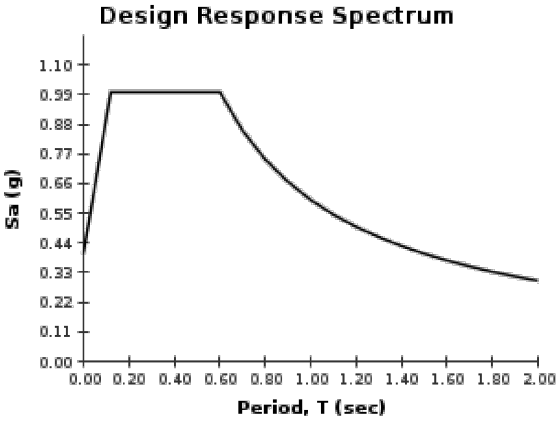


USGS–Provided Output

S_S =	1.500 g	S_{MS} =	1.500 g	S_{DS} =	1.000 g
S_1 =	0.600 g	S_{M1} =	0.900 g	S_{D1} =	0.600 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





SOURCE: U.S. GEOLOGICAL SURVEY (USGS)
<http://geohazards.usgs.gov/designmaps/us/application.php>

SEISMIC DESIGN PARAMETERS

PROPOSED COMMERCIAL/INDUSTRIAL BUILDING

RIVERSIDE, CALIFORNIA

DRAWN: PM
CHKD: JAS

SCG PROJECT
16G168-1

PLATE E-1

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

PHASE I ENVIRONMENTAL SITE ASSESSMENT

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

PHASE I ENVIRONMENTAL SITE ASSESSMENT UPDATE 9.6± ACRE PROPOSED INDUSTRIAL PROPERTY LINCOLN AVENUE AND GRACE STREET RIVERSIDE, CALIFORNIA

PROJECT NO. 21226.2
JULY 7, 1999

Prepared For:

Aluminum Body Corporation
P.O. Box 40
Montebello, California 90640-5422

Attention: Mr. Lee Granus

6121 Quail Valley Court ▲ Riverside, California 92507 ▲ (909) 653-1760 ▲ Fax (909) 653-1741

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

July 7, 1999

Aluminum Body Corporation
P.O. Box 40
Montebello, California 90640-5422

Project No. 21226.2

Attention: Mr. Lee Granus

Attached herewith is the Phase I Environmental Site Assessment Update conducted by this firm for the 9.6± acre proposed industrial property, located in the City of Riverside, Riverside County, California.

This Phase I Environmental Site Assessment Update was authorized and executed based upon a scope of services outlined in our Work Authorization Agreement dated June 8, 1999.

We appreciate the opportunity to provide this Phase I Environmental Site Assessment Update for this property. If you have any questions or comments regarding this assessment, please do not hesitate to contact this firm at your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.

M. Kevin Osmun, P.E.
Vice President

AAT:MKO:qam

Distribution: Addressee (2)

6121 Quail Valley Court ▲ Riverside, California 92507 ▲ (909) 653-1760 ▲ Fax (909) 653-1741

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EXECUTIVE SUMMARY

The subject site consists of 9.6 ± acres of vacant land.

The site was reported in a Phase I Environmental Site Assessment (ESA) conducted by Envirogenesis for Riverside National Bank in June, 1995. No significant adverse environmental concerns related to the site were discovered during that investigation.

Historically, the site has been predominately citrus groves. No adverse environmental impact to the site is anticipated from the previous citrus grove operations on the site due to its proposed commercial development. An approximately 10 by 10 foot concrete pad, apparently for a former wind machine, is present in the south center portion of the site. An above ground fuel tank may have been associated with this wind machine. We did not see any surficial signs of soil staining in the area of the pad.

End dumped fill, consisting mostly of concrete and asphalt is present on the east and north portion of the site. No drums barrels or containers were noted in any of the end dumped fill.

In the southeast corner of the site composite roof shingles were also noted.

There are no environmentally impaired sites within one-half to one mile of the site which would have an adverse environmental impact on the property.

Based on the results of this Phase I Environmental Site Assessment Update, the site does not appear to have been environmentally impaired due to on-site or off-site sources. The results of our investigative efforts indicate further investigation of the site is not deemed necessary.

INTRODUCTION

During June of 1999, LOR Geotechnical Group, Inc. performed a Phase I Environmental Site Assessment, (ESA) Update for 9.6 ± acre proposed industrial property located on the southwest corner of Grace Street and Lincoln Avenue in the City of Riverside, Riverside County, California. This Phase I ESA Update was conducted for Aluminum

Body Corporation in general accordance with the Standard Practice for Environmental Site Assessments, ASTM E 1527-97. The purpose of this Phase I ESA Update is to identify, to the extent feasible pursuant to the processes described within, recognized environmental conditions in connection with the property. As such, this report is intended to permit Aluminum Body Corporation to satisfy one of the requirements to qualify for the innocent landowner defense under CERCLA in that all appropriate inquiry into the previous uses of the property consistent with good commercial or customary practice has been conducted.

The approximate location of the site, within its regional setting is presented on Enclosure A-1, within Appendix A.

The findings of our Phase I Environmental Site Assessment Update, as well as our conclusions and recommendations, are presented in the following sections of this report.

PREVIOUS PHASE I ESA REPORT

The following Phase I ESA report was previously conducted for the site. This update is based upon this Phase I Update:

- Envirogenesis, Phase I Environmental Site Assessment Goldenwest Industrial Park (proposed) 9.59 Acre Vacant Parcel (zoned map), 7700 Lincoln Avenue @, 2800 Grace Street (SW Corner), Riverside, California, 92504, Riverside County APN 237-040-02, dated June 30, 1995.

The Phase 1 Environmental Site Assessment Report, dated June 30, 1995, was for a proposed industrial park and was conducted by Envirogenesis for Martinez and Turek, Inc. The report indicated that the site did not appear to have been environmentally impaired due to on-site or off-site sources. However, this report recommended environmental action regarding the roof shingles and roof felt present in a demolition debris pile on the southeast portion of the site for the possible presence of asbestos mineral constituents. They stated any suspect asbestos should be sampled and analyzed. Any materials identified as asbestos by testing should be properly bagged, transported, and disposed of prior to development. Also, this report recommends the use of caution during future site excavation and grading operations

due to the presence of asphalt and concrete debris and potential presence of irrigation wellbore (pipe).

METHODOLOGY AND PROCEDURES

During our research for this Phase I Environmental Site Assessment Update, we contacted city and county agencies for updated records pertaining to the site. Updated environmental databases were reviewed to ascertain the presence of know environmentally impaired sites within the immediate area of the property and to determine their impact, if any to the site.

Concurrent with our review of available literature and database research and aerial photographs, a site reconnaissance of the property was conducted. The site reconnaissance was conducted in order to determine current uses of the site and the potential for soil and/or possible groundwater contamination based on above-ground visual observation. Included with our field reconnaissance was a drive by survey of the immediate vicinity.

Aerial photographs from the Riverside County Flood Control were reviewed to ascertain the presence of previous structures at the site.

AERIAL PHOTOGRAPH REVIEW

To obtain a comprehensive history of prior site usage and locate previous structures a search was conducted for available aerial photographs of the area on file at the Riverside County Flood Control, by a geologist from this firm. The search reviewed aerial photographs taken of the site and surrounding area in 1931, 1948, 1962, 1974, 1980, 1984, 1990, and 1995.

The aerial photographs reviewed consisted of vertical aerial stereographic photographic pairs of varying scales. These photographs were viewed using stereoscopes with magnifications of 2X, and 4X for three-dimensional enhancement. Due to the relatively large photographic scales involved, the analysis and subsequent interpretation of detail from aerial photographs sometimes requires a degree of subjective judgement. The degree of certainty on the interpretation of details depends upon such factors as the scale and the quality of the photograph. However, an

analysis of aerial photographs will reveal the general site history as to the relative use of the land, possible ground disturbance, activities, etc.

A summary of the site and surrounding conditions during the various times, as reflected in the photographs, is given below.

1. **September 24, 1931, Flight No. 1931, Photos No. 254-255, Scale 1" = 1000'**

Groves are present on the subject property. A small structure is visible in the trees and maybe a windmill in the south central portion of the property. Several large trees outline the property to the north along Lincoln Avenue and east along Grace Street. Surrounding land use is groves and agricultural fields with the exception of single family residences to the northeast. The field to the west is not groves, it is a plowed field.

2. **January 19, 1948, Flight No. 1948, Photos No. 60, 62, Scale 1" = 2625'**

The site and immediate surrounding region appear as described in the previous photographs, except that the trees from the northern approximate 200 feet of the property have been cleared. The property adjacent to the west has been plowed/graded in the northeast corner.

3. **January 30, 1962, Flight No. 24244, Photos No. 3-439,-440, Scale 1" = 2000'**

The site and immediate surrounding region appear as described in the previous photographs. However, trees have been replanted in the northern 200 feet of the site. On the property to the west, a residence was built in the southwest corner along Jefferson Street.

4. **May 24, 1974, Flight No. 1974, Photos No. 155,156, Scale 1" = 2000'**

The site and immediate surrounding region appear as described in the previous photographs.

5. **February 1, 1980, Flight No. 1980, Photos No. 159,160, Scale 1" = 2000'**

The site appears as described in the previous photographs. Some land use changes are apparent to the west, north, and east of the site. To the west, the property has been developed with an industrial building on the north and with a parking area to the south. An industrial building exists to the north of the site across Lincoln Avenue. Apartments exist to the east.

6. **February 7, 1984, Flight No. 1984, Photos No. 1517,1518, Scale 1" = 1600'**

The northwest corner of the site has been cleared of groves and graded. Cars are parked along the western site boundary in this graded area. The graded area is approximately 200 feet by 400 feet. The cars may be associated with the apartments to the east.

7. **January 23, 1990, Flight No. 1990, Photos No. 5-16,5-17, Scale 1" = 1600'**

The groves have been cleared from the entire site. The foundation for the windmill is visible in the south central portion of the site. The immediate surrounding region appear as described in the previous photographs.

8. **January 28, 1995, Flight No. 1995, Photos No. 5-15,5-16, Scale 1" = 1600'**

The site and immediate surrounding region appear as described in the previous photographs.

Sanborn Maps

We contracted with Vista Information Solutions, Inc. (VISTA) to determine if any Sanborn Maps were available for the site. A search was conducted and no Sanborn Maps were available for the address range provided.

SITE RECONNAISSANCE

A site reconnaissance was conducted on June 17, 1999 by Mr. M. Kevin Osmun of this firm. To orient our site visit an Assessor's Parcel Map was provided for our use.

A copy of the Assessor's Parcel Map is provided on Enclosure A-2, within Appendix A.

The site is roughly square consisting of 9.6± acres of vacant land located on the southwest corner of Lincoln Avenue and Grace Street, Riverside, California. The site topography is planar with an overall slope to the west. The site has recently been disced and vegetation is sparse.

The surface of the site has numerous pieces of broken concrete and asphalt especially along the east and north portion of the site. We noted several pieces of broken concrete irrigation pipe alluding to the past agricultural use of the site.

Located in the south center portion of the site was an approximate 10 by 10 foot square concrete pad with bolts in the center. The concrete pad appears to have been for a wind machine. Wind machines may have an above ground fuel tank or electricity as their source of power. Based on its age, an above ground fuel tank may have been associated with the wind machine. We did not see any soil staining in the area of the concrete pad.

The most significant area of dumped trash is present on the southeast corner of the site. The trash consisted mainly of concrete, footings, asphalt and composite shingles. Based on our observation of the majority of trash dumped at the site, no hazardous materials are present and it appears suitable for disposal in a Class III landfill with the exception of the composite shingles which may have asbestos mineral constituents and should be tested by the demolition contractor prior to removal from the site.

We noted several empty 1-quart plastic containers of oil over the east and north portion of the site. No soil staining was noted associated with these empty 1-quart oil containers. No drums or barrels were noted. No stained soil or unusual odors were noted on the site.

Adjacent Properties

The site is bordered on the east by Grace Street followed by apartments and to the south by citrus groves. West of the site is Supreme Truck Bodies of California, a truck

body manufacturer. North of the site, across Lincoln Avenue, is ER Carpenter Company, a large industrial building.

A drive by survey of these adjacent properties did not reveal any potential above ground sources of contamination such as drums, barrels, or containers.

Color photographs of the site and adjacent properties are presented within Appendix A.

REGULATORY AGENCY REVIEW

For accidental spills of hazardous materials within the County of Riverside, the County of Riverside Department of Environmental Health Services (DEHS), generally acts as the lead agency. The Regional Water Quality Control Board (RWQCB), Santa Ana Region, generally becomes the lead agency for groundwater contamination investigation and remediation.

The County DEHS was contacted for information regarding the site and had no information on file regarding the site.

The City of Riverside Fire Department was contacted for any information regarding UST's or hazardous materials incidents at the site. They indicated they had no record of any hazardous materials incidents or UST's at the site.

REGULATORY DATABASE REVIEW

LOR Geotechnical Group, Inc. contracted with Vista Information Solutions, Inc. (VISTA) to provide an updated environmental database search for the site. The database search provides information regarding landfills, underground storage tanks, hazardous waste sites, contaminated wells and other knowledge of hazardous waste on the site and surrounding properties.

A copy of the VISTA report, which provides a complete list of the databases searched, is provided within Appendix B.

EPA CERCLIS/NPL Sites

Pursuant to the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA), the U.S. Environmental Protection Agency (EPA) has developed and maintained lists of contaminated properties under the Federal Superfund Program.

There were no sites listed on the April 1999 National Priority List within a one-mile radius of the site.

There were no sites identified with an one-half mile radius of the subject property which are included on the March 1999 Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS).

EPA RCRIS Generators/TSD Facilities

The February 1999 RCRIS list of Temporary Storage and Disposal (TSD) Facilities has no listing within a one-half mile radius of the site.

The February 1999 RCRIS list of large and small quantity hazardous waste generators listed two facilities within one-eighth mile of the site. The sites are ER Carpenter Company at 7809 Lincoln Avenue and Supreme Truck Bodies of California at 7888 Lincoln Avenue. Supreme Truck Bodies of California is adjacent to the west of the site and ER Carpenter Company is across Lincoln Avenue, north of the site. Both are small quantity generators and should not adversely impact the site.

EPA CORRACTS

The February 1999 RCRIS Corrective Action Report (CORRACTS) database did not list any facilities within a one-mile radius of the site.

EPA ERNS

The EPA Emergency Response Notification System (ERNS) database, dated December of 1998 was reviewed and there was no listing of the site.

DTSC Annual Workplan Sites

The October 1998 List of Active Annual Workplan sites had no sites listed within one-mile of the site.

Cortese List Sites

The California Governor's Office of Planning and Research annually publishes a list of potential and confirmed hazardous waste sites throughout the State of California. The April 1998 Cortese list was reviewed to identify sites within one-eighth mile of the subject property. There were no sites identified on this list within a one-eighth mile radius.

Leaking Underground Storage Tanks

The California Regional Water Quality Control Board (CRWQCB) maintains a list of all leaking underground storage tanks (LUST) within its regions. According to the CRWQCB, Region 8, January 1999 database and the LUST Information System (LUSTIS), October 1998 database of Leaking Underground Storage Tanks, there are four sites with an underground storage tank leak within one-half mile of the site. These sites, their addresses, and status are presented in the following table:

Facility	Address	Status
Riverside City Corporate Yard	8095 Lincoln Avenue	Not Confirmed
California Highway Patrol	8118 Lincoln Avenue	Case Closed
Topham and Sons	3245 Madison Street	Not Confirmed
City of Riverside Training Tower	3205 St. Lawrence Street	Case Closed

No adverse environmental impact to the subject property is anticipated from the above LUST sites due to their distance from the site.

Landfills

No transfer stations, or proposed special facilities were identified within a one-half mile radius of the site during a review of the December 1998 California Waste Management Board Solid Waste Information Systems (SWIS) list, and the Riverside County Waste Management Exempt Site Inventory list dated March 1997. Two closed facilities, Bio-Gro Sludge Management Plan and Regional Green West Composting Factory were located within one-half mile of the site.

UST

The Riverside County Department of Environmental Health list of registered UST's dated January 1999 and the CRWCB Hazardous Substance Storage Container database (historical listing of UST sites) dated January 1994, had one listing within a one-quarter mile radius. This site was ER Carpenter Company located at 7809 Lincoln Avenue, across Lincoln Avenue north of the site.

Calsites

The California Environmental Protection Agency maintains the Calsites database which contains a listing of potential hazardous waste sites. This database is compiled from the Abandoned Site Survey Program and Rural Site Evaluation Program. The October 1998 Calsites list was reviewed and no sites were listed within one-mile of the site.

Database Summary

Based on the information provided by the information obtained during our records search, site reconnaissance and literature review, the site does not appear to be a hazardous waste property or border zone property, as defined in Section 25221 of the State of California's Health and Safety Code.

CONCLUSIONS AND RECOMMENDATIONS

The composite shingles noted in the southeast corner of the site do not appear to, but may contain asbestos minerals. These roof shingles should be tested for the presence

of asbestos mineral constituents by the demolition contractor prior to removal from the site.

An above ground fuel tank may have been associated with the former wind machine on the site. We did not observe any stained soil, however, some may be uncovered when the slab is removed. If this occurs the stained soil should be removed and properly disposed of.

We have performed a Phase I Environmental Site Assessment Update in conformance with the scope and limitations of ASTM Practice E1527-97 for the 9.6± acre proposed industrial property located on the southwest corner of Grace Street and Lincoln Avenue in the City of Riverside, Riverside County, California. This update assessment has revealed no evidence of recognized environmental conditions in connection with the property.

LIMITATIONS

LOR Geotechnical Group, Inc., has performed our services within the limits prescribed by our client, with the usual thoroughness and competence of the Environmental Profession. The conclusions in this report are based upon readily available data obtained, literature researched and information provided by consultants. It is assumed and expected that the information provided by these third parties is accurate. LOR does not guarantee the accuracy or completeness of any information provided by third parties nor shall LOR be responsible for errors, omissions or damages arising out of the use of that information. Our site description represents the conditions observed at the time of our site reconnaissance only. The information obtained was solely for the project and scope of services described.

CLOSURE

We appreciate this opportunity to be of service and trust this report provides the information desired at this time. Should questions arise, please do not hesitate to contact this office.

Respectfully submitted,
LOR Geotechnical Group, Inc.

Andrew A. Tardie
Staff Geologist

M. Kevin Osmun, PE, REA 642
Vice President

REGISTERED ENVIRONMENTAL ASSESSOR
M. KEVIN OSMUN
No. 00642
Expires: 6-30-00
STATE OF CALIFORNIA

AAT:MKO:qam

Distribution: Addressee (4)

APPENDIX F

WATER QUALITY MANAGEMENT PLAN

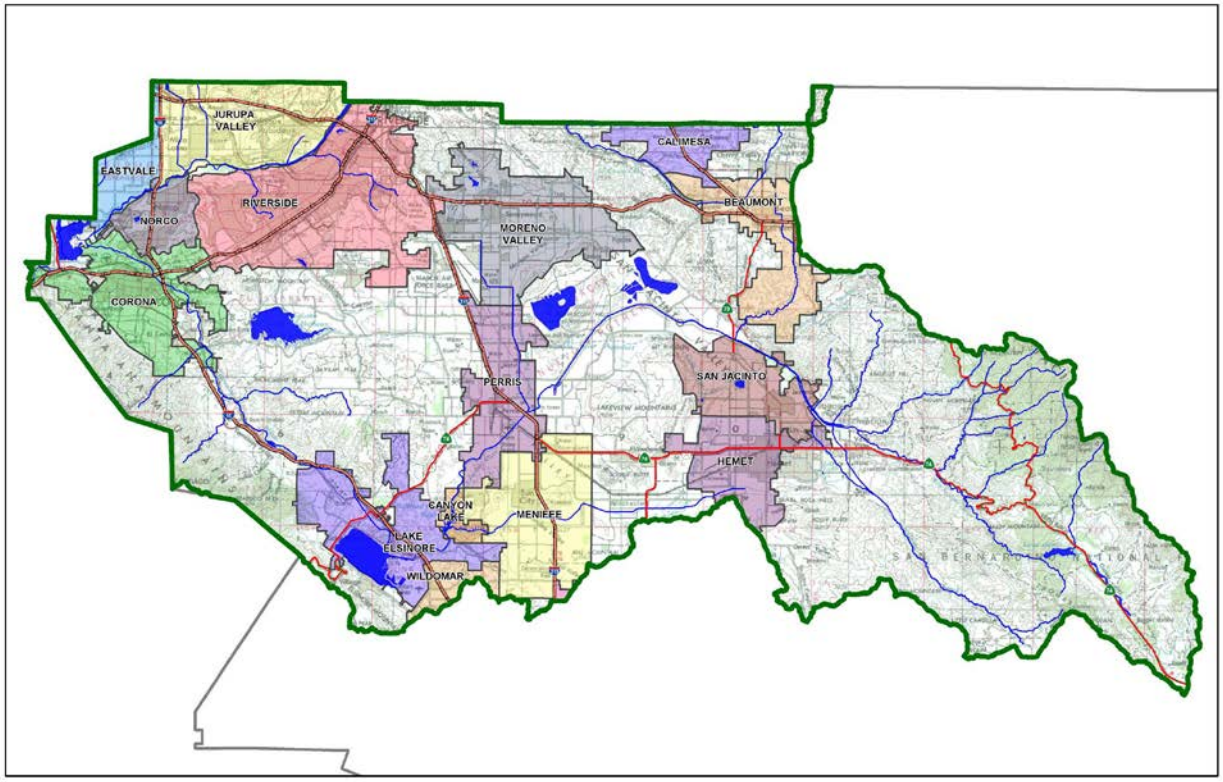
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Lincoln Business Park

Development No: APN: 237-040-020

Design Review/Case No: _____



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E-mail: Kevin.richer@lddc.net

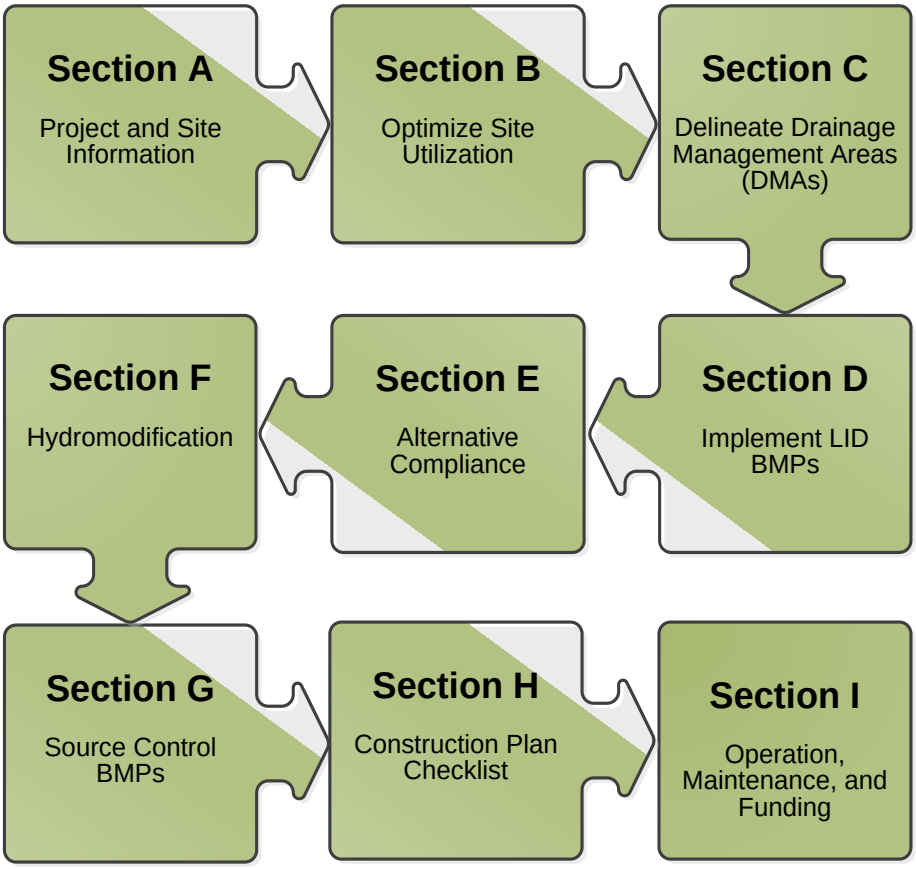
☒ **Preliminary**
☐ **Final**

Original Date Prepared: November 4, 2015

Prepared for Compliance with
Regional Board Order No.

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Riverside Lincoln, LLC , a California Limited Liability Company by Land Development Design Company, LLC, for Lincoln Business Park project.

This WQMP is intended to comply with the requirements of the City of Riverside for Plot Plan Number:_____ which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Riverside Water Quality Ordinance (Municipal Code Section x).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

_____	_____
Owner's Signature	Date
Klaas Vlietstra	Managing Member
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. _____ and any subsequent amendments thereto."

_____	_____
Preparer's Signature	Date
Kevin J. Richer	Project Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION
Type of Project:
Planning Area:
Community Name:
Development Name:
PROJECT LOCATION
Latitude & Longitude (DMS): 33d55’33”/-N 117d24’14” W
Project Watershed and Sub-Watershed: Santa Ana Watershed; San Jacinto Watershed
APN(s): APN: 0237-040-20
Map Book and Page No.: M.B. 11/20
PROJECT CHARACTERISTICS
Proposed or Potential Land Use(s)
Proposed or Potential SIC Code(s)
Area of Impervious Project Footprint (SF)
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement
Does the project consist of offsite road improvements?
Does the project propose to construct unpaved roads?
Is the project part of a larger common plan of development (phased project)?
EXISTING SITE CHARACTERISTICS
Total area of existing Impervious Surfaces within the project limits (SF)
Is the project located within any MSHCP Criteria Cell?
If so, identify the Cell number:
Are there any natural hydrologic features on the project site?
Is a Geotechnical Report attached?
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)
What is the Water Quality Design Storm Depth for the project?

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Salt Creek	None	None	N/A
Temescal Creek	Nutrients and Pathogens	Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2)	N/A

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* City of Riverside Grading Permit	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, constraints might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. Opportunities might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bio retention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The existing drainage patterns have been identified. The proposed development will mimic the existing drainage pattern. Additionally, the proposed development will add bioretention facilities and permeable pavement.

Did you identify and protect existing vegetation? If so, how? If not, why?

There are minimal trees or shrubs onsite; however, the proposed landscape will significantly increase the canopy interception for the site. The landscape will include the use of native and drought tolerant tree and shrubs.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

The existing site sheet flows in a northwesterly direction towards Lincoln Avenue. The site consists of soil class B soil, due to the poor infiltration rate, alternative treatment methods will be used, but soil testing shows infiltration rate is 1.0" /hr.

Did you identify and minimize impervious area? If so, how? If not, why?

The project site is proposing a 88 percent impervious ratio. This is lower than a typical commercial development which is typically 90% impervious. Project is designed to meet the minimum requirements for parking, drive aisle width, pedestrian access, and building locations. Pervious pavement has been used in some parking areas to reduce impervious ratio.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

The northerly and easterly site flows are directed to bioretention facilities located in the landscape setback fronting Lincoln Avenue. The southerly and westerly flows sheet through permeable pavement.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
1A	Roofs	30,378	Type D
1B	Ornamental Landscape	15,680	Type D
1C	Concrete/Asphalt	26,700	Type D
2A	Roofs	29,638	Type D
2B	Ornamental Landscape	7,421	Type D
2C	Concrete/Asphalt	18,939	Type D
3A	Roofs	34,986	Type D
3B	Ornamental Landscape	3,589	Type D
3C	Concrete/Asphalt	40,563	Type D
3D	Permeable Pavement	8,424	Type D
4B	Ornamental Landscape	4,449	Type D
4C	Concrete/Asphalt	31,221	Type D
4D	Permeable Pavement	3,330	Type D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
N/A			

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A						

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]
N/A							

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
1A	Bioretention Basin (Area 1)
1B	Bioretention Basin (Area 1)
1C	Bioretention Basin Area 1)
2A	Bioretention Basin (Area 2)
2B	Bioretention Basin (Area 2)
2C	Bioretention Basin Area 2)
3A	Permeable Pavement (Area 3)
3B	Permeable Pavement (Area 3)
3C	Permeable Pavement (Area 3)
3D	Permeable Pavement (Area 3)
4B	Permeable Pavement (Area 4)
4C	Permeable Pavement (Area 4)
4D	Permeable Pavement (Area 4)

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?		X
If Yes, list affected DMAs: Area 1 & 2		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here: DMA1 & DMA2 have less than 1.6"/hour infiltration rates. See soils letter attached in App. 3		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

- ☐ Reclaimed water will be used for the non-potable water demands for the project.
- ☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).
- ☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 0.71 Acreas

Type of Landscaping (Conservation Design or Active Turf): *Conservation Design*

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 4.98 Acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 0.52

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 2.58 Acres

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
2.58 Acres	*0.71 Acres*

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 220

Project Type: Commercial /Industrial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 4.98 Acreas

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 158

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 784

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
784	*220*

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	*N/A*

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
1A	☐	☐	☒	☐	☐
1B	☐	☐	☒	☐	☐
1C	☐	☐	☒	☐	☐
2A	☐	☐	☒	☐	☐
2B	☐	☐	☒	☐	☐
2C	☐	☐	☒	☐	☐
3A	☐	☐	☒	☐	☐
3B	☐	☐	☒	☐	☐
3C	☐	☐	☒	☐	☐
3D	☐	☐	☒	☐	☐
4B	☐	☐	☒	☐	☐
4C	☐	☐	☒	☐	☐
4D	☐	☐	☒	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervi	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*

			ous Fraction, I_f					
	[A]		[B]	[C]	[A] x [C]			
						Design Storm Depth (in)	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x}{12}$	[G]

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	**Bioretention Basin (Area 1)**		
	[A]		[B]	[C]	[A] x [C]			
1A	*30,378*	*Roofs*	*1*	*0.89*	*27,097.2*	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1B	*15,680*	*Ornamental Landscaping*	*0.1*	*0.11*	*1,732*			
1C	*26,700*	*Concrete or Asphalt*	*1*	*0.89*	*23,816.4*			
	72,758	Total			52,645.6	0.54	2,369.1	240

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Bioretention Basin (Area 2)		
	[A]		[B]	[C]	[A] x [C]			
2A	*29,638*	*Roofs*	*1*	*0.89*	*26,437.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
2B	*7,421*	*Ornamental Landscaping*	*0.1*	*0.11*	*819.7*			
2C	*18,939*	*Concrete or Asphalt*	*1*	*0.89*	*16,893.6*			
	55,,998	Total			44,150.4	0.54	1,986.8	2,306

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Permeable Pavement (Area 3)		
	[A]		[B]	[C]	[A] x [C]			
3A	*34,986*	*Roofs*	*1*	*0.89*	*31,207.5*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
3B	*3,589*	*Ornamental Landscaping*	*0.1*	*0.11*	*396.4*			
3C	*40,563*	*Concrete or Asphalt*	*1*	*0.89*	*54,828.6*			
3D	*8,424*	*Permeable Pavement*	*0.1*	*0.11*	*930.5*			
	87,562	Total			68,716.6	0.54	3,092	3,370

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Permeable pavement (Area 4)		
	[A]		[B]	[C]	[A] x [C]			
4A	*0*	*Roofs*	*1*	*0.89*	*0*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
4B	*4,449*	*Ornamental Landscaping*	*0.1*	*0.11*	*491.4*			
4C	*31,221*	*Concrete or Asphalt*	*1*	*0.89*	*27,849.1*			
4D	*3,330*	*Permeable Pavement*	*.1*	*.11*	*367.8*			
	39,000	Total			28,708.37	0.54	1,291.9	1,332

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P

☐	Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☒	Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐	Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern		☐	☒	☐	☐	☒	☐	☒	☒

P = Potential
N = Not Potential
(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected
(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected
(3) A potential Pollutant is land use involving animal waste
(4) Specifically petroleum hydrocarbons
(5) Specifically solvents
(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]Cannot Exceed 50%
[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square	Post-Project Surface	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff		*Enter BMP Name / Identifier Here*

	feet)	Type			Factor				
	[A]		[B]	[C]	[A] x [C]				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
Bioretention	Metals, Toxic Organic Compounds, Trash & Debris, Oil & Grease	

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

Drains to SUMP: Prado Dam.

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that

should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site Storm Drain Inlets	All on-site drain inlets shall be stenciled per the City of Riverside Standards. At a minimum the drain inlets shall be stenciled "ONLY RAIN DOWN THE DRAIN".	The Storm Drain System Stenciling and Signage shall be inspected annually at a minimum by the owner and shall be replaced as necessary. The Owner shall provide stormwater pollution prevention information to new site owners, lessees, and operators. All drain inlets and the underwalk drain shall be inspected to ensure they are clean, free of standing water, working properly, and unobstructed from debris/sediment, etc.. Additionally, see SC-44, "Drainage System Maintenance," of the CASQA Stormwater Quality Handbooks. The owner/tenants shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as

		to create a potential discharge to storm drains.
Landscape/Outdoor Pesticide Use	The landscape planters will be depressed to minimize irrigation runoff. The use of fertilizers and pesticides used will be limited to the recommendation of the landscape architect to prevent overuse which can contribute to stormwater pollution. The landscape architect shall propose the site to be landscaped and planted with grouped species, which have similar irrigation requirements on his landscape plans. Additionally, the plants shall be appropriate to the site's soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	The landscape shall be maintained using minimum or no pesticides. The discharge of fertilizer and pesticides into streets is prevented by the landscape depression.
Refuse Areas	The owner shall inform future tenants of the policies for trash disposal through, the lease agreements. Violations of these policies and procedures shall be addresses in accordance with procedures set forth by the lease agreements. Trash enclosures are designed to divert all flows around the enclosure. All dumpsters will have inspected to ensure that the dumpsters remain leak-proof. The owner shall contract with a refuse company to have the dumpsters emptied on a weekly basis at a minimum. A sign shall be posted on or near the dumpsters with the words "Do not dump hazardous materials here" or similar.	The owner shall ensure an adequate number of receptacles are provided as required by the city. A program shall be implemented by the owner to inspect trash enclosures and receptacles regularly, to pick up litter, and sweep/clean the trash enclosure at a regularly scheduled frequency. In the event a receptacle is identified to be leaking, it must be repaired or replaced. Spill control materials shall be available on-site to clean up spills immediately. Additionally, see SC-34, "Waste Handling and Disposal," of the CASQA Stormwater Quality Handbooks.
Fire Sprinkler Test Water	Drains will be constructed to collect fire sprinkler test water as required by the City of Riverside.	See SC-41, "Building and Grounds Maintenance," of the CASQA Stormwater Quality Handbooks.

Boiler Drain Lines	Boiler drain lines shall be directly or indirectly connected to the sewer line and may not discharge into the storm drain system.	
Condensate Drain Lines	Condensate drain lines may discharge to landscaped areas if the flows is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.	Condensate Drain Lines
Rooftop Equipment	Rooftop equipment shall roofed or have secondary containment.	
Roofing, Gutters, and Trim	The use of roofing, gutters, and trim made of copper or unprotected metals that may leach into runoff shall be avoided.	
Plazas, Sidewalks, and Parking Lots		Parking lots shall be swept weekly to prevent sediment, garden waste, and trash, or other pollutants from entering public storm channels. The parking lot shall be swept by a qualified maintenance/landscape contractor on a weekly basis at a minimum.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
Bioretenetion	Bioterention	WQMP Exhibit plan.

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: A Maintenance Agreement and Operations and Maintenance Plan has been prepared. A copy is included in Appendix 9.

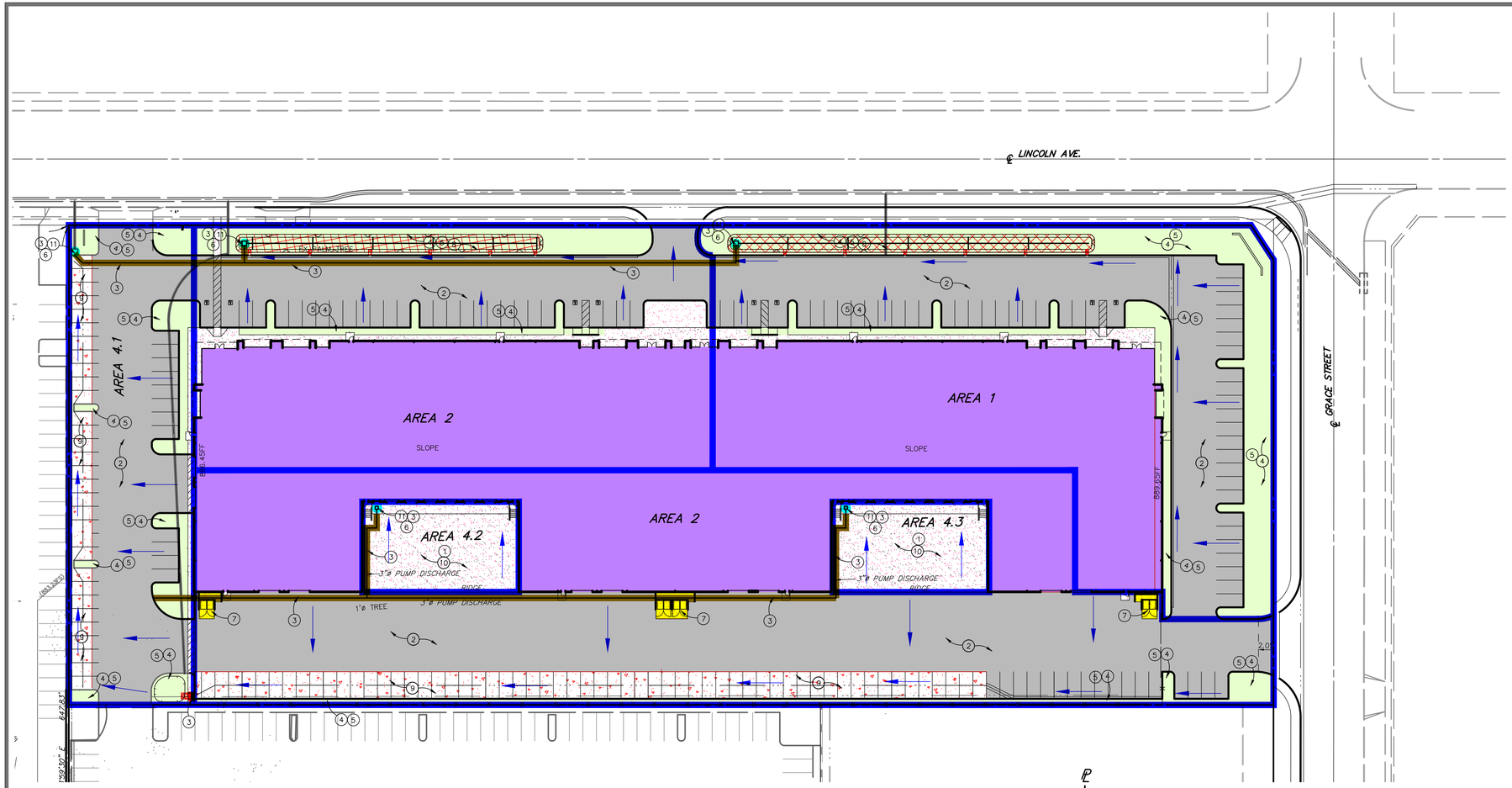
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



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3	3,107 CF	3,370 C.F.	7,768 SF	8,424 SF
4	1,283 CF	1,332 C.F.	3,208 SF	3,330 SF

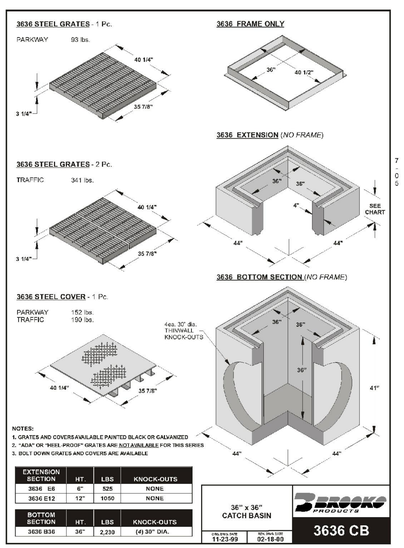
BMP LEGEND

1	SC-30	OUTDOOR LOADING/UNLOADING
2	SC-43	PARKING/STORAGE AREA MAINTENANCE
3	SC-44	DRAINAGE SYSTEM MAINTENANCE
4	SC-73	LANDSCAPE MAINTENANCE
5	SD-12	EFFICIENT IRRIGATION
6	SD-13	STORM DRAIN SIGNAGE
7	SD-32	TRASH ENCLOSURES
8	TC-32	BIORETENTION BASIN WITH 4" BERM 40' ON CENTER
9	SD-20	PERVIOUS PAVEMENT
10	SD-31	MAINTENANCE BAY AND DOCKS
11	MP-52	DRAIN INSERTS (FLEXSTORM INLET FILTERS)

SC-10 NON-STORMWATER DISCHARGES
SC-11 SPILL PROTECTION, CONTROL AND CLEANUP
SC-41 BUILDING & GROUNDS MAINTENANCE
SC-60 HOUSEKEEPING PRACTICES
SD-11 ROOF RUNOFF CONTROLS
SD-10 SITE DESIGN & LANDSCAPE PLANNING

LEGEND

- PROP. LANDSCAPE
- PROP. AC PAVEMENT
- PROP. BUILDING
- PROP. CONCRETE
- PROP. UNDERGROUND BIORETENTION STORAGE BASIN
- PROP. RIP RAP PAD
- PROP. PERMEABLE PAVER
- PROP. BROOKS BOX
- PROP. STORM DRAIN PIPE
- DRAINAGE FLOW
- DRAINAGE AREA BOUNDARY
- PROP. UNDERWALK DRAIN



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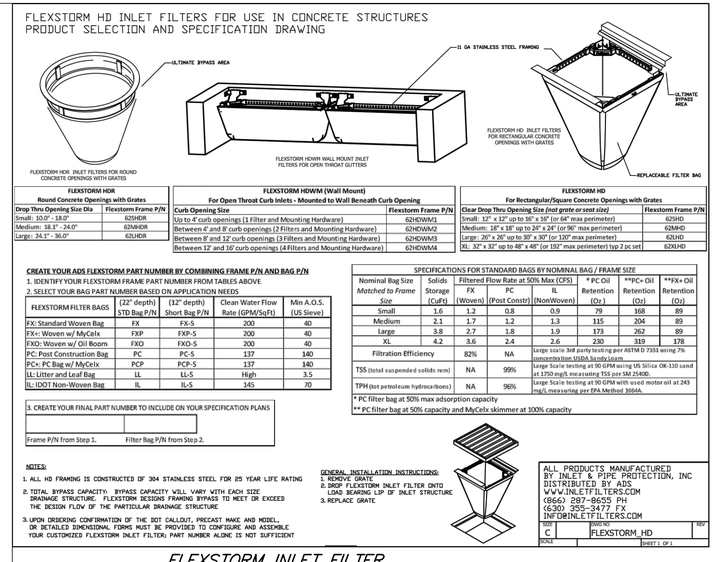
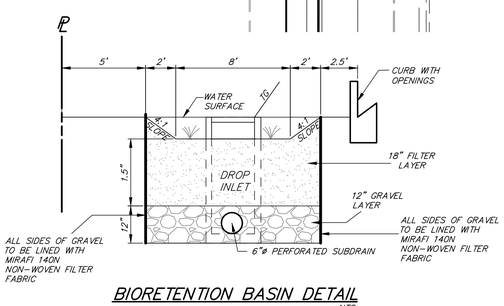
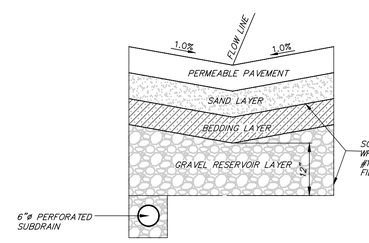
NTS



FLEXSTORM INLET FILTER
NTS



BIORETENTION BASIN DETAIL
NTS



PERMEABLE PAVEMENT DETAIL
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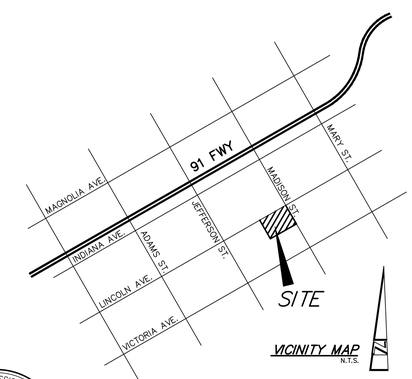

VICINITY MAP
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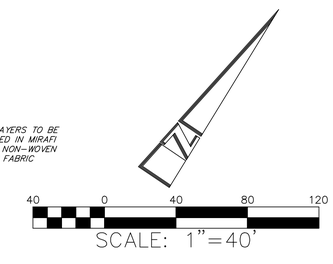

REGISTERED PROFESSIONAL ENGINEER
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BENCHMARK

REVISIONS:

PREPARED UNDER THE SUPERVISION OF:
KEVIN J. RICHER
R.C.E. 43714 LIC. EXP. 03/31/17 DATE

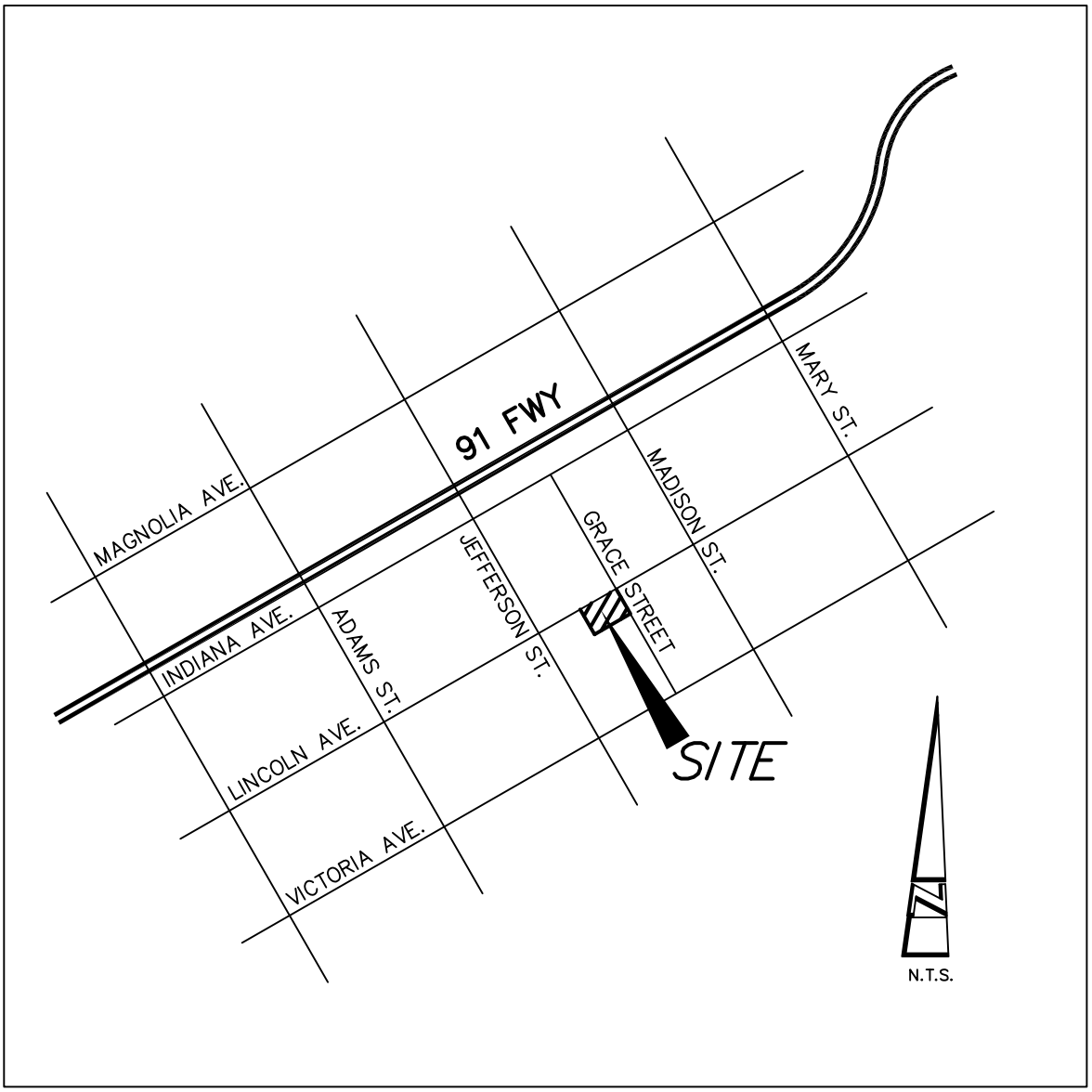
APPROVED BY:
DATE

WQMP EXHIBIT

SITE:
LINCOLN AVE. & GRACE ST.
RIVERSIDE, CA 92504

PREPARED FOR:
VLETCO ENTERPRISES, LLC
11601 WILSHIRE BLVD., SUITE 1680
LOS ANGELES, CA 90025

DATE: 5/16/16	JOB NO. 3548
DRAWN BY: CF	SCALE 1"=30'
DESIGNED BY: ----	SHEET 1 OF 1 SHEETS
CHECKED BY: KJR	



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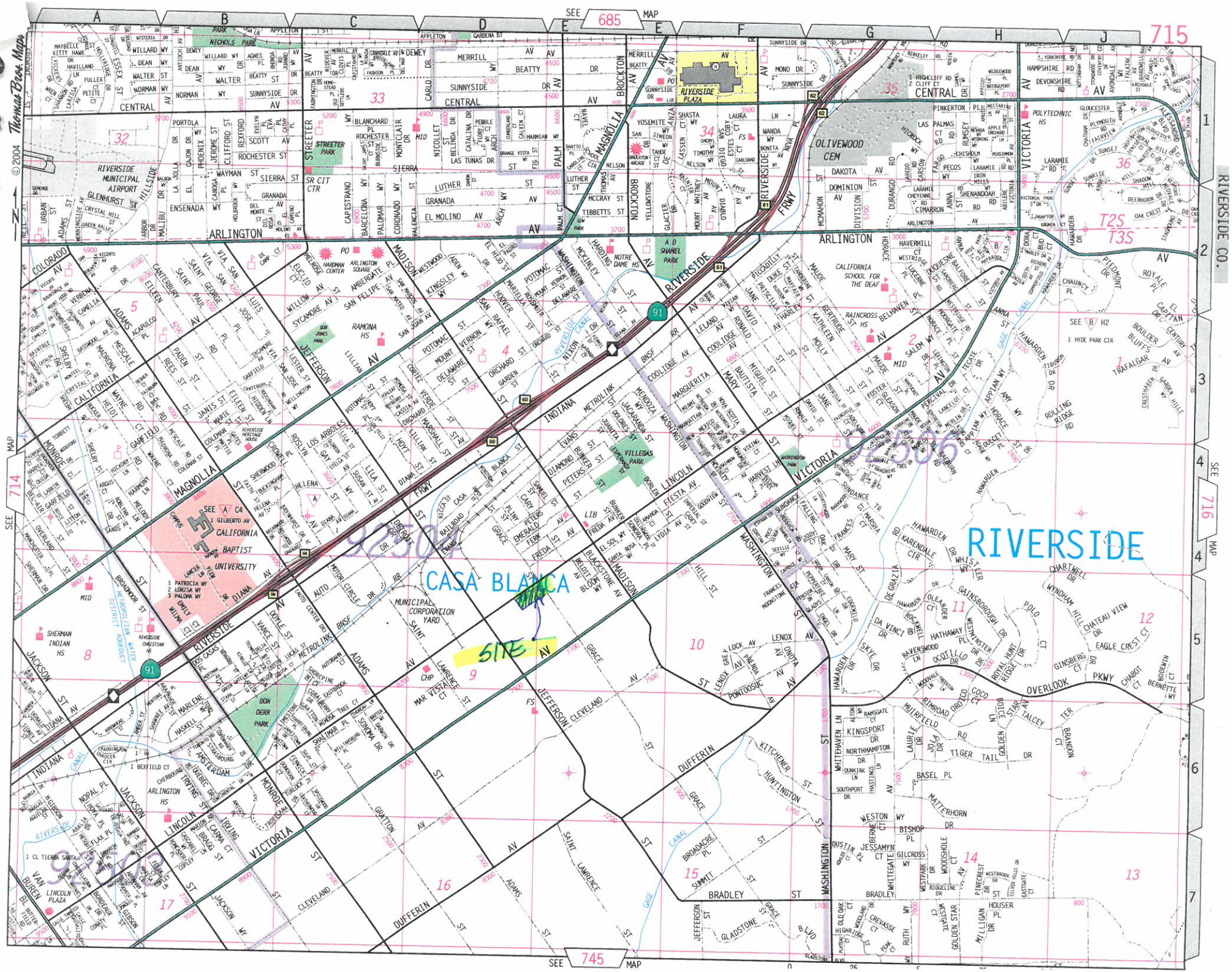
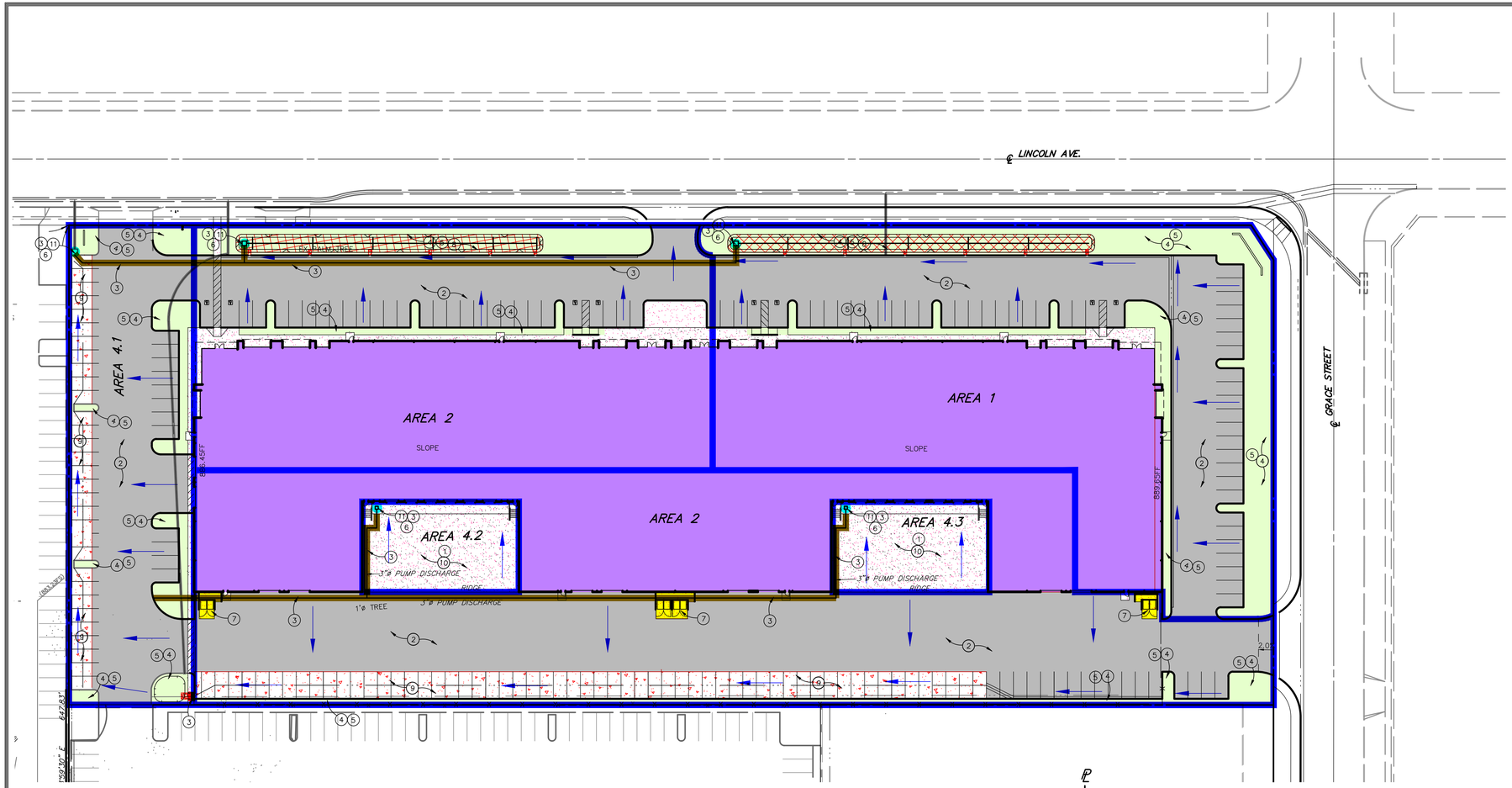

Thomas Bros. Maps
© 2004
SEE 685 MAP
SEE 714 MAP
SEE 716 MAP
SEE 745 MAP
715
T2S
T3S
RIVERSIDE CO.
RIVERSIDE
CASA BLANCA
SITE
92506
92504
92507
NICHOLS PARK
RIVERSIDE MUNICIPAL AIRPORT
OLIVEWOOD CEM
CALIFORNIA SCHOOL FOR THE DEAF
RAINCROSS HS
RAMONA HS
ARLINGTON HS
CALIFORNIA BAPTIST UNIVERSITY
SHERMAN INDIAN HS
RIVERSIDE CHRISTIAN HS
MUNICIPAL CORPORATION YARD
VILLEGAS PARK
DON DERR PARK
A D SHANEL PARK
WASHINGTON PARK
RIVERSIDE PLAZA
LINCOLN PLAZA
ARLINGTON SQUARE
HARDMAN CENTER
NOTRE DAME HS
POLYTECHNIC HS
STREETER PARK
SR CIT CTR
DON JONES PARK
METROPOLITAN WATER DISTRICT AQUEDUCT
RIVERSIDE CANAL
ARLINGTON
CENTRAL
MAGNOLIA
INDIANA
JACKSON
VICTORIA
WASHINGTON
JEFFERSON
MADISON
MONROE
ADAMS
DUFFERIN
OVERLOOK PKWY
BRADLEY ST
91
60
62
61
215
SEE A C4
1 GILBERTO AV
SEE B H2
1 HYDE PARK CIR

Appendix 2: Construction Plans

Grading and Drainage Plans



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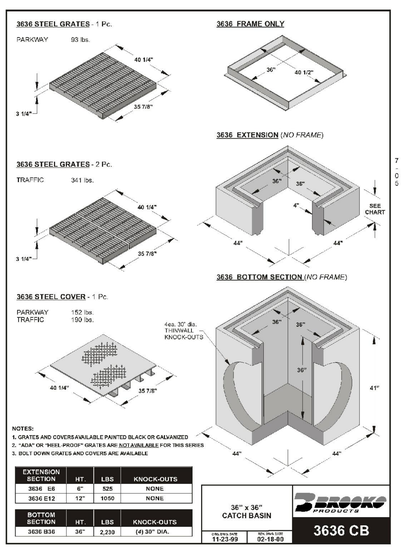

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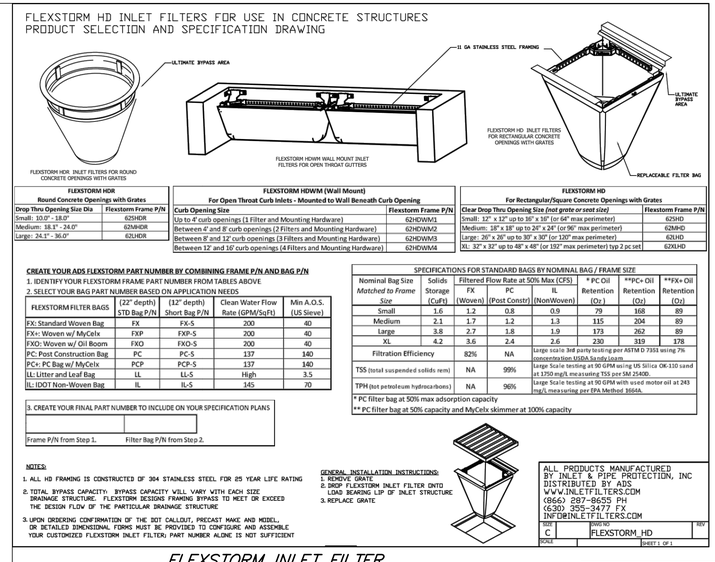

FLEXSTORM INLET FILTER
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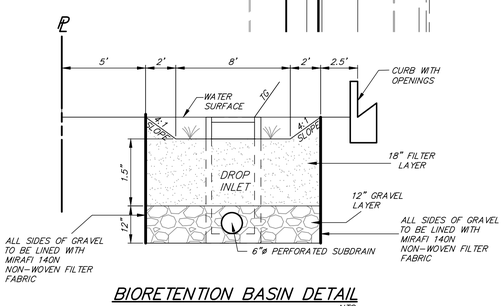

BIORETENTION BASIN DETAIL
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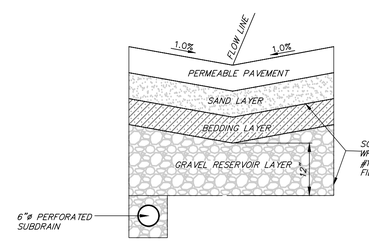

PERMEABLE PAVEMENT DETAIL
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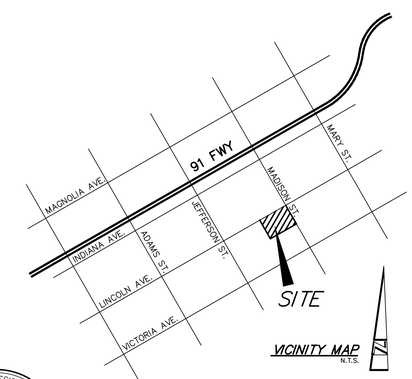

VICINITY MAP
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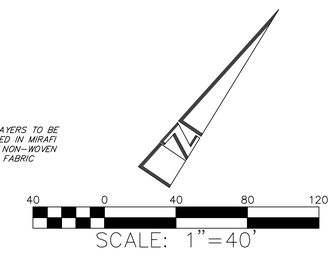

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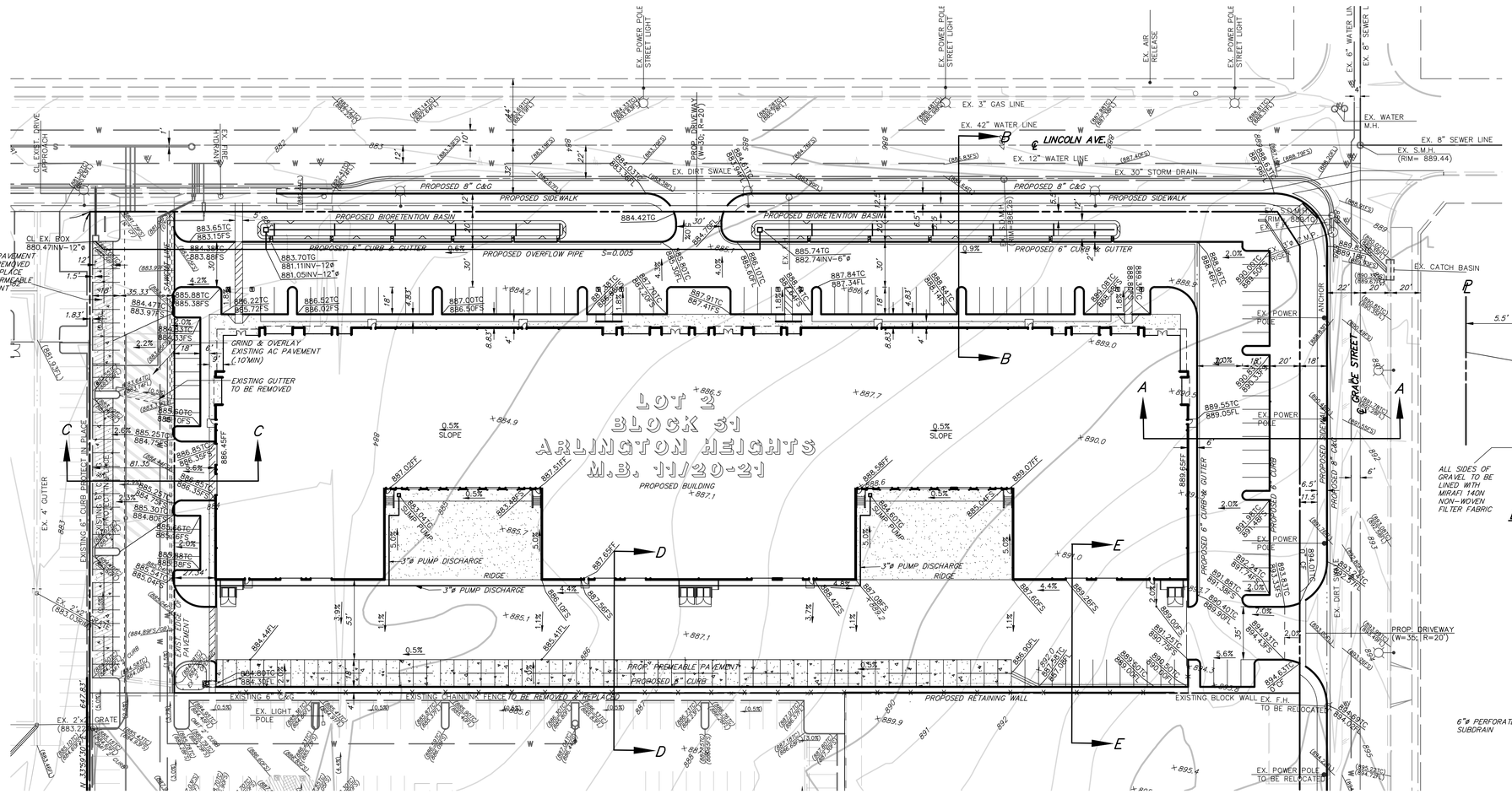
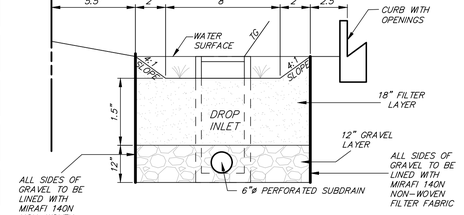
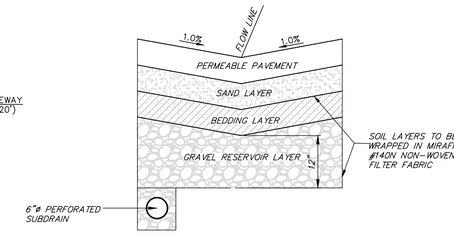


LEGEND

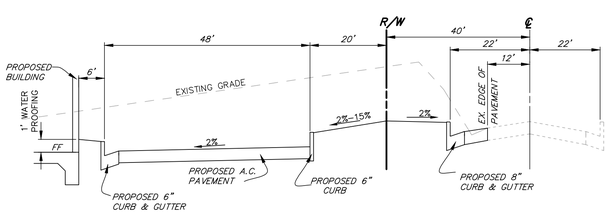
BW	BACK OF WALK
EG	EXISTING GRADE
FG	FINISH GRADE
FS	FINISH SURFACE
TC	TOP OF CURB
FL	FLOW LINE
EP	EDGE OF PAVEMENT
FF	FINISH FLOOR
PAD	PAD GRADE
TW	TOP OF WALL
TF	TOP OF FOOTING
HP	HIGH POINT
LP	LOW POINT
CF	CURB FACE
TG	TOP OF GRATE
TRW	TOP OF RETAINING WALL
EDF	EXTRA DEPTH FOOTING
INV	INVERT OF PIPE
	TOP OF SLOPE
2:1	RATE OF SLOPE
	TOE OF SLOPE
— —S— —	EXISTING SEWER
— —W— —	EXISTING WATER
	EXISTING FIRE HYDRANT
	EXISTING FDC
	EXISTING WATER VALVE
GM	EXISTING GAS METER
WM	EXISTING WATER METER
PB	EXISTING PULL BOX
	EXISTING BALLARD
ICV	EXISTING ICV
	EXISTING COLUMN
SCO	EXISTING SEWER CLEANOUT
	FOUND MONUMENT AS NOTED
	EXISTING PARKING LIGHT
	EXISTING STREET LIGHT
(0)	EXISTING CONTOUR
	FINISH CONTOURS
	DAYLIGHT LINE
	EXIST. CONCRETE
	REMOVAL
	SIDEWALK
	PROP. PERMEABLE PAVEMENT
	OVERLAY
	EXIST. EDGE OF PAVEMENT
T	TELEPHONE MANHOLE
S	SEWER MANHOLE
D	STORM DRAIN MANHOLE



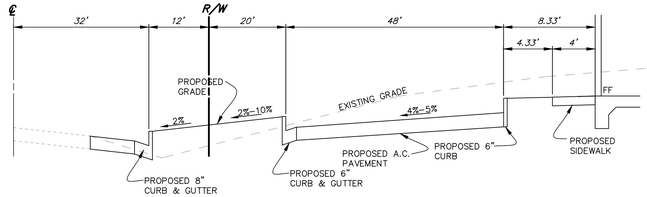
BIORETENTION BASIN DETAIL
NTS



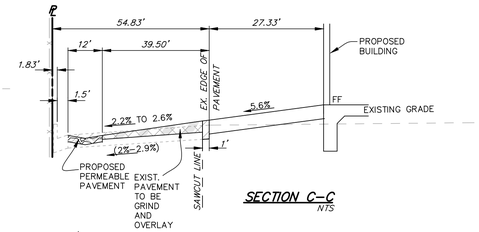
PERMEABLE PAVEMENT DETAIL
NTS



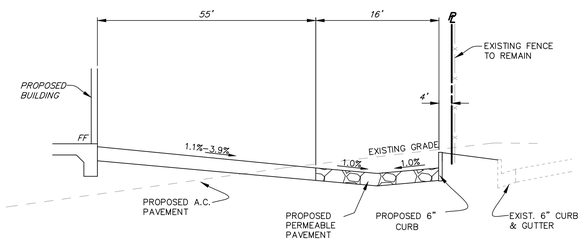
SECTION A–A
NTS



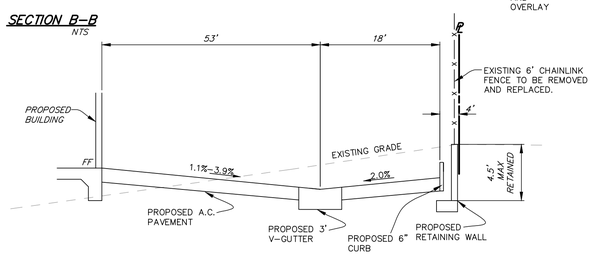
SECTION B–B
NTS



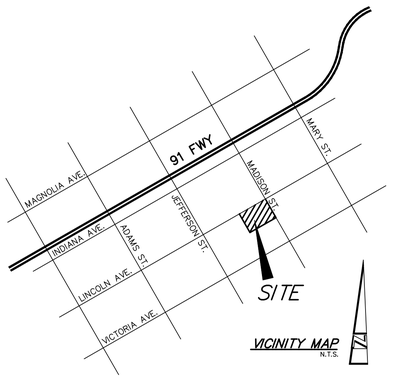
SECTION C–C
NTS



SECTION D–D
NTS



SECTION E–E
NTS



VICINITY MAP
N.T.S.

SCALE: 1"=40'

DIGALERT
DIAL TOLL FREE
811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. RICHER
No. 43714
Exp. 3/31/2017
CIVIL
STATE OF CALIFORNIA

BENCHMARK

REVISIONS:

PREPARED UNDER THE SUPERVISION OF:

KEVIN J. RICHER
R.C.E. 43714 LIC. EXP.03/31/17 DATE

APPROVED BY:

DATE

LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. Philadelphia St., Ste. F
Ontario, CA 91761
(909) 930-1466 • FAX (909) 930-1468
PLANNING • CIVIL • SURVEYING

PRELIMINARY GRADING PLAN

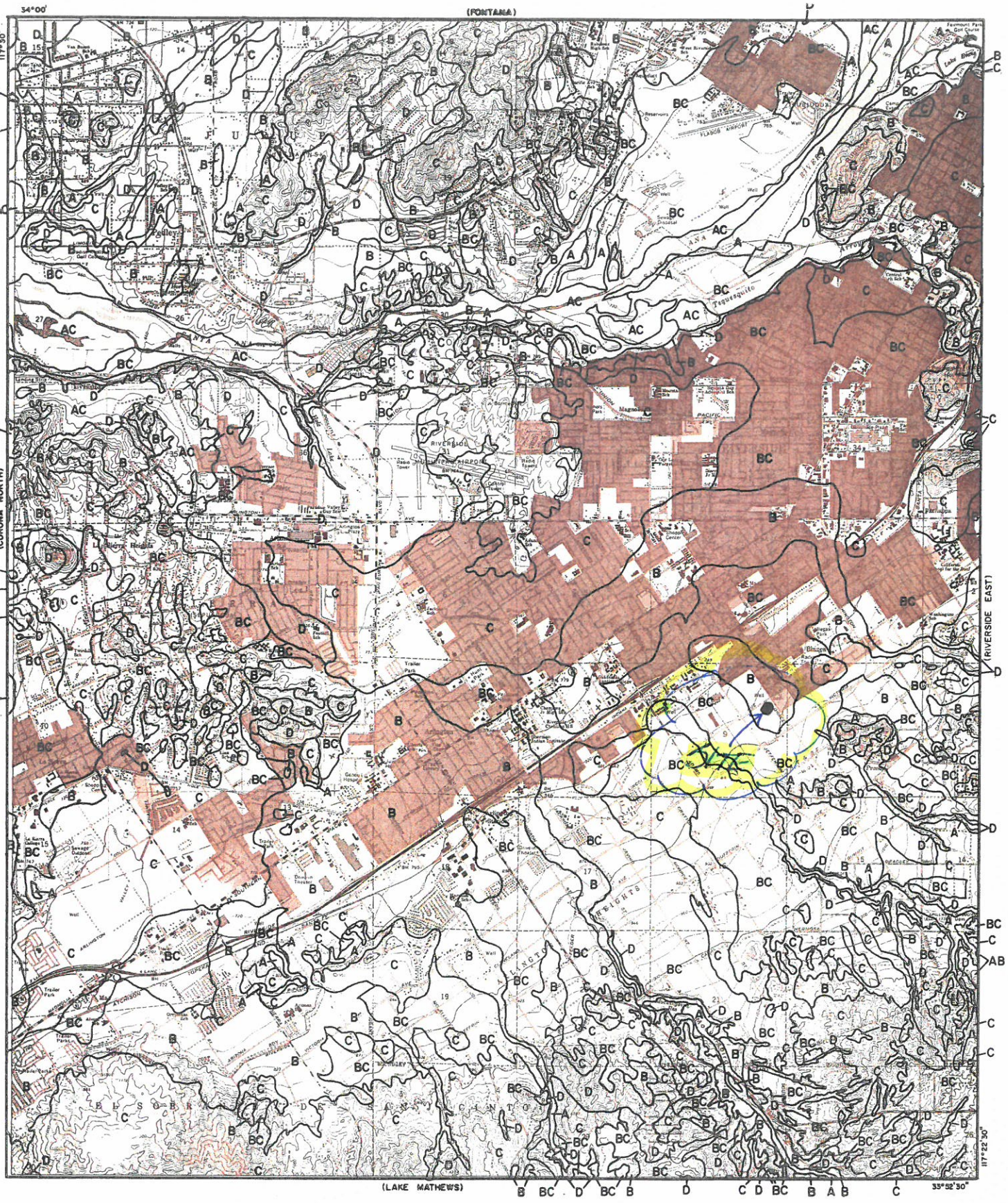
SITE:
LINCOLN AVE. & GRACE ST.
RIVERSIDE, CA 92504

PREPARED FOR:
VUETCO ENTERPRISES, LLC
11601 WILSHIRE BLVD., SUITE 1680
LOS ANGELES, CA 90025

DATE: 5/16/16	JOB NO. 3548
DRAWN BY: CF	SCALE 1"=40'
DESIGNED BY: KJR	SHEET 1
CHECKED BY: KJR	OF 1 SHEETS

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR RIVERSIDE—WEST

PLATE C-1.15

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

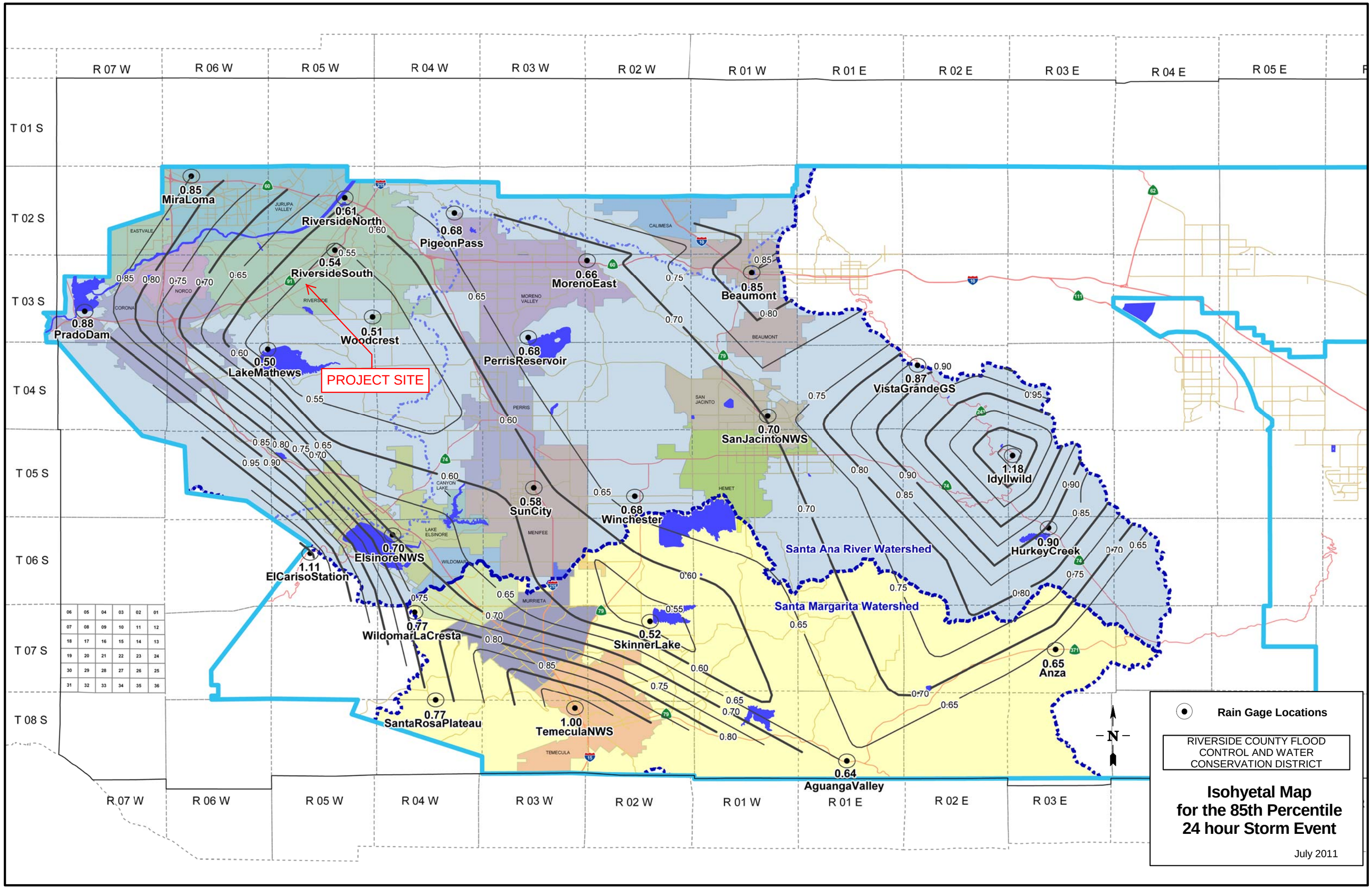
Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Not Applicable

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation


R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
PROJECT SITE
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Santa Ana River Watershed
Santa Margarita Watershed
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Land Development Design Company, LLC	Date	6/16/2016
Designed by	Kevin J. Richer	Case No	Pending
Company Project Number/Name	JN3548- Lincoln Business Park		

BMP Identification

BMP NAME / ID: Area 1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.54 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1A	*30,378*	*Roofs*	*1*	*0.89*	*27097.2*			
1B	*15,680*	*Ornamental Landscaping*	*0.1*	*0.110458*	*1732*			
1C	*26,700*	*Concrete or Asphalt*	*1*	*0.892*	*23816.4*			
	72758	***Total***			**52645.6**	**0.54**	***2369.1***	***2,757***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Land Development Design Company, LLC	Date	6/16/2016
Designed by	Kevin J. Richer	Case No	Pending
Company Project Number/Name	JN3548- Lincoln Business Park		

BMP Identification

BMP NAME / ID: Area 2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.54 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
2A	*29,638*	*Roofs*	*1*	*0.89*	*26437.1*			
2B	*7,421*	*Ornamental Landscaping*	*0.1*	*0.110458*	*819.7*			
2C	*18,939*	*Concrete or Asphalt*	*1*	*0.892*	*16893.6*			
	55998	***Total***			**44150.4**	**0.54**	***1986.8***	***2,306***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Land Development Design Company, LLC	Date	6/16/2016
Designed by	Kevin J. Richer	Case No	
Company Project Number/Name	JN3548- Lincoln Business Park		

BMP Identification

BMP NAME / ID: Area 3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.54 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
3A	*34,986*	*Roofs*	*1*	*0.89*	*31207.5*			
3B	*3,589*	*Ornamental Landscaping*	*0.1*	*0.11046*	*396.4*			
3C	*40,563*	*Concrete or Asphalt*	*1*	*0.892*	*36182.2*			
4C	*8424*	*Pervious Concrete / Porous Asphalt*	*0.1*	*0.11046*	*930.5*			
	87562		***Total***		**68716.6**	**0.54**	***3092.2***	***3,370***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Land Development Design Company, LLC	Date	6/16/2016
Designed by	Kevin J. Richer	Case No	
Company Project Number/Name	JN3548- Lincoln Business Park		

BMP Identification

BMP NAME / ID: Area 4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.54 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
4A	*0*	*Roofs*	*1*	*0.89*	*0*			
4B	*4,449*	*Ornamental Landscaping*	*0.1*	*0.11046*	*491.4*			
4C	*31,221*	*Concrete or Asphalt*	*1*	*0.892*	*27849.1*			
4D	*3,330*	*Pervious Concrete / Porous Asphalt*	*0.1*	*0.11046*	*367.8*			
	39000		***Total***		**28708.3**	**0.54**	***1291.9***	***1,332***

Notes:

Bioretention Facility - Design Procedure	BMP ID Area 1	Legend:	Required Entries Calculated Cells
Company Name:	Land Development Design Company	Date:	16-Jun
Designed by:	Kevin J. Richer	County/City Case No.:	PP2015-031

Design Volume

Enter the area tributary to this feature	A_T=	1.67	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	2,370	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.5	ft
Top Width of Bioretention Facility, excluding curb	w_T =	12.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.29	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	1,835	ft^2
Proposed Surface Area	A=	1,920	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Other	

Notes: Per Landscape Architect Plans.

Bioretention Facility - Design Procedure	BMP ID Area 2	Legend:	Required Entries Calculated Cells

Company Name:	Land Development Design Company	Date:	16-Jun
Designed by:	Kevin J. Richer	County/City Case No.:	PP2015-031

Design Volume

Enter the area tributary to this feature	A_T=	1.29	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,987	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.5	ft
Top Width of Bioretention Facility, excluding curb	w_T =	12.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.29	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	1,539	ft^2
Proposed Surface Area	A=	1,600	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Other	

Notes: Per Landscape Architect Plans.

Permeable Pavement - Design Procedure	BMP ID Area 3	Legend:	Required Entries Calculated Cells

Company Name:	LDDC	Date:	6/16/2016
Designed by:	Kevin J. Richer	County/City Case No.:	

Design Volume

Enter the area tributary to this feature A_T= 2.01 acres

Enter V_{BMP} determines from Section 2.1 of this Handbook V_{BMP}= 3,092 ft^3

Permeable Pavement Surface Area

Reservoir Layer Depth, b_{TH} b_{TH}= 12 inches

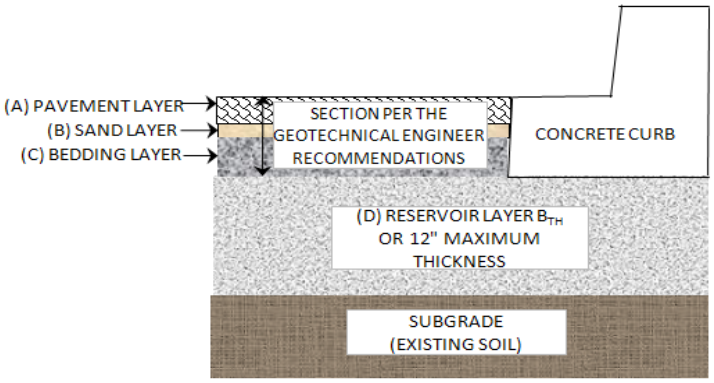
Minimum Surface Area Required, A_S

$$A_{S\,(ft)} = \frac{V_{BMP}\,(ft^3)}{(0.4 \times b_{TH}\,(in))\,/\,12(in/ft)}$$

A_S= 7,730 ft^2

Proposed Surface Area = 8,424 ft^2

Permeable Pavement Cross Section



Per the Geotechnical Engineer's Recommendations	(A)		in
	(B)		in
	(C)		in
Reservoir Layer	(D)	12	in
Total Permeable Pavement Section			in
Slope of Permeable Pavement		2	%

Sediment Control Provided? (Use pulldown)

Geotechnical report attached? (Use pulldown)

Describe Surrounding Vegetation:

Notes:

If the permeable pavement has been designed correctly, there should be no error messages on the spreadsheet.

Permeable Pavement - Design Procedure	BMP ID Area 4	Legend:	Required Entries Calculated Cells
Company Name:	LDDC	Date:	6/16/2016
Designed by:	Kevin J. Richer	County/City Case No.:	

Design Volume

Enter the area tributary to this feature A_T= 0.61 acres

Enter V_{BMP} determines from Section 2.1 of this Handbook V_{BMP}= 1,292 ft^3

Permeable Pavement Surface Area

Reservoir Layer Depth, b_{TH} b_{TH}= 12 inches

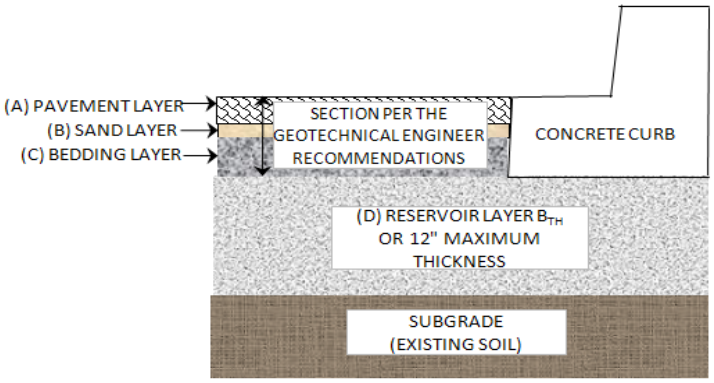
Minimum Surface Area Required, A_S

$$A_{S\,(ft)} = \frac{V_{BMP}\,(ft^3)}{(0.4 \times b_{TH}\,(in))\,/\,12(in/ft)}$$

A_S= 3,230 ft^2

Proposed Surface Area = 3,330 ft^2

Permeable Pavement Cross Section



Per the Geotechnical Engineer's Recommendations	(A)		in
	(B)		in
	(C)		in
Reservoir Layer	(D)	12	in
Total Permeable Pavement Section			in
Slope of Permeable Pavement		2	%

Sediment Control Provided? (Use pulldown)

Geotechnical report attached? (Use pulldown)

Describe Surrounding Vegetation:

Notes:

If the permeable pavement has been designed correctly, there should be no error messages on the spreadsheet.

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Not Applicable

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☑ **A.** On-site storm drain inlets	☑ Locations of inlets.	☑ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	☑ Maintain and periodically repaint or replace inlet markings. ☑ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
☐ **B.** Interior floor drains and elevator shaft sump pumps		☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.
☐ **C.** Interior parking garages		☐ State that parking garage floor drains will be plumbed to the sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☑ **D1.** Need for future indoor & structural pest control		☑ Note building design features that discourage entry of pests.	☑ Provide Integrated Pest Management information to owners, lessees, and operators.
☑ **D2.** Landscape/ Outdoor Pesticide Use	☑ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☑ Show self-retaining landscape areas, if any. ☑ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following. ☑ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☑ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☑ Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☑ Maintain landscaping using minimum or no pesticides. ☑ See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/Error! Hyperlink reference not valid. ☑ Provide IPM information to new owners, lessees and operators.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☐ **E.** Pools, spas, ponds, decorative fountains, and other water features.	☐ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☐ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ **F.** Food service	☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☐ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.
☑ **G.** Refuse areas	☑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ☑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	☑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	☑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **H.** Industrial processes.	❑ Show process area.	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **J.** Vehicle and Equipment Cleaning	❑ Show on drawings as appropriate: **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑ **Car dealerships and similar may rinse cars with water only.**

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❑ **K.** Vehicle/Equipment Repair and Maintenance	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ L. Fuel Dispensing Areas	❑ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ **M.** Loading Docks	☑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ☑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☑ Move loaded and unloaded items indoors as soon as possible. ☑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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☐ **N.** Fire Sprinkler Test Water		☐ Provide a means to drain fire sprinkler test water to the sanitary sewer.	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
O. Miscellaneous Drain or Wash Water or Other Sources ☐ Boiler drain lines ☐ Condensate drain lines ☑ Rooftop equipment ☐ Drainage sumps ☑ Roofing, gutters, and trim. ☐ Other sources		☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ☐ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☑ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. ☐ Include controls for other sources as specified by local reviewer.	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ **P.** Plazas, sidewalks, and parking lots.			☑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

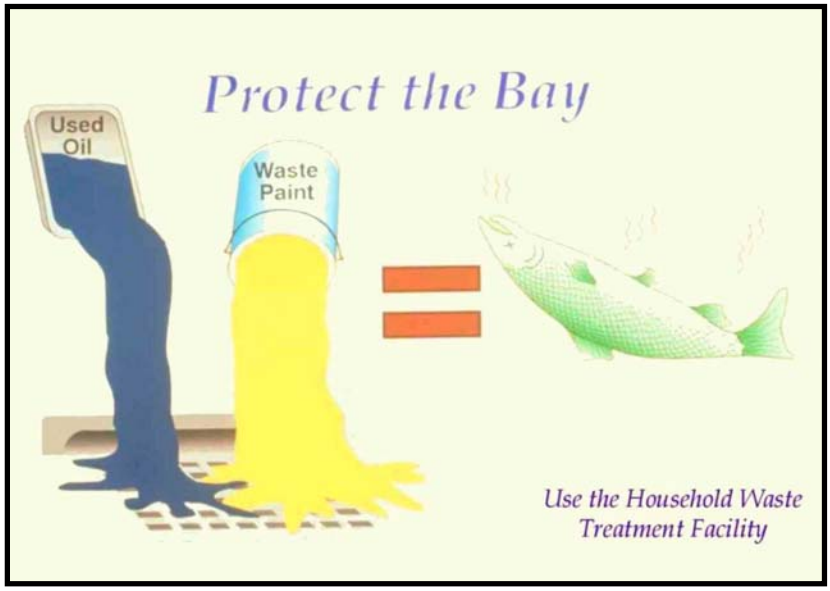
Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Non-Stormwater Discharges SC-10



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

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Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Spill Prevention, Control & Cleanup SC-11

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

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- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel

■ Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

■ Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

■ If consistent illegal dumping is observed at the facility:

- Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
- Landscaping and beautification efforts may also discourage illegal dumping.
- Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

■ Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

■ If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

■ Routine maintenance:

- Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
- Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
- Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain*.

- Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- Label all containers according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- Establish a system for tracking incidents. The system should be designed to identify the following:

  - Types and quantities (in some cases) of wastes

  - Patterns in time of occurrence (time of day/night, month, or year)

- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

Training

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- A Spill Prevention Control and Countermeasure Plan (SPCC) is required for facilities that are subject to the oil pollution regulations specified in Part 112 of Title 40 of the Code of Federal Regulations or if they have a storage capacity of 10,000 gallons or more of petroleum. (Health and Safety Code 6.67)
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off' of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Outdoor Loading/Unloading SC-30

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- Limit exposure of material to rainfall whenever possible.
- Prevent stormwater run-on.
- Check equipment regularly for leaks.

Suggested Protocols

Loading and Unloading – General Guidelines

- Develop an operations plan that describes procedures for loading and/or unloading.
- Conduct loading and unloading in dry weather if possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm the loading/unloading area to a drain that is connected to a deadend.

Inspection

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

Training

- Train employees (e.g., fork lift operators) and contractors on proper spill containment and cleanup.
- Have employees trained in spill containment and cleanup present during loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.
- Make sure forklift operators are properly trained on loading and unloading procedures.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Contain leaks during transfer.
- Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all and ensure that employees are familiar with the site's spill control plan and proper spill cleanup procedures.
- Have an emergency spill cleanup plan readily available.
- Use drip pans or comparable devices when transferring oils, solvents, and paints.

Other Considerations (Limitations and Regulations)

- Space and time limitations may preclude all transfers from being performed indoors or under cover.
- It may not be possible to conduct transfers only during dry weather.

Requirements

Costs

Costs should be low except when covering a large loading/unloading area.

Maintenance

- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Conduct regular broom dry-sweeping of area.

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
  - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
  - The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

- The transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:

  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.

  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

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- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

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SC-43 Parking/Storage Area Maintenance

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
  - Block the storm drain or contain runoff.
  - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
  - Clean oily spots with absorbent materials.
  - Use a screen or filter fabric over inlet, then wash surfaces.

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Housekeeping Practices SC-60

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.

- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.

- Dispose of wash water, sweepings, and sediments, properly.

- Recycle or dispose of fluids properly.

- Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.

- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).

- Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

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- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.
- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.
- Keep records of water, air and solid waste quantities and quality tests and their disposition.
- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.
- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.
- Have, and review regularly, a contingency plan for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.
- Train municipal employees who handle potentially harmful materials in good housekeeping practices.
- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.
- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and Countermeasure (SPCC) plant up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- There are no major limitations to this best management practice.
- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

- Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

- Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

- The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000.
http://www.nalms.org/bclss/bmphome.html#bmp

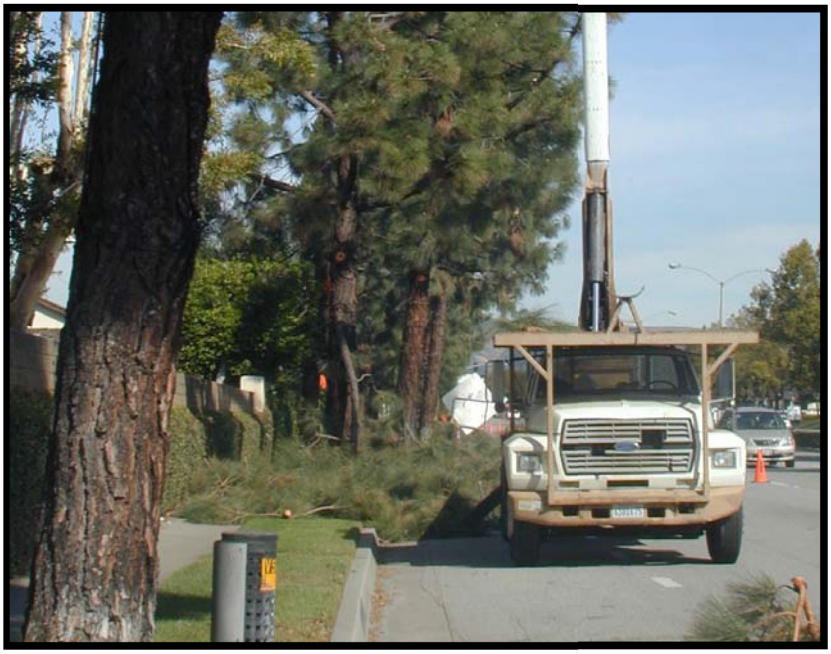
King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

Landscape Maintenance SC-73



Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	☑

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

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- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a know in location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.cfm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Landscaping and Lawn Care. Office of Water. Office of Wastewater Management. On-line: http://www.epa.gov/npdes/menuofbmps/poll_8.htm

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Drain Insert MP-52

General Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Inspection/Maintenance Considerations

Washout problems increase with rain intensity. Susceptibility of accumulated sediments to be re-suspended at low flow rates, can be corrected with an energy dissipater between gate and treatment areas.

Inspection Activities	Suggested Frequency
■ Inspect for sediment buildup and proper functioning.	At the beginning of the wet season and after significant storms
■ Verify that stormwater enters the unit and does not leak around the perimeter.	After construction.
Maintenance Activities	**Suggested Frequency**
■ Remove sediment as needed.	At the beginning of the wet season and as necessary

Maintenance Concerns, Objectives, and Goals

■ Sediment Removal

Targeted Constituents

✓ Sediment
✓ Nutrients
✓ Trash
✓ Metals
Bacteria
✓ Oil and Grease
✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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Bioretention TC-32

Maintenance Concerns, Objectives, and Goals

- Clogged Soil or Outlet Structures
- Invasive Species
- Vegetation/Landscape Maintenance
- Erosion
- Channelization of Flow
- Aesthetics

General Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through a sand bed and is subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

Inspection/Maintenance Considerations

Bioretention requires frequent landscaping maintenance, including measures to ensure that the area is functioning properly, as well as maintenance of the landscaping on the practice. In many cases, bioretention areas initially require intense maintenance, but less maintenance is needed over time. In many cases, maintenance tasks can be completed by a landscaping contractor, who may already be hired at the site. In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Targeted Constituents

✓	Sediment	■
✓	Nutrients	▲
✓	Trash	■
✓	Metals	■
✓	Bacteria	■
✓	Oil and Grease	■
✓	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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Inspection Activities	Suggested Frequency
■ Inspect soil and repair eroded areas.	Monthly
■ Inspect for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the strips are ready for winter. However, additional inspection after periods of heavy runoff is desirable.	Semi-annual inspection
■ Inspect to ensure grass is well established. If not, either prepare soil and reseed or replace with alternative species. Install erosion control blanket. ■ Check for debris and litter, and areas of sediment accumulation. ■ Inspect health of trees and shrubs.	

Maintenance Activities	Suggested Frequency
■ Water plants daily for 2 weeks.	At project completion
■ Remove litter and debris.	Monthly
■ Remove sediment. ■ Remulch void areas. ■ Treat diseased trees and shrubs. ■ Mow turf areas. ■ Repair erosion at inflow points. ■ Repair outflow structures. ■ Unclog underdrain. ■ Regulate soil pH regulation.	As needed
■ Remove and replace dead and diseased vegetation.	Semi-annual
■ Add mulch. ■ Replace tree stakes and wires.	Annual
■ Mulch should be replaced every 2 to 3 years or when bare spots appear. Remulch prior to the wet season.	Every 2-3 years, or as needed

Additional Information

Landscaping is critical to the function and aesthetic value of bioretention areas. It is preferable to plant the area with native vegetation, or plants that provide habitat value, where possible. Another important design feature is to select species that can withstand the hydrologic regime they will experience. At the bottom of the bioretention facility, plants that tolerate both wet and dry conditions are preferable. At the edges, which will remain primarily dry, upland species will be the most resilient. It is best to select a combination of trees, shrubs, and herbaceous materials.

References

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, revised February, 2002.

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

APPENDIX G

INFILTRATION REPORT

June 14, 2016

Vlietco Enterprises, LLC
c/o Warmington Properties
3090 Pullman Street
Costa Mesa, California 92626

Attention: Mr. David H. Clark
President

Project No.: **16G168-2**

Subject: **Results of Infiltration Testing**
Proposed Commercial/Industrial Building
South Corner Lincoln Avenue and Grace Street
Riverside, California

References: Geotechnical Investigation Proposed Business Park and Aluminum Body Corporation Building No. 5, SWC Lincoln Avenue and Grace Street Riverside, California prepared for Shook Building Systems, Inc. by Southern California Geotechnical, Inc. (SCG), SCG Project No. 03G174-1, dated June 26, 2003.

Geotechnical Investigation, Proposed Commercial/Industrial Building, South Corner Lincoln Avenue and Grace Street, Riverside, California, prepared for Vlietco Enterprises, LLC by SCG, SCG Project No. 16G168-1, dated June 14, 2016.

Gentlemen:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 16P250 dated May 13, 2016. The scope of services included surface reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rate of the onsite soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The subject site is located at the south corner of Lincoln Avenue and Grace Street in Riverside, California. The site is bounded to the northwest by Lincoln Avenue, to the northeast by Grace Street, and to the southeast and southwest by existing commercial/industrial buildings. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 of this report.

The site consists of a rectangular shaped parcel, 5.9± acres in size. The site is currently vacant and undeveloped. The southwestern portion of the site is currently being used as a trailer and equipment storage yard. The storage and equipment yard area is surrounded by a chain link fence. A stock pile of concrete and vegetation approximately 15 feet in diameter is located along the southwestern fence line. The ground surface cover in this portion of the site consists of crushed aggregate base (CAB) and exposed soils with sparse native grass and weed growth. The ground surface cover in the northeastern portion of the site consists of exposed soil with extensive native grass and weed growth. Asphaltic concrete pavements are present along the southwestern properly line area. The pavements are generally in fair condition with minor to moderate cracking throughout.

Detailed topographic information was not available at the time of this report. Based on visual observations, the site topography slopes to the southwest at an estimated gradient of approximately 1 to 2 percent. There was estimated to be 5 to 6± feet of elevation differential across the site.

Proposed Development

Based on a site plan prepared by HPA Architecture, Inc., the site will be developed with a new commercial/industrial building. The building will be located in the central area of the site and will be 107,070± ft² in size. The building will be subdivided into four (4) units/suites and will include two loading docks along the southeast side of the building. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, with some areas of concrete flatwork and landscape planters throughout.

We understand that the subject site will utilize an on-site storm water infiltration system. Based on conversations with Mr. Kevin Richer of LDDC, the project engineer, the storm water disposal system will consist of a below ground chamber system located in the northwestern area of the subject site. The bottom of the proposed chamber system will be 8 to 10± feet below the existing site grades.

Previous Study

Southern California Geotechnical, Inc. (SCG) previously performed a geotechnical investigation at the subject site and a larger surrounding area, which is referenced above. This report provides information on eleven (11) previous borings drilled at the subject site advanced to depths of 15 to 25± feet below the previously existing site grades. Six (6) of the borings are located on the subject site, and are indicated on the Infiltration Test Location Plan, included as Plate 2 of this report. Artificial fill soils were encountered at all of the boring locations extending to a depth of 2½± feet. The fill soils consisted of loose to medium dense silty fine to medium sands with little fine gravel. Native alluvial soils were encountered below the fill soils, which consisted of loose to dense silty fine to medium sands, silty fine sands, fine to medium sands, and fine sandy silts, extending to the maximum depth explored of 25± feet. No groundwater was encountered during the subsurface exploration.

Concurrent Study

The subsurface exploration conducted for this project consisted of three (3) borings advanced to depths of 25± feet below presently existing site grades. All of the borings were logged during drilling by a member of our staff.

Artificial fill soils were encountered at the ground surface at all three of the boring locations, extending to depths of 1½ to 3± feet below the existing site grades. The fill soils generally consist of loose to medium dense silty fine sands to fine sandy silts with varying amounts of medium sand and fine to coarse gravel. Laboratory test results indicated that these fills were generally damp to moist. Native alluvium was encountered beneath the artificial fill soils at all of the boring locations. The near-surface alluvium generally consists of loose silty fine sands with trace medium to coarse sands, extending to depths of 6 to 7± feet. The borings then encountered loose to medium dense fine sandy silts to silty fine sands with trace calcareous nodules and trace medium sand, extending to depths of 12± feet. At greater depths, the borings encountered alluvium that consists of medium dense silty fine sands to fine sandy silts with varying amounts of medium to coarse sands, silt, and fine gravel extending to the maximum depths explored of 25± feet. Free water was not encountered during the drilling of any of the borings.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of four (4) backhoe excavated trenches, extending to depths of 8 to 10± feet below the existing site grades. All of the trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration test trenches (identified as I-1 through I-4) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Artificial fill soils were encountered at the ground surface at all four (4) of the infiltration test locations, extending to a depth of 1± foot below existing grades. The fill soils generally consist of loose to medium dense silty fine to medium sands with varying amounts of coarse sand and fine gravel. These soils possess a disturbed appearance and trace amounts of debris (asphaltic concrete fragments, glass, and plastic) resulting in their classification as artificial fill soils. A 2± inch thick layer of crushed miscellaneous base (CMB) was approximately 1± foot below existing site grades at Infiltration Trench Nos. I-1 and I-2. Native alluvial soils were encountered beneath the artificial fill soils and CMB at all of the infiltration test locations, extending to the maximum depth explored of 10± feet below existing site grades. The native alluvial soils generally consist of loose to medium dense silty fine to medium sands and silty fine to coarse sands. Free water was not encountered during the excavation of any of the trenches. The Trench Logs, which illustrate the conditions encountered at the trench locations, are included with this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used to dispose of storm water at the subject site. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At each test location, the outer ring was driven 3± inches into the soil at the base of the trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledgehammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at all four (4) of the infiltration test locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4± inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings were maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the test.

The schedule for readings was determined based on the observed soil type at the base of each backhoe excavated trench. Due to the varying silt content and the relative densities of the existing soils at each infiltration test location, the volumetric measurements were made at increments of 5 or 15 minutes. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for all the tests are calculated in centimeters per hour and then converted to inches per hour. These rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	8′	Silty fine to medium Sand, little coarse Sand	1.8
I-2	10′	Silty fine to coarse Sand	7.8
I-3	9′	Silty fine to coarse Sand	0.8
I-4	8′	Silty fine to medium Sand, little coarse Sand	1.1

Laboratory Testing

Grain Size Analysis

The grain size distribution of selected soils from the base of each infiltration test trench has been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented at the end of this report.

Design Recommendations

A total of four (4) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range from 0.8 to 7.7 inches per hour. The primary factor affecting the infiltration rates is the silt content of the encountered soils, which vary at different depths and locations at the subject site. In general, higher silt content was observed within the soil exposed at the bottom of Infiltration Test Nos. I-1, I-3, and I-4, which exhibited slower infiltration rates.

Based on the infiltration test results, we recommend a design infiltration rate of 1.0 inch per hour be used for the proposed below ground chamber system located in the northwestern area of the subject site.

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration system to identify the soil classification at the base of the system. It should be confirmed that the soils at the base of the proposed infiltration system correspond with those presented in this report to ensure that the performance of the system will be consistent with the rates reported herein.

The design of the proposed storm water infiltration system should be performed by the project civil engineer, in accordance with the City and/or Riverside County guidelines. **It is recommended that the project civil engineer apply an appropriate factor of safety.** It is also recommended that the system be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the effective infiltration rates. **The infiltration rates recommended above are based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rates.** It should be noted that the recommended infiltration rates are based on infiltration testing at four (4) discrete locations and the overall infiltration rate of the storm water infiltration system could vary considerably.

Infiltration versus Permeability

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. The infiltration rates presented herein were determined in accordance with the

ASTM Test Method D-3385-03 standard, and are considered valid for the time and place of the actual test. Changes in soil moisture content will affect these infiltration rates. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration areas could potentially be damaged due to saturation of subgrade soils. If possible, the proposed infiltration system for this site should be located at least 25 feet away from any structures, including retaining walls. Even with this provision of locating the infiltration system at least 25 feet from the buildings, it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rates contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between trench locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

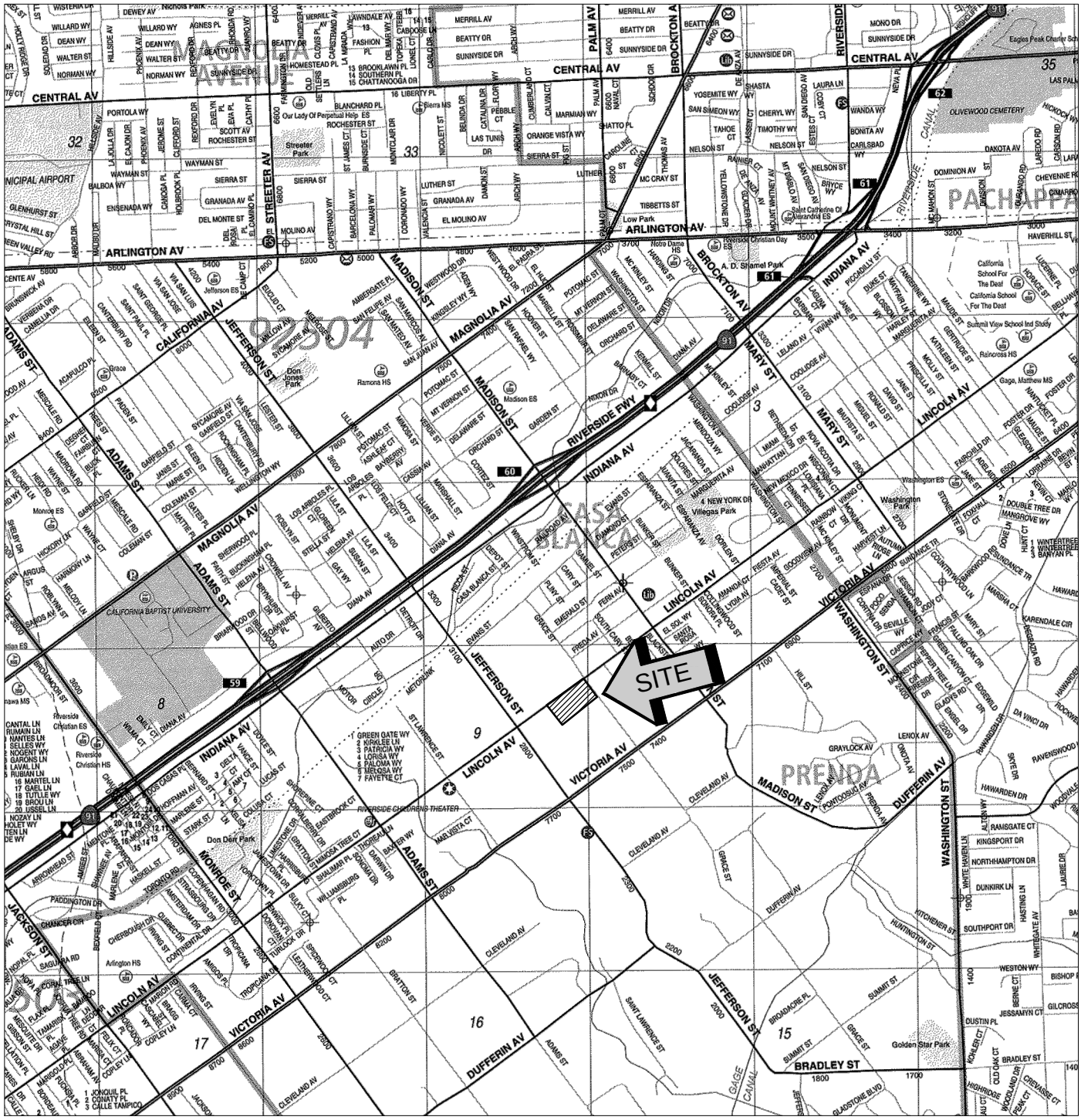
Scott McCann
Staff Scientist

John A. Seminara, GE 2294
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN A. SEMINARA
No. 2294
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

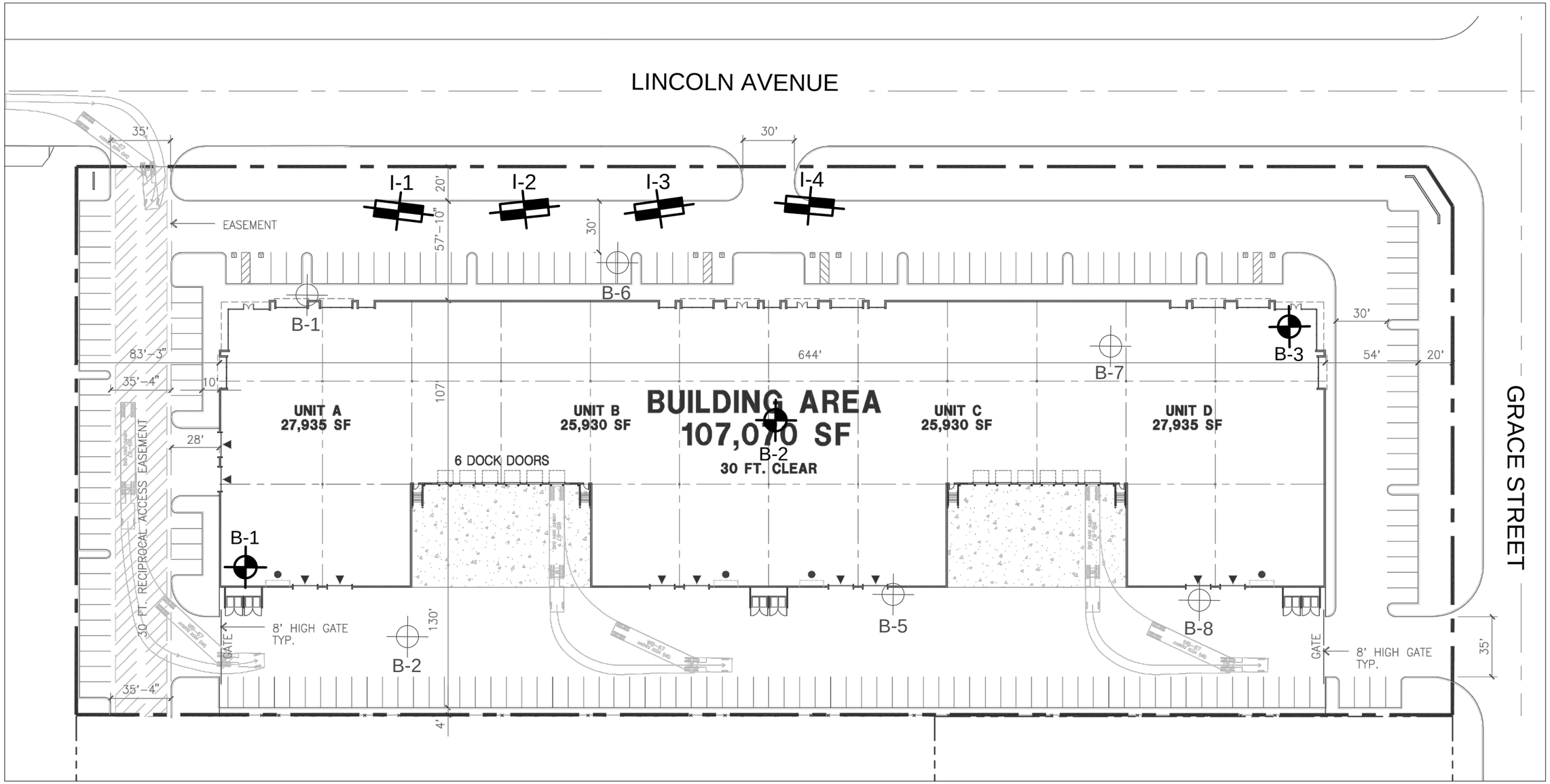
Enclosures: Plate 1 Site Location Map
Plate 2 Infiltration Test Location Plan
Trench Logs (4 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grain Size Distribution Graphs (4 pages)



SOURCE: RIVERSIDE COUNTY
THOMAS GUIDE, 2013

SITE LOCATION MAP
PROPOSED COMMERCIAL/INDUSTRIAL BUILDING
RIVERSIDE, CALIFORNIA
SCALE: 1" = 2400'
DRAWN: SAM CHKD: JAS
SCG PROJECT 16G168-2
PLATE 1

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION FROM CONCURRENT STUDY (SCG PROJECT NO. 16G168-1)
- APPROXIMATE BORING LOCATION FROM PREVIOUS STUDY (SCG PROJECT NO. 03G174-1)

NORTH

NOTE: BASE MAP PREPARED BY HPA.

BORING LOCATION PLAN
PROPOSED COMMERCIAL/INDUSTRIAL BUILDING
RIVERSIDE, CALIFORNIA
SCALE: 1" = 60'
DRAWN: JLL CHKD: JAS
SCG PROJECT 16G168-2
PLATE 2

SOUTHERN CALIFORNIA GEOTECHNICAL

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. I-1

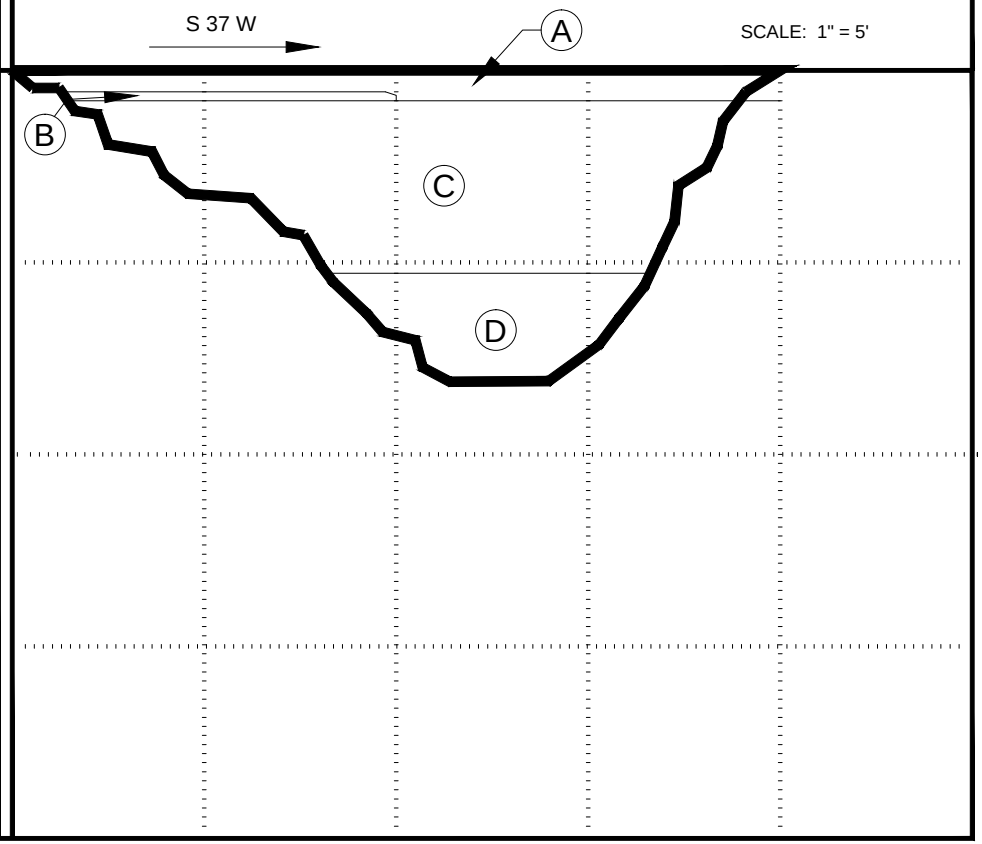
JOB NO.: 16G168-2
PROJECT: Proposed Commercial/Industrial Building
LOCATION: Riverside, CA
DATE: 5-20-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Scott McCann
ORIENTATION: S 37 W
ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: FILL: Light Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel, trace fine root fibers, trace Plastic, loose to medium dense - damp B: CRUSHED MISCELLANEOUS BASE: 2 inches thick C: ALLUVIUM: Light Brown Silty fine to medium Sand, trace coarse Sand, loose to medium dense - damp
5				D: ALLUVIUM: Light Brown Silty fine to medium Sand, little coarse Sand, trace roots, medium dense - damp to moist
				Trench Terminated @ 8 feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. I-2

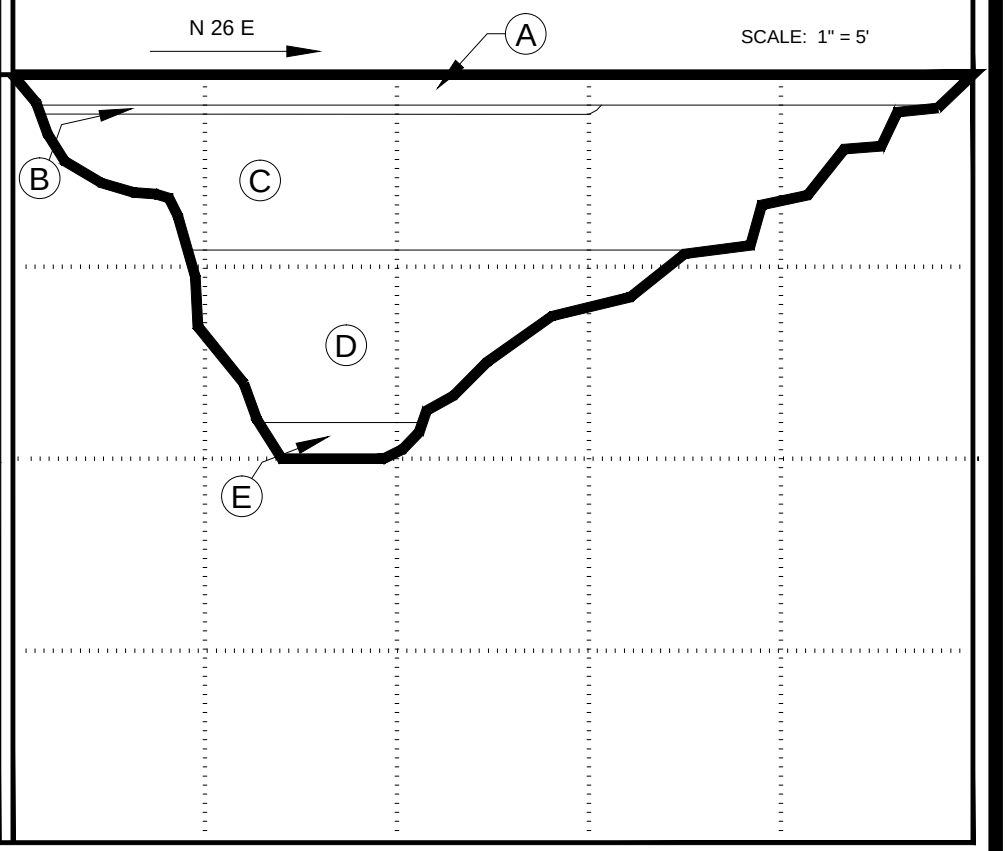
JOB NO.: 16G168-2
PROJECT: Proposed Commercial/Industrial Building
LOCATION: Riverside, CA
DATE: 5-20-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Scott McCann
ORIENTATION: N 26 E
ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: FILL: Light Brown Silty fine to coarse Sand, trace fine Gravel, trace fine root fibers, medium dense - dry B: CRUSHED MISCELLANEOUS BASE: 2 inches thick C: ALLUVIUM: Light Brown Silty fine to medium Sand, little coarse Sand, trace fine root fibers, loose to medium dense - damp
5				D: ALLUVIUM: Light Brown Silty fine Sand, little medium Sand, slightly porous, medium dense - dry to damp
10				E: ALLUVIUM: Light Brown Silty fine to coarse Sand, medium dense - damp Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. I-3

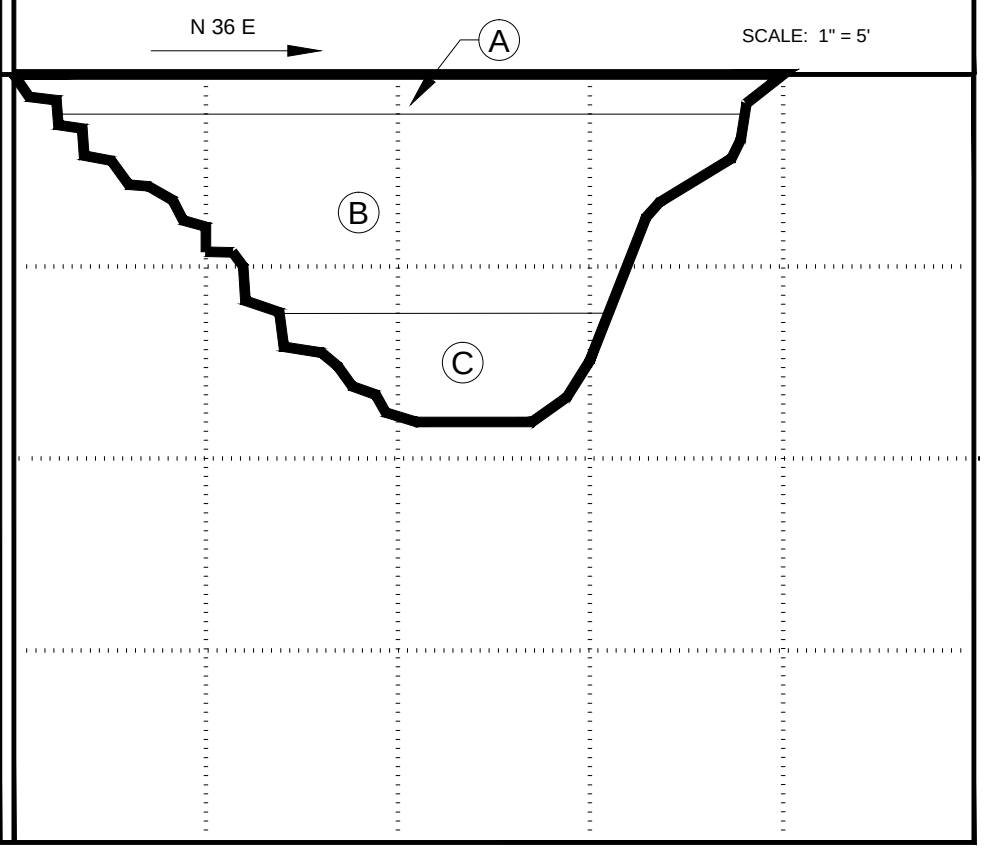
JOB NO.: 16G168-2
PROJECT: Proposed Commercial/Industrial Building
LOCATION: Riverside, CA
DATE: 5-20-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Scott McCann
ORIENTATION: N 36 E
ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: FILL: Brown Silty fine to medium Sand, trace coarse Sand, trace Asphaltic concrete fragments, trace Glass fragments, trace fine root fibers, loose to medium dense - damp B: ALLUVIUM: Light Brown Silty fine Sand, little to some medium Sand, slightly porous, medium dense - damp
5				C: ALLUVIUM: Brown Silty fine to coarse Sand, slightly porous, medium dense - damp
				Trench Terminated @ 9 feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. I-4

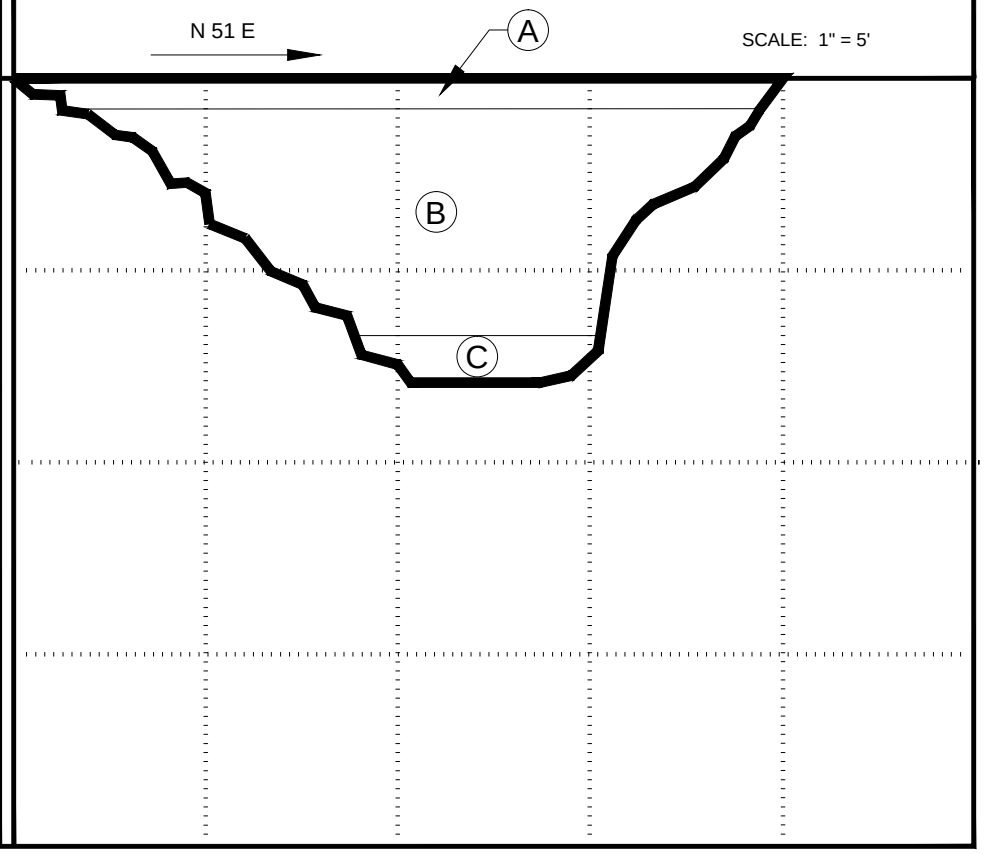
JOB NO.: 16G168-2
PROJECT: Proposed Commercial/Industrial Building
LOCATION: Riverside, CA
DATE: 5-20-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Scott McCann
ORIENTATION: N 51 E
ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: FILL: Brown Silty fine to medium Sand, trace coarse Sand, trace fine root fibers, medium dense - dry B: ALLUVIUM: Light Brown Silty fine Sand, little medium Sand, slightly porous, medium dense - dry to damp
5				C: ALLUVIUM: Light Brown Silty fine to medium Sand, little coarse Sand, slightly porous, medium dense - damp
				Trench Terminated @ 8 feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-4

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Building
Project Location	Riverside, CA
Project Number	16G168-2
Engineer	Scott McCann

Infiltration Test No: I-1

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	729.6
Annular	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Time Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	12:25 PM	15	225	1275	400	4700	6.99	8.59	2.75	3.38
	Final	12:40 PM	**15**	1500		5100					
2	Initial	12:41 PM	15	100	1075	400	3700	5.89	6.76	2.32	2.66
	Final	12:56 PM	**30**	1175		4100					
3	Initial	12:57 PM	15	50	1000	450	3350	5.48	6.12	2.16	2.41
	Final	1:12 PM	**45**	1050		3800					
4	Initial	1:13 PM	15	75	875	300	3200	4.80	5.85	1.89	2.30
	Final	1:28 PM	**60**	950		3500					
5	Initial	1:29 PM	15	50	850	400	3150	4.66	5.76	1.83	2.27
	Final	1:44 PM	**75**	900		3550					

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Building
Project Location	Riverside, CA
Project Number	16G168-2
Engineer	Scott McCann

Infiltration Test No: I-2

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	729.6
Annular	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Time Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	11:10 AM	5	50	2150	600	6900	35.36	37.83	13.92	14.89
	Final	11:15 AM	**5**	2200		7500					
2	Initial	11:16 AM	5	150	1750	300	6000	28.78	32.89	11.33	12.95
	Final	11:21 AM	**10**	1900		6300					
3	Initial	11:22 AM	5	100	1450	200	5450	23.85	29.88	9.39	11.76
	Final	11:27 AM	**15**	1550		5650					
4	Initial	11:28 AM	5	100	1350	200	5100	22.20	27.96	8.74	11.01
	Final	11:33 AM	**20**	1450		5300					
5	Initial	11:34 AM	5	150	1275	400	4900	20.97	26.86	8.26	10.58
	Final	11:39 AM	**25**	1425		5300					
6	Initial	11:40 AM	5	100	1200	500	4800	19.74	26.31	7.77	10.36
	Final	11:45 AM	**30**	1300		5300					
7	Initial	11:46 AM	5	100	1200	700	4700	19.74	25.77	7.77	10.14
	Final	11:51 AM	**35**	1300		5400					

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Building
Project Location	Riverside, CA
Project Number	16G168-2
Engineer	Scott McCann

Infiltration Test No: I-3

Constants			
	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	729.6
Annular	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Time Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	9:40 AM	15	50	825	100	2300	4.52	4.20	1.78	1.65
	Final	9:55 AM	**15**	875		2400					
2	Initial	9:56 AM	15	100	400	200	1400	2.19	2.56	0.86	1.01
	Final	10:11 AM	**30**	500		1600					
3	Initial	10:12 AM	15	75	400	200	1600	2.19	2.92	0.86	1.15
	Final	10:27 AM	**45**	475		1800					
4	Initial	10:28 AM	15	75	375	100	1350	2.06	2.47	0.81	0.97
	Final	10:43 AM	**60**	450		1450					
5	Initial	10:44 AM	15	100	375	200	1350	2.06	2.47	0.81	0.97
	Final	10:59 AM	**75**	475		1550					

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Building
Project Location	Riverside, CA
Project Number	16G168-2
Engineer	Scott McCann

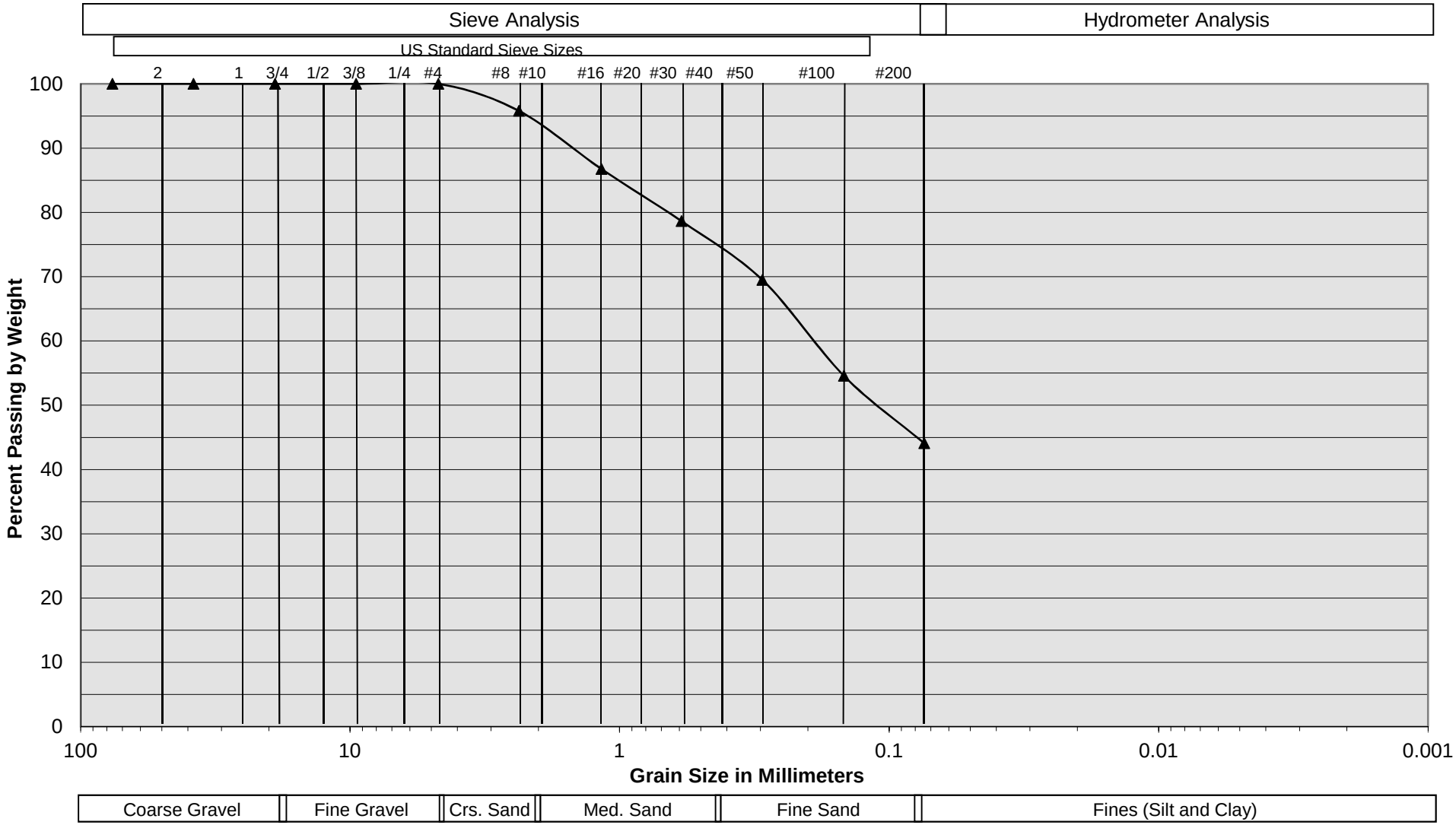
Infiltration Test No: I-4

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	729.6
Annular	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Time Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	8:03 AM	15	100	975	600	3100	5.35	5.66	2.10	2.23
	Final	8:18 AM	**15**	1075		3700					
2	Initial	8:19 AM	15	100	575	200	2200	3.15	4.02	1.24	1.58
	Final	8:34 AM	**30**	675		2400					
3	Initial	8:35 AM	15	25	550	250	2100	3.02	3.84	1.19	1.51
	Final	8:50 AM	**45**	575		2350					
4	Initial	8:51 AM	15	25	525	300	2050	2.88	3.75	1.13	1.47
	Final	9:06 AM	**60**	550		2350					
5	Initial	9:07 AM	15	50	525	300	2000	2.88	3.65	1.13	1.44
	Final	9:22 AM	**75**	575		2300					

Grain Size Distribution

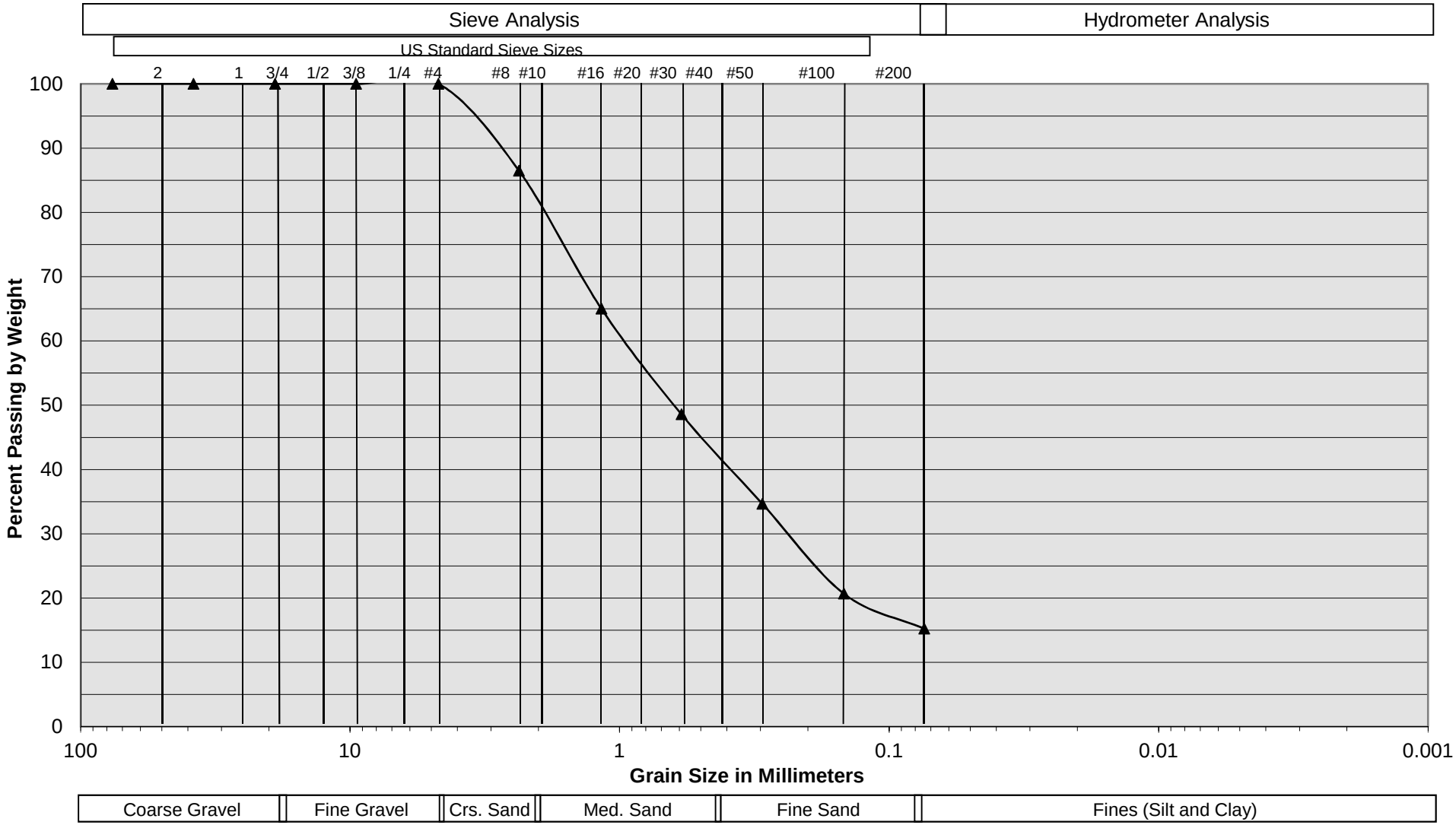


Sample Description	I-1 @ 8 feet
Soil Classification	Light Brown Silty fine to medium Sand, little coarse Sand

Proposed Commercial/Industrial Building
Riverside, California
Project No. 16G168-2
PLATE C-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

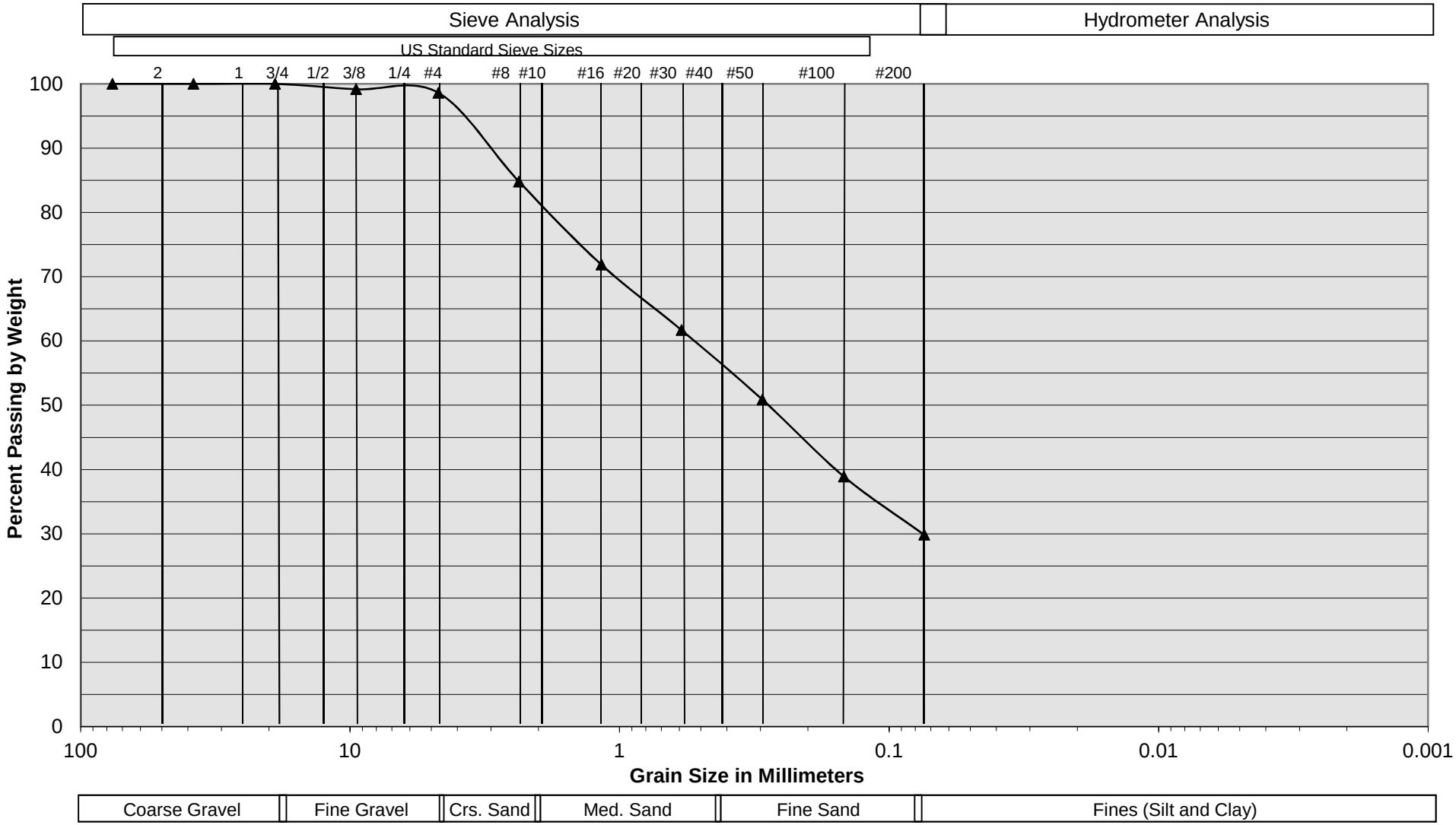


Sample Description	I-2 @ 10 feet
Soil Classification	Light Brown Silty fine to coarse Sand

Proposed Commercial/Industrial Building
Riverside, California
Project No. 16G168-2
PLATE C-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

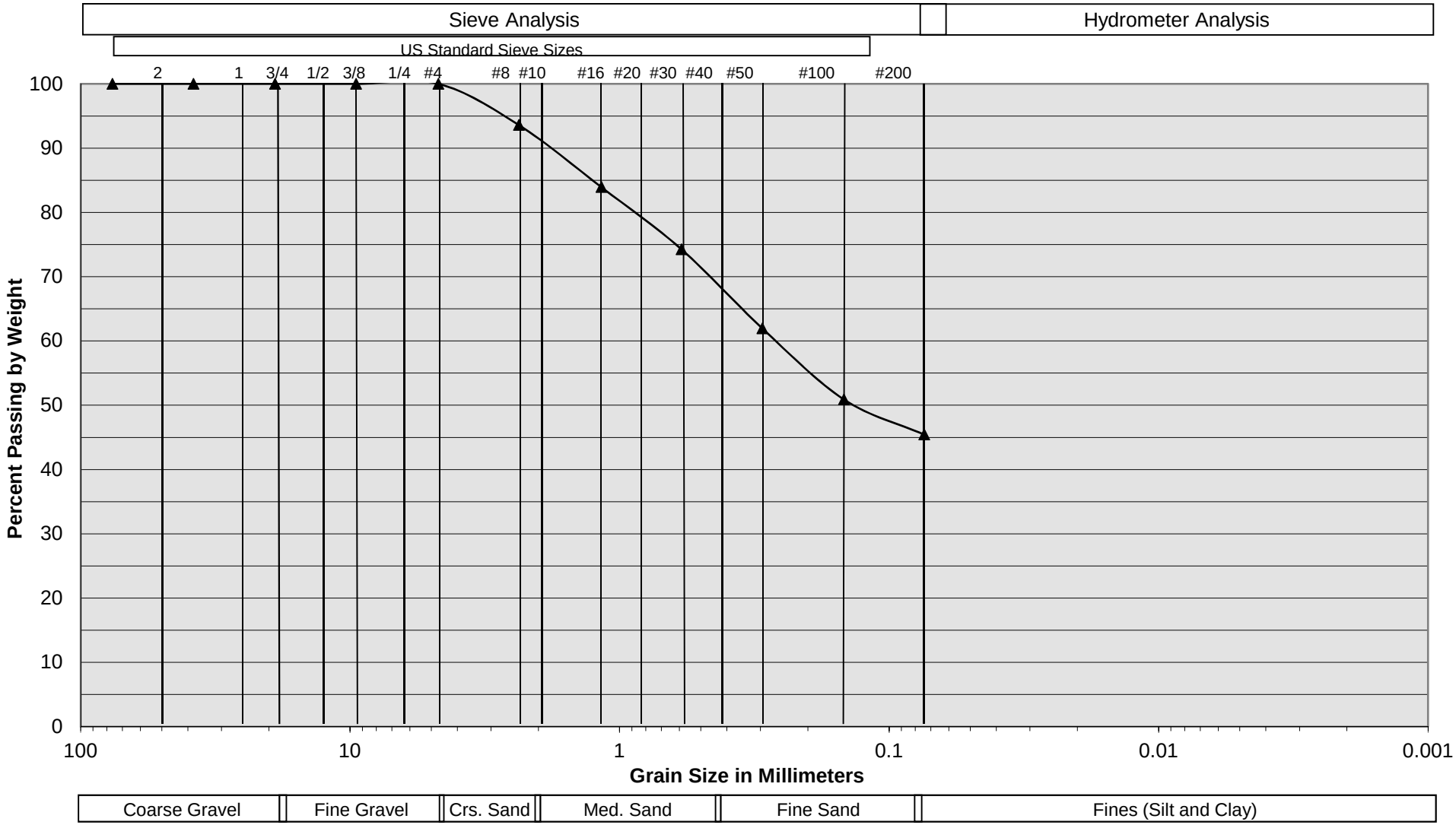


Sample Description	I-3 @ 9 feet
Soil Classification	Light Brown Silty fine to coarse Sand

Proposed Commercial/Industrial Building
Riverside, California
Project No. 16G168-2
PLATE C-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-4 @ 8 feet
Soil Classification	Light Brown Silty fine to medium Sand, little coarse Sand

Proposed Commercial/Industrial Building
Riverside, California
Project No. 16G168-2
PLATE C-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX H

TRAFFIC IMPACT ANALYSIS

TRAFFIC IMPACT ANALYSIS

LINCOLN AVENUE INDUSTRIAL WAREHOUSE

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

LSA

October 25, 2016

TRAFFIC IMPACT ANALYSIS

LINCOLN AVENUE INDUSTRIAL WAREHOUSE

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

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1500 Iowa Avenue, Suite 200
Riverside, California 92507
(951) 781-9310

LSA Project No. RVL1601D

October 25, 2016

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INTRODUCTION

This traffic impact analysis (TIA) has been prepared to assess the potential circulation impacts associated with the proposed Lincoln Avenue Industrial Warehouse to be located southwest of the intersection of Lincoln Avenue/Grace Street in the City of Riverside (City). The proposed project consists of one 100,974-square foot industrial warehouse building. Figure 1 illustrates the regional and project location. Figure 2 illustrates the conceptual site plan.

This report is intended to satisfy the requirements established by the City of Riverside "Traffic Impact Preparation Guide," dated January 2016, as well as the requirements for the disclosure of potential impacts and mitigation measures pursuant to the California Environmental Quality Act (CEQA). The scope of work for this TIA, including trip generation, trip distribution, study area, and analysis methodologies have been approved by City staff via the City's Scoping Agreement process. A Copy of the City Scoping Agreement is included in Appendix A.

This TIA examines traffic operations in the vicinity of the proposed project under the following six scenarios:

- Existing traffic conditions;
- Existing with project traffic conditions;
- Project completion (2017) conditions;
- Project completion (2017) with project traffic conditions;
- Cumulative (2017) traffic conditions; and
- Cumulative (2017) with project traffic conditions.

For each scenario, traffic operations at study intersections are evaluated for the a.m. and p.m. peak hours. The a.m. peak hour is defined as the one hour of highest traffic volumes occurring between 7:00 and 9:00 a.m. The p.m. peak hour is defined as the one hour of highest traffic volumes occurring between 4:00 and 6:00 p.m.

STUDY AREA DETERMINATION

The study area was approved by City staff via the City's scoping agreement process (Appendix A). Study intersections were selected based on discussion with City staff. The study includes locations where project traffic has potential to cause a significant impact. The following six intersections were analyzed:

1. Adams Street/Lincoln Avenue;
2. Jefferson Street/Lincoln Avenue;
3. Project Driveway 1/Lincoln Avenue;
4. Project Driveway 2/Lincoln Avenue;
5. Grace Street/Lincoln Avenue; and

LSA

FIGURE 1

N

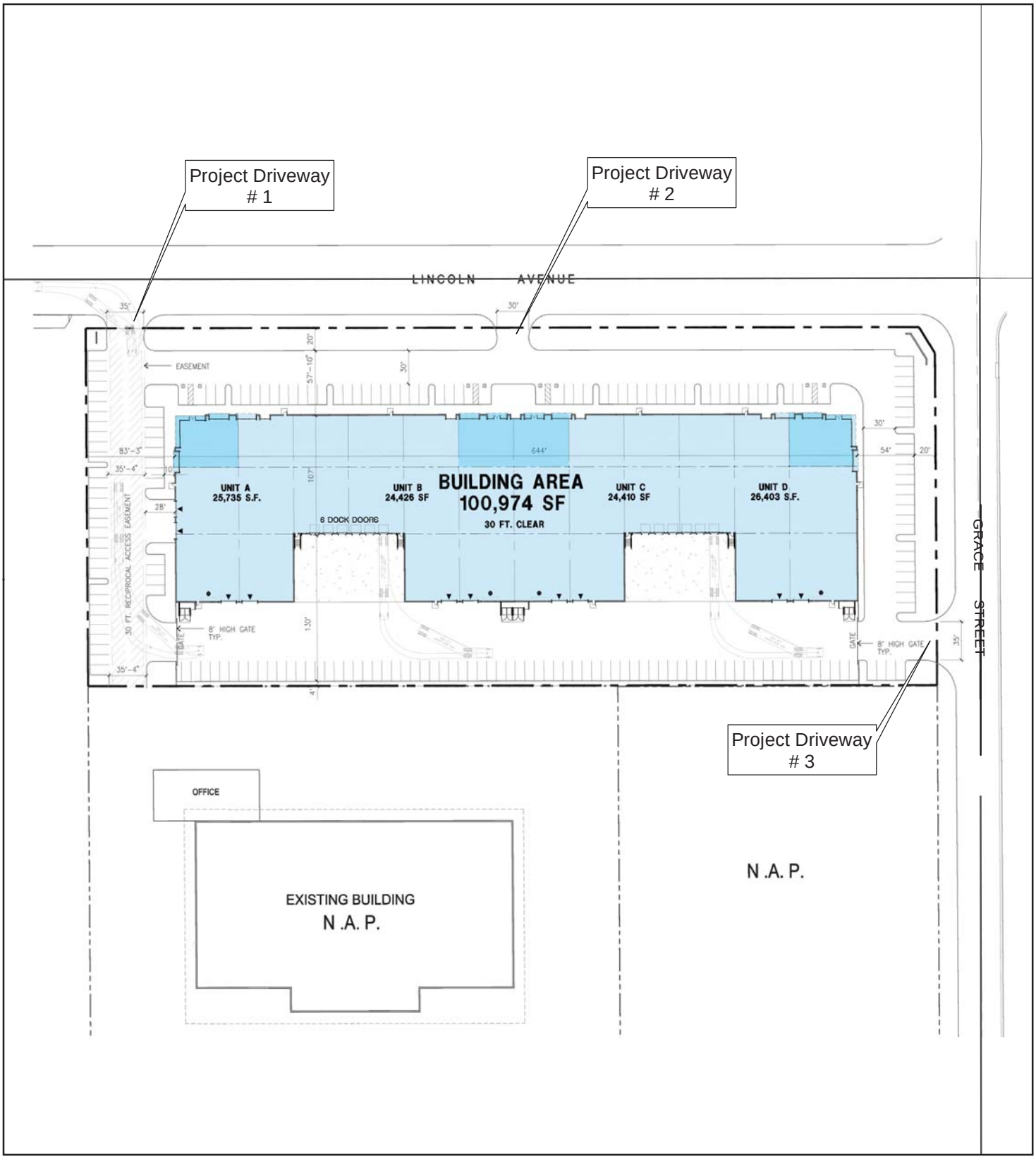
0 1000 2000
FEET

SOURCE: Bing Aerial, 2016.

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Regional and Project Location

I:\RVL1601\Reports\Traffic\fig1_RegLoc.mxd (9/23/2016)



LSA

FIGURE 2

0 60 120
FEET

SOURCE: HPA Architechture, May 11, 2016.

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Conceptual Site Plan

I:\RVL1601\Reports\Traffic\fig2_Concept_SitePlan.mxd (10/26/2016)

6. Project Driveway 3/Grace Street.

Figure 3 illustrates the study area intersections.

PROJECT DESCRIPTION

As previously discussed, the proposed project consists of one 100,974-square foot industrial warehouse building. Access to the project site will be provided via three proposed driveways. The location of project driveways is shown on previously referenced Figure 2. The project will use an existing driveway (Project Driveway 1) located on the northwest portion of the project site and currently used by an adjacent industrial building. Two additional driveways are proposed on Lincoln Avenue (Project Driveway 2) and Grace Street (Project Driveway 3). All three driveways will allow full access to passenger vehicles. Truck access will be provided via Project Driveways 1 and 3. Project Driveway 1 will allow full access for trucks, while Project Driveway 3 restricts truck access to egress left-turn movements. At Driveway 3, egress right-turns and ingress movements will be prohibited. Project Driveway 2 will not have truck access. All vehicle restrictions will be enforced with signage in conformance with City's zoning code.

ANALYSIS METHODOLOGY

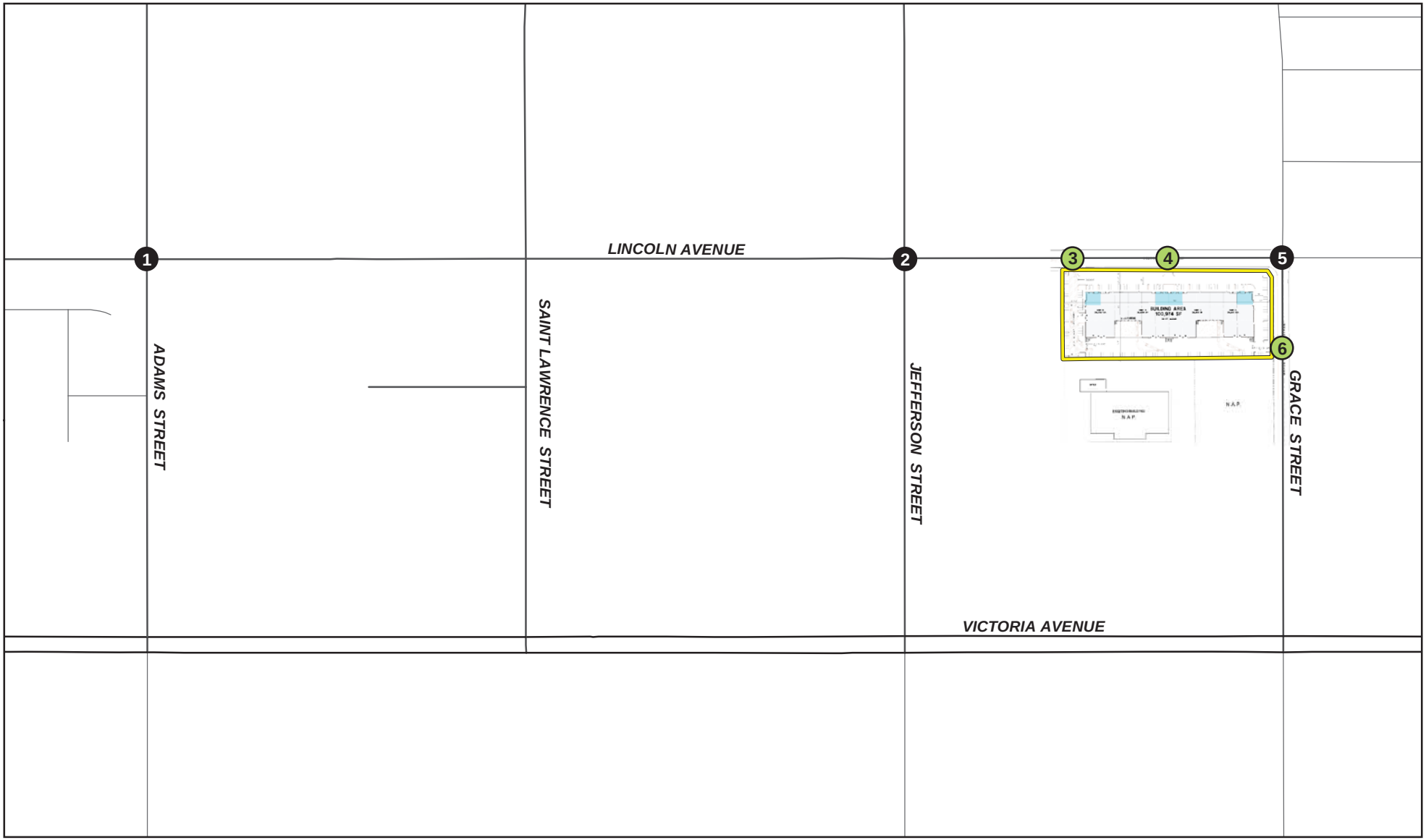
Level of Service Definitions and Procedures

Roadway operations and the relationship between capacity and traffic volumes are generally expressed in terms of levels of service (which are defined using the letter grades A through F). These levels recognize that, while an absolute limit exists as to the amount of traffic traveling through a given intersection (the absolute capacity), the conditions that motorists experience rapidly deteriorate as traffic approaches the absolute capacity. Under such conditions, congestion is experienced. There is general instability in the traffic flow, which means that relatively small incidents (e.g., momentary engine stall) can cause considerable fluctuations in speeds and delays. This near-capacity situation is labeled Level of Service (LOS) E. Beyond LOS E, capacity has been exceeded, and arriving traffic will exceed the ability of the intersection to accommodate it. An upstream queue will then form and continue to expand in length until the demand volume again declines.

A complete description of the meaning of level of service can be found in the Transportation Research Board Special Report 209, *Highway Capacity Manual* (HCM). The HCM establishes levels of service A through F as shown in Table A.

Table B shows the level of service criteria for unsignalized and signalized intersections.

Consistent with the City's TIA guidelines, the 2010 HCM analysis methodologies were used to determine intersection levels of service for all study area intersections. All levels of service were calculated using Synchro 9.0 software, which uses the HCM 2010 methodologies.



LSA

Project Boundary

Study Area Intersections

Existing Intersection

Project Driveway

0 250 500
FEET

SOURCE: Riverside County, 2015.

FIGURE 3

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Study Area Intersections

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Table A: Level of Service Definitions

LOS	Description
A	No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turns are made easily and nearly all drivers find freedom of operation.
B	This service level represents stable operation, where an occasional approach phase is fully utilized and a substantial number are approaching full use. Many drivers begin to feel restricted within platoons of vehicles.
C	This level still represents stable operating conditions. Occasionally drivers may have to wait through more than one red signal indication, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so.
D	This level encompasses a zone of increasing restriction approaching instability at the intersection. Delays to approaching vehicles may be substantial during short peaks within the peak period; however, enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive backups.
E	Capacity occurs at the upper end of this service level. It represents the most vehicles that any particular intersection approach can accommodate. Full utilization of every signal cycle is seldom attained no matter how great the demand.
F	This level describes forced flow operations at low speeds, where volumes exceed capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. Speeds are reduced substantially and stoppages may occur for short or long periods of time due to the congestion. In the extreme case, both speed and volume can drop to zero.

Table B: Level of Service Criteria for Unsignalized and Signalized Intersections

Level of Service	Unsignalized Intersection Average Delay per Vehicle (sec.)	Signalized Intersection Average Delay per Vehicle (sec.)
A	$\leq$ 10	$\leq$ 10
B	> 10 and $\leq$ 15	> 10 and $\leq$ 20
C	> 15 and $\leq$ 25	> 20 and $\leq$ 35
D	> 25 and $\leq$ 35	> 35 and $\leq$ 55
E	> 35 and $\leq$ 50	> 55 and $\leq$ 80
F	> 50	> 80

Level of Service Threshold

All study intersections are under the jurisdiction of the City. The City uses LOS D as its minimum level of service criteria for intersections and roadways of Collector or higher classification, while LOS C is to be maintained on local street intersections. All study intersections are located on either Lincoln Avenue, which is designated as a 4-lane arterial by the City's General Plan, or Grace Street, a 2-lane local street. Therefore, for intersections on Lincoln Avenue, LOS D is the minimum level of service standard and LOS C is used for intersections located solely on Grace Street.

Project Significance Threshold

The City's significance criteria are used for all study intersections within the City's jurisdiction. As stated in the City's TIA preparation guide, for projects in conformance with the City's General Plan, a significant project impact occurs at a study intersection when the peak hour LOS falls below D (to E or F) per Policy CCM-2.3. Since the proposed project is consistent with the City's General Plan, a significant impact occurs when the peak hour LOS falls below D (below LOS C for local streets).

TRAFFIC VOLUMES WITHOUT PROJECT SCENARIOS

Existing Traffic Volumes

Existing traffic volumes are based on peak hour intersection turn movement counts collected by National Data and Surveying Services in September and October 2016. Count sheets are included in Appendix B. Vehicle classification counts were conducted at the intersections of Adams Street/ Lincoln Avenue and Jefferson Street/Lincoln Avenue. The percentage of trucks at the remaining study intersections without classification counts was determined from classification counts at nearby intersections.

The concept of passenger car equivalents (PCEs) accounts for the larger impact of trucks on traffic operations. It does so by assigning each type of truck a PCE factor that represents the number of passenger vehicles that could travel through an intersection in the same time that a particular type of truck could. Consistent with the HCM 2010 Methodologies, PCE volumes at study intersections were computed using a factor 2.0 for all trucks. Figure 4 illustrates existing peak hour PCE volumes at study intersections. Detailed volume development worksheets are included in Appendix C.

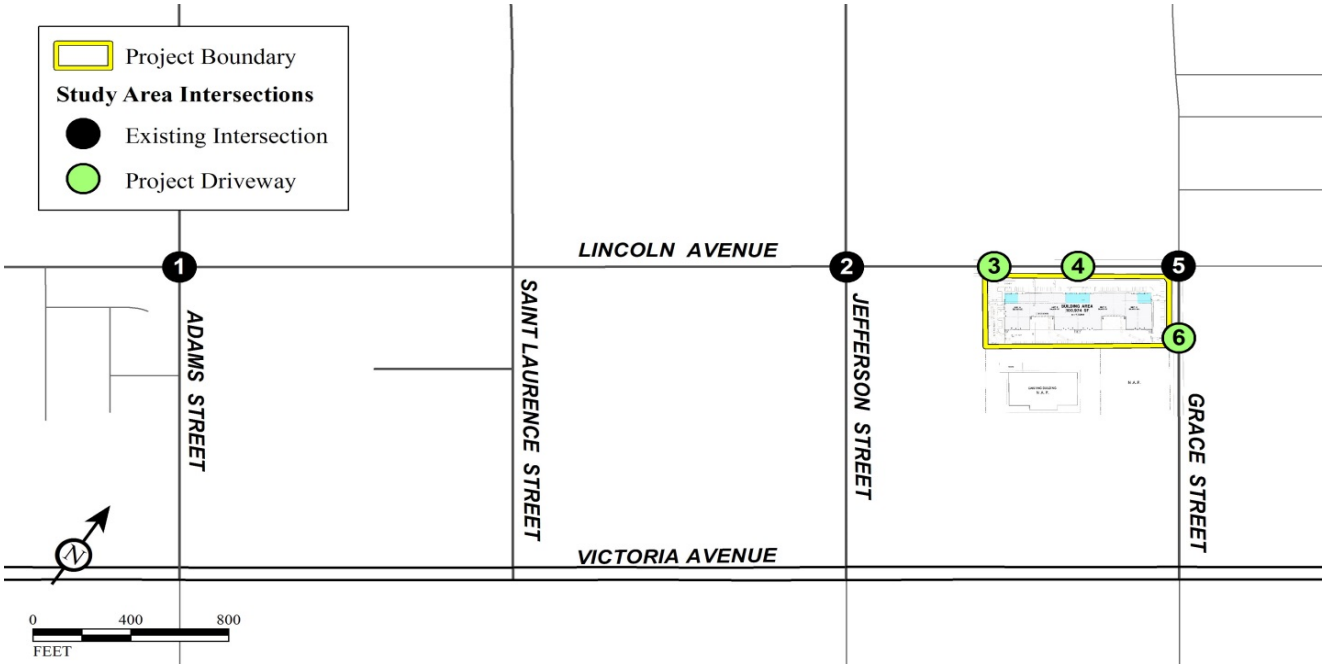
Project Completion (2017) Traffic Volumes

Project completion traffic volumes were developed by applying an annual growth rate of 1.5 percent per year (2016 to 2017) to the existing PCE volumes at each study area intersection. All assumptions, including the growth rate to be used for project completion analyses, are outlined in the City-approved scoping letter (Appendix A). Figure 5 illustrates project completion without project peak hour PCE volumes. Detailed volume development worksheets are included in Appendix C.

Cumulative (2017) Traffic Volumes

Information concerning cumulative projects in the vicinity of the proposed project was obtained from City staff. Table C lists the cumulative projects included in this analysis. Figure 6 illustrates the cumulative project locations.

The trip generation for cumulative projects was developed using rates from the Institute of Transportation Engineers (ITE) *Trip Generation*, 9th Edition. As shown in Table C, cumulative projects are expected to generate 8,982 net daily trips, 370 net a.m. peak hour trips, and 576 net p.m. peak hour trips. Figure 7 illustrates the total cumulative project trips at study intersections. Cumulative traffic volumes were added to the project completion volumes to develop cumulative without project PCE volumes. Figure 8 illustrates cumulative without project peak hour PCE volumes at study intersections. Detailed volume development worksheets are included in Appendix C.



1 Adams Street/Lincoln Avenue

89 / 115	103 / 269	133 / 102	167 / 106	291 / 188	11 / 10
119 / 59	269 / 221	8 / 19	27 / 16	364 / 111	24 / 17

2 Jefferson Street/Lincoln Avenue

74 / 73	75 / 220	27 / 64	58 / 44	315 / 172	8 / 7
88 / 52	342 / 272	25 / 37	33 / 8	222 / 87	11 / 4

3 Project Driveway 1/Lincoln Street

		383 / 212	3 / 1
356 / 355	5 / 10	1 / 2	1 / 6

4 Project Driveway 2/Lincoln Street

Future Intersection

5 Grace Street/Lincoln Avenue

29 / 6	1 / 3	2 / 5	4 / 5	318 / 198	14 / 27
16 / 7	330 / 342	14 / 15	35 / 9	6 / 6	23 / 14

6 Project Driveway 3/Grace Street

19 / 41	3 / 9	5 / 1	
		68 / 31	

LSA

FIGURE 4

XXX / YYY

AM / PM Peak Hour PCE Traffic Volumes

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Existing Peak Hour Traffic Volumes

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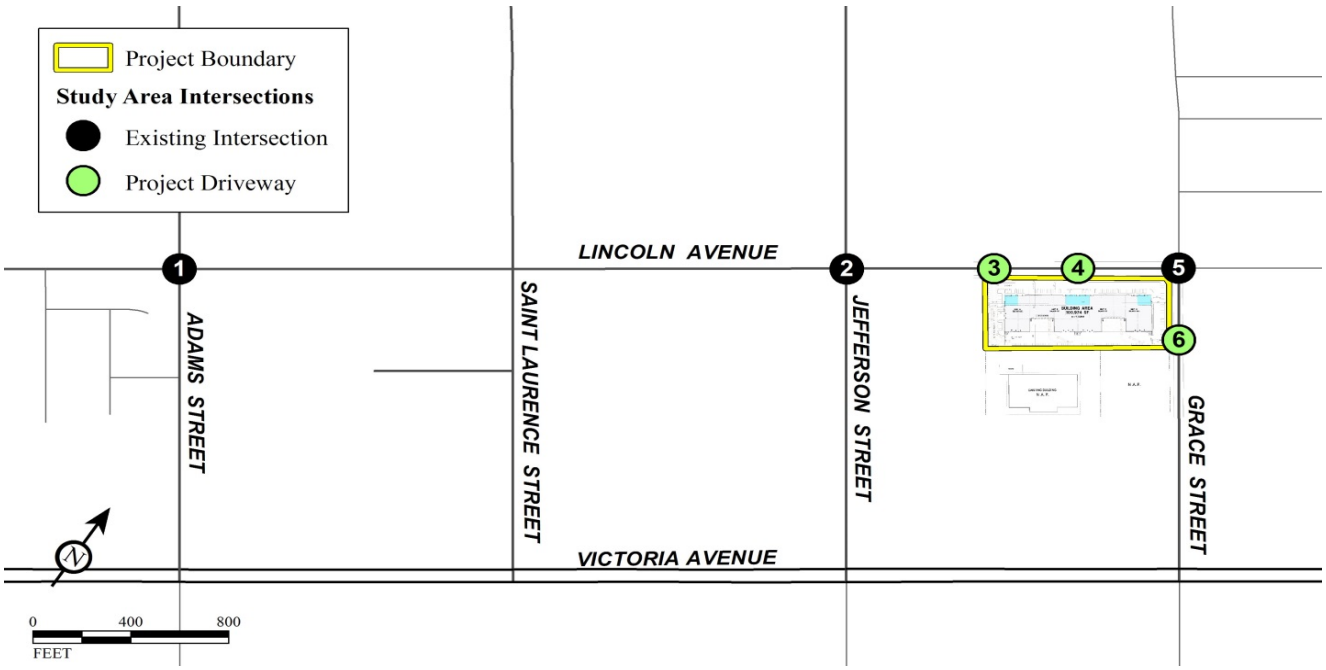

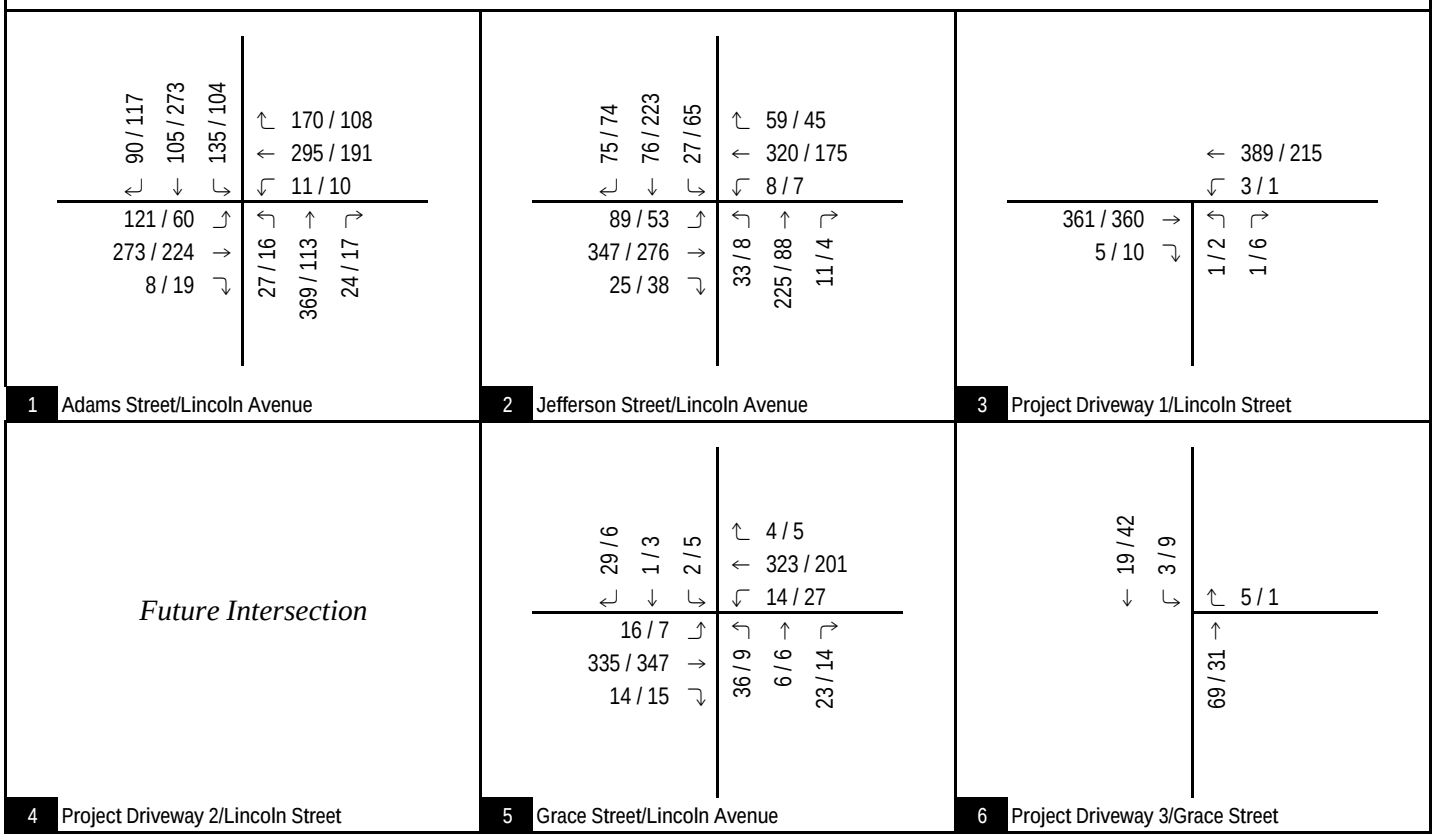

LSA

FIGURE 5

XXX / YYY

AM / PM Peak Hour PCE Traffic Volumes

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Completion (2017) Peak Hour Traffic Volumes

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Table C - Cumulative Projects Trip Generation

No.	Location	Land Use	Units		Rate	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
1 .	3490 Madison Street	Commercial/Retail Center	80.9	TSF	Total Net Trips[1]	**138**	**102**	**239**	**222**	**193**	**415**	**6,204**
2 .	3345 Madison Street	Automated Carwash Facility	3.3	TSF	Trips/Unit[2]	7.06	7.06	14.12	7.06	7.06	14.12	190.62
					Trip Generation	**23**	**23**	**46**	**23**	**23**	**46**	**627**
3 .	8100 Auto Drive	Auto Dealership	15.2	TSF	Trips/Unit[3]	1.44	0.48	1.92	1.05	1.57	2.62	32.30
					Trip Generation	**22**	**7**	**29**	**16**	**24**	**40**	**491**
4 .	3399 Adams Street	Gas Station with Convenience Store and Carwash	12	VFP	Trips/Unit[4]	6.04	5.80	11.84	7.07	6.79	13.86	152.84
					Trip Generation	72	70	142	85	81	166	1,834
					Pass-by Trips[5]	(44)	(44)	(88)	(46)	(46)	(93)	(181)
					Total Net Trips	**28**	**26**	**54**	**39**	**35**	**73**	**1,653**
5 .	3628 Madison Street	Senior Apartments	2	DU	Trips/Unit[6]	0.07	0.13	0.20	0.14	0.12	0.25	3.44
					Trip Generation	**1**	**1**	**2**	**1**	**1**	**2**	**7**
					Total Net Trip Generation	**212**	**159**	**370**	**301**	**276**	**576**	**8,982**

Notes:

TSF = Thousand Square Feet, DU = Dwelling Units, VFP = Vehicle Fueling Positions

[1] Trip Generation based on the "Madison Plaza Traffic Impact Analysis," dated July 6, 2016.

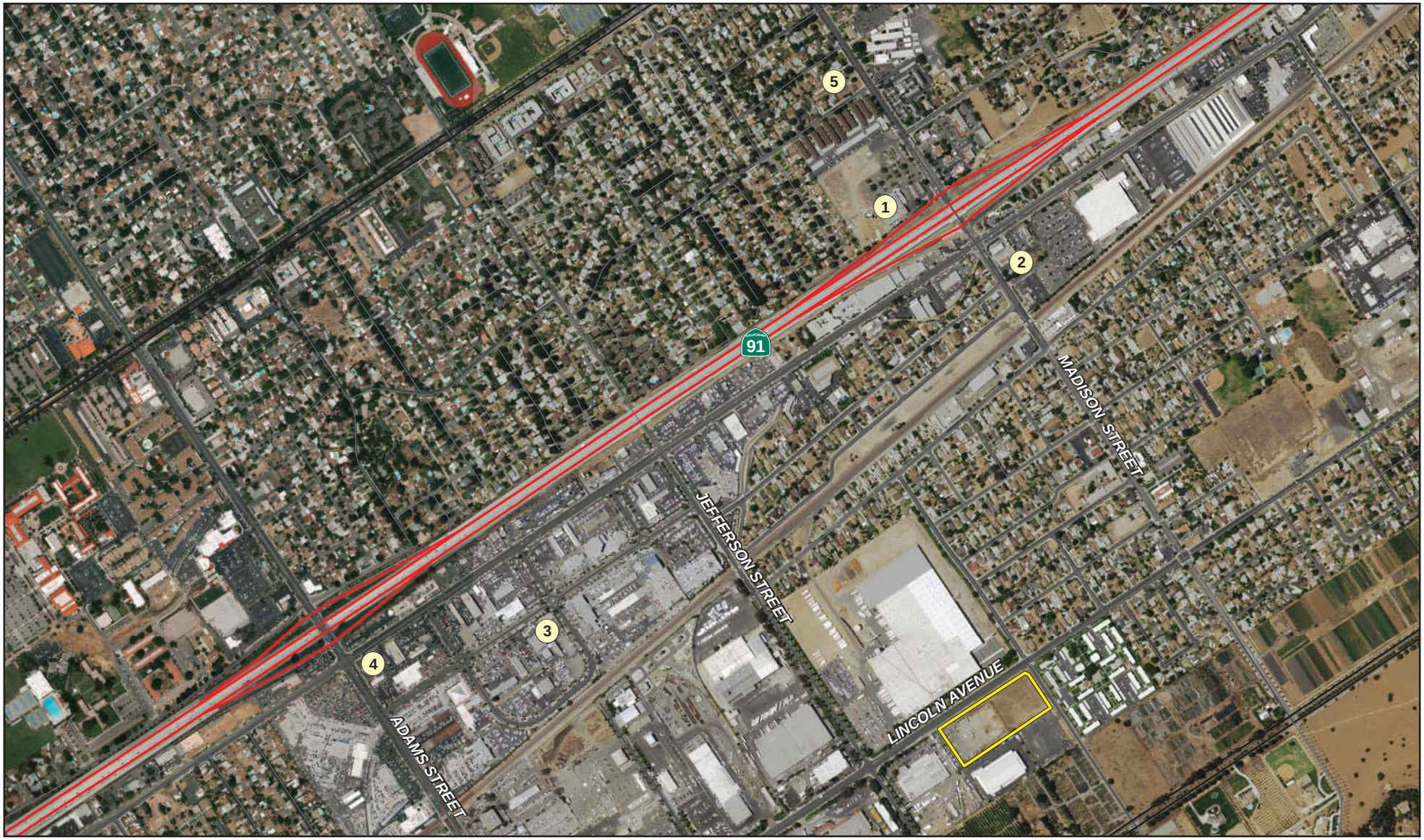
[2] Rates based on Land Use 948 "Automated Car Wash" from the Institute of Transportation Engineers (ITE) *Trip Generation* Manual, 9th Edition. Daily rates were developed by using the ratio between the daily and p.m. peak hour rates for Land Use 947 "Self-Service Car Wash" as contained in the ITE *Trip Generation* Manual, 9th Edition.

[3] Rates based on Land Use 841 "Automobile Sales" from the ITE *Trip Generation* Manual, 9th Edition.

[4] Rates based on Land Use 945 "Gasoline/Service Station with Convenience Market" from the ITE *Trip Generation* Manual, 9th Edition.

[5] Pass-by trips are based on rates for Land Use 945 "Gasoline/Service Station with Convenience Market" from the ITE *Trip Generation Handbook*, 2nd Edition. Since there is no data available for daily pass-by trips, p.m. pass-by trips have been applied to the daily trip generation.

[6] Rates based on Land Use 220 "Apartments" from the ITE *Trip Generation* Manual, 9th Edition.



LSA

FIGURE 6

Project Boundary

Cumulative Project

N

0 500 1000

FEET

SOURCE: ESRI World Imagery, 2015; Riverside County, 2015.

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Cumulative Projects

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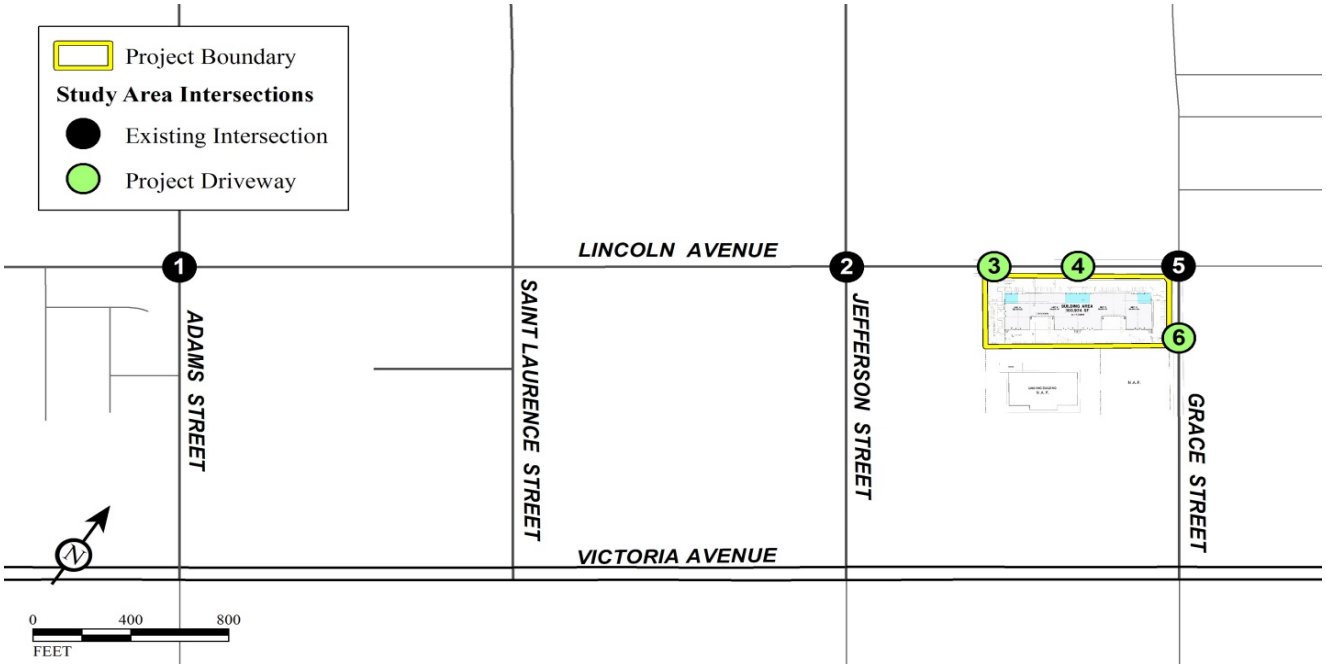

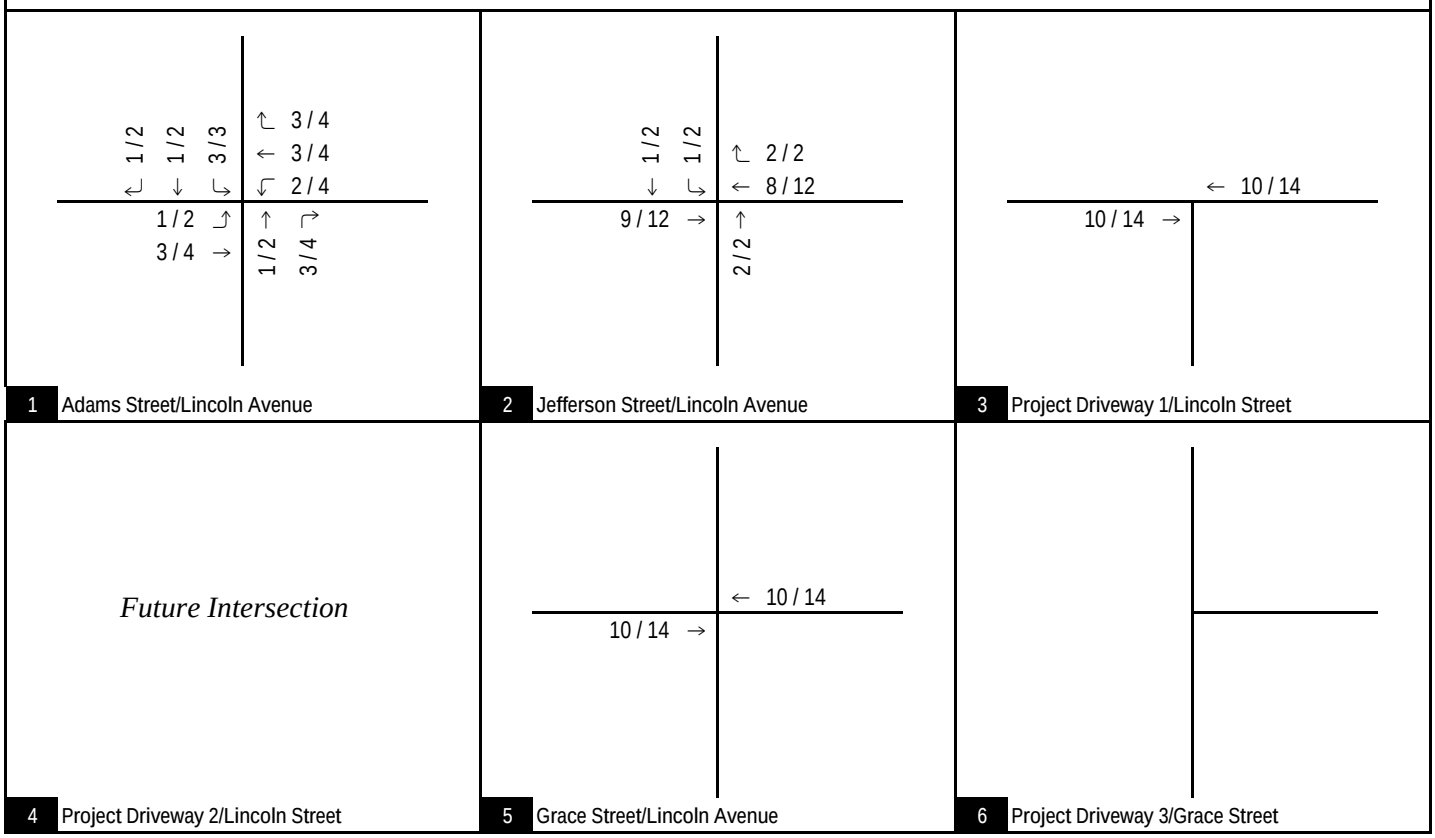

1 Adams Street/Lincoln Avenue

2 Jefferson Street/Lincoln Avenue

3 Project Driveway 1/Lincoln Street

4 Project Driveway 2/Lincoln Street

5 Grace Street/Lincoln Avenue

6 Project Driveway 3/Grace Street

LSA

FIGURE 7

XX / YY

AM / PM Peak Hour Traffic Volumes

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Cumulative Project Trips

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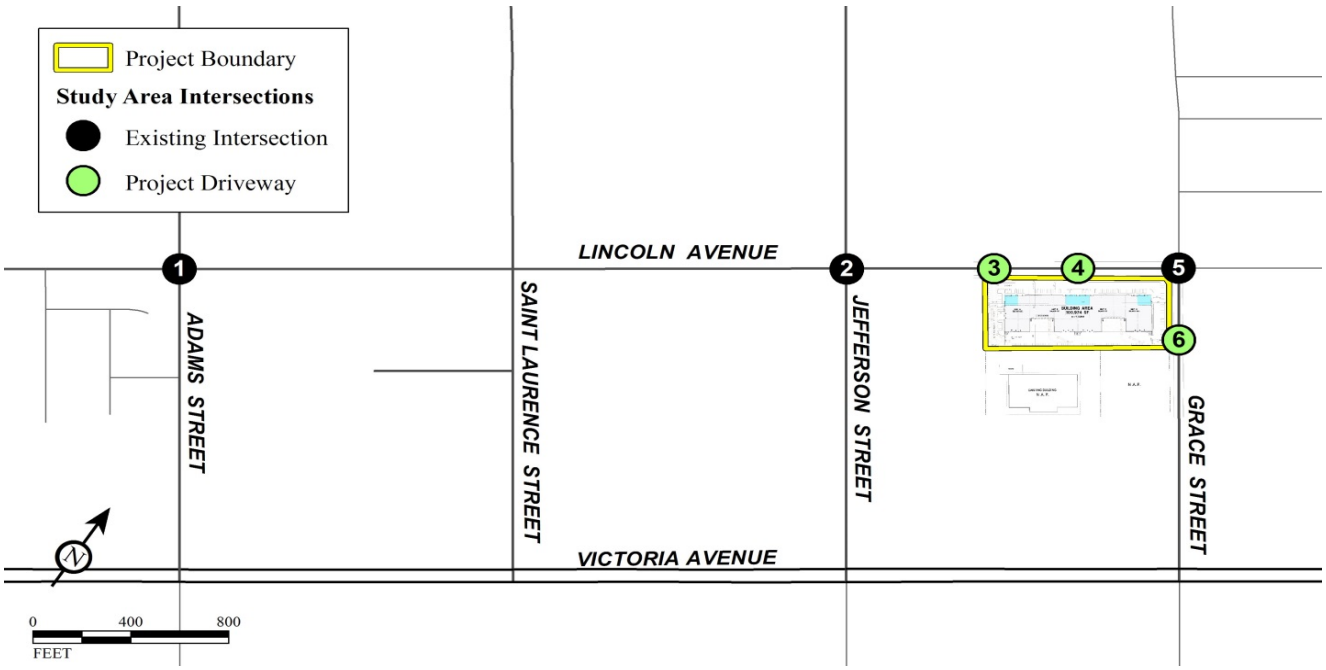

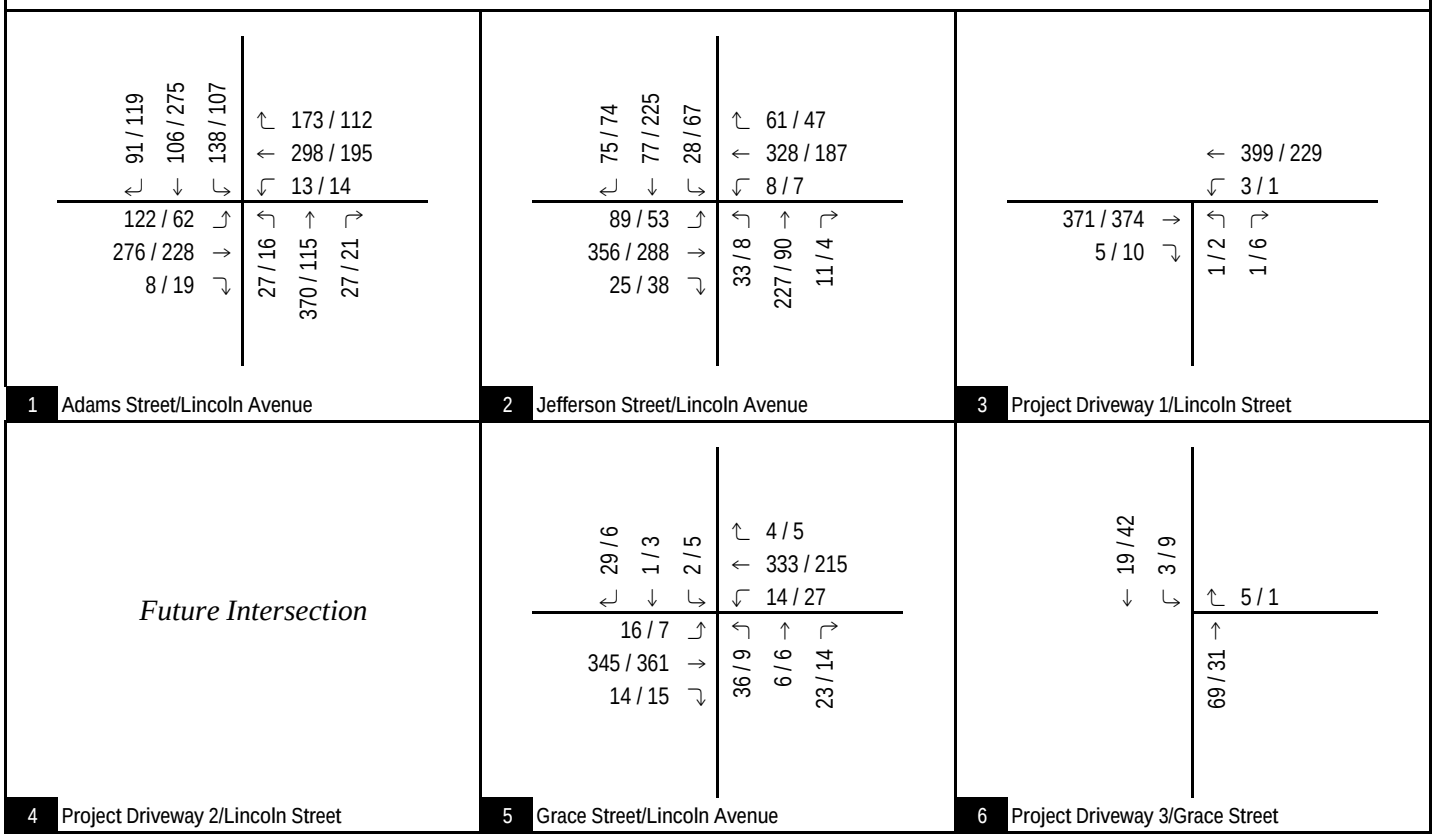

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FIGURE 8

XXX / YYY

AM / PM Peak Hour PCE Traffic Volumes

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Cumulative (2017) Project Peak Hour Traffic Volumes

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12 - Vol_Cumul\Figure (10/25/2016)

PROJECT TRAFFIC

Project Trip Generation

The trip generation for the proposed project is based on rates for Land Use 110 – "General Light Industrial" from the ITE *Trip Generation*, 9th Edition. All trip generation rates were converted to passenger vehicle and truck trips using the vehicle mix included in the Fontana Truck Trip Generation Study. As such, for a light industrial land use, trucks comprise of 21.4 percent of the total trip generation. Truck trips were converted to PCEs using a 1.5 PCE factor for two-axle trucks, 2.0 for three-axle trucks, and 3.0 for four or more axle trucks. As shown in Table D, the project is expected to generate 923 daily total PCE trips, with 119 PCE trips occurring the a.m. peak hour and 125 PCE trips occurring during the p.m. peak hour.

Project Trip Distribution and Assignment

Generalized trip distribution patterns were developed based on the location of the proposed project in relation to surrounding land uses and the regional roadway network. The project trip distributions were approved by City staff via the City's scoping agreement process. Because passenger vehicles and trucks have different travel patterns and on-site access restrictions, two trip distributions were developed. Figures 9 and 10 illustrate the trip distribution patterns for project passenger vehicles and truck traffic, respectively.

The trip assignment for project trips is the product of the project trip generation and the trip distribution percentages. Figures 11 and 12 illustrate the resulting peak hour passenger vehicle and truck PCE traffic volumes at the study area intersections. Figure 13 illustrates the total project traffic peak hour PCE volumes at study intersections.

TRAFFIC VOLUMES WITH PROJECT SCENARIOS

Existing, project completion, and cumulative with project traffic volumes were developed by adding project traffic to the corresponding without project scenarios. Figures 14, 15, and 16 illustrate existing, project completion, and cumulative with project traffic volumes.

INTERSECTION LEVELS OF SERVICE

Existing, Project Completion (2017), and Cumulative (2017) Levels of Service

Figure 17 illustrates existing and future year without and with project study intersection geometrics. Existing, project completion, and cumulative traffic volumes were developed using the approach discussed in the traffic forecast section of this report. An intersection level of service analysis was conducted for existing, project completion, and cumulative conditions to determine intersection performance. LOS calculation worksheets are included in Appendix D. Tables E, F, and G summarize the results of these analyses and show that all study area intersections are projected to operate at satisfactory levels of service.

Table D - Project Trip Generation

Land Uses	Units	A.M. Peak Hour In	A.M. Peak Hour Out	A.M. Peak Hour Total	P.M. Peak Hour In	P.M. Peak Hour Out	P.M. Peak Hour Total	Daily
Light Industrial[1]	100.9 TSF							
Trips/Unit (Cars)		0.636	0.087	0.723	0.095	0.667	0.762	5.546
Trips/Unit (2-Axle Trucks)		0.065	0.009	0.074	0.009	0.069	0.078	0.241
Trips/Unit (3-Axle Trucks)		0.032	0.004	0.036	0.005	0.033	0.038	0.323
Trips/Unit (4+ Axle Trucks)		0.077	0.010	0.087	0.011	0.081	0.092	0.860
Trips/Unit (Total)		0.810	0.110	0.920	0.120	0.850	0.970	6.970
Trip Generation (Cars)		64	9	73	10	67	77	560
Trip Generation (2-Axle Trucks)		7	0	7	1	7	8	24
Trip Generation (3-Axle Trucks)		3	1	4	1	3	4	33
Trip Generation (4+ Axle Trucks)		8	1	9	1	8	9	87
Trip Generation (Total)		82	11	93	13	85	98	704
Trip Generation (Cars)		64	9	73	10	67	77	560
PCE Trip Generation (2-Axle Trucks)		11	0	11	2	11	13	36
PCE Trip Generation (3-Axle Trucks)		6	2	8	2	6	8	66
PCE Trip Generation (4+ Axle Trucks)		24	3	27	3	24	27	261
PCE Trip Generation (Total)		105	14	119	17	108	125	923
Total PCE Trips		**105**	**14**	**119**	**17**	**108**	**125**	**923**

Notes:

TSF= Thousand Square Feet.

[1] The trip generation for the proposed project is based on rates for Land Use 110 – "General Light Industrial" from the ITE *Trip Generation Manual* , 9th Edition. All trip generation rates were converted to passenger vehicle and truck trips using the vehicle mix included in the Fontana Truck Trip Generation Study. As such, for a light industrial land use, trucks comprise of 21.4 percent of the total trip generation. Truck trips were converted to PCEs using a 1.5 PCE factor for two-axle trucks, 2.0 for three-axle trucks, and 3.0 for four or more axle trucks.

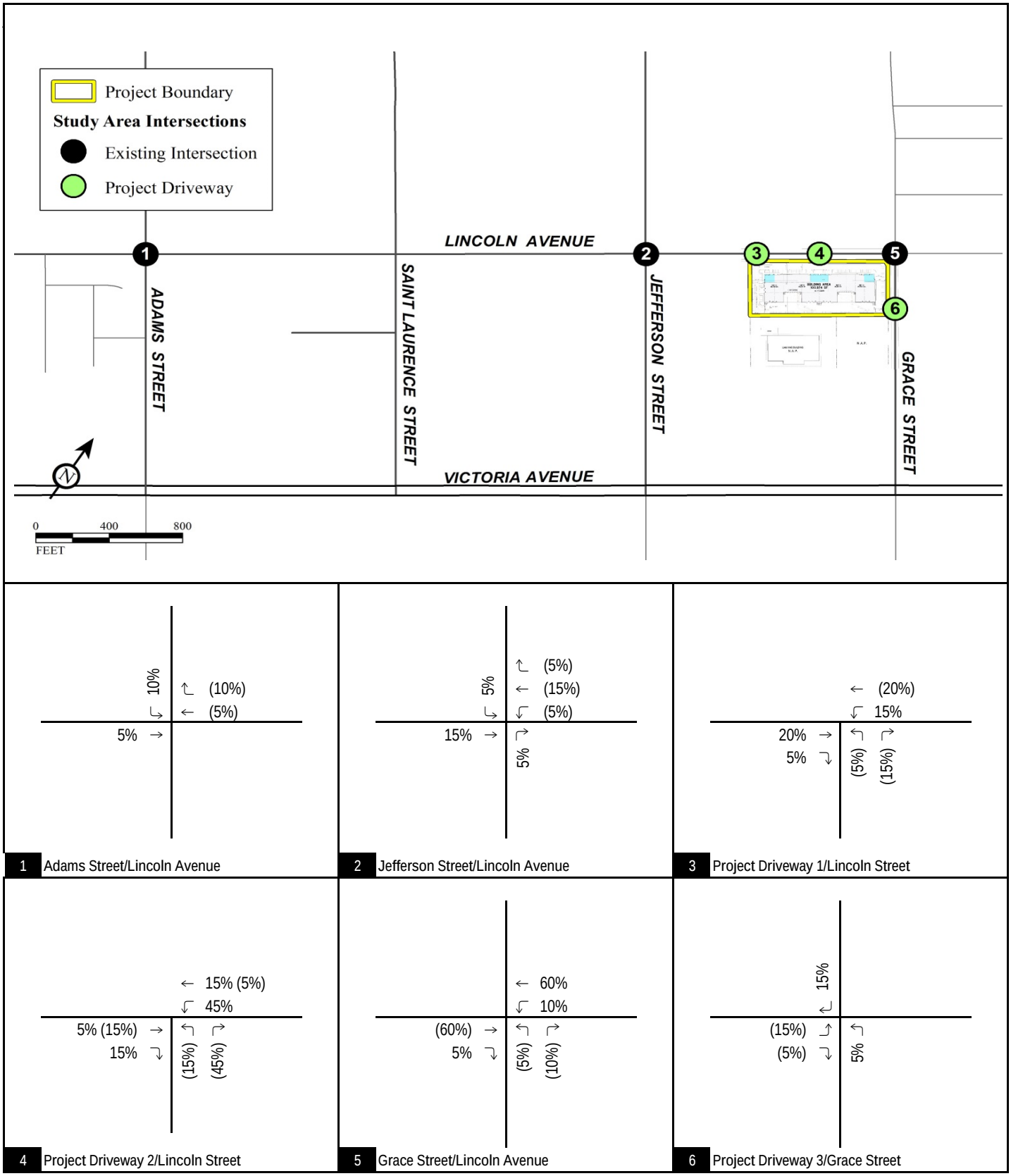

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FIGURE 9

XX% (YY%)

Inbound (Outbound) Distribution

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Trip Distribution (Passenger Vehicles)

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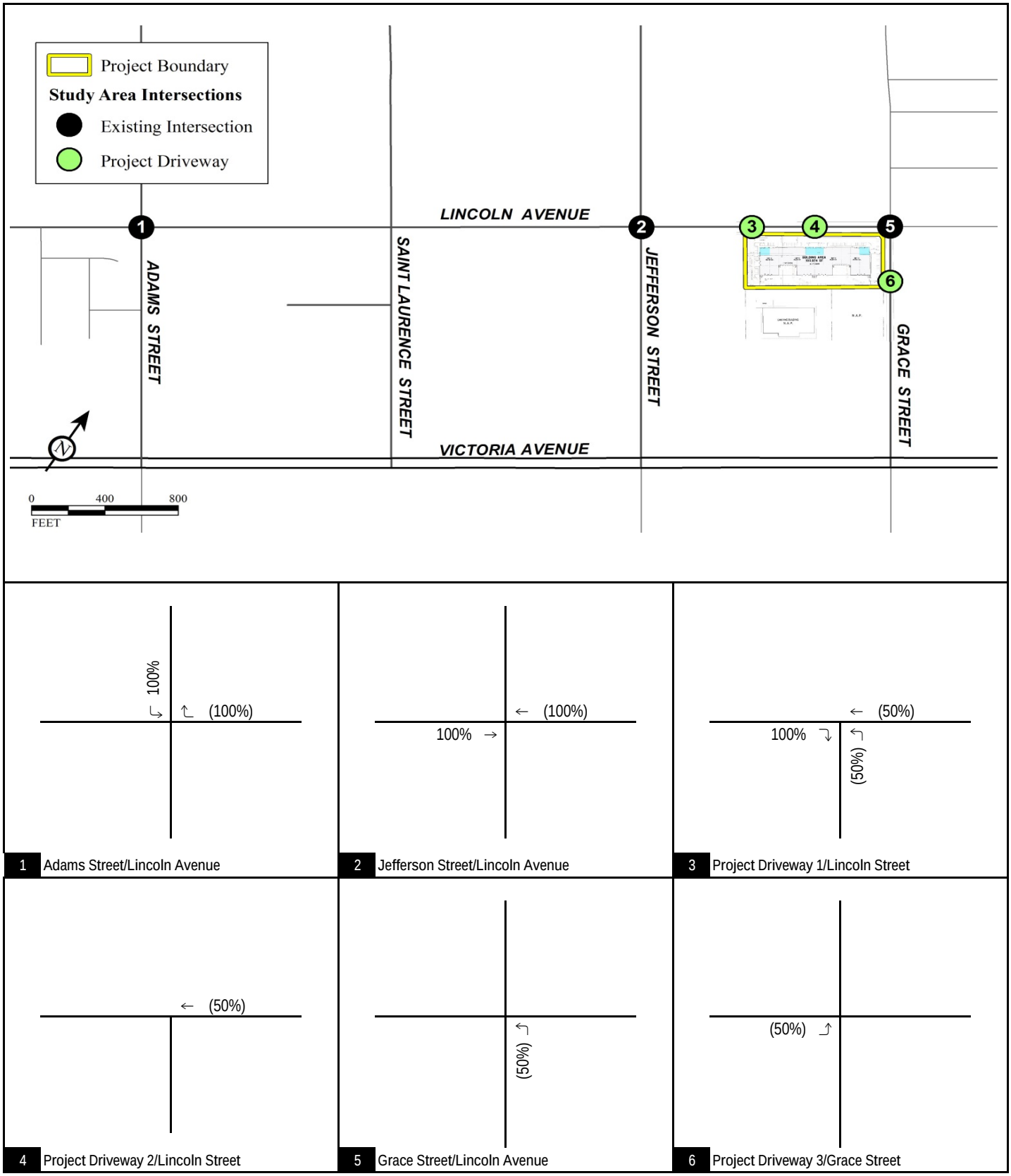

LSA

FIGURE 10

XX% (YY%)

Inbound (Outbound) Distribution

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Trip Distribution (Trucks)

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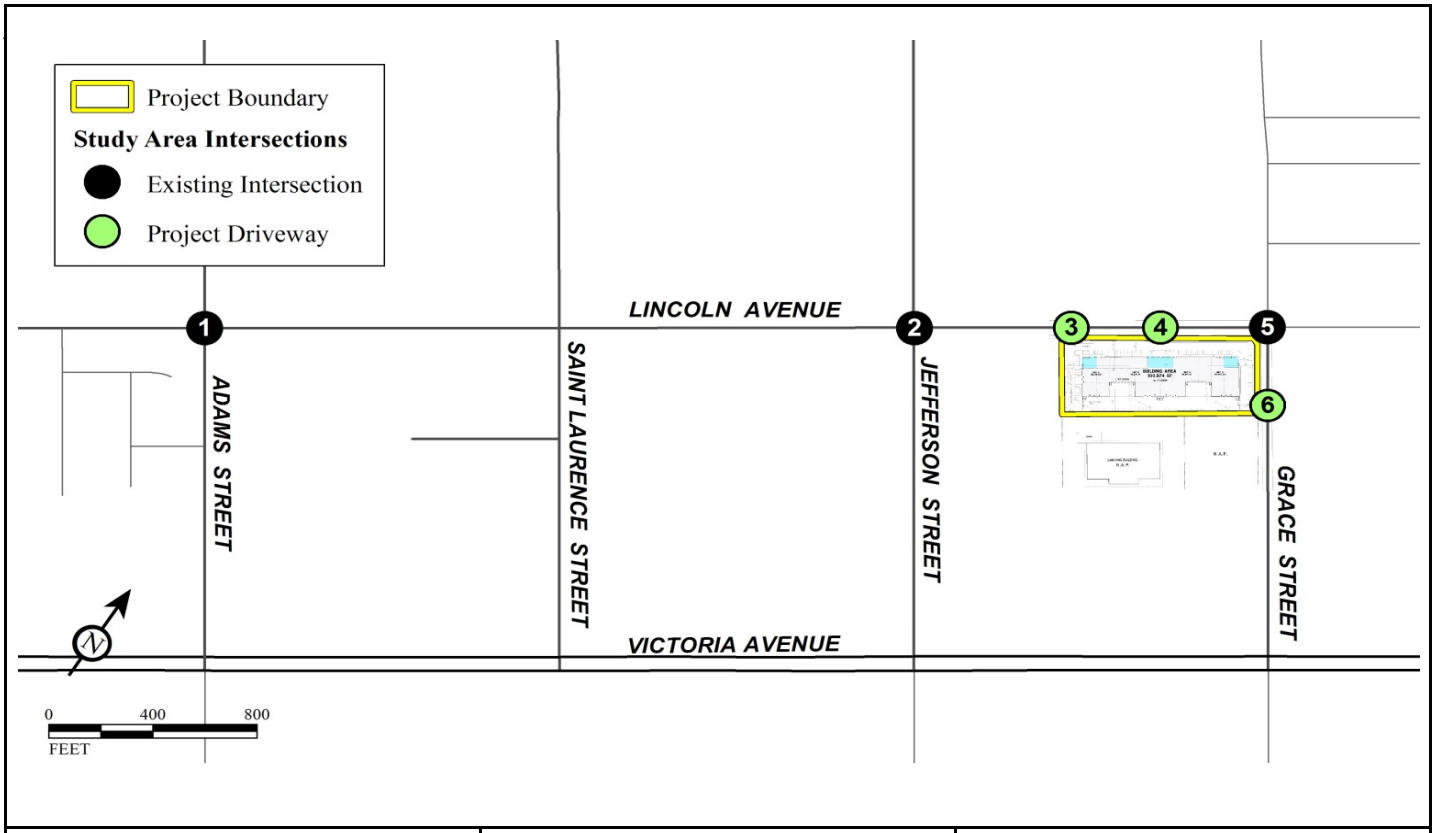

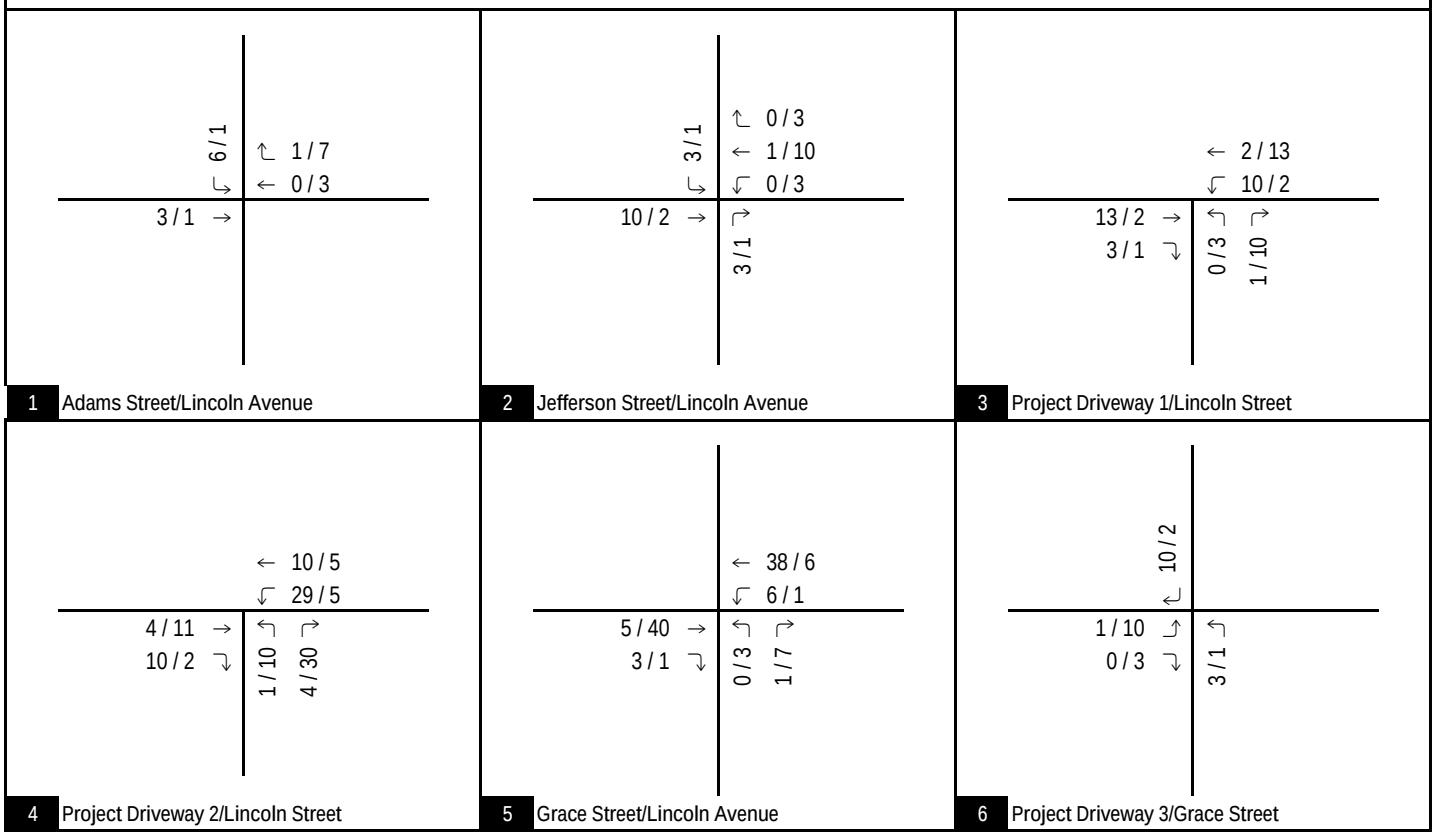

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FIGURE 11

XX / YY
AM / PM Peak Hour Trips

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Trip Assignment (Passenger Vehicles)

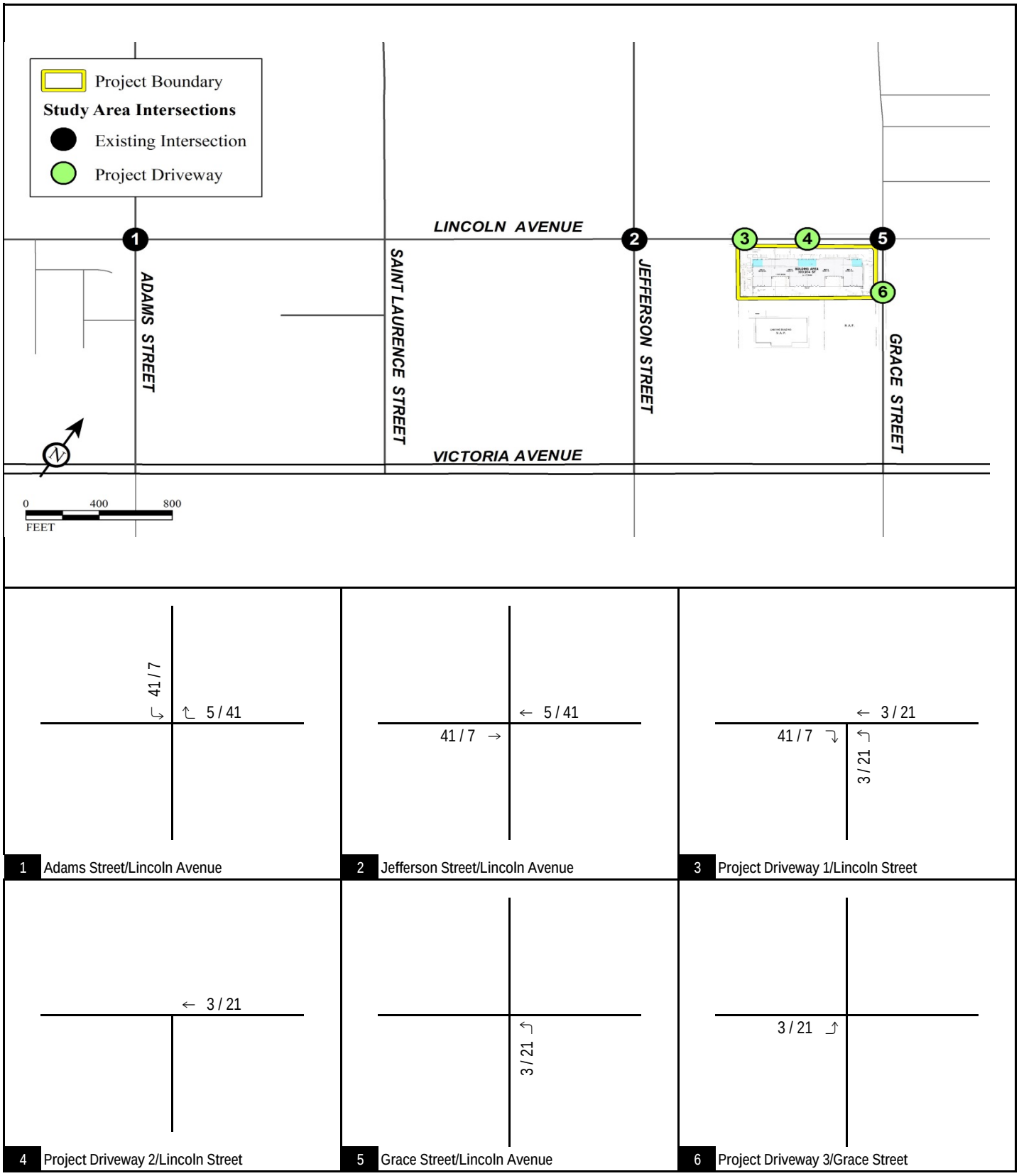

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FIGURE 12

XX / YY
AM / PM Peak Hour PCE Trips

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Project Trip Assignment (Truck PCEs)

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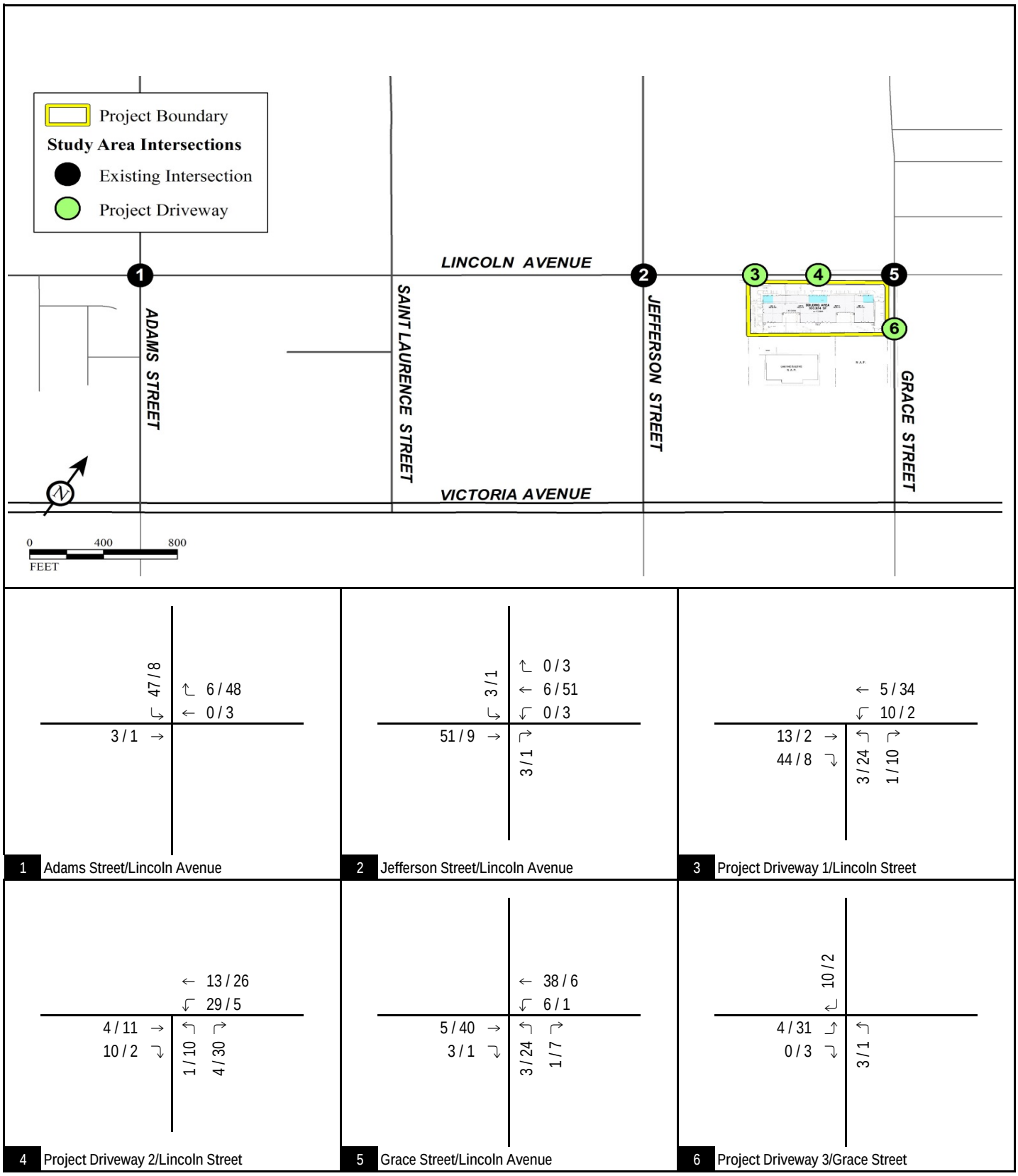

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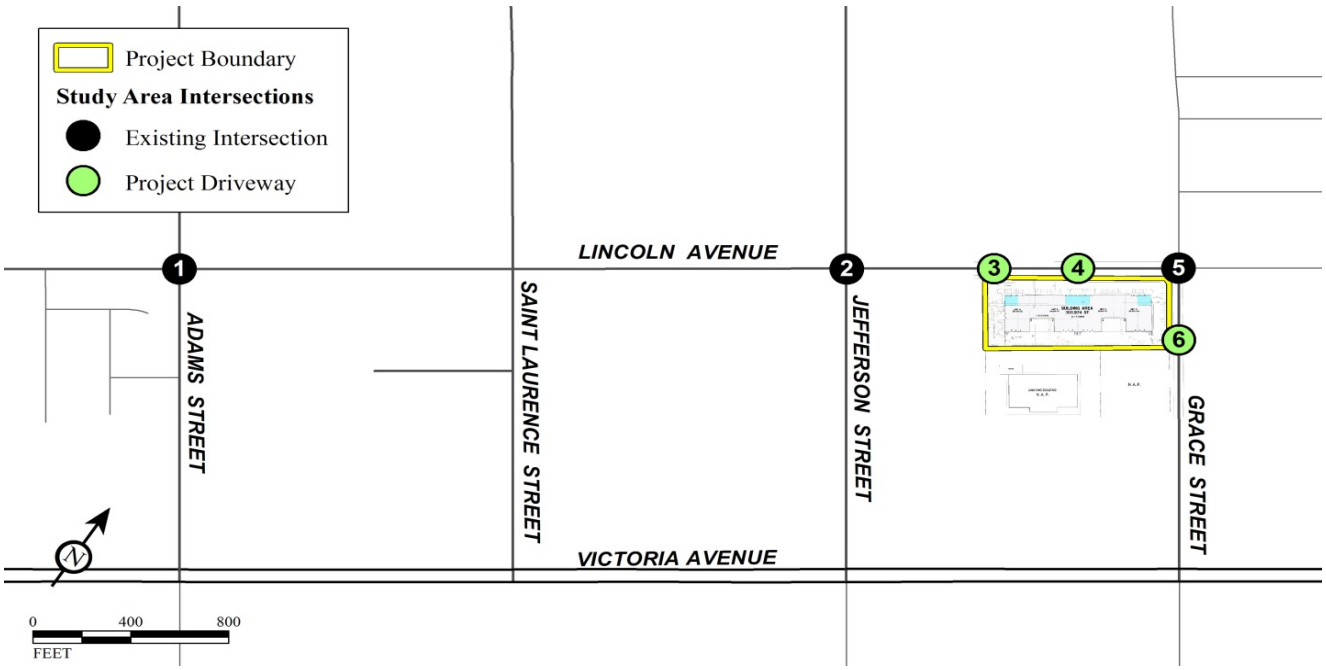
FIGURE 13

XX / YY
AM / PM Peak Hour PCE Trips

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Total Project Trip Assignment



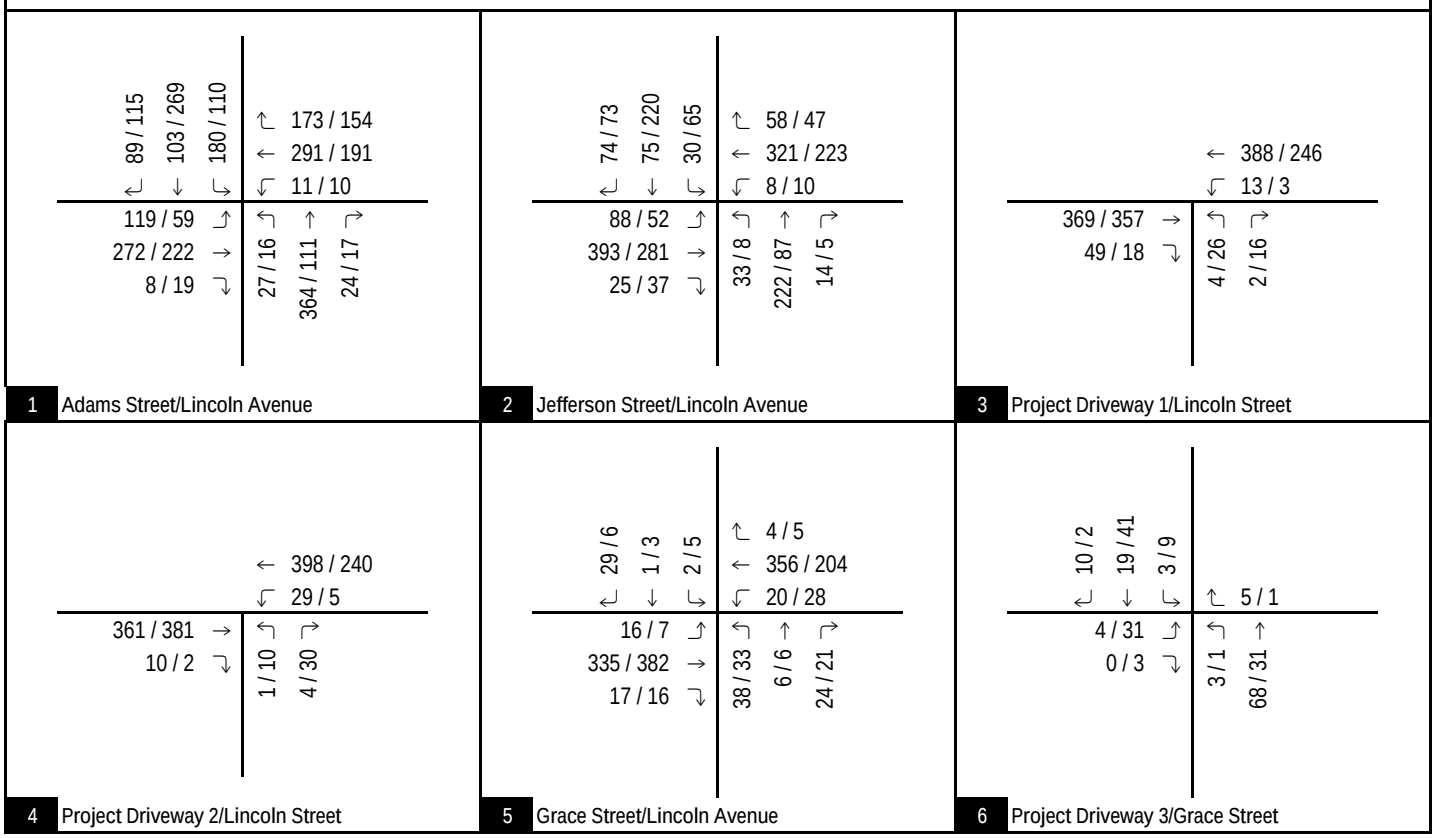


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FIGURE 14

XXX / YYY

AM / PM Peak Hour PCE Traffic Volumes

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Existing With Project Peak Hour Traffic Volumes

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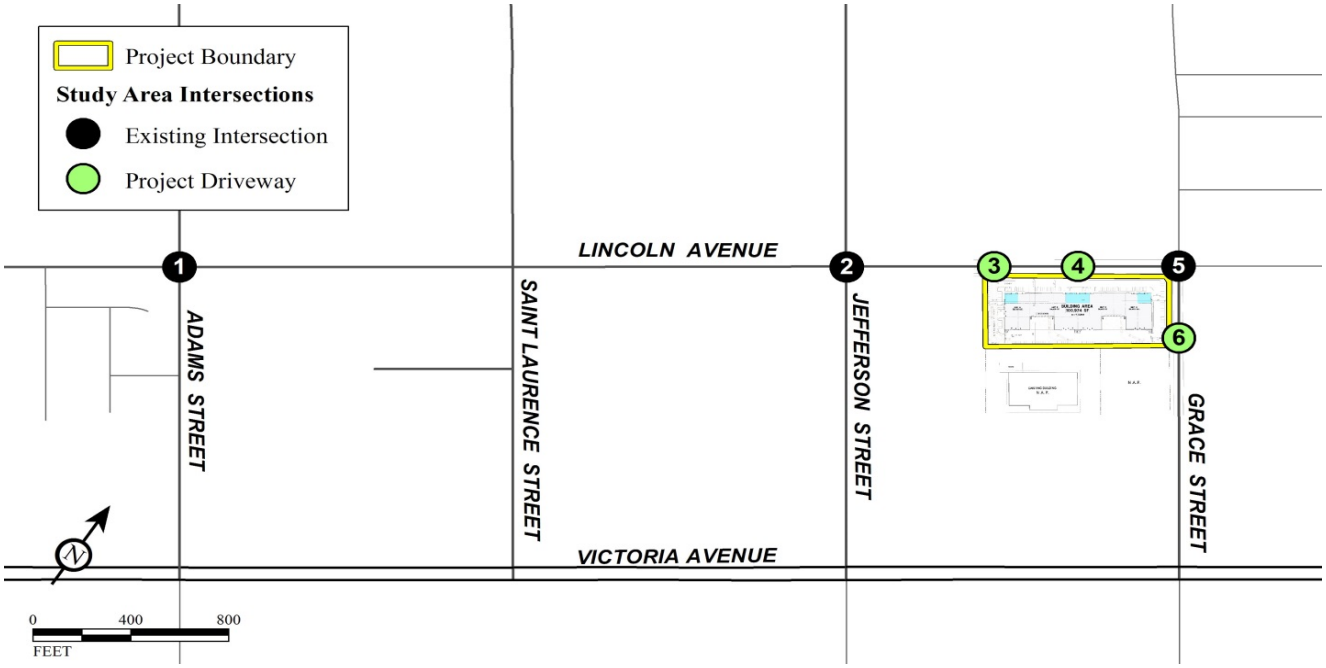

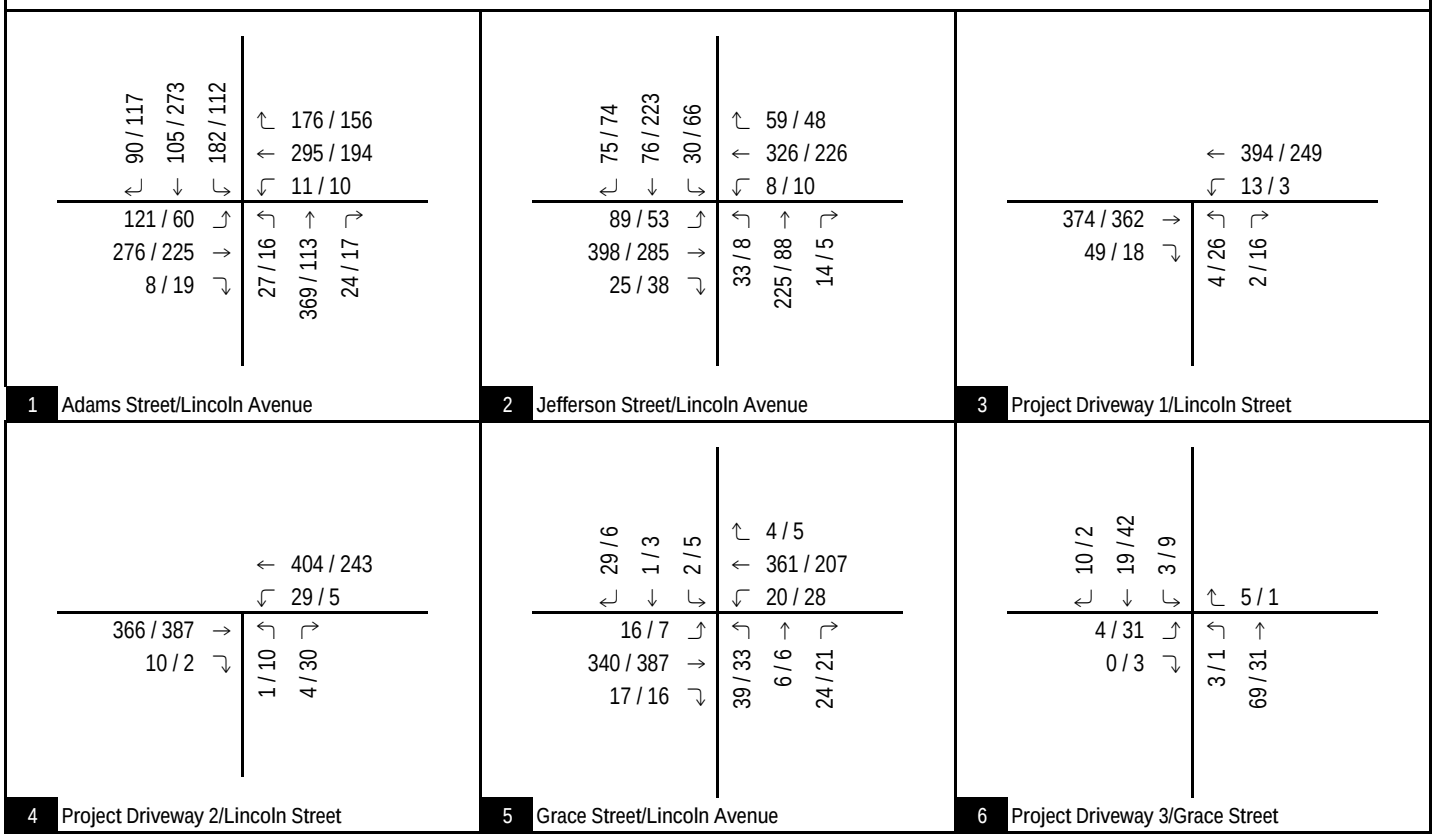

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FIGURE 15

XXX / YYY

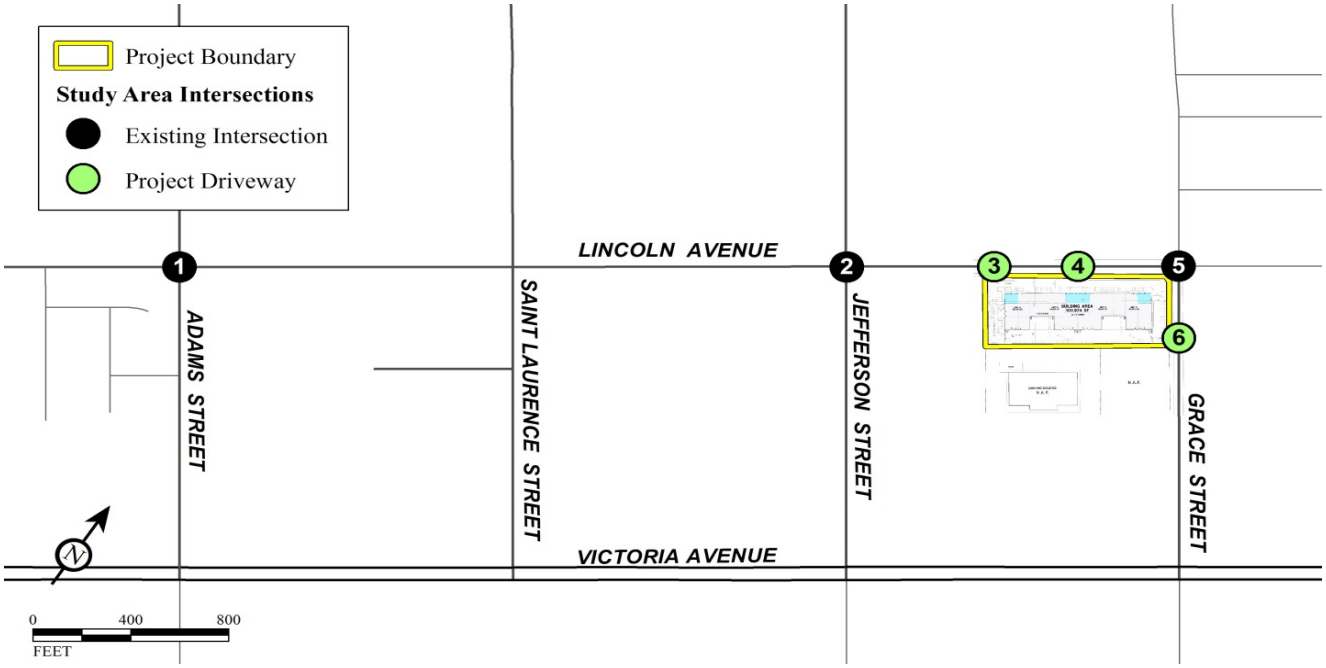
AM / PM Peak Hour PCE Traffic Volumes

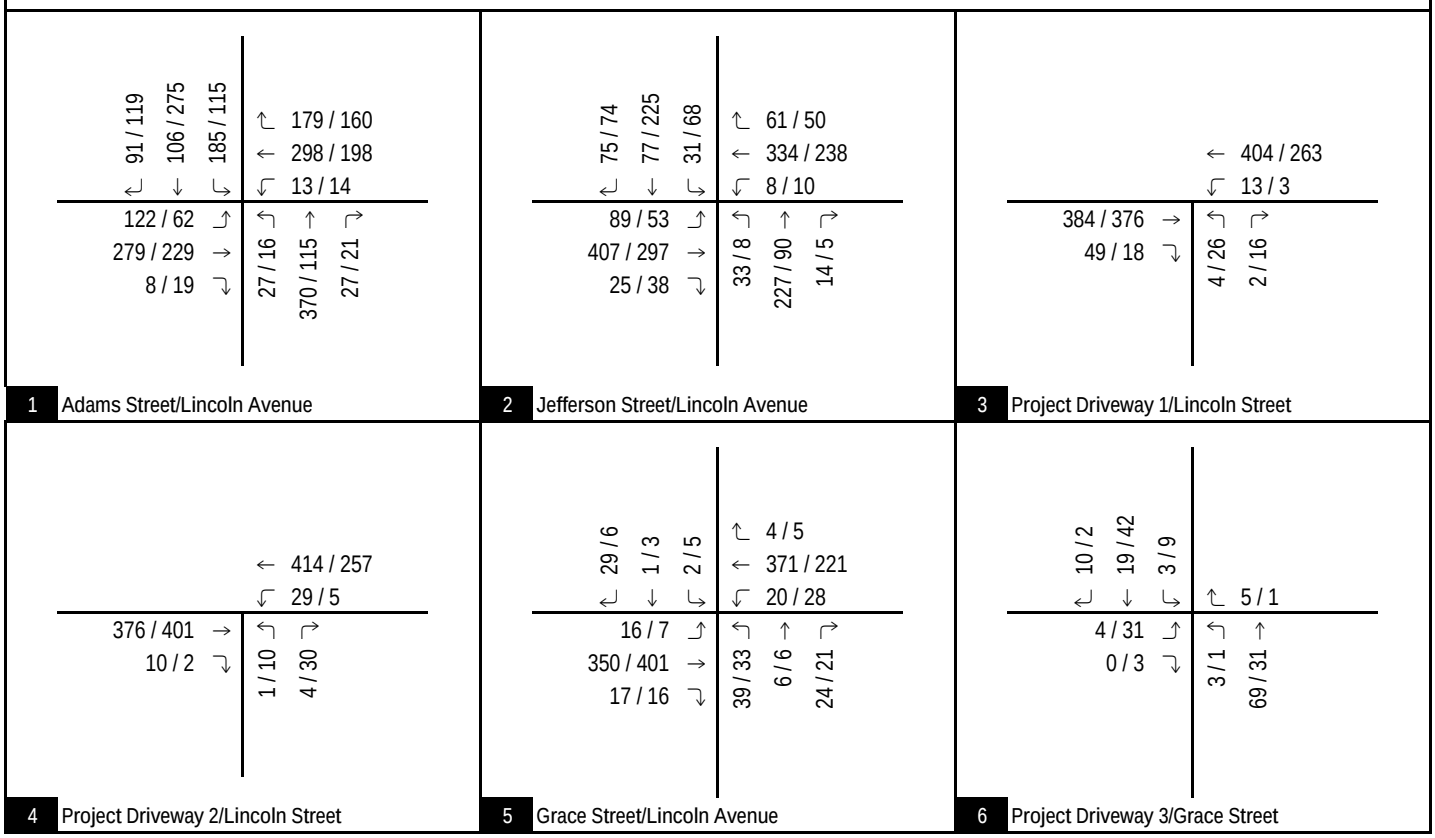
Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Completion (2017) With Project Peak Hour Traffic Volumes

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12 - Vol_Pr Comp P\Figure (10/25/2016)





LSA

FIGURE 16

XXX / YYY

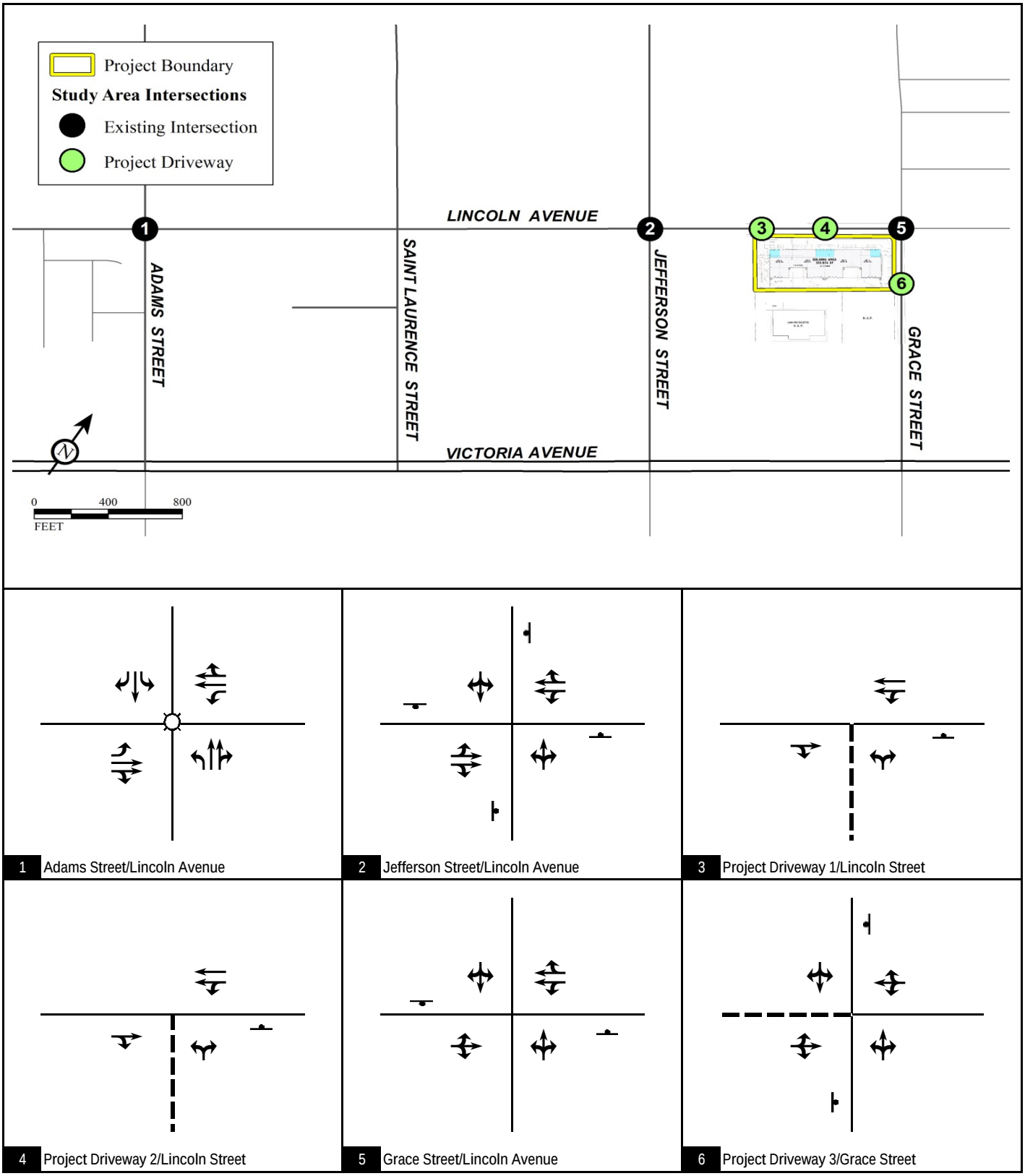
AM / PM Peak Hour PCE Traffic Volumes

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Cumulative (2017) With Project Peak Hour Traffic Volumes

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12 - Vol_PCumul P\Figure (10/25/2016)



LSA

FIGURE 17

Legend

Signal

Stop Sign

Project Driveway

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Existing Intersection Geometrics and Stop Control

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12 -geo_Exist\Figure (10/26/2016)

Table E - Existing Conditions Intersection Levels of Service

Intersection	Control	Without Project				With Project				Significant Impact
		A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour		
		Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	
1 . Adams Street/Lincoln Avenue	Signal	26.3	C	21.8	C	29.2	C	22.3	C	No
2 . Jefferson Street/Lincoln Avenue	AWSC	21.1	C	17.5	C	23.9	C	19.0	C	No
3 . Project Driveway 1/Lincoln Street	TWSC	12.6	B	11.5	B	14.2	B	13.3	B	No
4 . Project Driveway 2/Lincoln Street	TWSC	*Future Intersection*				11.3	B	11.6	B	No
5 . Grace Street/Lincoln Avenue	TWSC	17.8	C	14.8	B	19.3	C	17.7	C	No
6 . Project Driveway 3/Grace Street	TWSC	8.7	A	8.5	A	9.3	A	9.3	A	No

Notes:

TWSC = Two-Way Stop Control, AWSC = All-Way Stop Control

Delay = Average control delay in seconds (For TWSC intersections, reported delay is for worst-case movement).

LOS = Level of Service

Table F - Project Completion (2017) Conditions Intersection Levels of Service

Intersection	Control	Without Project				With Project				Significant Impact
		A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour		
		Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	
1 . Adams Street/Lincoln Avenue	Signal	26.6	C	21.8	C	29.7	C	22.3	C	No
2 . Jefferson Street/Lincoln Avenue	AWSC	21.9	C	18.1	C	24.8	C	19.7	C	No
3 . Project Driveway 1/Lincoln Street	TWSC	12.7	B	11.6	B	14.3	B	13.4	B	No
4 . Project Driveway 2/Lincoln Street	TWSC	*Future Intersection*				11.3	B	11.6	B	No
5 . Grace Street/Lincoln Avenue	TWSC	17.3	C	14.3	B	18.8	C	17.1	C	No
6 . Project Driveway 3/Grace Street	TWSC	8.7	A	8.5	A	9.3	A	9.3	A	No

Notes:

TWSC = Two-Way Stop Control, AWSC = All-Way Stop Control

Delay = Average control delay in seconds (For TWSC intersections, reported delay is for worst-case movement).

LOS = Level of Service

Table G - Cumulative (2017) Conditions Intersection Levels of Service

Intersection	Control	Without Project				With Project				Significant Impact
		A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour		
		Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	
1 . Adams Street/Lincoln Avenue	Signal	26.8	C	22.0	C	30.2	C	22.5	C	No
2 . Jefferson Street/Lincoln Avenue	AWSC	22.8	C	19.0	C	26.0	D	20.8	C	No
3 . Project Driveway 1/Lincoln Street	TWSC	12.9	B	11.8	B	14.6	B	13.7	B	No
4 . Project Driveway 2/Lincoln Street	TWSC	*Future Intersection*				11.5	B	11.8	B	No
5 . Grace Street/Lincoln Avenue	TWSC	17.3	C	14.3	B	18.8	C	17.1	C	No
6 . Project Driveway 3/Grace Street	TWSC	8.7	A	8.5	A	9.3	A	9.3	A	No

Notes:

TWSC = Two-Way Stop Control, AWSC = All-Way Stop Control

Delay = Average control delay in seconds (For TWSC intersections, reported delay is for worst-case movement).

LOS = Level of Service

With Project Levels of Service

Intersection levels of service analyses were conducted for existing, project completion, and cumulative with project conditions. LOS calculation worksheets are included in Appendix D. Previously referenced Tables E, F, and G summarize the results of these analyses and show that all study area intersections are projected to operate at satisfactory levels of service. As such, no significant circulation impacts (as defined in the "Project Significance Threshold" section of this report) would result from project implementation.

SIGNAL WARRANT ANALYSIS

A signal warrant analysis (Appendix E) was conducted at the intersection of Grace Street/Lincoln Avenue. As stated in the City's TIA guidelines, a peak hour signal warrant analysis shall utilize the peak hour warrants from the most recent edition the *California Manual on Uniform Traffic Control Devices* (CAMUTCD). Therefore, this analysis is based on the provisions of the CAMUTCD, 2012, Chapter 4C–Traffic Control Signal Needs Study for Warrant 3 – Peak Hour. The peak hour signal warrant is intended for use where traffic conditions are such that for a minimum of one hour on an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

Based on the signal warrant analysis, a signal would not be warranted at the intersection of Grace Street/Lincoln Avenue under existing, opening year, and cumulative (without and with project) conditions.

SUMMARY AND CONCLUSIONS

The proposed project consists of one 100,974-square foot industrial warehouse building. As shown in previously referenced Tables E, F, and G, all study area intersections are projected to operate at satisfactory levels of service without and with the proposed project. As such, no significant circulation impacts, as defined in the "Project Significance Threshold" section of this report would result from project implementation.

APPENDIX A:

CITY SCOPING AGREEMENT LETTER

LSA

LSA ASSOCIATES, INC.
1500 IOWA AVENUE, SUITE 200
RIVERSIDE, CALIFORNIA 92507

951.781.9310 TEL
951.781.4277 FAX

BERKELEY
CARLSBAD
FRESNO
IRVINE
PALM SPRINGS
PT. RICHMOND
ROCKLIN
SAN LUIS OBISPO

October 18, 2016

Mr. Nathan Mustafa, P.E.
City of Riverside
Senior Traffic Engineer
Bicycle Coordinator
(951) 826-2251

Subject: Scope of Work for Lincoln Avenue Warehouse Traffic Impact Analysis (LSA Project No. RVL1601-1.5)

Dear Mr. Mustafa:

LSA will be preparing a traffic impact analysis (TIA) for the proposed Lincoln Avenue Warehouse to be located southwest of the intersection of Lincoln Avenue/Grace Street in the City of Riverside (City). Attached is Exhibit B "Scoping Agreement for Traffic Impact Study" from of the City's Traffic Impact Preparation Guide, dated January 2016, for your review.

The proposed project will include one 100,974-square foot industrial warehouse building. Access to the project site will be provided via three proposed driveways. All three driveways allow full access to passenger vehicles. Truck access will be provided via a westerly driveway on Lincoln Avenue and the proposed driveway on Grace Street; however, the Grace Street driveway will restrict truck access to egress movements. All vehicle restrictions will be enforced with signage in conformance with City's zoning code. Figure 1 (all figures and tables attached) illustrates the regional and project location. Figure 2 illustrates the conceptual site plan of the proposed project.

LSA anticipates that the following scope of work will be required to conduct the traffic study for proposed project. Figure 3 illustrates proposed study area intersections.

SCOPE OF WORK

Trip Generation

Table A summarizes the daily, a.m., and p.m. peak hour project trip generation and shows the project is expected to generate 923 daily passenger car equivalent (PCE) trips, with 119 PCE trips occurring the a.m. peak hour and 125 PCE trips occurring during the p.m. peak hour.

The trip generation for the proposed project is based on rates for Land Use 110 – "General Light Industrial" from the Institute of Transportation Engineers (ITE) *Trip Generation*, 9th Edition. All trip generation rates were converted to passenger vehicle and truck trips using the vehicle mix included in the Fontana Truck Trip Generation Study. As such, for a light industrial land use, trucks comprise of 21.4 percent of the total trip generation. Truck trips were converted to PCEs using a 1.5 PCE factor for two-axle trucks, 2.0 for three-axle trucks, and 3.0 for four or more axle trucks.

Trip Distribution and Study Intersection

Generalized trip distribution patterns were developed based on the location of the proposed project in relation to surrounding land uses, the regional roadway network, and truck routes. Because passenger vehicles and trucks have different travel patterns and on-site access restrictions, two trip distributions were developed. Figures 4 and 5 illustrate the trip distribution patterns for project passenger vehicles and truck traffic, respectively.

The trip assignment for project trips is the product of the project trip generation and the trip distribution percentages. Figures 6 and 7 illustrate the resulting peak hour passenger vehicle and truck PCE traffic volumes at the study area intersections. Figure 8 illustrates the total project traffic peak hour PCE volumes at study intersections.

The TIA will be prepared to satisfy the requirements established by the City of Riverside "Traffic Impact Preparation Guide," dated January 2016, as well as the requirements for the disclosure of potential impacts and mitigation measures pursuant to the California Environmental Quality Act (CEQA).

LSA proposes to include the following intersections:

1. Adams Street/Lincoln Avenue;
2. Jefferson Street/Lincoln Avenue;
3. Project Driveway 1/Lincoln Street;
4. Project Driveway 2/Lincoln Street;
5. Grace Street/Lincoln Avenue; and
6. Project Driveway 3/Grace Street.

Analysis Scenarios

The TIA for the proposed project will be prepared to meet the requirements of the City. LSA proposes to analyze a.m. and p.m. peak hour traffic operations at the study intersection for the following scenarios:

- Existing Year Traffic Conditions;
- Existing Year Plus Project Traffic Conditions;
- Opening Year Without Project Traffic Conditions;
- Opening Year With Project Traffic Conditions;
- Cumulative Without Project Conditions (Project Opening Year Base Plus Other Proposed Projects Traffic Conditions); and
- Cumulative Plus Project Conditions (Project Opening Year Base Plus Other Proposed Projects Plus Project Traffic Conditions);

Volume Development

Traffic volumes for existing year traffic conditions will be based on existing a.m. and p.m. peak hour traffic counts collected the intersections identified for analysis. The a.m. peak hour is defined as the one hour of highest traffic volumes occurring between 7:00 and 9:00 a.m., while the p.m. peak hour is defined as the one hour of highest traffic volume occurring between 4:00 and 6:00 p.m.

Project completion without project traffic volumes will be developed by applying an annual growth rate of 1.5 percent per year (2016 to 2017) to existing peak hour traffic volumes. Cumulative project traffic volumes will be added to the project completion volumes to develop cumulative without project traffic volumes. Existing, project completion, and cumulative with project traffic volumes were developed by adding project traffic to the corresponding without project scenarios.

The TIA will analyze study intersections during the a.m. and p.m. peak hours. Intersection levels of service (LOS) will be calculated using the *Highway Capacity Manual 2010* (HCM 2010) analysis methodologies and using *Synchro 9.0* software.

Project Impact Assessment and Mitigation Measures

Intersection LOS without the project will be compared to the intersection LOS plus the project for each of the analysis scenarios to determine potential project impacts. Determination of the significance of project impacts will be made based on City's LOS and threshold of significance criteria. At significantly affected intersections, mitigation measures will be recommended to improve intersection performance to satisfactory conditions. Mitigation measures may include intersection turn lanes, signalization, and segment lane additions. The LOS with mitigation will be calculated and summarized, along with a comparison of the LOS without mitigation.

Fair Share

For improvements not included in any fee program, LSA will calculate project's fair-share percentage to total new traffic. A table with recommended mitigation will be prepared and will include mitigation measures required under future build-out year (2040) conditions. The fair share will be based on project traffic as a percentage of total growth from existing to year 2040.

We would appreciate if you could review the scope of the study outlined in this letter and the accompanying figures and tables to verify the trip generation, trip distribution, and the proposed study area intersections. Should the City have any comments or require additional information, please do not hesitate to contact me at (951) 781-9310 or via email at Joe.Urzua@lsa.net.

Sincerely,

LSA ASSOCIATES, INC.

Joe Urzua, AICP
Senior Transportation Planner

Attachments:

Exhibit B: Scope of Study Form
Table A: Project Trip Generation
Table B: Proposed Cumulative Projects
Figure 1: Regional and Project Location
Figure 2: Conceptual Site Plan
Figure 3: Study Area Intersections
Figure 4: Project Trip Distribution (Passenger Vehicles)
Figure 5: Project Trip Distribution (Trucks)
Figure 6: Project Trip Assignment (Passenger Vehicles)
Figure 7: Project Trip Assignment (Truck PCEs)
Figure 8: Total Project Trip Assignment

Exhibit B

SCOPING AGREEMENT FOR TRAFFIC IMPACT STUDY

This letter acknowledges the City of Riverside Public Works Traffic Engineering Division requirements for traffic impact analysis of the following project. The analysis must follow the City Traffic Impact Analysis Preparation Guide dated January 2016.

Case No. p-16-0413
Related Cases -
SP No.
EIR No.
GPA No.
CZ No.
Project Name: Lincoln Avenue Industrial Warehouse
Project Location: Southwest of the intersection of Lincoln Avenue/Grace Street
Project Description: 100,974 square foot industrial warehouse

	Consultant	Developer
Name:	LSA Associates, Inc.	Klass Vlietstra, Riverside Lincoln LLC
Address:	1500 Iowa Avenue, Suite 200	563 Spoleto Drive
	Riverside, CA 92507	Pacific Palisades, 90272
Telephone:	951-781-9310	

A. Trip Generation Source: ITE *Trip Generation Manual*, most recent edition

Existing Land Use	Vacant	**Proposed Land Use**	Industrial Warehouse
Existing Zoning	Business/Office Park	**Proposed Zoning**	Business/Office Park
Total Daily Trips	923 PCE		

	In	Out	Total
AM Trips	105 PCE	14 PCE	119 PCE
PM Trips	17 PCE	108 PCE	125 PCE

Internal Trip Allowance ☐ Yes ■ No (% Trip Discount)
Pass-By Trip Allowance ☐ Yes ■ No (% Trip Discount)
(Attach additional sheet if this is a multi-use site with a breakdown of trips generated)

B. Trip Geographic Distribution: N 6 % S 6 % E 44 % W 44 %
(See attached exhibit for detailed assignment)

C. Background Traffic

Project Completion Year: 2017 **Annual Ambient Growth Rate:** 1.5 %
Other area projects to be included: See attached Table B

Please contact Planning Division or use the most recently provided data

Model/Forecast methodology if required Not Applicable

D. Build-out Studies: Does this project require a Build-out Study per TIA Guidelines Section 7.2?

☐ Yes ■ No

E. Study Intersections: (NOTE: Subject to revision after other projects, trip generation and distribution are determined, or comments from other agencies.)

1. Adams Street/Lincoln Avenue
2. Jefferson Street/Lincoln Avenue
3. Project Driveway 1/Lincoln Street
4. Project Driveway 2/Lincoln Street
5. Grace Street/Lincoln Avenue
6. Project Driveway 3/Grace Street
7.
8.

F. Study Roadway Segments (For Build-out Studies):

1.
2.
3.
4.
5.
6.
7.
8.

G. Other Jurisdictional Impacts

Is this project within any other Agency's Sphere of Influence or one-mile radius of boundaries? ☐ Yes ■ No

If so, name of Jurisdiction:

H. Site Plan (please attach a legible 11'X17' copy)

I. Specific Issues to be addressed in the Study (in addition to the standard analysis described in the Guideline) (To be filled out by Public Works Traffic Department)

TRUCK ROUTING FOR FINAL DEVELOPMENT SHALL REFLECT RECOMMENDED CIRCULATION FROM TIA

Recommended by:

Joe Urzua
Consultant's Representative

10/18/2016
Date

Scoping Agreement Submitted on

10/18/2016
Date

Scoping Agreement Resubmitted on

Date

Approved Scoping Agreement:

City of Riverside
Traffic Engineering Division

10/24/16
Date

cc: Planning Division

Table A - Project Trip Generation

Land Uses	Units	A.M. Peak Hour In	A.M. Peak Hour Out	A.M. Peak Hour Total	P.M. Peak Hour In	P.M. Peak Hour Out	P.M. Peak Hour Total	Daily
Warehouse[1]	100.9 TSF							
Trips/Unit (Cars)		0.636	0.087	0.723	0.095	0.667	0.762	5.546
Trips/Unit (2-Axle Trucks)		0.065	0.009	0.074	0.009	0.069	0.078	0.241
Trips/Unit (3-Axle Trucks)		0.032	0.004	0.036	0.005	0.033	0.038	0.323
Trips/Unit (4+ Axle Trucks)		0.077	0.010	0.087	0.011	0.081	0.092	0.860
Trips/Unit (Total)		0.810	0.110	0.920	0.120	0.850	0.970	6.970
Trip Generation (Cars)		64	9	73	10	67	77	560
Trip Generation (2-Axle Trucks)		7	0	7	1	7	8	24
Trip Generation (3-Axle Trucks)		3	1	4	1	3	4	33
Trip Generation (4+ Axle Trucks)		8	1	9	1	8	9	87
Trip Generation (Total)		82	11	93	13	85	98	704
Trip Generation (Cars)		64	9	73	10	67	77	560
PCE Trip Generation (2-Axle Trucks)		11	0	11	2	11	13	36
PCE Trip Generation (3-Axle Trucks)		6	2	8	2	6	8	66
PCE Trip Generation (4+ Axle Trucks)		24	3	27	3	24	27	261
PCE Trip Generation (Total)		105	14	119	17	108	125	923
Total PCE Trips		**105**	**14**	**119**	**17**	**108**	**125**	**923**

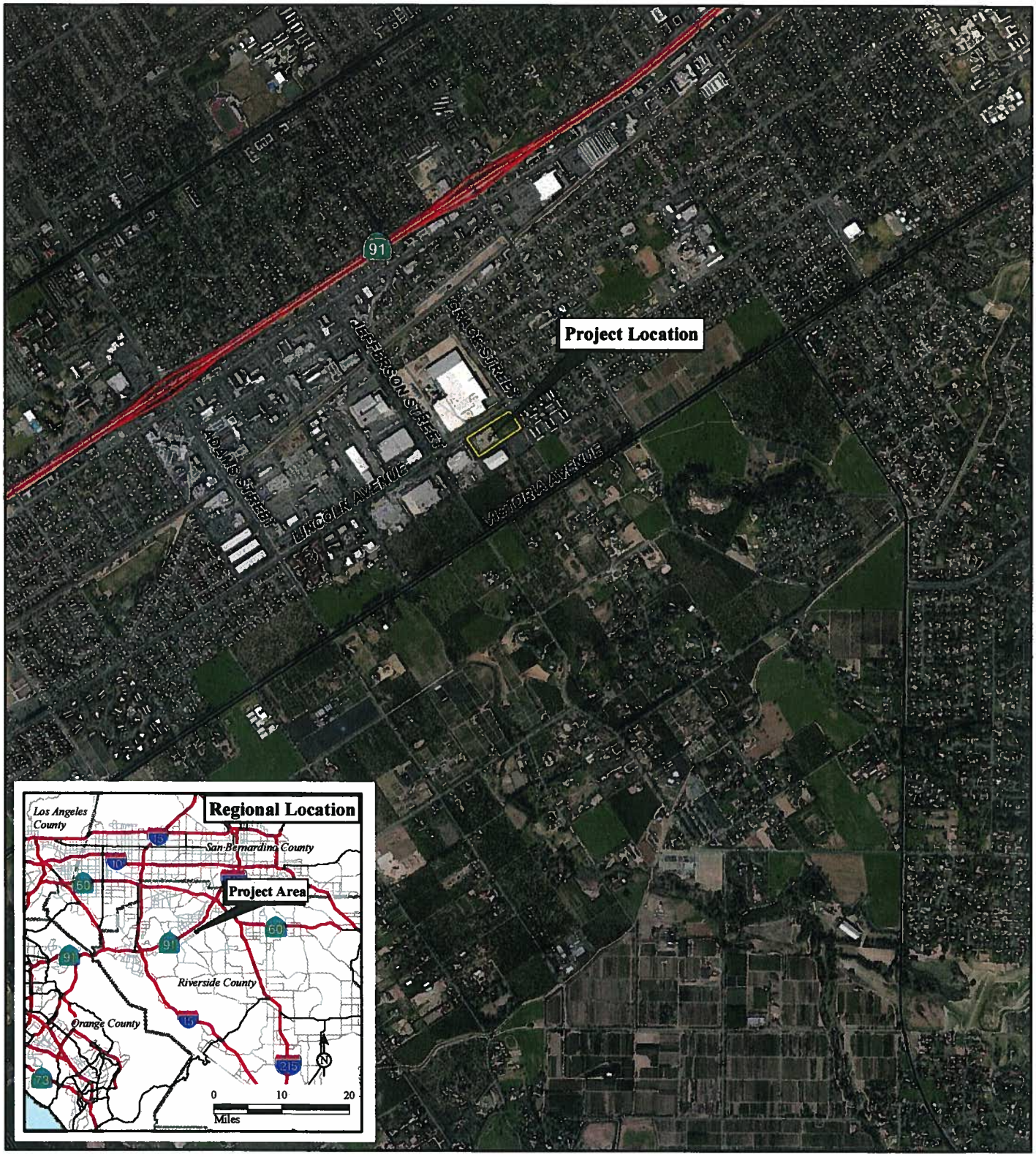
Notes:

TSF= Thousand Square Feet.

[1] The trip generation for the proposed project is based on rates for Land Use 110 – "General Light Industrial" from the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition. All trip generation rates were converted to passenger vehicle and truck trips using the vehicle mix included in the Fontana Truck Trip Generation Study. As such, for a light industrial land use, trucks comprise of 21.4 percent of the total trip generation. Truck trips were converted to PCEs using a 1.5 PCE factor for two-axle trucks, 2.0 for three-axle trucks, and 3.0 for four or more axle trucks.

Table B - Proposed Cumulative Projects

Map No.	Project (Case #)	Land Use	Location	Units
1	P15-0847 through 0851	Commercial/Retail Center	3490 Madison Street	80,916 SF
2	P16-0510 through 0512	Automated Carwash Facility	3345 Madison Street	3,288 SF
3	P16-0559	Auto Dealership	8100 Auto Drive	15,200 SF
4	P15-0404-0405, 0568 & 0631	Gas Station with Carwash associated Convenience Store	3399 Adams Street	9,279 SF
5	P16-0184-0186	Senior Apartments	3628 Madison Street	9,712 SF



LSA

FIGURE 1

N

0 1000 2000
FEET

SOURCE: Bing Aerial, 2016.

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Regional and Project Location

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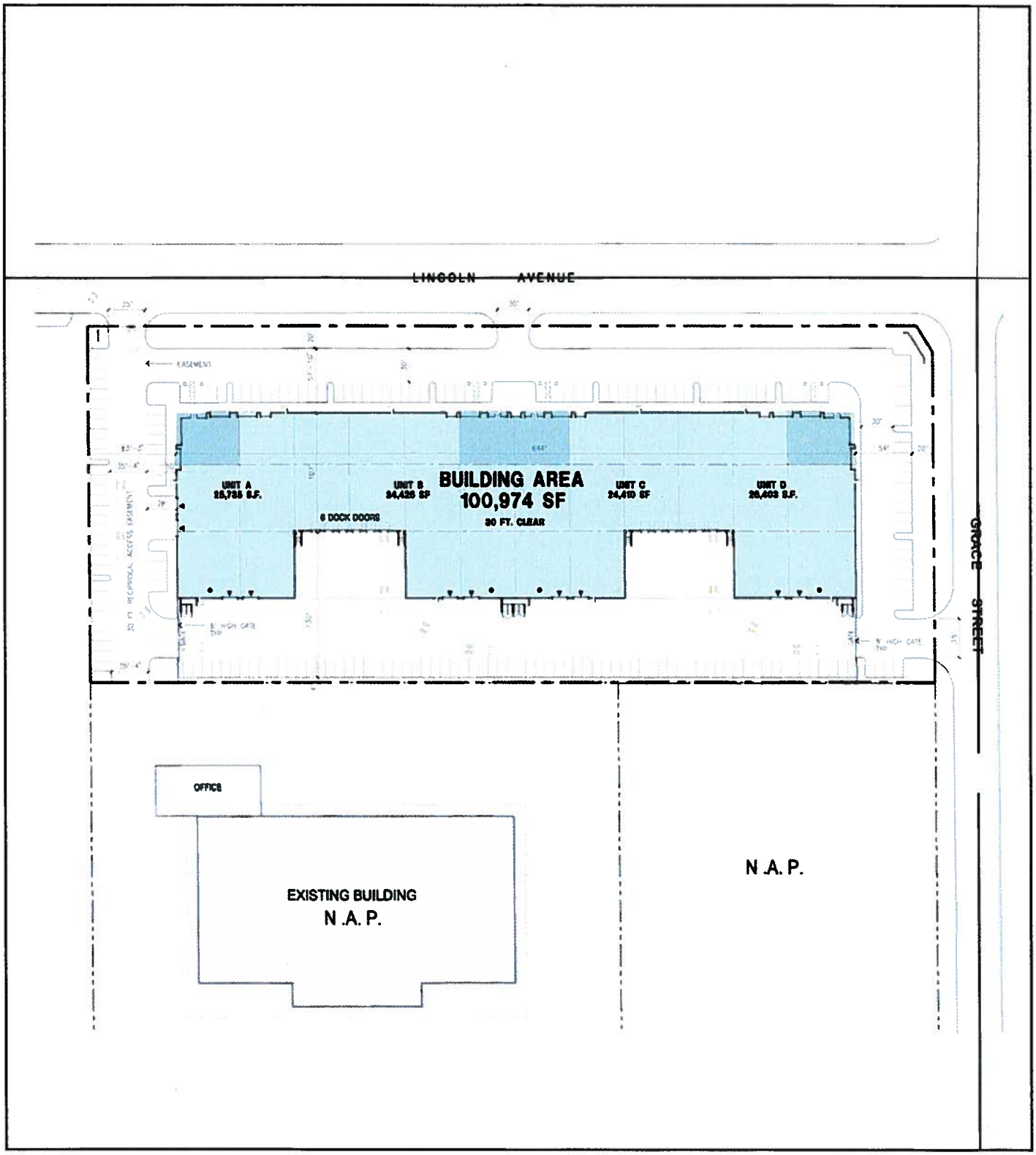

LSA

FIGURE 2

0 60 120
FEET

SOURCE: HPA Architechture, May 11, 2016.

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Conceptual Site Plan

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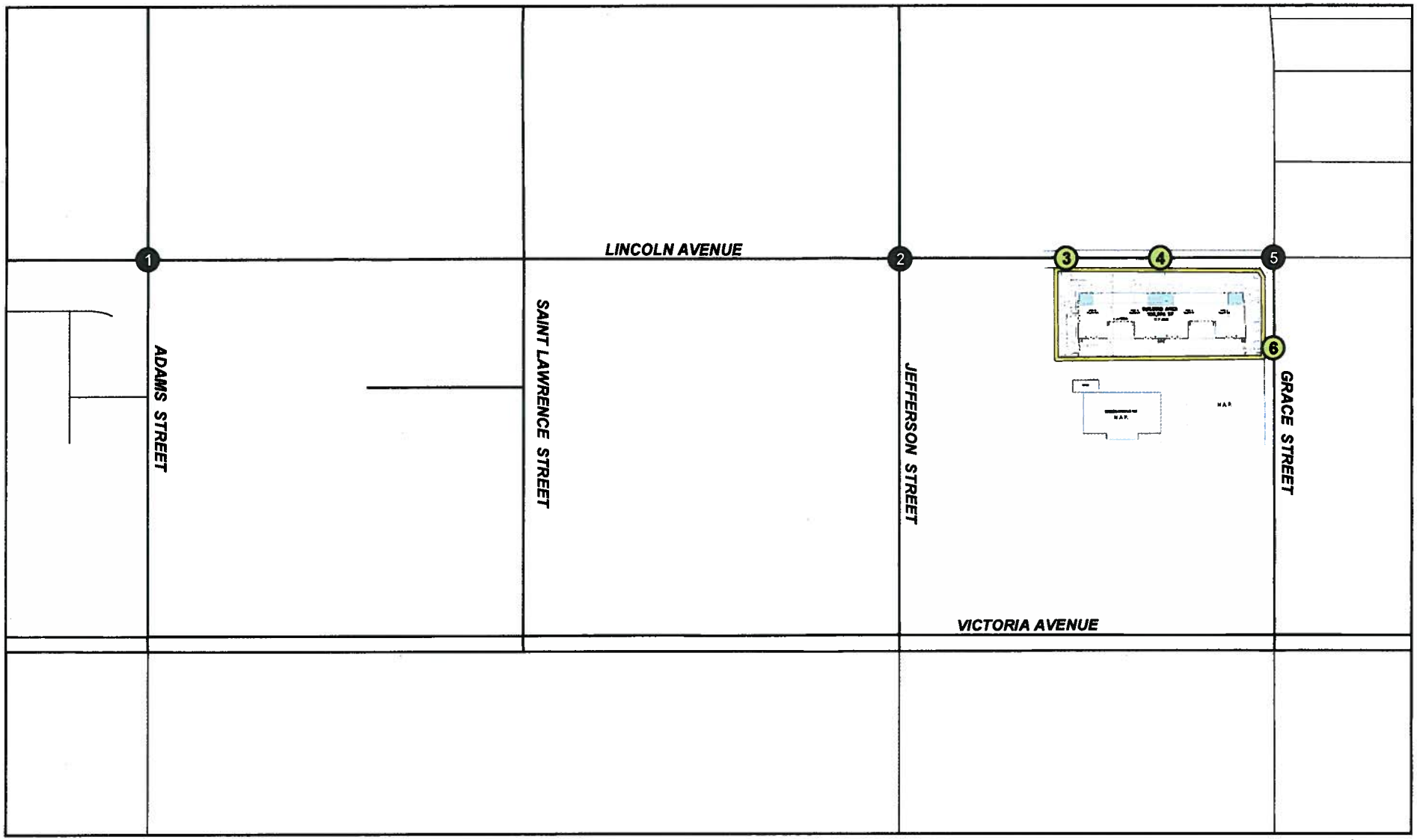

FIGURE 3

LSA

Project Boundary

Study Area Intersections

Existing Intersection

Project Driveway

0 250 500
FEET

SOURCE: Riverside County, 2015.

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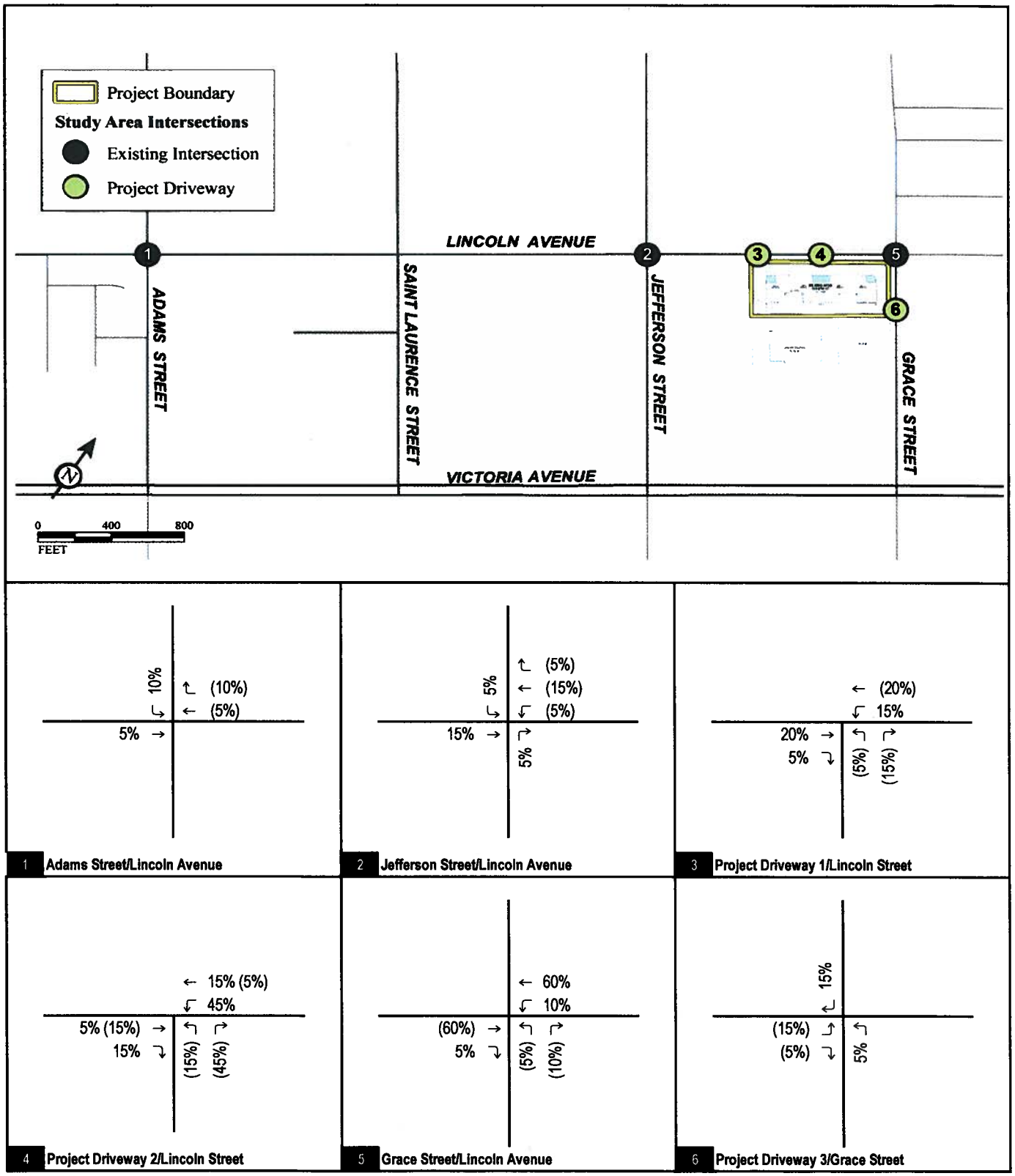
Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis

Study Area Intersections



LSA

FIGURE 4

XX% (YY%)

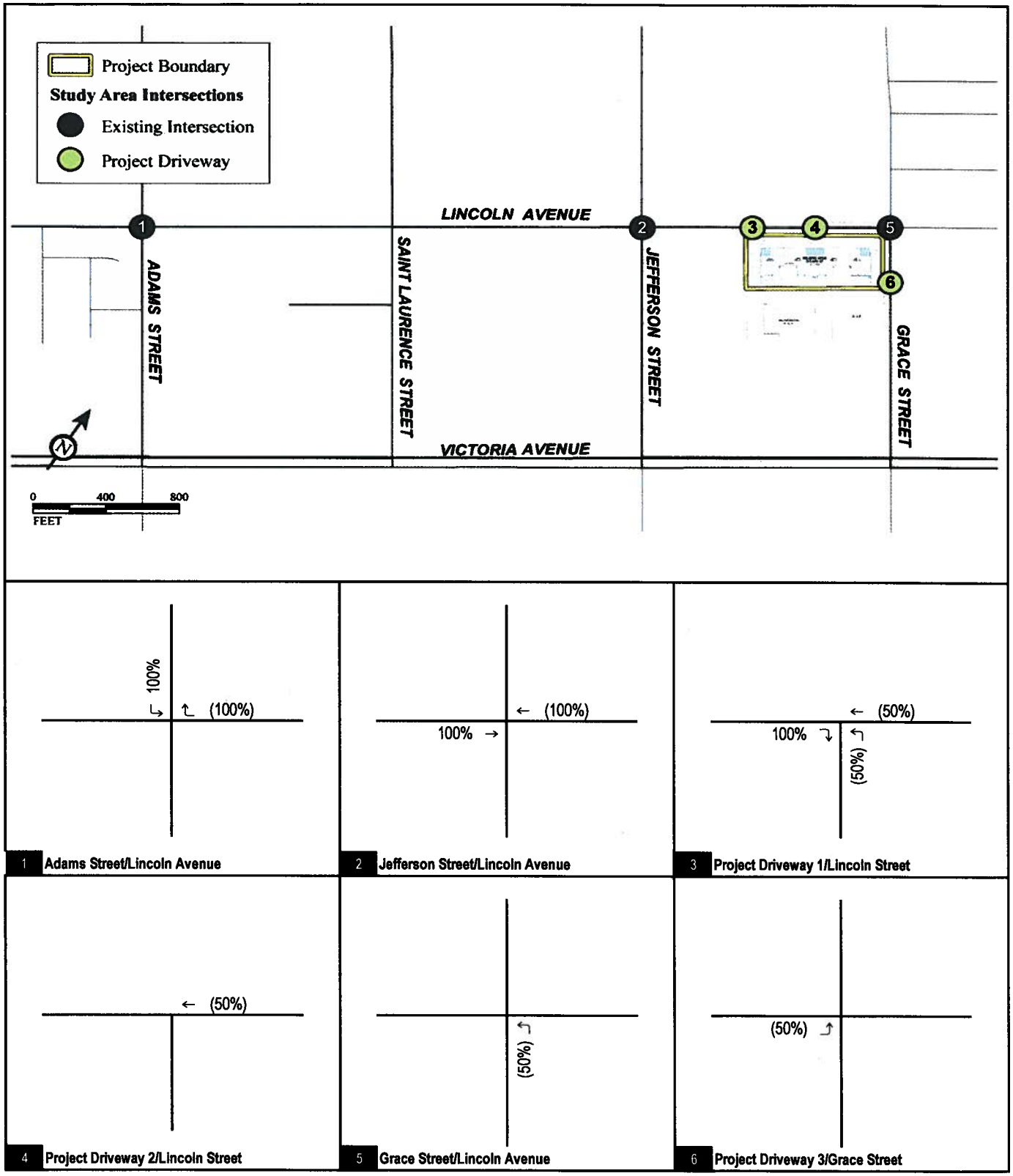
Inbound (Outbound) Distribution

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Trip Distribution (Passenger Vehicles)

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12_Dist auto\Figure (10/14/2016)



LSA

FIGURE 5

XX% (YY%)

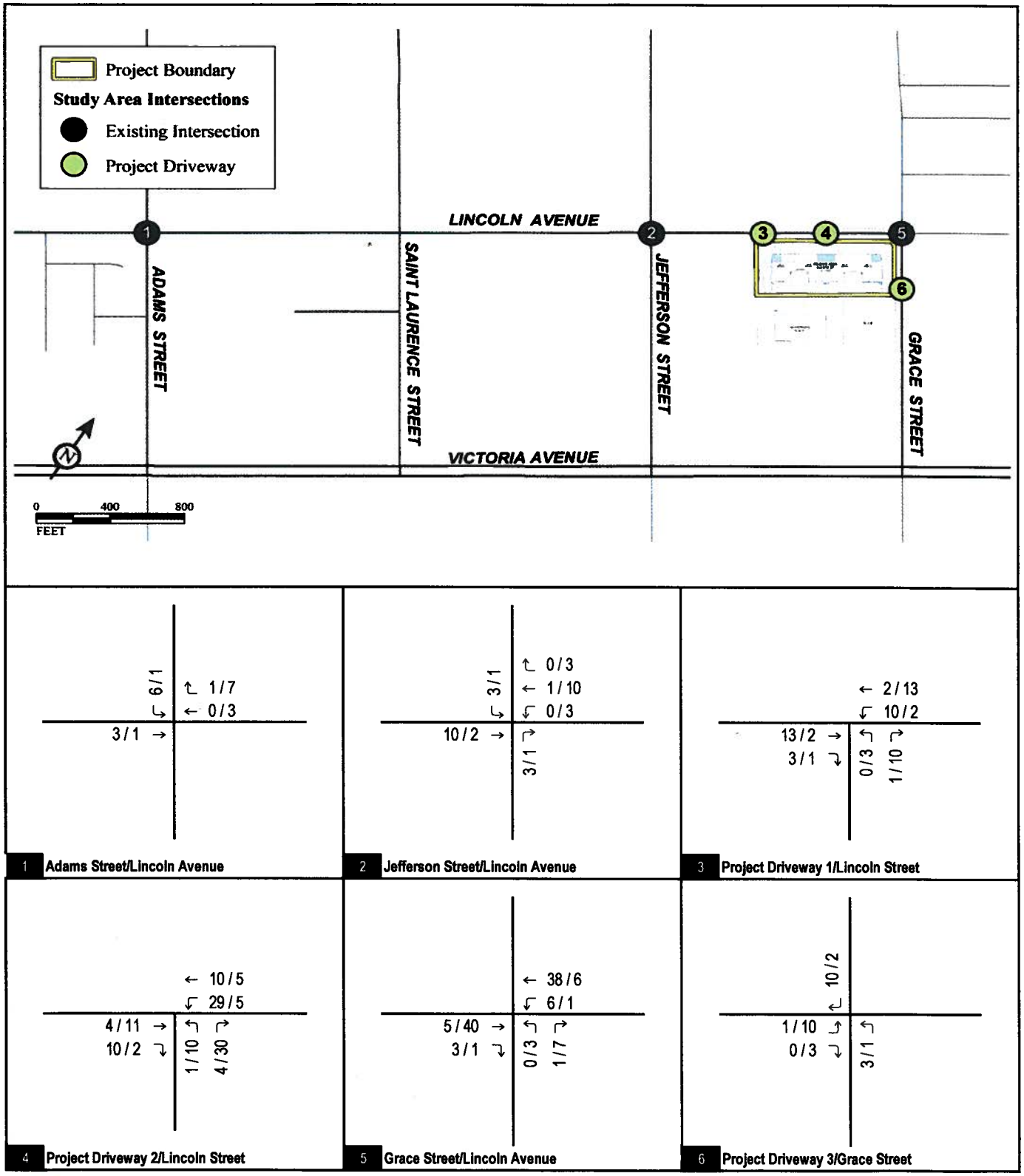
Inbound (Outbound) Distribution

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Trip Distribution (Trucks)

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12_Dist Truck\Figure (10/13/2016)



LSA

FIGURE 6

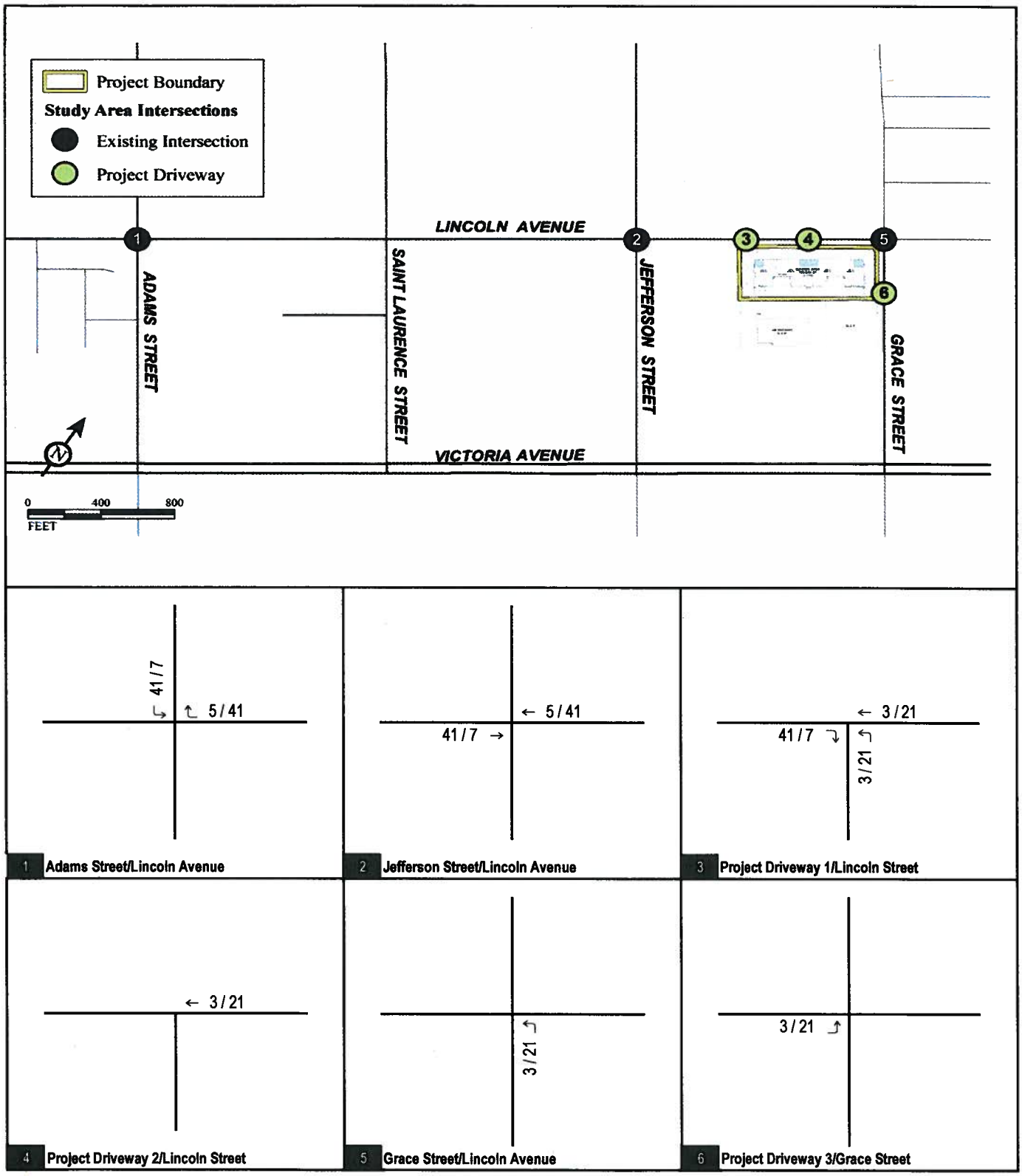
XX / YY
AM / PM Peak Hour Trips

Lincoln Avenue Industrial Warehouse

Traffic Impact Analysis

Project Trip Assignment (Passenger Vehicles)

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12_ Trip Assign auto\Figure (10/14/2016)



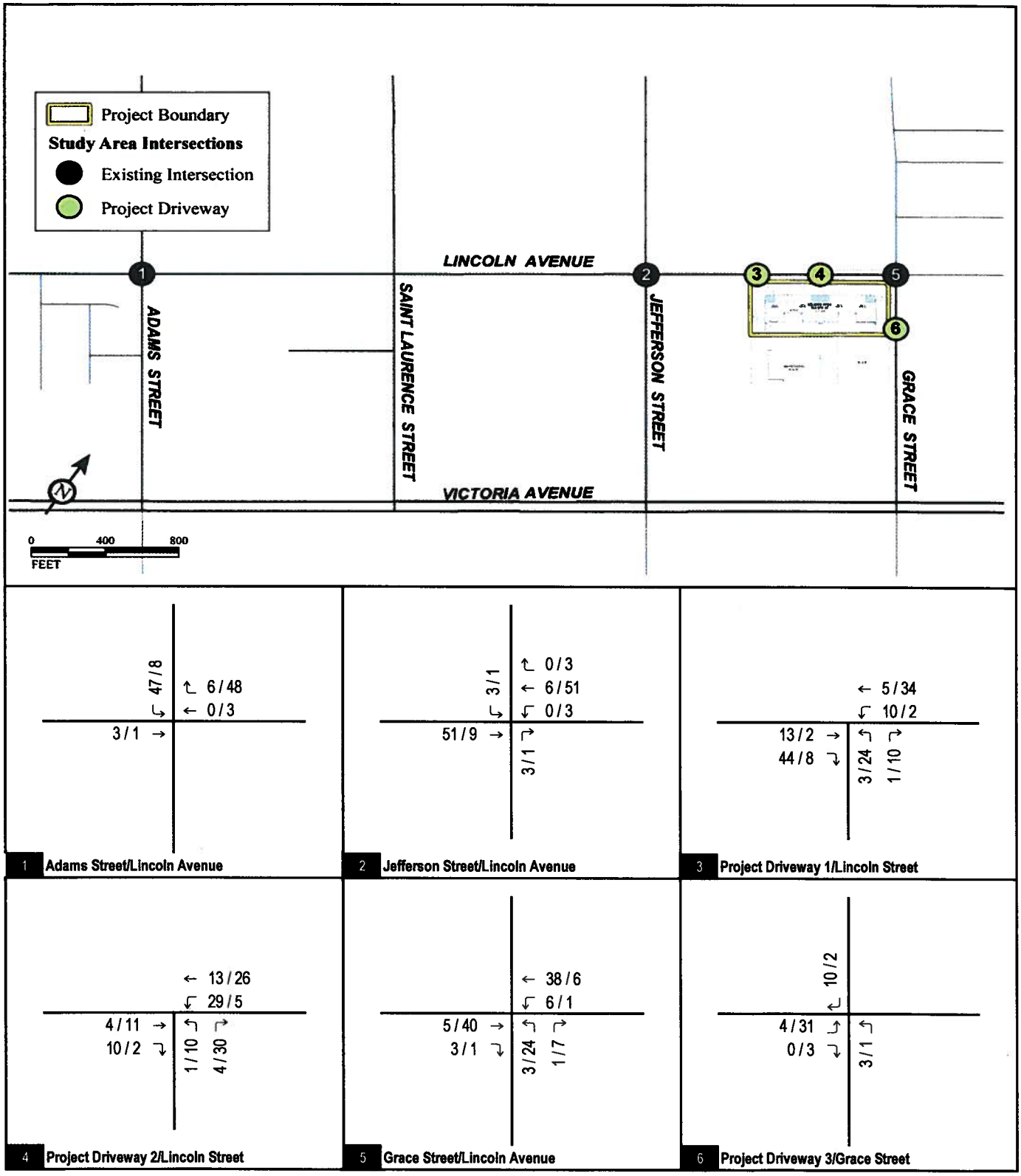
LSA

FIGURE 7

XX / YY
AM / PM Peak Hour PCE Trips

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis
Project Trip Assignment (Truck PCEs)

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12_ Trip Assign Truck\Figure (10/13/2016)



LSA

FIGURE 8

XX / YY
AM / PM Peak Hour PCE Trips

Lincoln Avenue Industrial Warehouse
Traffic Impact Analysis
Total Project Trip Assignment

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\z12_ Trip Assign total\Figure (10/14/2016)

APPENDIX B:

TRAFFIC COUNT SHEETS

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Adams St and Lincoln Ave , Riverside

Date: 10/5/2016

Day: Wednesday

Project #: 16-6131-001

City: Riverside

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Peak Hour Summary

Southbound Approach

Adams St

Lanes	1	1	1		
AM	85	96	119	622	AM
NOON	0	0	0	0	NOON
PM	114	266	97	262	PM

Lincoln Ave

Eastbound Approach

	AM	NOON	PM
	383	0	315
1	119	0	58
2	260	0	213
0	8	0	19
Lanes	AM	NOON	PM

Westbound Approach

AM	NOON	PM	Lanes
143	0	95	0
271	0	186	2
10	0	10	1
400	0	327	
AM	NOON	PM	

CONTROL

Signalized

Northbound Approach

AM	114	27	360	21	AM
	0	0	0	0	
	295	15	109	17	
		1	2	0	Lanes

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Jefferson St and Lincoln Ave , Riverside

Date: 9/8/2016

Day: Thursday

Project #: 16-6123-001

City: Riverside

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Peak Hour Summary

Southbound Approach

Jefferson St

Lanes	0	1	0		
AM	67	68	27	352	AM
NOON	0	0	0	0	NOON
PM	71	220	64	183	PM

Lincoln Ave

Eastbound Approach

	AM	NOON	PM
	398	0	245
0	78	0	52
2	312	0	266
0	17	0	37
Lanes	AM	NOON	PM

Westbound Approach

AM	NOON	PM	Lanes
54	0	44	0
300	0	166	2
5	0	7	0
349	0	334	
AM	NOON	PM	

CONTROL

4-Way Stop

Northbound Approach

AM	90	31	220	10	AM
NOON	0	0	0	0	NOON
PM	264	8	87	4	PM
		0	1	0	Lanes

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Southern Dwys (West) and Lincoln Ave , Riverside

Date: 9/8/2016

Day: Thursday

Project #: 16-6123-003

City: Riverside

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Peak Hour Summary

Southbound Approach

Southern Dwys (West)

	Lanes					
	0	0	0			
AM	0	0	0	0		AM
NOON	0	0	0	0		NOON
PM	0	0	0	0		PM

Eastbound Approach

Lincoln Ave

	AM	NOON	PM
	354	0	212
0	0	0	0
1	331	0	347
0	6	0	1
Lanes	AM	NOON	PM

Westbound Approach

AM	NOON	PM	Lanes
0	0	0	0
353	0	208	2
5	0	1	0
332	0	362	
AM	NOON	PM	

CONTROL

No Control

Northbound Approach

AM	11	1	0	1	AM
NOON	0	0	0	0	NOON
PM	2	4	0	15	PM
		0	1	0	Lanes

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Grace St and Lincoln Ave , Riverside

Date: 9/8/2016

Day: Thursday

Project #: 16-6123-002

City: Riverside

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Peak Hour Summary

Southbound Approach

Grace St

Lanes	0	1	0		
AM	29	1	2	26	AM
NOON	0	0	0	0	NOON
PM	6	3	5	18	PM

Lincoln Ave

Eastbound Approach

	AM	NOON	PM
	358	0	209
0	16	0	7
1	307	0	335
0	13	0	15
Lanes	AM	NOON	PM

Westbound Approach

AM	NOON	PM	Lanes
4	0	5	0
296	0	194	2
13	0	26	0
330	0	354	
AM	NOON	PM	

CONTROL

2-Way Stop (NB/SB)

Northbound Approach

AM	27	33	6	21	AM
	0	0	0	0	
	44	9	6	14	
		0	1	0	Lanes

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Grace St and Dwy , Riverside

Date: 9/8/2016

Day: Thursday

Project #: 16-6123-004

City: Riverside

AM Peak Hour	700 AM
NOON Peak Hour	
PM Peak Hour	400 PM

Peak Hour Summary

Southbound Approach

Grace St

Lanes	0	1	0		
AM	0	18	3	68	AM
NOON	0	0	0	0	NOON
PM	0	40	9	31	PM

Eastbound Approach

Dwy

	AM	NOON	PM
	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
Lanes	AM	NOON	PM

Westbound Approach

AM	NOON	PM	Lanes
5	0	1	0
0	0	0	1
0	0	0	0
3	0	9	
AM	NOON	PM	

CONTROL

No Control

Northbound Approach

AM	18	0	63	0	AM
NOON	0	0	0	0	NOON
PM	40	0	30	0	PM
		0	1	0	Lanes

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

APPENDIX C:

VOLUME DEVELOPMENT WORKSHEETS

Table C-1 - Existing Peak Hour PCE Volumes
(Intersections with Classification Counts)

	A.M. Peak Hour						P.M. Peak Hour					
	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume
1 Adams Street/Lincoln Avenue												
NBL	27	0	0	0	0	27	14	1	0	0	2	16
NBT	356	4	0	0	8	364	107	2	0	0	4	111
NBR	18	2	1	0	6	24	17	0	0	0	0	17
SBL	105	9	4	1	28	133	92	0	1	4	10	102
SBT	89	4	1	2	14	103	263	2	1	0	6	269
SBR	81	4	0	0	8	89	113	1	0	0	2	115
EBL	119	0	0	0	0	119	57	1	0	0	2	59
EBT	251	8	1	0	18	269	205	6	0	2	16	221
EBR	8	0	0	0	0	8	19	0	0	0	0	19
WBL	9	1	0	0	2	11	10	0	0	0	0	10
WBT	251	17	3	0	40	291	184	2	0	0	4	188
WBR	119	14	8	2	48	167	84	3	1	7	22	106
North Leg												
Approach	275	17	5	3	50	325	468	3	2	4	18	486
Departure	594	18	8	2	56	650	248	6	1	7	28	276
Total	869	35	13	5	106	975	716	9	3	11	46	762
South Leg												
Approach	401	6	1	0	14	415	138	3	0	0	6	144
Departure	106	5	1	2	16	122	292	2	1	0	6	298
Total	507	11	2	2	30	537	430	5	1	0	12	442
East Leg												
Approach	379	32	11	2	90	469	278	5	1	7	26	304
Departure	374	19	6	1	52	426	314	6	1	6	26	340
Total	753	51	17	3	142	895	592	11	2	13	52	644
West Leg												
Approach	378	8	1	0	18	396	281	7	0	2	18	299
Departure	359	21	3	0	48	407	311	4	0	0	8	319
Total	737	29	4	0	66	803	592	11	0	2	26	618
Total Approaches												
Approach	1,433	63	18	5	172	1,605	1,165	18	3	13	68	1,233
Departure	1,433	63	18	5	172	1,605	1,165	18	3	13	68	1,233
Total	2,866	126	36	10	344	3,210	2,330	36	6	26	136	2,466

Table C-1 - Existing Peak Hour PCE Volumes
(Intersections with Classification Counts)

	A.M. Peak Hour						P.M. Peak Hour					
	Passenger Vehicles	Trucks				Total PCE Volume	Passenger Vehicles	Trucks				Total PCE Volume
		2 Axle	3 Axle	4 Axle	PCE			2 Axle	3 Axle	4 Axle	PCE	
2 Jefferson Street/Lincoln Avenue												
NBL	29	2	0	0	4	33	8	0	0	0	0	8
NBT	218	2	0	0	4	222	87	0	0	0	0	87
NBR	9	1	0	0	2	11	4	0	0	0	0	4
SBL	27	0	0	0	0	27	64	0	0	0	0	64
SBT	61	7	0	0	14	75	220	0	0	0	0	220
SBR	60	3	3	1	14	74	69	2	0	0	4	73
EBL	68	7	3	0	20	88	52	0	0	0	0	52
EBT	282	24	4	2	60	342	260	2	2	2	12	272
EBR	9	8	0	0	16	25	37	0	0	0	0	37
WBL	2	3	0	0	6	8	7	0	0	0	0	7
WBT	285	11	2	2	30	315	160	4	0	2	12	172
WBR	50	2	0	2	8	58	44	0	0	0	0	44
North Leg												
Approach	148	10	3	1	28	176	353	2	0	0	4	357
Departure	336	11	3	2	32	368	183	0	0	0	0	183
Total	484	21	6	3	60	544	536	2	0	0	4	540
South Leg												
Approach	256	5	0	0	10	266	99	0	0	0	0	99
Departure	72	18	0	0	36	108	264	0	0	0	0	264
Total	328	23	0	0	46	374	363	0	0	0	0	363
East Leg												
Approach	337	16	2	4	44	381	211	4	0	2	12	223
Departure	318	25	4	2	62	380	328	2	2	2	12	340
Total	655	41	6	6	106	761	539	6	2	4	24	563
West Leg												
Approach	359	39	7	2	96	455	349	2	2	2	12	361
Departure	374	16	5	3	48	422	237	6	0	2	16	253
Total	733	55	12	5	144	877	586	8	2	4	28	614
Total Approaches												
Approach	1,100	70	12	7	178	1,278	1,012	8	2	4	28	1,040
Departure	1,100	70	12	7	178	1,278	1,012	8	2	4	28	1,040
Total	2,200	140	24	14	356	2,556	2,024	16	4	8	56	2,080

Table C-2 - Existing Peak Hour Truck Percentages

	A.M. Peak Hour				P.M. Peak Hour			
	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %
1 Adams Street/Lincoln Avenue								
NBL	27	0	27	0.0%	14	1	15	6.7%
NBT	356	4	360	1.1%	107	2	109	1.8%
NBR	18	3	21	14.3%	17	0	17	0.0%
SBL	105	14	119	11.8%	92	5	97	5.2%
SBT	89	7	96	7.3%	263	3	266	1.1%
SBR	81	4	85	4.7%	113	1	114	0.9%
EBL	119	0	119	0.0%	57	1	58	1.7%
EBT	251	9	260	3.5%	205	8	213	3.8%
EBR	8	0	8	0.0%	19	0	19	0.0%
WBL	9	1	10	10.0%	10	0	10	0.0%
WBT	251	20	271	7.4%	184	2	186	1.1%
WBR	119	24	143	16.8%	84	11	95	11.6%
North Leg								
Approach	275	25	300		468	9	477	
Departure	594	28	622		248	14	262	
Total	869	53	922	5.7%	716	23	739	3.1%
South Leg								
Approach	401	7	408		138	3	141	
Departure	106	8	114		292	3	295	
Total	507	15	522	2.9%	430	6	436	1.4%
East Leg								
Approach	379	45	424		278	13	291	
Departure	374	26	400		314	13	327	
Total	753	71	824	8.6%	592	26	618	4.2%
West Leg								
Approach	378	9	387		281	9	290	
Departure	359	24	383		311	4	315	
Total	737	33	770	4.3%	592	13	605	2.1%
Total Approaches								
Approach	1,433	86	1,519		1,165	34	1,199	
Departure	1,433	86	1,519		1,165	34	1,199	
Total	2,866	172	3,038	5.7%	2,330	68	2,398	2.8%

Table C-2 - Existing Peak Hour Truck Percentages

	A.M. Peak Hour				P.M. Peak Hour			
	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %
2 Jefferson Street/Lincoln Avenue								
NBL	29	2	31	6.5%	8	0	8	0.0%
NBT	218	2	220	0.9%	87	0	87	0.0%
NBR	9	1	10	10.0%	4	0	4	0.0%
SBL	27	0	27	0.0%	64	0	64	0.0%
SBT	61	7	68	10.3%	220	0	220	0.0%
SBR	60	7	67	10.4%	69	2	71	2.8%
EBL	68	10	78	12.8%	52	0	52	0.0%
EBT	282	30	312	9.6%	260	6	266	2.3%
EBR	9	8	17	47.1%	37	0	37	0.0%
WBL	2	3	5	60.0%	7	0	7	0.0%
WBT	285	15	300	5.0%	160	6	166	3.6%
WBR	50	4	54	7.4%	44	0	44	0.0%
North Leg								
Approach	148	14	162		353	2	355	
Departure	336	16	352		183	0	183	
Total	484	30	514	5.8%	536	2	538	0.4%
South Leg								
Approach	256	5	261		99	0	99	
Departure	72	18	90		264	0	264	
Total	328	23	351	6.6%	363	0	363	0.0%
East Leg								
Approach	337	22	359		211	6	217	
Departure	318	31	349		328	6	334	
Total	655	53	708	7.5%	539	12	551	2.2%
West Leg								
Approach	359	48	407		349	6	355	
Departure	374	24	398		237	8	245	
Total	733	72	805	8.9%	586	14	600	2.3%
Total Approaches								
Approach	1,100	89	1,189		1,012	14	1,026	
Departure	1,100	89	1,189		1,012	14	1,026	
Total	2,200	178	2,378	7.5%	2,024	28	2,052	1.4%

Table C-3 - Existing Peak Hour Volumes
(Intersections Without Classification Counts)

	A.M. Peak Hour						P.M. Peak Hour					
	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume
3 Project Driveway 1/Lincoln Street												
NBL	1		1	0	0	1	2		2	0	0	2
NBT	0		0	0	0	0	0		0	0	0	0
NBR	1		1	0	0	1	6		6	0	0	6
SBL	0		0	0	0	0	0		0	0	0	0
SBT	0		0	0	0	0	0		0	0	0	0
SBR	0		0	0	0	0	0		0	0	0	0
EBL	0		0	0	0	0	0		0	0	0	0
EBT	331	7.5%	306	25	50	356	347	2.2%	339	8	15	355
EBR	5		5	0	0	5	10		10	0	0	10
WBL	3		3	0	0	3	1		1	0	0	1
WBT	356	7.5%	329	27	53	383	207	2.2%	202	5	9	212
WBR	0		0	0	0	0	0		0	0	0	0
North Leg												
Approach	0		0	0	0	0	0		0	0	0	0
Departure	0		0	0	0	0	0		0	0	0	0
Total	0		0	0	0	0	0		0	0	0	0
South Leg												
Approach	2		2	0	0	2	8		8	0	0	8
Departure	8		8	0	0	8	11		11	0	0	11
Total	10		10	0	0	10	19		19	0	0	19
East Leg												
Approach	359		332	27	53	386	208		203	5	9	213
Departure	332		307	25	50	357	353		345	8	15	361
Total	691		640	51	103	743	561		549	12	24	574
West Leg												
Approach	336		311	25	50	361	357		349	8	15	365
Departure	357		330	27	53	384	209		204	5	9	214
Total	693		642	51	103	745	566		554	12	24	579
Total Approaches												
Approach	697		646	51	103	749	573		561	12	24	586
Departure	697		646	51	103	749	573		561	12	24	586
Total	1,394		1,291	103	206	1,498	1,146		1,122	24	48	1,172

Table C-3 - Existing Peak Hour Volumes
(Intersections Without Classification Counts)

	A.M. Peak Hour						P.M. Peak Hour					
	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume
4 Project Driveway 2/Lincoln Street												
NBL	0		0	0	0	0	0		0	0	0	0
NBT	0		0	0	0	0	0		0	0	0	0
NBR	0		0	0	0	0	0		0	0	0	0
SBL	0		0	0	0	0	0		0	0	0	0
SBT	0		0	0	0	0	0		0	0	0	0
SBR	0		0	0	0	0	0		0	0	0	0
EBL	0		0	0	0	0	0		0	0	0	0
EBT	332	7.5%	307	25	50	357	362	2.2%	354	8	16	370
EBR	0		0	0	0	0	0		0	0	0	0
WBL	0		0	0	0	0	0		0	0	0	0
WBT	358	7.5%	331	27	54	385	209	2.2%	204	5	9	214
WBR	0		0	0	0	0	0		0	0	0	0
North Leg												
Approach	0		0	0	0	0	0		0	0	0	0
Departure	0		0	0	0	0	0		0	0	0	0
Total	0		0	0	0	0	0		0	0	0	0
South Leg												
Approach	0		0	0	0	0	0		0	0	0	0
Departure	0		0	0	0	0	0		0	0	0	0
Total	0		0	0	0	0	0		0	0	0	0
East Leg												
Approach	358		331	27	54	385	209		204	5	9	214
Departure	332		307	25	50	357	362		354	8	16	370
Total	690		638	52	103	742	571		559	12	25	584
West Leg												
Approach	332		307	25	50	357	362		354	8	16	370
Departure	358		331	27	54	385	209		204	5	9	214
Total	690		638	52	103	742	571		559	12	25	584
Total Approaches												
Approach	690		638	52	103	742	571		559	12	25	584
Departure	690		638	52	103	742	571		559	12	25	584
Total	1,380		1,277	103	207	1,484	1,142		1,117	25	50	1,168

Table C-3 - Existing Peak Hour Volumes
(Intersections Without Classification Counts)

	A.M. Peak Hour						P.M. Peak Hour					
	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume
5 Grace Street/Lincoln Avenue												
NBL	33	7.5%	31	2	5	35	9	2.2%	9	0	0	9
NBT	6		6	0	0	6	6		6	0	0	6
NBR	21	7.5%	19	2	3	23	14	2.2%	14	0	1	14
SBL	2		2	0	0	2	5		5	0	0	5
SBT	1		1	0	0	1	3		3	0	0	3
SBR	29		29	0	0	29	6		6	0	0	6
EBL	16		16	0	0	16	7		7	0	0	7
EBT	307	7.5%	284	23	46	330	335	2.2%	328	7	15	342
EBR	13	7.5%	12	1	2	14	15	2.2%	15	0	1	15
WBL	13	7.5%	12	1	2	14	26	2.2%	25	1	1	27
WBT	296	7.5%	274	22	44	318	194	2.2%	190	4	8	198
WBR	4		4	0	0	4	5		5	0	0	5
North Leg												
Approach	32		32	0	0	32	14		14	0	0	14
Departure	26		26	0	0	26	18		18	0	0	18
Total	58		58	0	0	58	32		32	0	0	32
South Leg												
Approach	60		56	4	8	64	29		28	1	1	29
Departure	27		25	2	4	29	44		43	1	2	45
Total	87		81	6	12	93	73		72	1	3	74
East Leg												
Approach	313		290	23	46	336	225		220	5	10	230
Departure	330		305	25	49	355	354		346	8	15	361
Total	643		595	48	95	691	579		567	12	25	591
West Leg												
Approach	336		312	24	48	360	357		349	8	15	364
Departure	358		333	25	49	382	209		205	4	9	213
Total	694		645	49	97	742	566		554	12	24	577
Total Approaches												
Approach	741		690	51	102	792	625		612	13	26	637
Departure	741		690	51	102	792	625		612	13	26	637
Total	1,482		1,380	102	205	1,584	1,250		1,224	26	52	1,274

Table C-3 - Existing Peak Hour Volumes
(Intersections Without Classification Counts)

	A.M. Peak Hour						P.M. Peak Hour					
	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume	Total Vehicles	Truck %	Pass. Veh.	Truck	Truck PCE	Total PCE Volume
6 Project Driveway 3/Grace Street												
NBL	0		0	0	0	0	0		0	0	0	0
NBT	63	7.5%	58	5	9	68	30	2.2%	29	1	1	31
NBR	0		0	0	0	0	0		0	0	0	0
SBL	3		3	0	0	3	9		9	0	0	9
SBT	18	7.5%	17	1	3	19	40	2.2%	39	1	2	41
SBR	0		0	0	0	0	0		0	0	0	0
EBL	0		0	0	0	0	0		0	0	0	0
EBT	0		0	0	0	0	0		0	0	0	0
EBR	0		0	0	0	0	0		0	0	0	0
WBL	0		0	0	0	0	0		0	0	0	0
WBT	0		0	0	0	0	0		0	0	0	0
WBR	5		5	0	0	5	1		1	0	0	1
North Leg												
Approach	21		20	1	3	22	49		48	1	2	50
Departure	68		63	5	9	73	31		30	1	1	32
Total	89		83	6	12	95	80		78	2	3	82
South Leg												
Approach	63		58	5	9	68	30		29	1	1	31
Departure	18		17	1	3	19	40		39	1	2	41
Total	81		75	6	12	87	70		68	2	3	72
East Leg												
Approach	5		5	0	0	5	1		1	0	0	1
Departure	3		3	0	0	3	9		9	0	0	9
Total	8		8	0	0	8	10		10	0	0	10
West Leg												
Approach	0		0	0	0	0	0		0	0	0	0
Departure	0		0	0	0	0	0		0	0	0	0
Total	0		0	0	0	0	0		0	0	0	0
Total Approaches												
Approach	89		83	6	12	95	80		78	2	3	82
Departure	89		83	6	12	95	80		78	2	3	82
Total	178		166	12	24	190	160		157	3	6	164

Table C-4 - Existing (2016) Peak Hour PCE Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE Volume	Project Trips	Plus Project PCE Volume	Existing PCE Volume	Project Trips	Plus Project PCE Volume
1 Adams Street/Lincoln Avenue						
NBL	27	0	27	16	0	16
NBT	364	0	364	111	0	111
NBR	24	0	24	17	0	17
SBL	133	47	180	102	8	110
SBT	103	0	103	269	0	269
SBR	89	0	89	115	0	115
EBL	119	0	119	59	0	59
EBT	269	3	272	221	1	222
EBR	8	0	8	19	0	19
WBL	11	0	11	10	0	10
WBT	291	0	291	188	3	191
WBR	167	6	173	106	48	154
North Leg						
Approach	325	47	372	486	8	494
Departure	650	6	656	276	48	324
Total	975	53	1,028	762	56	818
South Leg						
Approach	415	0	415	144	0	144
Departure	122	0	122	298	0	298
Total	537	0	537	442	0	442
East Leg						
Approach	469	6	475	304	51	355
Departure	426	50	476	340	9	349
Total	895	56	951	644	60	704
West Leg						
Approach	396	3	399	299	1	300
Departure	407	0	407	319	3	322
Total	803	3	806	618	4	622
Total Approaches						
Approach	1,605	56	1,661	1,233	60	1,293
Departure	1,605	56	1,661	1,233	60	1,293
Total	3,210	112	3,322	2,466	120	2,586

Table C-4 - Existing (2016) Peak Hour PCE Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE Volume	Project Trips	Plus Project PCE Volume	Existing PCE Volume	Project Trips	Plus Project PCE Volume
2 Jefferson Street/Lincoln Avenue						
NBL	33	0	33	8	0	8
NBT	222	0	222	87	0	87
NBR	11	3	14	4	1	5
SBL	27	3	30	64	1	65
SBT	75	0	75	220	0	220
SBR	74	0	74	73	0	73
EBL	88	0	88	52	0	52
EBT	342	51	393	272	9	281
EBR	25	0	25	37	0	37
WBL	8	0	8	7	3	10
WBT	315	6	321	172	51	223
WBR	58	0	58	44	3	47
North Leg						
Approach	176	3	179	357	1	358
Departure	368	0	368	183	3	186
Total	544	3	547	540	4	544
South Leg						
Approach	266	3	269	99	1	100
Departure	108	0	108	264	3	267
Total	374	3	377	363	4	367
East Leg						
Approach	381	6	387	223	57	280
Departure	380	57	437	340	11	351
Total	761	63	824	563	68	631
West Leg						
Approach	455	51	506	361	9	370
Departure	422	6	428	253	51	304
Total	877	57	934	614	60	674
Total Approaches						
Approach	1,278	63	1,341	1,040	68	1,108
Departure	1,278	63	1,341	1,040	68	1,108
Total	2,556	126	2,682	2,080	136	2,216

Table C-4 - Existing (2016) Peak Hour PCE Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE Volume	Project Trips	Plus Project PCE Volume	Existing PCE Volume	Project Trips	Plus Project PCE Volume
3 Project Driveway 1/Lincoln Street						
NBL	1	3	4	2	24	26
NBT	0	0	0	0	0	0
NBR	1	1	2	6	10	16
SBL	0	0	0	0	0	0
SBT	0	0	0	0	0	0
SBR	0	0	0	0	0	0
EBL	0	0	0	0	0	0
EBT	356	13	369	355	2	357
EBR	5	44	49	10	8	18
WBL	3	10	13	1	2	3
WBT	383	5	388	212	34	246
WBR	0	0	0	0	0	0
North Leg						
Approach	0	0	0	0	0	0
Departure	0	0	0	0	0	0
Total	0	0	0	0	0	0
South Leg						
Approach	2	4	6	8	34	42
Departure	8	54	62	11	10	21
Total	10	58	68	19	44	63
East Leg						
Approach	386	15	401	213	36	249
Departure	357	14	371	361	12	373
Total	743	29	772	574	48	622
West Leg						
Approach	361	57	418	365	10	375
Departure	384	8	392	214	58	272
Total	745	65	810	579	68	647
Total Approaches						
Approach	749	76	825	586	80	666
Departure	749	76	825	586	80	666
Total	1,498	152	1,650	1,172	160	1,332

Table C-4 - Existing (2016) Peak Hour PCE Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE Volume	Project Trips	Plus Project PCE Volume	Existing PCE Volume	Project Trips	Plus Project PCE Volume
4 Project Driveway 2/Lincoln Street						
NBL	0	1	1	0	10	10
NBT	0	0	0	0	0	0
NBR	0	4	4	0	30	30
SBL	0	0	0	0	0	0
SBT	0	0	0	0	0	0
SBR	0	0	0	0	0	0
EBL	0	0	0	0	0	0
EBT	357	4	361	370	11	381
EBR	0	10	10	0	2	2
WBL	0	29	29	0	5	5
WBT	385	13	398	214	26	240
WBR	0	0	0	0	0	0
North Leg						
Approach	0	0	0	0	0	0
Departure	0	0	0	0	0	0
Total	0	0	0	0	0	0
South Leg						
Approach	0	5	5	0	40	40
Departure	0	39	39	0	7	7
Total	0	44	44	0	47	47
East Leg						
Approach	385	42	427	214	31	245
Departure	357	8	365	370	41	411
Total	742	50	792	584	72	656
West Leg						
Approach	357	14	371	370	13	383
Departure	385	14	399	214	36	250
Total	742	28	770	584	49	633
Total Approaches						
Approach	742	61	803	584	84	668
Departure	742	61	803	584	84	668
Total	1,484	122	1,606	1,168	168	1,336

Table C-4 - Existing (2016) Peak Hour PCE Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE Volume	Project Trips	Plus Project PCE Volume	Existing PCE Volume	Project Trips	Plus Project PCE Volume
5 Grace Street/Lincoln Avenue						
NBL	35	3	38	9	24	33
NBT	6	0	6	6	0	6
NBR	23	1	24	14	7	21
SBL	2	0	2	5	0	5
SBT	1	0	1	3	0	3
SBR	29	0	29	6	0	6
EBL	16	0	16	7	0	7
EBT	330	5	335	342	40	382
EBR	14	3	17	15	1	16
WBL	14	6	20	27	1	28
WBT	318	38	356	198	6	204
WBR	4	0	4	5	0	5
North Leg						
Approach	32	0	32	14	0	14
Departure	26	0	26	18	0	18
Total	58	0	58	32	0	32
South Leg						
Approach	64	4	68	29	31	60
Departure	29	9	38	45	2	47
Total	93	13	106	74	33	107
East Leg						
Approach	336	44	380	230	7	237
Departure	355	6	361	361	47	408
Total	691	50	741	591	54	645
West Leg						
Approach	360	8	368	364	41	405
Departure	382	41	423	213	30	243
Total	742	49	791	577	71	648
Total Approaches						
Approach	792	56	848	637	79	716
Departure	792	56	848	637	79	716
Total	1,584	112	1,696	1,274	158	1,432

Table C-4 - Existing (2016) Peak Hour PCE Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE Volume	Project Trips	Plus Project PCE Volume	Existing PCE Volume	Project Trips	Plus Project PCE Volume
6 Project Driveway 3/Grace Street						
NBL	0	3	3	0	1	1
NBT	68	0	68	31	0	31
NBR	0	0	0	0	0	0
SBL	3	0	3	9	0	9
SBT	19	0	19	41	0	41
SBR	0	10	10	0	2	2
EBL	0	4	4	0	31	31
EBT	0	0	0	0	0	0
EBR	0	0	0	0	3	3
WBL	0	0	0	0	0	0
WBT	0	0	0	0	0	0
WBR	5	0	5	1	0	1
North Leg						
Approach	22	10	32	50	2	52
Departure	73	4	77	32	31	63
Total	95	14	109	82	33	115
South Leg						
Approach	68	3	71	31	1	32
Departure	19	0	19	41	3	44
Total	87	3	90	72	4	76
East Leg						
Approach	5	0	5	1	0	1
Departure	3	0	3	9	0	9
Total	8	0	8	10	0	10
West Leg						
Approach	0	4	4	0	34	34
Departure	0	13	13	0	3	3
Total	0	17	17	0	37	37
Total Approaches						
Approach	95	17	112	82	37	119
Departure	95	17	112	82	37	119
Total	190	34	224	164	74	238

Table C-5- Project Completion (2017) Peak Hour PCE Volume Summary

	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project
1 Adams Street/Lincoln Avenue										
NBL	27	0	27	0	27	16	0	16	0	16
NBT	364	5	369	0	369	111	2	113	0	113
NBR	24	0	24	0	24	17	0	17	0	17
SBL	133	2	135	47	182	102	2	104	8	112
SBT	103	2	105	0	105	269	4	273	0	273
SBR	89	1	90	0	90	115	2	117	0	117
EBL	119	2	121	0	121	59	1	60	0	60
EBT	269	4	273	3	276	221	3	224	1	225
EBR	8	0	8	0	8	19	0	19	0	19
WBL	11	0	11	0	11	10	0	10	0	10
WBT	291	4	295	0	295	188	3	191	3	194
WBR	167	3	170	6	176	106	2	108	48	156
North Leg										
Approach	325	5	330	47	377	486	8	494	8	502
Departure	650	10	660	6	666	276	5	281	48	329
Total	975	15	990	53	1,043	762	13	775	56	831
South Leg										
Approach	415	5	420	0	420	144	2	146	0	146
Departure	122	2	124	0	124	298	4	302	0	302
Total	537	7	544	0	544	442	6	448	0	448
East Leg										
Approach	469	7	476	6	482	304	5	309	51	360
Departure	426	6	432	50	482	340	5	345	9	354
Total	895	13	908	56	964	644	10	654	60	714
West Leg										
Approach	396	6	402	3	405	299	4	303	1	304
Departure	407	5	412	0	412	319	5	324	3	327
Total	803	11	814	3	817	618	9	627	4	631
Total Approaches										
Approach	1,605	23	1,628	56	1,684	1,233	19	1,252	60	1,312
Departure	1,605	23	1,628	56	1,684	1,233	19	1,252	60	1,312
Total	3,210	46	3,256	112	3,368	2,466	38	2,504	120	2,624

Table C-5- Project Completion (2017) Peak Hour PCE Volume Summary

	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project
2 Jefferson Street/Lincoln Avenue										
NBL	33	0	33	0	33	8	0	8	0	8
NBT	222	3	225	0	225	87	1	88	0	88
NBR	11	0	11	3	14	4	0	4	1	5
SBL	27	0	27	3	30	64	1	65	1	66
SBT	75	1	76	0	76	220	3	223	0	223
SBR	74	1	75	0	75	73	1	74	0	74
EBL	88	1	89	0	89	52	1	53	0	53
EBT	342	5	347	51	398	272	4	276	9	285
EBR	25	0	25	0	25	37	1	38	0	38
WBL	8	0	8	0	8	7	0	7	3	10
WBT	315	5	320	6	326	172	3	175	51	226
WBR	58	1	59	0	59	44	1	45	3	48
North Leg										
Approach	176	2	178	3	181	357	5	362	1	363
Departure	368	5	373	0	373	183	3	186	3	189
Total	544	7	551	3	554	540	8	548	4	552
South Leg										
Approach	266	3	269	3	272	99	1	100	1	101
Departure	108	1	109	0	109	264	4	268	3	271
Total	374	4	378	3	381	363	5	368	4	372
East Leg										
Approach	381	6	387	6	393	223	4	227	57	284
Departure	380	5	385	57	442	340	5	345	11	356
Total	761	11	772	63	835	563	9	572	68	640
West Leg										
Approach	455	6	461	51	512	361	6	367	9	376
Departure	422	6	428	6	434	253	4	257	51	308
Total	877	12	889	57	946	614	10	624	60	684
Total Approaches										
Approach	1,278	17	1,295	63	1,358	1,040	16	1,056	68	1,124
Departure	1,278	17	1,295	63	1,358	1,040	16	1,056	68	1,124
Total	2,556	34	2,590	126	2,716	2,080	32	2,112	136	2,248

Table C-5- Project Completion (2017) Peak Hour PCE Volume Summary

	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project
3 Project Driveway 1/Lincoln Street										
NBL	1	0	1	3	4	2	0	2	24	26
NBT	0	0	0	0	0	0	0	0	0	0
NBR	1	0	1	1	2	6	0	6	10	16
SBL	0	0	0	0	0	0	0	0	0	0
SBT	0	0	0	0	0	0	0	0	0	0
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	356	5	361	13	374	355	5	360	2	362
EBR	5	0	5	44	49	10	0	10	8	18
WBL	3	0	3	10	13	1	0	1	2	3
WBT	383	6	389	5	394	212	3	215	34	249
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
South Leg										
Approach	2	0	2	4	6	8	0	8	34	42
Departure	8	0	8	54	62	11	0	11	10	21
Total	10	0	10	58	68	19	0	19	44	63
East Leg										
Approach	386	6	392	15	407	213	3	216	36	252
Departure	357	5	362	14	376	361	5	366	12	378
Total	743	11	754	29	783	574	8	582	48	630
West Leg										
Approach	361	5	366	57	423	365	5	370	10	380
Departure	384	6	390	8	398	214	3	217	58	275
Total	745	11	756	65	821	579	8	587	68	655
Total Approaches										
Approach	749	11	760	76	836	586	8	594	80	674
Departure	749	11	760	76	836	586	8	594	80	674
Total	1,498	22	1,520	152	1,672	1,172	16	1,188	160	1,348

Table C-5- Project Completion (2017) Peak Hour PCE Volume Summary

	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project
4 Project Driveway 2/Lincoln Street										
NBL	0	0	0	1	1	0	0	0	10	10
NBT	0	0	0	0	0	0	0	0	0	0
NBR	0	0	0	4	4	0	0	0	30	30
SBL	0	0	0	0	0	0	0	0	0	0
SBT	0	0	0	0	0	0	0	0	0	0
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	357	5	362	4	366	370	6	376	11	387
EBR	0	0	0	10	10	0	0	0	2	2
WBL	0	0	0	29	29	0	0	0	5	5
WBT	385	6	391	13	404	214	3	217	26	243
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
South Leg										
Approach	0	0	0	5	5	0	0	0	40	40
Departure	0	0	0	39	39	0	0	0	7	7
Total	0	0	0	44	44	0	0	0	47	47
East Leg										
Approach	385	6	391	42	433	214	3	217	31	248
Departure	357	5	362	8	370	370	6	376	41	417
Total	742	11	753	50	803	584	9	593	72	665
West Leg										
Approach	357	5	362	14	376	370	6	376	13	389
Departure	385	6	391	14	405	214	3	217	36	253
Total	742	11	753	28	781	584	9	593	49	642
Total Approaches										
Approach	742	11	753	61	814	584	9	593	84	677
Departure	742	11	753	61	814	584	9	593	84	677
Total	1,484	22	1,506	122	1,628	1,168	18	1,186	168	1,354

Table C-5- Project Completion (2017) Peak Hour PCE Volume Summary

	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project
5 Grace Street/Lincoln Avenue										
NBL	35	1	36	3	39	9	0	9	24	33
NBT	6	0	6	0	6	6	0	6	0	6
NBR	23	0	23	1	24	14	0	14	7	21
SBL	2	0	2	0	2	5	0	5	0	5
SBT	1	0	1	0	1	3	0	3	0	3
SBR	29	0	29	0	29	6	0	6	0	6
EBL	16	0	16	0	16	7	0	7	0	7
EBT	330	5	335	5	340	342	5	347	40	387
EBR	14	0	14	3	17	15	0	15	1	16
WBL	14	0	14	6	20	27	0	27	1	28
WBT	318	5	323	38	361	198	3	201	6	207
WBR	4	0	4	0	4	5	0	5	0	5
North Leg										
Approach	32	0	32	0	32	14	0	14	0	14
Departure	26	0	26	0	26	18	0	18	0	18
Total	58	0	58	0	58	32	0	32	0	32
South Leg										
Approach	64	1	65	4	69	29	0	29	31	60
Departure	29	0	29	9	38	45	0	45	2	47
Total	93	1	94	13	107	74	0	74	33	107
East Leg										
Approach	336	5	341	44	385	230	3	233	7	240
Departure	355	5	360	6	366	361	5	366	47	413
Total	691	10	701	50	751	591	8	599	54	653
West Leg										
Approach	360	5	365	8	373	364	5	369	41	410
Departure	382	6	388	41	429	213	3	216	30	246
Total	742	11	753	49	802	577	8	585	71	656
Total Approaches										
Approach	792	11	803	56	859	637	8	645	79	724
Departure	792	11	803	56	859	637	8	645	79	724
Total	1,584	22	1,606	112	1,718	1,274	16	1,290	158	1,448

Table C-5- Project Completion (2017) Peak Hour PCE Volume Summary

	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE Volume	Ambient Growth	Opening Year No Project	Project Trips	Opening Year With Project
6 Project Driveway 3/Grace Street										
NBL	0	0	0	3	3	0	0	0	1	1
NBT	68	1	69	0	69	31	0	31	0	31
NBR	0	0	0	0	0	0	0	0	0	0
SBL	3	0	3	0	3	9	0	9	0	9
SBT	19	0	19	0	19	41	1	42	0	42
SBR	0	0	0	10	10	0	0	0	2	2
EBL	0	0	0	4	4	0	0	0	31	31
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	3	3
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	5	0	5	0	5	1	0	1	0	1
North Leg										
Approach	22	0	22	10	32	50	1	51	2	53
Departure	73	1	74	4	78	32	0	32	31	63
Total	95	1	96	14	110	82	1	83	33	116
South Leg										
Approach	68	1	69	3	72	31	0	31	1	32
Departure	19	0	19	0	19	41	1	42	3	45
Total	87	1	88	3	91	72	1	73	4	77
East Leg										
Approach	5	0	5	0	5	1	0	1	0	1
Departure	3	0	3	0	3	9	0	9	0	9
Total	8	0	8	0	8	10	0	10	0	10
West Leg										
Approach	0	0	0	4	4	0	0	0	34	34
Departure	0	0	0	13	13	0	0	0	3	3
Total	0	0	0	17	17	0	0	0	37	37
Total Approaches										
Approach	95	1	96	17	113	82	1	83	37	120
Departure	95	1	96	17	113	82	1	83	37	120
Total	190	2	192	34	226	164	2	166	74	240

Table C-6 - Cumulative (2017) Peak Hour PCE Volume Summary

	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project
1 Adams Street/Lincoln Avenue										
NBL	27	0	27	0	27	16	0	16	0	16
NBT	369	1	370	0	370	113	2	115	0	115
NBR	24	3	27	0	27	17	4	21	0	21
SBL	135	3	138	47	185	104	3	107	8	115
SBT	105	1	106	0	106	273	2	275	0	275
SBR	90	1	91	0	91	117	2	119	0	119
EBL	121	1	122	0	122	60	2	62	0	62
EBT	273	3	276	3	279	224	4	228	1	229
EBR	8	0	8	0	8	19	0	19	0	19
WBL	11	2	13	0	13	10	4	14	0	14
WBT	295	3	298	0	298	191	4	195	3	198
WBR	170	3	173	6	179	108	4	112	48	160
North Leg										
Approach	330	5	335	47	382	494	7	501	8	509
Departure	660	5	665	6	671	281	8	289	48	337
Total	990	10	1,000	53	1,053	775	15	790	56	846
South Leg										
Approach	420	4	424	0	424	146	6	152	0	152
Departure	124	3	127	0	127	302	6	308	0	308
Total	544	7	551	0	551	448	12	460	0	460
East Leg										
Approach	476	8	484	6	490	309	12	321	51	372
Departure	432	9	441	50	491	345	11	356	9	365
Total	908	17	925	56	981	654	23	677	60	737
West Leg										
Approach	402	4	406	3	409	303	6	309	1	310
Departure	412	4	416	0	416	324	6	330	3	333
Total	814	8	822	3	825	627	12	639	4	643
Total Approaches										
Approach	1,628	21	1,649	56	1,705	1,252	31	1,283	60	1,343
Departure	1,628	21	1,649	56	1,705	1,252	31	1,283	60	1,343
Total	3,256	42	3,298	112	3,410	2,504	62	2,566	120	2,686

Table C-6 - Cumulative (2017) Peak Hour PCE Volume Summary

	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project
2 Jefferson Street/Lincoln Avenue										
NBL	33	0	33	0	33	8	0	8	0	8
NBT	225	2	227	0	227	88	2	90	0	90
NBR	11	0	11	3	14	4	0	4	1	5
SBL	27	1	28	3	31	65	2	67	1	68
SBT	76	1	77	0	77	223	2	225	0	225
SBR	75	0	75	0	75	74	0	74	0	74
EBL	89	0	89	0	89	53	0	53	0	53
EBT	347	9	356	51	407	276	12	288	9	297
EBR	25	0	25	0	25	38	0	38	0	38
WBL	8	0	8	0	8	7	0	7	3	10
WBT	320	8	328	6	334	175	12	187	51	238
WBR	59	2	61	0	61	45	2	47	3	50
North Leg										
Approach	178	2	180	3	183	362	4	366	1	367
Departure	373	4	377	0	377	186	4	190	3	193
Total	551	6	557	3	560	548	8	556	4	560
South Leg										
Approach	269	2	271	3	274	100	2	102	1	103
Departure	109	1	110	0	110	268	2	270	3	273
Total	378	3	381	3	384	368	4	372	4	376
East Leg										
Approach	387	10	397	6	403	227	14	241	57	298
Departure	385	10	395	57	452	345	14	359	11	370
Total	772	20	792	63	855	572	28	600	68	668
West Leg										
Approach	461	9	470	51	521	367	12	379	9	388
Departure	428	8	436	6	442	257	12	269	51	320
Total	889	17	906	57	963	624	24	648	60	708
Total Approaches										
Approach	1,295	23	1,318	63	1,381	1,056	32	1,088	68	1,156
Departure	1,295	23	1,318	63	1,381	1,056	32	1,088	68	1,156
Total	2,590	46	2,636	126	2,762	2,112	64	2,176	136	2,312

Table C-6 - Cumulative (2017) Peak Hour PCE Volume Summary

	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project
3 Project Driveway 1/Lincoln Street										
NBL	1	0	1	3	4	2	0	2	24	26
NBT	0	0	0	0	0	0	0	0	0	0
NBR	1	0	1	1	2	6	0	6	10	16
SBL	0	0	0	0	0	0	0	0	0	0
SBT	0	0	0	0	0	0	0	0	0	0
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	361	10	371	13	384	360	14	374	2	376
EBR	5	0	5	44	49	10	0	10	8	18
WBL	3	0	3	10	13	1	0	1	2	3
WBT	389	10	399	5	404	215	14	229	34	263
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
South Leg										
Approach	2	0	2	4	6	8	0	8	34	42
Departure	8	0	8	54	62	11	0	11	10	21
Total	10	0	10	58	68	19	0	19	44	63
East Leg										
Approach	392	10	402	15	417	216	14	230	36	266
Departure	362	10	372	14	386	366	14	380	12	392
Total	754	20	774	29	803	582	28	610	48	658
West Leg										
Approach	366	10	376	57	433	370	14	384	10	394
Departure	390	10	400	8	408	217	14	231	58	289
Total	756	20	776	65	841	587	28	615	68	683
Total Approaches										
Approach	760	20	780	76	856	594	28	622	80	702
Departure	760	20	780	76	856	594	28	622	80	702
Total	1,520	40	1,560	152	1,712	1,188	56	1,244	160	1,404

Table C-6 - Cumulative (2017) Peak Hour PCE Volume Summary

	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project
4 Project Driveway 2/Lincoln Street										
NBL	0	0	0	1	1	0	0	0	10	10
NBT	0	0	0	0	0	0	0	0	0	0
NBR	0	0	0	4	4	0	0	0	30	30
SBL	0	0	0	0	0	0	0	0	0	0
SBT	0	0	0	0	0	0	0	0	0	0
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	362	10	372	4	376	376	14	390	11	401
EBR	0	0	0	10	10	0	0	0	2	2
WBL	0	0	0	29	29	0	0	0	5	5
WBT	391	10	401	13	414	217	14	231	26	257
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
South Leg										
Approach	0	0	0	5	5	0	0	0	40	40
Departure	0	0	0	39	39	0	0	0	7	7
Total	0	0	0	44	44	0	0	0	47	47
East Leg										
Approach	391	10	401	42	443	217	14	231	31	262
Departure	362	10	372	8	380	376	14	390	41	431
Total	753	20	773	50	823	593	28	621	72	693
West Leg										
Approach	362	10	372	14	386	376	14	390	13	403
Departure	391	10	401	14	415	217	14	231	36	267
Total	753	20	773	28	801	593	28	621	49	670
Total Approaches										
Approach	753	20	773	61	834	593	28	621	84	705
Departure	753	20	773	61	834	593	28	621	84	705
Total	1,506	40	1,546	122	1,668	1,186	56	1,242	168	1,410

Table C-6 - Cumulative (2017) Peak Hour PCE Volume Summary

	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project
5 Grace Street/Lincoln Avenue										
NBL	36	0	36	3	39	9	0	9	24	33
NBT	6	0	6	0	6	6	0	6	0	6
NBR	23	0	23	1	24	14	0	14	7	21
SBL	2	0	2	0	2	5	0	5	0	5
SBT	1	0	1	0	1	3	0	3	0	3
SBR	29	0	29	0	29	6	0	6	0	6
EBL	16	0	16	0	16	7	0	7	0	7
EBT	335	10	345	5	350	347	14	361	40	401
EBR	14	0	14	3	17	15	0	15	1	16
WBL	14	0	14	6	20	27	0	27	1	28
WBT	323	10	333	38	371	201	14	215	6	221
WBR	4	0	4	0	4	5	0	5	0	5
North Leg										
Approach	32	0	32	0	32	14	0	14	0	14
Departure	26	0	26	0	26	18	0	18	0	18
Total	58	0	58	0	58	32	0	32	0	32
South Leg										
Approach	65	0	65	4	69	29	0	29	31	60
Departure	29	0	29	9	38	45	0	45	2	47
Total	94	0	94	13	107	74	0	74	33	107
East Leg										
Approach	341	10	351	44	395	233	14	247	7	254
Departure	360	10	370	6	376	366	14	380	47	427
Total	701	20	721	50	771	599	28	627	54	681
West Leg										
Approach	365	10	375	8	383	369	14	383	41	424
Departure	388	10	398	41	439	216	14	230	30	260
Total	753	20	773	49	822	585	28	613	71	684
Total Approaches										
Approach	803	20	823	56	879	645	28	673	79	752
Departure	803	20	823	56	879	645	28	673	79	752
Total	1,606	40	1,646	112	1,758	1,290	56	1,346	158	1,504

Table C-6 - Cumulative (2017) Peak Hour PCE Volume Summary

	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project	Opening Year No Project	Cumulative Projects	Cumulative Without Project	Project Trips	Cumulative With Project
6 Project Driveway 3/Grace Street										
NBL	0	0	0	3	3	0	0	0	1	1
NBT	69	0	69	0	69	31	0	31	0	31
NBR	0	0	0	0	0	0	0	0	0	0
SBL	3	0	3	0	3	9	0	9	0	9
SBT	19	0	19	0	19	42	0	42	0	42
SBR	0	0	0	10	10	0	0	0	2	2
EBL	0	0	0	4	4	0	0	0	31	31
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	3	3
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	5	0	5	0	5	1	0	1	0	1
North Leg										
Approach	22	0	22	10	32	51	0	51	2	53
Departure	74	0	74	4	78	32	0	32	31	63
Total	96	0	96	14	110	83	0	83	33	116
South Leg										
Approach	69	0	69	3	72	31	0	31	1	32
Departure	19	0	19	0	19	42	0	42	3	45
Total	88	0	88	3	91	73	0	73	4	77
East Leg										
Approach	5	0	5	0	5	1	0	1	0	1
Departure	3	0	3	0	3	9	0	9	0	9
Total	8	0	8	0	8	10	0	10	0	10
West Leg										
Approach	0	0	0	4	4	0	0	0	34	34
Departure	0	0	0	13	13	0	0	0	3	3
Total	0	0	0	17	17	0	0	0	37	37
Total Approaches										
Approach	96	0	96	17	113	83	0	83	37	120
Departure	96	0	96	17	113	83	0	83	37	120
Total	192	0	192	34	226	166	0	166	74	240

APPENDIX D:

LEVEL OF SERVICE CALCULATION WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	119	269	8	11	291	167	27	364	24	133	103	89
Future Volume (veh/h)	119	269	8	11	291	167	27	364	24	133	103	89
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	138	313	9	13	338	194	31	423	28	155	120	103
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	175	1003	29	40	458	258	82	1245	82	194	806	685
Arrive On Green	0.10	0.28	0.28	0.02	0.21	0.21	0.05	0.36	0.36	0.11	0.42	0.42
Sat Flow, veh/h	1810	3584	103	1810	2229	1255	1810	3438	227	1810	1900	1615
Grp Volume(v), veh/h	138	157	165	13	272	260	31	221	230	155	120	103
Grp Sat Flow(s),veh/h/ln	1810	1805	1882	1810	1805	1679	1810	1805	1860	1810	1900	1615
Q Serve(g_s), s	5.2	4.8	4.8	0.5	9.9	10.2	1.2	6.2	6.3	5.9	2.7	2.7
Cycle Q Clear(g_c), s	5.2	4.8	4.8	0.5	9.9	10.2	1.2	6.2	6.3	5.9	2.7	2.7
Prop In Lane	1.00		0.05	1.00		0.75	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	175	505	526	40	371	345	82	654	673	194	806	685
V/C Ratio(X)	0.79	0.31	0.31	0.32	0.73	0.75	0.38	0.34	0.34	0.80	0.15	0.15
Avail Cap(c_a), veh/h	207	505	526	181	464	432	181	654	673	233	806	685
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.9	19.9	19.9	33.7	26.0	26.1	32.5	16.2	16.2	30.5	12.4	12.4
Incr Delay (d2), s/veh	15.9	0.3	0.3	4.5	4.5	5.6	2.9	1.4	1.4	15.0	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	2.5	2.6	0.3	5.4	5.2	0.7	3.3	3.4	3.7	1.5	1.3
LnGrp Delay(d),s/veh	46.9	20.2	20.2	38.2	30.6	31.8	35.3	17.6	17.6	45.5	12.8	12.9
LnGrp LOS	D	C	C	D	C	C	D	B	B	D	B	B
Approach Vol, veh/h		460			545			482			378	
Approach Delay, s/veh		28.2			31.3			18.8			26.2	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	29.3	5.6	23.6	7.2	33.7	10.8	18.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	19.0	7.0	19.0	7.0	21.0	8.0	18.0
Max Q Clear Time (g_c+I1), s	7.9	8.3	2.5	6.8	3.2	4.7	7.2	12.2
Green Ext Time (p_c), s	0.0	2.8	0.0	4.2	0.0	3.4	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	21.1
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	88	342	25	0	8	315	58	0	33	222	11	0	27	75	74
Future Vol, veh/h	0	88	342	25	0	8	315	58	0	33	222	11	0	27	75	74
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	107	417	30	0	10	384	71	0	40	271	13	0	33	91	90
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	22.6	18.3	25.2	17.4
HCM LOS	C	C	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	34%	0%	5%	0%	15%
Vol Thru, %	83%	66%	87%	95%	73%	43%
Vol Right, %	4%	0%	13%	0%	27%	42%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	266	259	196	166	216	176
LT Vol	33	88	0	8	0	27
Through Vol	222	171	171	158	158	75
RT Vol	11	0	25	0	58	74
Lane Flow Rate	324	316	239	202	263	215
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.68	0.689	0.504	0.441	0.557	0.463
Departure Headway (Hd)	7.55	7.856	7.588	7.862	7.628	7.758
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	480	461	476	458	473	464
Service Time	5.571	5.583	5.315	5.598	5.378	5.812
HCM Lane V/C Ratio	0.675	0.685	0.502	0.441	0.556	0.463
HCM Control Delay	25.2	26.3	17.8	16.7	19.6	17.4
HCM Lane LOS	D	D	C	C	C	C
HCM 95th-tile Q	5	5.2	2.8	2.2	3.3	2.4

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	356	5	3	383	1	1
Future Vol, veh/h	356	5	3	383	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	451	6	4	485	1	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	457	0	704	454
Stage 1	-	-	-	-	454	-
Stage 2	-	-	-	-	250	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1114	-	391	610
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	774	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1114	-	389	610
Mov Cap-2 Maneuver	-	-	-	-	389	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	770	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	475	-	-	1114	-
HCM Lane V/C Ratio	0.005	-	-	0.003	-
HCM Control Delay (s)	12.6	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	330	14	14	318	4	35	6	23	2	1	29
Future Vol, veh/h	16	330	14	14	318	4	35	6	23	2	1	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	413	18	18	398	5	44	8	29	3	1	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	403	0	0	430	0	0	695	899	421	914	905	201
Stage 1	-	-	-	-	-	-	461	461	-	435	435	-
Stage 2	-	-	-	-	-	-	234	438	-	479	470	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1167	-	-	1140	-	-	346	281	637	243	278	813
Stage 1	-	-	-	-	-	-	584	569	-	575	584	-
Stage 2	-	-	-	-	-	-	754	582	-	571	563	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1167	-	-	1140	-	-	319	269	637	220	266	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	319	269	-	220	266	-
Stage 1	-	-	-	-	-	-	571	556	-	562	572	-
Stage 2	-	-	-	-	-	-	704	570	-	526	550	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.4	16.9	10.8
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	381	1167	-	-	1140	-	-	660
HCM Lane V/C Ratio	0.21	0.017	-	-	0.015	-	-	0.061
HCM Control Delay (s)	16.9	8.1	0	-	8.2	0.1	-	10.8
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	5	0	68	0	3	19	0
Future Vol, veh/h	0	0	0	0	0	5	0	68	0	3	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	6	0	79	0	3	22	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	111	108	22	108	108	79	22	0	0	79	0	0
Stage 1	29	29	-	79	79	-	-	-	-	-	-	-
Stage 2	82	79	-	29	29	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	872	786	1061	876	786	987	1607	-	-	1532	-	-
Stage 1	993	875	-	935	833	-	-	-	-	-	-	-
Stage 2	931	833	-	993	875	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	866	784	1061	875	784	987	1607	-	-	1532	-	-
Mov Cap-2 Maneuver	866	784	-	875	784	-	-	-	-	-	-	-
Stage 1	993	873	-	935	833	-	-	-	-	-	-	-
Stage 2	926	833	-	991	873	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.7	0	1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1607	-	-	-	987	1532	-	-
HCM Lane V/C Ratio	-	-	-	-	0.006	0.002	-	-
HCM Control Delay (s)	0	-	-	0	8.7	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	221	19	10	188	106	16	111	17	102	269	115
Future Volume (veh/h)	59	221	19	10	188	106	16	111	17	102	269	115
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	69	257	22	12	219	123	19	129	20	119	313	134
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	134	715	61	38	361	195	56	1409	214	163	964	820
Arrive On Green	0.07	0.21	0.21	0.02	0.16	0.16	0.03	0.45	0.45	0.09	0.51	0.51
Sat Flow, veh/h	1810	3368	286	1810	2265	1224	1810	3142	478	1810	1900	1615
Grp Volume(v), veh/h	69	137	142	12	173	169	19	73	76	119	313	134
Grp Sat Flow(s),veh/h/ln	1810	1805	1849	1810	1805	1684	1810	1805	1816	1810	1900	1615
Q Serve(g_s), s	2.6	4.5	4.6	0.5	6.2	6.6	0.7	1.6	1.7	4.5	6.8	3.1
Cycle Q Clear(g_c), s	2.6	4.5	4.6	0.5	6.2	6.6	0.7	1.6	1.7	4.5	6.8	3.1
Prop In Lane	1.00		0.15	1.00		0.73	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	134	383	393	38	287	268	56	809	814	163	964	820
V/C Ratio(X)	0.52	0.36	0.36	0.32	0.60	0.63	0.34	0.09	0.09	0.73	0.32	0.16
Avail Cap(c_a), veh/h	181	464	476	181	464	433	181	809	814	259	964	820
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	23.5	23.5	33.8	27.4	27.5	33.2	11.1	11.1	31.0	10.2	9.3
Incr Delay (d2), s/veh	3.1	0.6	0.6	4.8	2.0	2.4	3.5	0.2	0.2	6.1	0.9	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	2.3	2.4	0.3	3.3	3.2	0.4	0.9	0.9	2.5	3.8	1.5
LnGrp Delay(d),s/veh	34.3	24.1	24.1	38.5	29.4	30.0	36.8	11.3	11.3	37.1	11.1	9.7
LnGrp LOS	C	C	C	D	C	C	D	B	B	D	B	A
Approach Vol, veh/h		348			354			168			566	
Approach Delay, s/veh		26.1			30.0			14.2			16.2	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.3	35.4	5.5	18.9	6.2	39.5	9.2	15.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	19.0	7.0	18.0	7.0	22.0	7.0	18.0
Max Q Clear Time (g_c+I1), s	6.5	3.7	2.5	6.6	2.7	8.8	4.6	8.6
Green Ext Time (p_c), s	0.1	2.9	0.0	2.9	0.0	2.7	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	21.8
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	17.5
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	52	272	37	0	7	172	44	0	8	87	4	0	64	220	73
Future Vol, veh/h	0	52	272	37	0	7	172	44	0	8	87	4	0	64	220	73
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	63	332	45	0	9	210	54	0	10	106	5	0	78	268	89
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	14.7	12.5	12.3	24.8
HCM LOS	B	B	B	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	28%	0%	8%	0%	18%
Vol Thru, %	88%	72%	79%	92%	66%	62%
Vol Right, %	4%	0%	21%	0%	34%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	99	188	173	93	130	357
LT Vol	8	52	0	7	0	64
Through Vol	87	136	136	86	86	220
RT Vol	4	0	37	0	44	73
Lane Flow Rate	121	229	211	113	159	435
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.236	0.448	0.395	0.228	0.306	0.742
Departure Headway (Hd)	7.029	7.039	6.743	7.231	6.949	6.135
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	509	511	534	496	517	588
Service Time	5.086	4.786	4.491	4.983	4.7	4.172
HCM Lane V/C Ratio	0.238	0.448	0.395	0.228	0.308	0.74
HCM Control Delay	12.3	15.4	13.9	12.1	12.8	24.8
HCM Lane LOS	B	C	B	B	B	C
HCM 95th-tile Q	0.9	2.3	1.9	0.9	1.3	6.4

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	355	10	1	212	2	6
Future Vol, veh/h	355	10	1	212	2	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	449	13	1	268	3	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	462	0	593	456
Stage 1	-	-	-	-	456	-
Stage 2	-	-	-	-	137	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1110	-	456	609
Stage 1	-	-	-	-	643	-
Stage 2	-	-	-	-	881	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1110	-	456	609
Mov Cap-2 Maneuver	-	-	-	-	456	-
Stage 1	-	-	-	-	643	-
Stage 2	-	-	-	-	880	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	562	-	-	1110	-
HCM Lane V/C Ratio	0.018	-	-	0.001	-
HCM Control Delay (s)	11.5	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	342	15	27	198	5	9	6	14	5	3	6
Future Vol, veh/h	7	342	15	27	198	5	9	6	14	5	3	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	9	428	19	34	248	6	11	8	18	6	4	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	254	0	0	446	0	0	647	775	437	785	782	127
Stage 1	-	-	-	-	-	-	454	454	-	318	318	-
Stage 2	-	-	-	-	-	-	193	321	-	467	464	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1323	-	-	1125	-	-	373	331	624	299	328	906
Stage 1	-	-	-	-	-	-	589	573	-	673	657	-
Stage 2	-	-	-	-	-	-	796	655	-	580	567	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1323	-	-	1125	-	-	354	317	624	276	314	906
Mov Cap-2 Maneuver	-	-	-	-	-	-	354	317	-	276	314	-
Stage 1	-	-	-	-	-	-	584	568	-	667	634	-
Stage 2	-	-	-	-	-	-	757	632	-	551	562	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.1	14.1	14.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	434	1323	-	-	1125	-	-	408
HCM Lane V/C Ratio	0.084	0.007	-	-	0.03	-	-	0.043
HCM Control Delay (s)	14.1	7.7	0	-	8.3	0.1	-	14.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	1	0	31	0	9	41	0
Future Vol, veh/h	0	0	0	0	0	1	0	31	0	9	41	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	1	0	36	0	10	48	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	106	105	48	105	105	36	48	0	0	36	0	0
Stage 1	69	69	-	36	36	-	-	-	-	-	-	-
Stage 2	37	36	-	69	69	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	878	789	1027	880	789	1042	1572	-	-	1588	-	-
Stage 1	946	841	-	985	869	-	-	-	-	-	-	-
Stage 2	984	869	-	946	841	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	873	784	1027	876	784	1042	1572	-	-	1588	-	-
Mov Cap-2 Maneuver	873	784	-	876	784	-	-	-	-	-	-	-
Stage 1	946	836	-	985	869	-	-	-	-	-	-	-
Stage 2	983	869	-	940	836	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.5	0	1.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1572	-	-	-	1042	1588	-	-
HCM Lane V/C Ratio	-	-	-	-	0.001	0.007	-	-
HCM Control Delay (s)	0	-	-	0	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	119	272	8	11	291	173	27	364	24	180	103	89
Future Volume (veh/h)	119	272	8	11	291	173	27	364	24	180	103	89
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	138	316	9	13	338	201	31	423	28	209	120	103
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	175	1007	29	40	454	265	82	1168	77	233	803	683
Arrive On Green	0.10	0.28	0.28	0.02	0.21	0.21	0.05	0.34	0.34	0.13	0.42	0.42
Sat Flow, veh/h	1810	3585	102	1810	2197	1281	1810	3438	227	1810	1900	1615
Grp Volume(v), veh/h	138	159	166	13	276	263	31	221	230	209	120	103
Grp Sat Flow(s),veh/h/ln	1810	1805	1882	1810	1805	1674	1810	1805	1860	1810	1900	1615
Q Serve(g_s), s	5.2	4.9	4.9	0.5	10.0	10.3	1.2	6.5	6.5	8.0	2.7	2.8
Cycle Q Clear(g_c), s	5.2	4.9	4.9	0.5	10.0	10.3	1.2	6.5	6.5	8.0	2.7	2.8
Prop In Lane	1.00		0.05	1.00		0.77	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	175	507	529	40	373	346	82	613	632	233	803	683
V/C Ratio(X)	0.79	0.31	0.31	0.32	0.74	0.76	0.38	0.36	0.36	0.90	0.15	0.15
Avail Cap(c_a), veh/h	207	507	529	181	464	430	181	613	632	233	803	683
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.9	19.8	19.9	33.7	26.0	26.1	32.5	17.4	17.4	30.0	12.4	12.5
Incr Delay (d2), s/veh	15.9	0.3	0.3	4.5	4.8	6.0	2.9	1.7	1.6	33.3	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	2.5	2.6	0.3	5.5	5.3	0.7	3.5	3.6	6.1	1.5	1.3
LnGrp Delay(d),s/veh	46.9	20.2	20.2	38.2	30.8	32.1	35.3	19.1	19.0	63.3	12.8	12.9
LnGrp LOS	D	C	C	D	C	C	D	B	B	E	B	B
Approach Vol, veh/h		463			552			482			432	
Approach Delay, s/veh		28.1			31.6			20.1			37.3	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	27.8	5.6	23.7	7.2	33.6	10.8	18.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	19.0	7.0	19.0	7.0	21.0	8.0	18.0
Max Q Clear Time (g_c+I1), s	10.0	8.5	2.5	6.9	3.2	4.8	7.2	12.3
Green Ext Time (p_c), s	0.0	2.8	0.0	4.2	0.0	3.4	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	29.2
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	23.9
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	88	393	25	0	8	321	58	0	33	222	14	0	30	75	74
Future Vol, veh/h	0	88	393	25	0	8	321	58	0	33	222	14	0	30	75	74
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	107	479	30	0	10	391	71	0	40	271	17	0	37	91	90
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	27.3	19.4	27.5	18.4
HCM LOS	D	C	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	31%	0%	5%	0%	17%
Vol Thru, %	83%	69%	89%	95%	73%	42%
Vol Right, %	5%	0%	11%	0%	27%	41%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	269	285	222	169	219	179
LT Vol	33	88	0	8	0	30
Through Vol	222	197	197	161	161	75
RT Vol	14	0	25	0	58	74
Lane Flow Rate	328	347	270	205	266	218
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.708	0.767	0.579	0.46	0.58	0.485
Departure Headway (Hd)	7.767	7.954	7.712	8.058	7.841	7.996
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	469	455	467	446	461	450
Service Time	5.767	5.708	5.466	5.813	5.596	6.055
HCM Lane V/C Ratio	0.699	0.763	0.578	0.46	0.577	0.484
HCM Control Delay	27.5	32.5	20.6	17.5	20.9	18.4
HCM Lane LOS	D	D	C	C	C	C
HCM 95th-tile Q	5.5	6.6	3.6	2.4	3.6	2.6

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	369	49	13	388	4	2
Future Vol, veh/h	369	49	13	388	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	467	62	16	491	5	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	529	0	776	498
Stage 1	-	-	-	-	498	-
Stage 2	-	-	-	-	278	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1048	-	353	576
Stage 1	-	-	-	-	615	-
Stage 2	-	-	-	-	750	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1048	-	346	576
Mov Cap-2 Maneuver	-	-	-	-	346	-
Stage 1	-	-	-	-	615	-
Stage 2	-	-	-	-	734	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	399	-	-	1048	-
HCM Lane V/C Ratio	0.019	-	-	0.016	-
HCM Control Delay (s)	14.2	-	-	8.5	0.1
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	361	10	29	398	1	4
Future Vol, veh/h	361	10	29	398	1	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	392	11	32	433	1	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	403	0	677	398
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	279	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1167	-	406	656
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	749	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1167	-	391	656
Mov Cap-2 Maneuver	-	-	-	-	391	-
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	722	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	578	-	-	1167	-
HCM Lane V/C Ratio	0.009	-	-	0.027	-
HCM Control Delay (s)	11.3	-	-	8.2	0.1
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	335	17	20	356	4	38	6	24	2	1	29
Future Vol, veh/h	16	335	17	20	356	4	38	6	24	2	1	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	419	21	25	445	5	48	8	30	3	1	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	450	0	0	440	0	0	742	969	429	986	978	225
Stage 1	-	-	-	-	-	-	469	469	-	498	498	-
Stage 2	-	-	-	-	-	-	273	500	-	488	480	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1121	-	-	1131	-	-	321	256	630	217	252	784
Stage 1	-	-	-	-	-	-	579	564	-	528	548	-
Stage 2	-	-	-	-	-	-	715	546	-	565	558	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1121	-	-	1131	-	-	293	243	630	194	239	784
Mov Cap-2 Maneuver	-	-	-	-	-	-	293	243	-	194	239	-
Stage 1	-	-	-	-	-	-	565	550	-	515	532	-
Stage 2	-	-	-	-	-	-	661	530	-	518	545	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.5	18.4	11.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	353	1121	-	-	1131	-	-	622
HCM Lane V/C Ratio	0.241	0.018	-	-	0.022	-	-	0.064
HCM Control Delay (s)	18.4	8.3	0	-	8.3	0.1	-	11.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	0	0	0	5	3	68	0	3	19	10
Future Vol, veh/h	4	0	0	0	0	5	3	68	0	3	19	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	0	0	0	0	6	3	79	0	3	22	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	124	121	28	121	127	79	34	0	0	79	0	0
Stage 1	35	35	-	86	86	-	-	-	-	-	-	-
Stage 2	89	86	-	35	41	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	855	773	1053	859	767	987	1591	-	-	1532	-	-
Stage 1	986	870	-	927	827	-	-	-	-	-	-	-
Stage 2	923	827	-	986	865	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	847	770	1053	856	764	987	1591	-	-	1532	-	-
Mov Cap-2 Maneuver	847	770	-	856	764	-	-	-	-	-	-	-
Stage 1	984	868	-	925	825	-	-	-	-	-	-	-
Stage 2	916	825	-	984	863	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	8.7	0.3	0.7
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1591	-	-	847	987	1532	-	-
HCM Lane V/C Ratio	0.002	-	-	0.005	0.006	0.002	-	-
HCM Control Delay (s)	7.3	0	-	9.3	8.7	7.4	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	222	19	10	191	154	16	111	17	110	269	115
Future Volume (veh/h)	59	222	19	10	191	154	16	111	17	110	269	115
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	69	258	22	12	222	179	19	129	20	128	313	134
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	134	777	66	38	345	266	56	1346	205	166	929	790
Arrive On Green	0.07	0.23	0.23	0.02	0.18	0.18	0.03	0.43	0.43	0.09	0.49	0.49
Sat Flow, veh/h	1810	3369	285	1810	1944	1497	1810	3142	478	1810	1900	1615
Grp Volume(v), veh/h	69	137	143	12	205	196	19	73	76	128	313	134
Grp Sat Flow(s),veh/h/ln	1810	1805	1850	1810	1805	1636	1810	1805	1816	1810	1900	1615
Q Serve(g_s), s	2.6	4.4	4.5	0.5	7.4	7.8	0.7	1.7	1.7	4.8	7.1	3.2
Cycle Q Clear(g_c), s	2.6	4.4	4.5	0.5	7.4	7.8	0.7	1.7	1.7	4.8	7.1	3.2
Prop In Lane	1.00		0.15	1.00		0.92	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	134	416	426	38	320	290	56	773	778	166	929	790
V/C Ratio(X)	0.52	0.33	0.33	0.32	0.64	0.67	0.34	0.09	0.10	0.77	0.34	0.17
Avail Cap(c_a), veh/h	181	464	476	181	464	421	181	773	778	259	929	790
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	22.4	22.5	33.8	26.7	26.9	33.2	11.9	11.9	31.1	10.9	10.0
Incr Delay (d2), s/veh	3.1	0.5	0.5	4.8	2.1	2.7	3.5	0.2	0.3	7.4	1.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	2.3	2.4	0.3	3.8	3.7	0.4	0.9	0.9	2.8	3.9	1.5
LnGrp Delay(d),s/veh	34.3	22.9	22.9	38.5	28.9	29.6	36.8	12.2	12.2	38.5	11.9	10.4
LnGrp LOS	C	C	C	D	C	C	D	B	B	D	B	B
Approach Vol, veh/h		349			413			168			575	
Approach Delay, s/veh		25.1			29.5			15.0			17.5	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	34.0	5.5	20.1	6.2	38.2	9.2	16.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	19.0	7.0	18.0	7.0	22.0	7.0	18.0
Max Q Clear Time (g_c+I1), s	6.8	3.7	2.5	6.5	2.7	9.1	4.6	9.8
Green Ext Time (p_c), s	0.1	2.8	0.0	3.2	0.0	2.7	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.3
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	52	281	37	0	10	223	47	0	8	87	5	0	65	220	73
Future Vol, veh/h	0	52	281	37	0	10	223	47	0	8	87	5	0	65	220	73
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	63	343	45	0	12	272	57	0	10	106	6	0	79	268	89
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	15.7	13.8	12.9	28.1
HCM LOS	C	B	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	27%	0%	8%	0%	18%
Vol Thru, %	87%	73%	79%	92%	70%	61%
Vol Right, %	5%	0%	21%	0%	30%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	100	193	178	122	159	358
LT Vol	8	52	0	10	0	65
Through Vol	87	141	141	112	112	220
RT Vol	5	0	37	0	47	73
Lane Flow Rate	122	235	216	148	193	437
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.25	0.474	0.42	0.303	0.382	0.775
Departure Headway (Hd)	7.376	7.274	6.985	7.369	7.113	6.387
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	485	495	515	486	504	568
Service Time	5.448	5.034	4.745	5.132	4.876	4.434
HCM Lane V/C Ratio	0.252	0.475	0.419	0.305	0.383	0.769
HCM Control Delay	12.9	16.5	14.8	13.3	14.2	28.1
HCM Lane LOS	B	C	B	B	B	D
HCM 95th-tile Q	1	2.5	2.1	1.3	1.8	7.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	357	18	3	246	26	16
Future Vol, veh/h	357	18	3	246	26	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	452	23	4	311	33	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	475	0	626	463
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	163	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1098	-	436	603
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	855	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1098	-	434	603
Mov Cap-2 Maneuver	-	-	-	-	434	-
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	852	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	486	-	-	1098	-
HCM Lane V/C Ratio	0.109	-	-	0.003	-
HCM Control Delay (s)	13.3	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	381	2	5	240	10	30
Future Vol, veh/h	381	2	5	240	10	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	414	2	5	261	11	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	416	0	556	415
Stage 1	-	-	-	-	415	-
Stage 2	-	-	-	-	141	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1154	-	480	642
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	877	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1154	-	478	642
Mov Cap-2 Maneuver	-	-	-	-	478	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	873	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	591	-	-	1154	-
HCM Lane V/C Ratio	0.074	-	-	0.005	-
HCM Control Delay (s)	11.6	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	382	16	28	204	5	33	6	21	5	3	6
Future Vol, veh/h	7	382	16	28	204	5	33	6	21	5	3	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	9	478	20	35	255	6	41	8	26	6	4	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	261	0	0	498	0	0	704	836	488	850	843	131
Stage 1	-	-	-	-	-	-	505	505	-	328	328	-
Stage 2	-	-	-	-	-	-	199	331	-	522	515	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1315	-	-	1076	-	-	341	305	584	270	303	901
Stage 1	-	-	-	-	-	-	553	544	-	664	651	-
Stage 2	-	-	-	-	-	-	790	649	-	542	538	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1315	-	-	1076	-	-	323	291	584	244	289	901
Mov Cap-2 Maneuver	-	-	-	-	-	-	323	291	-	244	289	-
Stage 1	-	-	-	-	-	-	548	539	-	658	626	-
Stage 2	-	-	-	-	-	-	749	624	-	506	533	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.1	16.9	15.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	378	1315	-	-	1076	-	-	373
HCM Lane V/C Ratio	0.198	0.007	-	-	0.033	-	-	0.047
HCM Control Delay (s)	16.9	7.8	0	-	8.5	0.1	-	15.1
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	0	3	0	0	1	1	31	0	9	41	2
Future Vol, veh/h	31	0	3	0	0	1	1	31	0	9	41	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	36	0	3	0	0	1	1	36	0	10	48	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	109	108	49	110	109	36	50	0	0	36	0	0
Stage 1	70	70	-	38	38	-	-	-	-	-	-	-
Stage 2	39	38	-	72	71	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	874	786	1025	873	785	1042	1570	-	-	1588	-	-
Stage 1	945	841	-	982	867	-	-	-	-	-	-	-
Stage 2	981	867	-	943	840	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	868	781	1025	865	780	1042	1570	-	-	1588	-	-
Mov Cap-2 Maneuver	868	781	-	865	780	-	-	-	-	-	-	-
Stage 1	944	836	-	981	866	-	-	-	-	-	-	-
Stage 2	979	866	-	934	835	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	8.5	0.2	1.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1570	-	-	880	1042	1588	-	-
HCM Lane V/C Ratio	0.001	-	-	0.045	0.001	0.007	-	-
HCM Control Delay (s)	7.3	0	-	9.3	8.5	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	273	8	11	295	170	27	369	24	135	105	90
Future Volume (veh/h)	121	273	8	11	295	170	27	369	24	135	105	90
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	141	317	9	13	343	198	31	429	28	157	122	105
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	178	1012	29	40	459	260	82	1233	80	196	801	681
Arrive On Green	0.10	0.28	0.28	0.02	0.21	0.21	0.05	0.36	0.36	0.11	0.42	0.42
Sat Flow, veh/h	1810	3585	102	1810	2223	1259	1810	3442	224	1810	1900	1615
Grp Volume(v), veh/h	141	159	167	13	277	264	31	224	233	157	122	105
Grp Sat Flow(s),veh/h/ln	1810	1805	1882	1810	1805	1678	1810	1805	1860	1810	1900	1615
Q Serve(g_s), s	5.3	4.9	4.9	0.5	10.1	10.4	1.2	6.4	6.4	5.9	2.8	2.8
Cycle Q Clear(g_c), s	5.3	4.9	4.9	0.5	10.1	10.4	1.2	6.4	6.4	5.9	2.8	2.8
Prop In Lane	1.00		0.05	1.00		0.75	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	178	510	531	40	373	346	82	647	666	196	801	681
V/C Ratio(X)	0.79	0.31	0.31	0.32	0.74	0.76	0.38	0.35	0.35	0.80	0.15	0.15
Avail Cap(c_a), veh/h	207	510	531	181	464	431	181	647	666	233	801	681
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.9	19.8	19.8	33.7	26.0	26.2	32.5	16.5	16.5	30.5	12.5	12.5
Incr Delay (d2), s/veh	16.5	0.3	0.3	4.5	5.0	6.1	2.9	1.5	1.4	15.3	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.5	2.6	0.3	5.5	5.4	0.7	3.4	3.6	3.8	1.5	1.3
LnGrp Delay(d),s/veh	47.3	20.1	20.1	38.2	31.0	32.3	35.3	17.9	17.9	45.8	12.9	13.0
LnGrp LOS	D	C	C	D	C	C	D	B	B	D	B	B
Approach Vol, veh/h		467			554			488			384	
Approach Delay, s/veh		28.3			31.8			19.0			26.4	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.6	29.1	5.6	23.8	7.2	33.5	10.9	18.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	19.0	7.0	19.0	7.0	21.0	8.0	18.0
Max Q Clear Time (g_c+I1), s	7.9	8.4	2.5	6.9	3.2	4.8	7.3	12.4
Green Ext Time (p_c), s	0.0	2.8	0.0	4.2	0.0	3.5	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	26.6
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	21.9
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	89	347	25	0	8	320	59	0	33	225	11	0	27	76	75
Future Vol, veh/h	0	89	347	25	0	8	320	59	0	33	225	11	0	27	76	75
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	109	423	30	0	10	390	72	0	40	274	13	0	33	93	91
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	23.4	18.9	26.3	17.8
HCM LOS	C	C	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	34%	0%	5%	0%	15%
Vol Thru, %	84%	66%	87%	95%	73%	43%
Vol Right, %	4%	0%	13%	0%	27%	42%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	269	263	199	168	219	178
LT Vol	33	89	0	8	0	27
Through Vol	225	174	174	160	160	76
RT Vol	11	0	25	0	59	75
Lane Flow Rate	328	320	242	205	267	217
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.696	0.703	0.514	0.451	0.571	0.473
Departure Headway (Hd)	7.637	7.904	7.637	7.916	7.696	7.837
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	476	458	472	455	467	460
Service Time	5.637	5.658	5.391	5.671	5.451	5.896
HCM Lane V/C Ratio	0.689	0.699	0.513	0.451	0.572	0.472
HCM Control Delay	26.3	27.4	18.2	17.1	20.3	17.8
HCM Lane LOS	D	D	C	C	C	C
HCM 95th-tile Q	5.3	5.4	2.9	2.3	3.5	2.5

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	361	5	3	389	1	1
Future Vol, veh/h	361	5	3	389	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	457	6	4	492	1	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	463	0	714	460
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	254	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1109	-	385	605
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	771	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1109	-	383	605
Mov Cap-2 Maneuver	-	-	-	-	383	-
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	767	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	469	-	-	1109	-
HCM Lane V/C Ratio	0.005	-	-	0.003	-
HCM Control Delay (s)	12.7	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	335	14	14	323	4	36	6	23	2	1	29
Future Vol, veh/h	16	335	14	14	323	4	36	6	23	2	1	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	419	18	18	404	5	45	8	29	3	1	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	409	0	0	436	0	0	706	912	428	927	917	204
Stage 1	-	-	-	-	-	-	468	468	-	441	441	-
Stage 2	-	-	-	-	-	-	238	444	-	486	476	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1161	-	-	1134	-	-	340	276	631	238	274	809
Stage 1	-	-	-	-	-	-	579	565	-	570	580	-
Stage 2	-	-	-	-	-	-	750	579	-	566	560	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1161	-	-	1134	-	-	313	264	631	215	262	809
Mov Cap-2 Maneuver	-	-	-	-	-	-	313	264	-	215	262	-
Stage 1	-	-	-	-	-	-	566	552	-	557	568	-
Stage 2	-	-	-	-	-	-	700	567	-	521	547	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.4	17.3	10.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	373	1161	-	-	1134	-	-	654
HCM Lane V/C Ratio	0.218	0.017	-	-	0.015	-	-	0.061
HCM Control Delay (s)	17.3	8.2	0	-	8.2	0.1	-	10.9
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	5	0	69	0	3	19	0
Future Vol, veh/h	0	0	0	0	0	5	0	69	0	3	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	6	0	80	0	3	22	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	112	109	22	109	109	80	22	0	0	80	0	0
Stage 1	29	29	-	80	80	-	-	-	-	-	-	-
Stage 2	83	80	-	29	29	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	870	785	1061	874	785	986	1607	-	-	1531	-	-
Stage 1	993	875	-	934	832	-	-	-	-	-	-	-
Stage 2	930	832	-	993	875	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	864	783	1061	873	783	986	1607	-	-	1531	-	-
Mov Cap-2 Maneuver	864	783	-	873	783	-	-	-	-	-	-	-
Stage 1	993	873	-	934	832	-	-	-	-	-	-	-
Stage 2	925	832	-	991	873	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.7	0	1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1607	-	-	-	986	1531	-	-
HCM Lane V/C Ratio	-	-	-	-	0.006	0.002	-	-
HCM Control Delay (s)	0	-	-	0	8.7	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	224	19	10	191	108	16	113	17	104	273	117
Future Volume (veh/h)	60	224	19	10	191	108	16	113	17	104	273	117
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	70	260	22	12	222	126	19	131	20	121	317	136
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	135	724	61	38	363	199	56	1403	210	164	960	816
Arrive On Green	0.07	0.21	0.21	0.02	0.16	0.16	0.03	0.45	0.45	0.09	0.51	0.51
Sat Flow, veh/h	1810	3372	283	1810	2256	1232	1810	3149	472	1810	1900	1615
Grp Volume(v), veh/h	70	138	144	12	176	172	19	74	77	121	317	136
Grp Sat Flow(s),veh/h/ln	1810	1805	1850	1810	1805	1683	1810	1805	1817	1810	1900	1615
Q Serve(g_s), s	2.6	4.6	4.6	0.5	6.3	6.7	0.7	1.7	1.7	4.6	6.9	3.2
Cycle Q Clear(g_c), s	2.6	4.6	4.6	0.5	6.3	6.7	0.7	1.7	1.7	4.6	6.9	3.2
Prop In Lane	1.00		0.15	1.00		0.73	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	135	388	397	38	291	271	56	804	809	164	960	816
V/C Ratio(X)	0.52	0.36	0.36	0.32	0.60	0.63	0.34	0.09	0.10	0.74	0.33	0.17
Avail Cap(c_a), veh/h	181	464	476	181	464	433	181	804	809	259	960	816
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	23.4	23.4	33.8	27.3	27.4	33.2	11.2	11.2	31.0	10.3	9.4
Incr Delay (d2), s/veh	3.1	0.6	0.6	4.8	2.0	2.5	3.5	0.2	0.2	6.4	0.9	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	2.3	2.4	0.3	3.3	3.3	0.4	0.9	0.9	2.6	3.9	1.5
LnGrp Delay(d),s/veh	34.3	23.9	24.0	38.5	29.3	29.9	36.8	11.5	11.5	37.4	11.2	9.8
LnGrp LOS	C	C	C	D	C	C	D	B	B	D	B	A
Approach Vol, veh/h		352			360			170			574	
Approach Delay, s/veh		26.0			29.9			14.3			16.4	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.3	35.2	5.5	19.0	6.2	39.4	9.2	15.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	19.0	7.0	18.0	7.0	22.0	7.0	18.0
Max Q Clear Time (g_c+I1), s	6.6	3.7	2.5	6.6	2.7	8.9	4.6	8.7
Green Ext Time (p_c), s	0.1	2.9	0.0	2.9	0.0	2.7	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	21.8
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	18.1
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	53	276	38	0	7	175	45	0	8	88	4	0	65	223	74
Future Vol, veh/h	0	53	276	38	0	7	175	45	0	8	88	4	0	65	223	74
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	65	337	46	0	9	213	55	0	10	107	5	0	79	272	90
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	15	12.7	12.4	26.1
HCM LOS	B	B	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	28%	0%	7%	0%	18%
Vol Thru, %	88%	72%	78%	93%	66%	62%
Vol Right, %	4%	0%	22%	0%	34%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	100	191	176	95	133	362
LT Vol	8	53	0	7	0	65
Through Vol	88	138	138	88	88	223
RT Vol	4	0	38	0	45	74
Lane Flow Rate	122	233	215	115	162	441
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.241	0.459	0.405	0.233	0.315	0.758
Departure Headway (Hd)	7.104	7.094	6.797	7.292	7.009	6.18
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	505	508	528	492	512	587
Service Time	5.165	4.845	4.547	5.046	4.763	4.221
HCM Lane V/C Ratio	0.242	0.459	0.407	0.234	0.316	0.751
HCM Control Delay	12.4	15.8	14.1	12.3	13	26.1
HCM Lane LOS	B	C	B	B	B	D
HCM 95th-tile Q	0.9	2.4	1.9	0.9	1.3	6.8

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	360	10	1	215	2	6
Future Vol, veh/h	360	10	1	215	2	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	456	13	1	272	3	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	468	0	601	462
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	139	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1104	-	451	604
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	879	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1104	-	451	604
Mov Cap-2 Maneuver	-	-	-	-	451	-
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	878	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	557	-	-	1104	-
HCM Lane V/C Ratio	0.018	-	-	0.001	-
HCM Control Delay (s)	11.6	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	347	15	27	201	5	9	6	14	5	3	6
Future Vol, veh/h	7	347	15	27	201	5	9	6	14	5	3	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	9	434	19	34	251	6	11	8	18	6	4	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	453	0	0	656	786	443	795	792	129
Stage 1	-	-	-	-	-	-	461	461	-	322	322	-
Stage 2	-	-	-	-	-	-	195	325	-	473	470	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1318	-	-	1118	-	-	368	326	619	295	324	903
Stage 1	-	-	-	-	-	-	584	569	-	670	655	-
Stage 2	-	-	-	-	-	-	794	653	-	576	563	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1318	-	-	1118	-	-	349	311	619	272	310	903
Mov Cap-2 Maneuver	-	-	-	-	-	-	349	311	-	272	310	-
Stage 1	-	-	-	-	-	-	579	564	-	664	631	-
Stage 2	-	-	-	-	-	-	755	629	-	547	558	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.1	14.2	14.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	428	1318	-	-	1118	-	-	403
HCM Lane V/C Ratio	0.085	0.007	-	-	0.03	-	-	0.043
HCM Control Delay (s)	14.2	7.8	0	-	8.3	0.1	-	14.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	1	0	31	0	9	42	0
Future Vol, veh/h	0	0	0	0	0	1	0	31	0	9	42	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	1	0	36	0	10	49	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	107	106	49	106	106	36	49	0	0	36	0	0
Stage 1	70	70	-	36	36	-	-	-	-	-	-	-
Stage 2	37	36	-	70	70	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	877	788	1025	878	788	1042	1571	-	-	1588	-	-
Stage 1	945	841	-	985	869	-	-	-	-	-	-	-
Stage 2	984	869	-	945	841	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	872	783	1025	874	783	1042	1571	-	-	1588	-	-
Mov Cap-2 Maneuver	872	783	-	874	783	-	-	-	-	-	-	-
Stage 1	945	836	-	985	869	-	-	-	-	-	-	-
Stage 2	983	869	-	939	836	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.5	0	1.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1571	-	-	-	1042	1588	-	-
HCM Lane V/C Ratio	-	-	-	-	0.001	0.007	-	-
HCM Control Delay (s)	0	-	-	0	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	276	8	11	295	176	27	369	24	182	105	90
Future Volume (veh/h)	121	276	8	11	295	176	27	369	24	182	105	90
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	141	321	9	13	343	205	31	429	28	212	122	105
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	178	1017	28	40	455	267	82	1160	75	233	798	679
Arrive On Green	0.10	0.28	0.28	0.02	0.21	0.21	0.05	0.34	0.34	0.13	0.42	0.42
Sat Flow, veh/h	1810	3587	100	1810	2192	1286	1810	3442	224	1810	1900	1615
Grp Volume(v), veh/h	141	161	169	13	281	267	31	224	233	212	122	105
Grp Sat Flow(s),veh/h/ln	1810	1805	1882	1810	1805	1673	1810	1805	1860	1810	1900	1615
Q Serve(g_s), s	5.3	4.9	4.9	0.5	10.2	10.5	1.2	6.6	6.6	8.1	2.8	2.8
Cycle Q Clear(g_c), s	5.3	4.9	4.9	0.5	10.2	10.5	1.2	6.6	6.6	8.1	2.8	2.8
Prop In Lane	1.00		0.05	1.00		0.77	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	178	512	534	40	375	347	82	608	627	233	798	679
V/C Ratio(X)	0.79	0.31	0.32	0.32	0.75	0.77	0.38	0.37	0.37	0.91	0.15	0.15
Avail Cap(c_a), veh/h	207	512	534	181	464	430	181	608	627	233	798	679
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.9	19.7	19.7	33.7	26.0	26.1	32.5	17.6	17.6	30.1	12.6	12.6
Incr Delay (d2), s/veh	16.5	0.3	0.3	4.5	5.3	6.5	2.9	1.7	1.7	36.0	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.5	2.6	0.3	5.6	5.4	0.7	3.5	3.7	6.3	1.5	1.3
LnGrp Delay(d),s/veh	47.3	20.1	20.1	38.2	31.3	32.7	35.3	19.3	19.3	66.1	13.0	13.1
LnGrp LOS	D	C	C	D	C	C	D	B	B	E	B	B
Approach Vol, veh/h		471			561			488			439	
Approach Delay, s/veh		28.2			32.1			20.3			38.6	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	27.6	5.6	23.9	7.2	33.4	10.9	18.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	19.0	7.0	19.0	7.0	21.0	8.0	18.0
Max Q Clear Time (g_c+I1), s	10.1	8.6	2.5	6.9	3.2	4.8	7.3	12.5
Green Ext Time (p_c), s	0.0	2.8	0.0	4.3	0.0	3.5	0.0	2.0

Intersection Summary	
HCM 2010 Ctrl Delay	29.7
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	24.8
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	89	398	25	0	8	326	59	0	33	225	14	0	30	76	75
Future Vol, veh/h	0	89	398	25	0	8	326	59	0	33	225	14	0	30	76	75
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	109	485	30	0	10	398	72	0	40	274	17	0	37	93	91
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	28.6	20	28.4	18.8
HCM LOS	D	C	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	31%	0%	5%	0%	17%
Vol Thru, %	83%	69%	89%	95%	73%	42%
Vol Right, %	5%	0%	11%	0%	27%	41%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	272	288	224	171	222	181
LT Vol	33	89	0	8	0	30
Through Vol	225	199	199	163	163	76
RT Vol	14	0	25	0	59	75
Lane Flow Rate	332	351	273	209	271	221
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.718	0.783	0.591	0.471	0.595	0.495
Departure Headway (Hd)	7.789	8.023	7.782	8.125	7.908	8.072
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	464	450	464	444	458	446
Service Time	5.833	5.772	5.531	5.874	5.657	6.127
HCM Lane V/C Ratio	0.716	0.78	0.588	0.471	0.592	0.496
HCM Control Delay	28.4	34.3	21.2	17.9	21.7	18.8
HCM Lane LOS	D	D	C	C	C	C
HCM 95th-tile Q	5.7	6.9	3.7	2.5	3.8	2.7

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	374	49	13	394	4	2
Future Vol, veh/h	374	49	13	394	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	473	62	16	499	5	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	535	0	786	504
Stage 1	-	-	-	-	504	-
Stage 2	-	-	-	-	282	-
Critical Hdwy	-	-	4.1	-	7.3	6.2
Critical Hdwy Stg 1	-	-	-	-	6.1	-
Critical Hdwy Stg 2	-	-	-	-	6.5	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1043	-	299	572
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1043	-	294	572
Mov Cap-2 Maneuver	-	-	-	-	294	-
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	692	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	15.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	351	-	-	1043	-
HCM Lane V/C Ratio	0.022	-	-	0.016	-
HCM Control Delay (s)	15.5	-	-	8.5	0.1
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	366	10	29	404	1	4
Future Vol, veh/h	366	10	29	404	1	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	398	11	32	439	1	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	409	0	686	403
Stage 1	-	-	-	-	403	-
Stage 2	-	-	-	-	283	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1161	-	401	652
Stage 1	-	-	-	-	679	-
Stage 2	-	-	-	-	746	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1161	-	387	652
Mov Cap-2 Maneuver	-	-	-	-	387	-
Stage 1	-	-	-	-	679	-
Stage 2	-	-	-	-	719	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	573	-	-	1161	-
HCM Lane V/C Ratio	0.009	-	-	0.027	-
HCM Control Delay (s)	11.3	-	-	8.2	0.1
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	340	17	20	361	4	39	6	24	2	1	29
Future Vol, veh/h	16	340	17	20	361	4	39	6	24	2	1	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	425	21	25	451	5	49	8	30	3	1	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	456	0	0	446	0	0	752	982	436	998	990	228
Stage 1	-	-	-	-	-	-	476	476	-	504	504	-
Stage 2	-	-	-	-	-	-	276	506	-	494	486	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1115	-	-	1125	-	-	316	251	625	212	248	781
Stage 1	-	-	-	-	-	-	574	560	-	524	544	-
Stage 2	-	-	-	-	-	-	712	543	-	561	554	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1115	-	-	1125	-	-	288	238	625	189	235	781
Mov Cap-2 Maneuver	-	-	-	-	-	-	288	238	-	189	235	-
Stage 1	-	-	-	-	-	-	560	547	-	511	528	-
Stage 2	-	-	-	-	-	-	657	527	-	514	541	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.5	18.8	11.3
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	347	1115	-	-	1125	-	-	616
HCM Lane V/C Ratio	0.249	0.018	-	-	0.022	-	-	0.065
HCM Control Delay (s)	18.8	8.3	0	-	8.3	0.1	-	11.3
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1	0.1	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	0	0	0	5	3	69	0	3	19	10
Future Vol, veh/h	4	0	0	0	0	5	3	69	0	3	19	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	0	0	0	0	6	3	80	0	3	22	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	125	122	28	122	128	80	34	0	0	80	0	0
Stage 1	35	35	-	87	87	-	-	-	-	-	-	-
Stage 2	90	87	-	35	41	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	854	772	1053	858	766	986	1591	-	-	1531	-	-
Stage 1	986	870	-	926	827	-	-	-	-	-	-	-
Stage 2	922	827	-	986	865	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	846	769	1053	855	763	986	1591	-	-	1531	-	-
Mov Cap-2 Maneuver	846	769	-	855	763	-	-	-	-	-	-	-
Stage 1	984	868	-	924	825	-	-	-	-	-	-	-
Stage 2	915	825	-	984	863	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	8.7	0.3	0.7
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1591	-	-	846	986	1531	-	-
HCM Lane V/C Ratio	0.002	-	-	0.005	0.006	0.002	-	-
HCM Control Delay (s)	7.3	0	-	9.3	8.7	7.4	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	225	19	10	194	156	16	113	17	112	273	117
Future Volume (veh/h)	60	225	19	10	194	156	16	113	17	112	273	117
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	70	262	22	12	226	181	19	131	20	130	317	136
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	135	786	66	38	349	268	56	1341	201	167	925	786
Arrive On Green	0.07	0.23	0.23	0.02	0.18	0.18	0.03	0.43	0.43	0.09	0.49	0.49
Sat Flow, veh/h	1810	3374	281	1810	1949	1493	1810	3149	472	1810	1900	1615
Grp Volume(v), veh/h	70	139	145	12	209	198	19	74	77	130	317	136
Grp Sat Flow(s),veh/h/ln	1810	1805	1850	1810	1805	1637	1810	1805	1817	1810	1900	1615
Q Serve(g_s), s	2.6	4.5	4.6	0.5	7.5	7.9	0.7	1.7	1.8	4.9	7.2	3.3
Cycle Q Clear(g_c), s	2.6	4.5	4.6	0.5	7.5	7.9	0.7	1.7	1.8	4.9	7.2	3.3
Prop In Lane	1.00		0.15	1.00		0.91	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	135	420	431	38	324	293	56	768	773	167	925	786
V/C Ratio(X)	0.52	0.33	0.34	0.32	0.64	0.68	0.34	0.10	0.10	0.78	0.34	0.17
Avail Cap(c_a), veh/h	181	464	476	181	464	421	181	768	773	259	925	786
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	22.3	22.3	33.8	26.7	26.8	33.2	12.0	12.1	31.1	11.1	10.1
Incr Delay (d2), s/veh	3.1	0.5	0.5	4.8	2.1	2.7	3.5	0.2	0.3	7.9	1.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	2.3	2.4	0.3	3.9	3.8	0.4	0.9	1.0	2.8	4.0	1.6
LnGrp Delay(d),s/veh	34.3	22.8	22.8	38.5	28.8	29.5	36.8	12.3	12.3	38.9	12.1	10.5
LnGrp LOS	C	C	C	D	C	C	D	B	B	D	B	B
Approach Vol, veh/h		354			419			170			583	
Approach Delay, s/veh		25.1			29.4			15.0			17.7	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	33.8	5.5	20.3	6.2	38.1	9.2	16.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	19.0	7.0	18.0	7.0	22.0	7.0	18.0
Max Q Clear Time (g_c+I1), s	6.9	3.8	2.5	6.6	2.7	9.2	4.6	9.9
Green Ext Time (p_c), s	0.1	2.9	0.0	3.2	0.0	2.7	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.3
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.7
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	53	285	38	0	10	226	48	0	8	88	5	0	66	223	74
Future Vol, veh/h	0	53	285	38	0	10	226	48	0	8	88	5	0	66	223	74
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	65	348	46	0	12	276	59	0	10	107	6	0	80	272	90
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	16	14.1	13.1	29.7
HCM LOS	C	B	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	27%	0%	8%	0%	18%
Vol Thru, %	87%	73%	79%	92%	70%	61%
Vol Right, %	5%	0%	21%	0%	30%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	101	196	181	123	161	363
LT Vol	8	53	0	10	0	66
Through Vol	88	143	143	113	113	223
RT Vol	5	0	38	0	48	74
Lane Flow Rate	123	238	220	150	196	443
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.255	0.486	0.43	0.31	0.391	0.791
Departure Headway (Hd)	7.451	7.331	7.04	7.43	7.173	6.433
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	480	491	511	483	501	562
Service Time	5.531	5.095	4.803	5.196	4.939	4.484
HCM Lane V/C Ratio	0.256	0.485	0.431	0.311	0.391	0.788
HCM Control Delay	13.1	16.9	15.1	13.5	14.5	29.7
HCM Lane LOS	B	C	C	B	B	D
HCM 95th-tile Q	1	2.6	2.1	1.3	1.8	7.5

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	362	18	3	249	26	16
Future Vol, veh/h	362	18	3	249	26	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	458	23	4	315	33	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	481	0	635	470
Stage 1	-	-	-	-	470	-
Stage 2	-	-	-	-	165	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1092	-	430	598
Stage 1	-	-	-	-	633	-
Stage 2	-	-	-	-	853	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1092	-	428	598
Mov Cap-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	633	-
Stage 2	-	-	-	-	850	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	480	-	-	1092	-
HCM Lane V/C Ratio	0.111	-	-	0.003	-
HCM Control Delay (s)	13.4	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	387	2	5	243	10	30
Future Vol, veh/h	387	2	5	243	10	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	421	2	5	264	11	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	423	0	565	422
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	143	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1147	-	474	636
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	875	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1147	-	472	636
Mov Cap-2 Maneuver	-	-	-	-	472	-
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	871	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	585	-	-	1147	-
HCM Lane V/C Ratio	0.074	-	-	0.005	-
HCM Control Delay (s)	11.6	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	387	16	28	207	5	33	6	21	5	3	6
Future Vol, veh/h	7	387	16	28	207	5	33	6	21	5	3	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	9	484	20	35	259	6	41	8	26	6	4	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	265	0	0	504	0	0	712	846	494	860	853	133
Stage 1	-	-	-	-	-	-	511	511	-	332	332	-
Stage 2	-	-	-	-	-	-	201	335	-	528	521	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1311	-	-	1071	-	-	336	301	579	265	299	898
Stage 1	-	-	-	-	-	-	549	540	-	661	648	-
Stage 2	-	-	-	-	-	-	788	646	-	538	535	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1311	-	-	1071	-	-	318	287	579	239	285	898
Mov Cap-2 Maneuver	-	-	-	-	-	-	318	287	-	239	285	-
Stage 1	-	-	-	-	-	-	544	535	-	654	623	-
Stage 2	-	-	-	-	-	-	747	621	-	501	530	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.1	17.1	15.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	373	1311	-	-	1071	-	-	367
HCM Lane V/C Ratio	0.201	0.007	-	-	0.033	-	-	0.048
HCM Control Delay (s)	17.1	7.8	0	-	8.5	0.1	-	15.3
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	0	3	0	0	1	1	31	0	9	42	2
Future Vol, veh/h	31	0	3	0	0	1	1	31	0	9	42	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	36	0	3	0	0	1	1	36	0	10	49	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	110	109	50	111	110	36	51	0	0	36	0	0
Stage 1	71	71	-	38	38	-	-	-	-	-	-	-
Stage 2	39	38	-	73	72	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	873	785	1024	872	784	1042	1568	-	-	1588	-	-
Stage 1	944	840	-	982	867	-	-	-	-	-	-	-
Stage 2	981	867	-	942	839	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	867	780	1024	864	779	1042	1568	-	-	1588	-	-
Mov Cap-2 Maneuver	867	780	-	864	779	-	-	-	-	-	-	-
Stage 1	943	835	-	981	866	-	-	-	-	-	-	-
Stage 2	979	866	-	933	834	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	8.5	0.2	1.2
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1568	-	-	879	1042	1588	-	-
HCM Lane V/C Ratio	0.001	-	-	0.045	0.001	0.007	-	-
HCM Control Delay (s)	7.3	0	-	9.3	8.5	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	276	8	13	298	173	27	370	27	138	106	91
Future Volume (veh/h)	122	276	8	13	298	173	27	370	27	138	106	91
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	142	321	9	15	347	201	31	430	31	160	123	106
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	179	1011	28	46	462	263	82	1209	87	200	796	677
Arrive On Green	0.10	0.28	0.28	0.03	0.21	0.21	0.05	0.35	0.35	0.11	0.42	0.42
Sat Flow, veh/h	1810	3587	100	1810	2220	1262	1810	3416	245	1810	1900	1615
Grp Volume(v), veh/h	142	161	169	15	281	267	31	227	234	160	123	106
Grp Sat Flow(s),veh/h/ln	1810	1805	1882	1810	1805	1677	1810	1805	1857	1810	1900	1615
Q Serve(g_s), s	5.4	4.9	5.0	0.6	10.2	10.5	1.2	6.5	6.5	6.0	2.8	2.9
Cycle Q Clear(g_c), s	5.4	4.9	5.0	0.6	10.2	10.5	1.2	6.5	6.5	6.0	2.8	2.9
Prop In Lane	1.00		0.05	1.00		0.75	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	179	509	531	46	376	349	82	639	657	200	796	677
V/C Ratio(X)	0.79	0.32	0.32	0.33	0.75	0.76	0.38	0.35	0.36	0.80	0.15	0.16
Avail Cap(c_a), veh/h	207	509	531	181	464	431	181	639	657	233	796	677
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.8	19.8	19.8	33.5	26.0	26.1	32.5	16.7	16.7	30.4	12.6	12.6
Incr Delay (d2), s/veh	16.6	0.4	0.3	4.1	5.2	6.4	2.9	1.5	1.5	15.8	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.5	2.6	0.3	5.6	5.4	0.7	3.5	3.6	3.9	1.6	1.3
LnGrp Delay(d),s/veh	47.5	20.2	20.2	37.6	31.1	32.4	35.3	18.2	18.2	46.2	13.0	13.1
LnGrp LOS	D	C	C	D	C	C	D	B	B	D	B	B
Approach Vol, veh/h		472			563			492			389	
Approach Delay, s/veh		28.4			31.9			19.3			26.7	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.7	28.8	5.8	23.7	7.2	33.3	10.9	18.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	19.0	7.0	19.0	7.0	21.0	8.0	18.0
Max Q Clear Time (g_c+I1), s	8.0	8.5	2.6	7.0	3.2	4.9	7.4	12.5
Green Ext Time (p_c), s	0.0	2.8	0.0	4.3	0.0	3.5	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	26.8
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	22.8
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	89	356	25	0	8	328	61	0	33	227	11	0	28	77	75
Future Vol, veh/h	0	89	356	25	0	8	328	61	0	33	227	11	0	28	77	75
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	109	434	30	0	10	400	74	0	40	277	13	0	34	94	91
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	24.6	19.6	27.2	18.3
HCM LOS	C	C	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	33%	0%	5%	0%	16%
Vol Thru, %	84%	67%	88%	95%	73%	43%
Vol Right, %	4%	0%	12%	0%	27%	42%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	271	267	203	172	225	180
LT Vol	33	89	0	8	0	28
Through Vol	227	178	178	164	164	77
RT Vol	11	0	25	0	61	75
Lane Flow Rate	330	326	248	210	274	220
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.705	0.722	0.531	0.466	0.592	0.484
Departure Headway (Hd)	7.68	7.982	7.72	7.992	7.772	7.939
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	473	453	468	451	464	454
Service Time	5.724	5.728	5.466	5.739	5.519	5.991
HCM Lane V/C Ratio	0.698	0.72	0.53	0.466	0.591	0.485
HCM Control Delay	27.2	28.9	18.9	17.6	21.2	18.3
HCM Lane LOS	D	D	C	C	C	C
HCM 95th-tile Q	5.4	5.7	3.1	2.4	3.8	2.6

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	371	5	3	399	1	1
Future Vol, veh/h	371	5	3	399	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	470	6	4	505	1	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	476	0	733	473
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	260	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1097	-	375	595
Stage 1	-	-	-	-	631	-
Stage 2	-	-	-	-	766	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1097	-	373	595
Mov Cap-2 Maneuver	-	-	-	-	373	-
Stage 1	-	-	-	-	631	-
Stage 2	-	-	-	-	762	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	459	-	-	1097	-
HCM Lane V/C Ratio	0.006	-	-	0.003	-
HCM Control Delay (s)	12.9	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	345	14	14	333	4	36	6	23	2	1	29
Future Vol, veh/h	16	345	14	14	333	4	36	6	23	2	1	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	431	18	18	416	5	45	8	29	3	1	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	421	0	0	449	0	0	724	936	440	952	943	211
Stage 1	-	-	-	-	-	-	480	480	-	454	454	-
Stage 2	-	-	-	-	-	-	244	456	-	498	489	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1149	-	-	1122	-	-	330	267	621	229	265	801
Stage 1	-	-	-	-	-	-	571	558	-	560	573	-
Stage 2	-	-	-	-	-	-	744	572	-	558	553	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1149	-	-	1122	-	-	303	255	621	206	253	801
Mov Cap-2 Maneuver	-	-	-	-	-	-	303	255	-	206	253	-
Stage 1	-	-	-	-	-	-	558	545	-	547	561	-
Stage 2	-	-	-	-	-	-	694	560	-	513	540	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.4	17.8	11
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	362	1149	-	-	1122	-	-	642
HCM Lane V/C Ratio	0.224	0.017	-	-	0.016	-	-	0.062
HCM Control Delay (s)	17.8	8.2	0	-	8.3	0.1	-	11
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	5	0	69	0	3	19	0
Future Vol, veh/h	0	0	0	0	0	5	0	69	0	3	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	6	0	80	0	3	22	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	112	109	22	109	109	80	22	0	0	80	0	0
Stage 1	29	29	-	80	80	-	-	-	-	-	-	-
Stage 2	83	80	-	29	29	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	870	785	1061	874	785	986	1607	-	-	1531	-	-
Stage 1	993	875	-	934	832	-	-	-	-	-	-	-
Stage 2	930	832	-	993	875	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	864	783	1061	873	783	986	1607	-	-	1531	-	-
Mov Cap-2 Maneuver	864	783	-	873	783	-	-	-	-	-	-	-
Stage 1	993	873	-	934	832	-	-	-	-	-	-	-
Stage 2	925	832	-	991	873	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.7	0	1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1607	-	-	-	986	1531	-	-
HCM Lane V/C Ratio	-	-	-	-	0.006	0.002	-	-
HCM Control Delay (s)	0	-	-	0	8.7	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	228	19	14	195	112	16	115	21	107	275	119
Future Volume (veh/h)	62	228	19	14	195	112	16	115	21	107	275	119
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	72	265	22	16	227	130	19	134	24	124	320	138
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	136	718	59	48	369	203	56	1355	238	165	952	809
Arrive On Green	0.08	0.21	0.21	0.03	0.16	0.16	0.03	0.44	0.44	0.09	0.50	0.50
Sat Flow, veh/h	1810	3377	278	1810	2247	1239	1810	3071	539	1810	1900	1615
Grp Volume(v), veh/h	72	141	146	16	181	176	19	78	80	124	320	138
Grp Sat Flow(s),veh/h/ln	1810	1805	1851	1810	1805	1681	1810	1805	1805	1810	1900	1615
Q Serve(g_s), s	2.7	4.7	4.7	0.6	6.5	6.9	0.7	1.8	1.8	4.7	7.1	3.3
Cycle Q Clear(g_c), s	2.7	4.7	4.7	0.6	6.5	6.9	0.7	1.8	1.8	4.7	7.1	3.3
Prop In Lane	1.00		0.15	1.00		0.74	1.00		0.30	1.00		1.00
Lane Grp Cap(c), veh/h	136	384	394	48	296	276	56	796	796	165	952	809
V/C Ratio(X)	0.53	0.37	0.37	0.33	0.61	0.64	0.34	0.10	0.10	0.75	0.34	0.17
Avail Cap(c_a), veh/h	181	464	476	181	464	432	181	796	796	259	952	809
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	23.5	23.6	33.4	27.2	27.3	33.2	11.4	11.4	31.0	10.5	9.5
Incr Delay (d2), s/veh	3.1	0.6	0.6	3.9	2.0	2.5	3.5	0.2	0.3	6.8	1.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	2.4	2.5	0.4	3.4	3.4	0.4	0.9	0.9	2.7	3.9	1.6
LnGrp Delay(d),s/veh	34.3	24.1	24.1	37.4	29.2	29.8	36.8	11.7	11.7	37.8	11.4	10.0
LnGrp LOS	C	C	C	D	C	C	D	B	B	D	B	A
Approach Vol, veh/h		359			373			177			582	
Approach Delay, s/veh		26.2			29.8			14.4			16.7	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	34.9	5.9	18.9	6.2	39.1	9.3	15.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	19.0	7.0	18.0	7.0	22.0	7.0	18.0
Max Q Clear Time (g_c+I1), s	6.7	3.8	2.6	6.7	2.7	9.1	4.7	8.9
Green Ext Time (p_c), s	0.1	3.0	0.0	3.0	0.0	2.8	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.0
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	53	288	38	0	7	187	47	0	8	90	4	0	67	225	74
Future Vol, veh/h	0	53	288	38	0	7	187	47	0	8	90	4	0	67	225	74
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	65	351	46	0	9	228	57	0	10	110	5	0	82	274	90
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	15.6	13.1	12.8	28.2
HCM LOS	C	B	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	27%	0%	7%	0%	18%
Vol Thru, %	88%	73%	79%	93%	67%	61%
Vol Right, %	4%	0%	21%	0%	33%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	102	197	182	101	141	366
LT Vol	8	53	0	7	0	67
Through Vol	90	144	144	94	94	225
RT Vol	4	0	38	0	47	74
Lane Flow Rate	124	240	222	123	171	446
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.251	0.48	0.426	0.252	0.338	0.78
Departure Headway (Hd)	7.257	7.193	6.905	7.388	7.111	6.291
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	493	500	519	485	504	576
Service Time	5.327	4.95	4.662	5.149	4.872	4.336
HCM Lane V/C Ratio	0.252	0.48	0.428	0.254	0.339	0.774
HCM Control Delay	12.8	16.5	14.7	12.6	13.5	28.2
HCM Lane LOS	B	C	B	B	B	D
HCM 95th-tile Q	1	2.6	2.1	1	1.5	7.3

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	374	10	1	229	2	6
Future Vol, veh/h	374	10	1	229	2	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	473	13	1	290	3	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	486	0	627	480
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	147	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1087	-	435	590
Stage 1	-	-	-	-	627	-
Stage 2	-	-	-	-	871	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1087	-	435	590
Mov Cap-2 Maneuver	-	-	-	-	435	-
Stage 1	-	-	-	-	627	-
Stage 2	-	-	-	-	870	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	542	-	-	1087	-
HCM Lane V/C Ratio	0.019	-	-	0.001	-
HCM Control Delay (s)	11.8	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	361	15	27	215	5	9	6	14	5	3	6
Future Vol, veh/h	7	361	15	27	215	5	9	6	14	5	3	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	9	451	19	34	269	6	11	8	18	6	4	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	275	0	0	470	0	0	682	821	461	830	827	138
Stage 1	-	-	-	-	-	-	478	478	-	339	339	-
Stage 2	-	-	-	-	-	-	204	343	-	491	488	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1300	-	-	1102	-	-	353	312	605	278	309	891
Stage 1	-	-	-	-	-	-	572	559	-	655	643	-
Stage 2	-	-	-	-	-	-	785	641	-	563	553	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1300	-	-	1102	-	-	335	298	605	256	295	891
Mov Cap-2 Maneuver	-	-	-	-	-	-	335	298	-	256	295	-
Stage 1	-	-	-	-	-	-	567	554	-	649	620	-
Stage 2	-	-	-	-	-	-	746	618	-	534	548	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1	14.6	14.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	413	1300	-	-	1102	-	-	384
HCM Lane V/C Ratio	0.088	0.007	-	-	0.031	-	-	0.046
HCM Control Delay (s)	14.6	7.8	0	-	8.4	0.1	-	14.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	1	0	31	0	9	42	0
Future Vol, veh/h	0	0	0	0	0	1	0	31	0	9	42	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	1	0	36	0	10	49	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	107	106	49	106	106	36	49	0	0	36	0	0
Stage 1	70	70	-	36	36	-	-	-	-	-	-	-
Stage 2	37	36	-	70	70	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	877	788	1025	878	788	1042	1571	-	-	1588	-	-
Stage 1	945	841	-	985	869	-	-	-	-	-	-	-
Stage 2	984	869	-	945	841	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	872	783	1025	874	783	1042	1571	-	-	1588	-	-
Mov Cap-2 Maneuver	872	783	-	874	783	-	-	-	-	-	-	-
Stage 1	945	836	-	985	869	-	-	-	-	-	-	-
Stage 2	983	869	-	939	836	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.5	0	1.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1571	-	-	-	1042	1588	-	-
HCM Lane V/C Ratio	-	-	-	-	0.001	0.007	-	-
HCM Control Delay (s)	0	-	-	0	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	279	8	13	298	179	27	370	27	185	106	91
Future Volume (veh/h)	122	279	8	13	298	179	27	370	27	185	106	91
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	142	324	9	15	347	208	31	430	31	215	123	106
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	179	1016	28	46	459	270	82	1143	82	233	794	675
Arrive On Green	0.10	0.28	0.28	0.03	0.21	0.21	0.05	0.33	0.33	0.13	0.42	0.42
Sat Flow, veh/h	1810	3588	99	1810	2189	1288	1810	3416	245	1810	1900	1615
Grp Volume(v), veh/h	142	163	170	15	285	270	31	227	234	215	123	106
Grp Sat Flow(s),veh/h/ln	1810	1805	1882	1810	1805	1673	1810	1805	1857	1810	1900	1615
Q Serve(g_s), s	5.4	5.0	5.0	0.6	10.4	10.7	1.2	6.7	6.7	8.2	2.8	2.9
Cycle Q Clear(g_c), s	5.4	5.0	5.0	0.6	10.4	10.7	1.2	6.7	6.7	8.2	2.8	2.9
Prop In Lane	1.00		0.05	1.00		0.77	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	179	511	533	46	378	350	82	604	621	233	794	675
V/C Ratio(X)	0.79	0.32	0.32	0.33	0.75	0.77	0.38	0.38	0.38	0.92	0.15	0.16
Avail Cap(c_a), veh/h	207	511	533	181	464	430	181	604	621	233	794	675
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.8	19.8	19.8	33.5	26.0	26.1	32.5	17.7	17.7	30.2	12.7	12.7
Incr Delay (d2), s/veh	16.6	0.4	0.3	4.1	5.5	6.7	2.9	1.8	1.7	38.8	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.5	2.7	0.3	5.7	5.5	0.7	3.6	3.8	6.6	1.6	1.4
LnGrp Delay(d),s/veh	47.5	20.1	20.1	37.6	31.5	32.8	35.3	19.5	19.5	69.0	13.1	13.2
LnGrp LOS	D	C	C	D	C	C	D	B	B	E	B	B
Approach Vol, veh/h		475			570			492			444	
Approach Delay, s/veh		28.3			32.3			20.5			40.2	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	27.4	5.8	23.8	7.2	33.2	10.9	18.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	19.0	7.0	19.0	7.0	21.0	8.0	18.0
Max Q Clear Time (g_c+I1), s	10.2	8.7	2.6	7.0	3.2	4.9	7.4	12.7
Green Ext Time (p_c), s	0.0	2.8	0.0	4.3	0.0	3.5	0.0	2.0

Intersection Summary	
HCM 2010 Ctrl Delay	30.2
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	26
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	89	407	25	0	8	334	61	0	33	227	14	0	31	77	75
Future Vol, veh/h	0	89	407	25	0	8	334	61	0	33	227	14	0	31	77	75
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	109	496	30	0	10	407	74	0	40	277	17	0	38	94	91
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	30.3	20.9	29.6	19.4
HCM LOS	D	C	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	30%	0%	5%	0%	17%
Vol Thru, %	83%	70%	89%	95%	73%	42%
Vol Right, %	5%	0%	11%	0%	27%	41%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	274	293	229	175	228	183
LT Vol	33	89	0	8	0	31
Through Vol	227	204	204	167	167	77
RT Vol	14	0	25	0	61	75
Lane Flow Rate	334	357	279	213	278	223
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.731	0.803	0.609	0.486	0.616	0.507
Departure Headway (Hd)	7.872	8.102	7.865	8.199	7.981	8.171
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	461	446	460	440	453	442
Service Time	5.919	5.853	5.616	5.951	5.732	6.226
HCM Lane V/C Ratio	0.725	0.8	0.607	0.484	0.614	0.505
HCM Control Delay	29.6	36.6	22.2	18.5	22.8	19.4
HCM Lane LOS	D	E	C	C	C	C
HCM 95th-tile Q	5.9	7.3	4	2.6	4.1	2.8

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	384	49	13	404	4	2
Future Vol, veh/h	384	49	13	404	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	486	62	16	511	5	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	548	0	806	517
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	289	-
Critical Hdwy	-	-	4.1	-	7.3	6.2
Critical Hdwy Stg 1	-	-	-	-	6.1	-
Critical Hdwy Stg 2	-	-	-	-	6.5	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1032	-	289	562
Stage 1	-	-	-	-	545	-
Stage 2	-	-	-	-	700	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1032	-	284	562
Mov Cap-2 Maneuver	-	-	-	-	284	-
Stage 1	-	-	-	-	545	-
Stage 2	-	-	-	-	685	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	15.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	340	-	-	1032	-
HCM Lane V/C Ratio	0.022	-	-	0.016	-
HCM Control Delay (s)	15.8	-	-	8.5	0.1
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	376	10	29	414	1	4
Future Vol, veh/h	376	10	29	414	1	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	409	11	32	450	1	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	420	0	702	414
Stage 1	-	-	-	-	414	-
Stage 2	-	-	-	-	288	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1150	-	392	643
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	741	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1150	-	377	643
Mov Cap-2 Maneuver	-	-	-	-	377	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	714	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	11.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	563	-	-	1150	-
HCM Lane V/C Ratio	0.01	-	-	0.027	-
HCM Control Delay (s)	11.5	-	-	8.2	0.1
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	350	17	20	371	4	39	6	24	2	1	29
Future Vol, veh/h	16	350	17	20	371	4	39	6	24	2	1	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	438	21	25	464	5	49	8	30	3	1	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	469	0	0	459	0	0	771	1007	448	1023	1015	234
Stage 1	-	-	-	-	-	-	488	488	-	516	516	-
Stage 2	-	-	-	-	-	-	283	519	-	507	499	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1103	-	-	1113	-	-	306	243	615	204	240	774
Stage 1	-	-	-	-	-	-	565	553	-	515	538	-
Stage 2	-	-	-	-	-	-	706	536	-	552	547	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1103	-	-	1113	-	-	279	230	615	182	227	774
Mov Cap-2 Maneuver	-	-	-	-	-	-	279	230	-	182	227	-
Stage 1	-	-	-	-	-	-	551	540	-	503	522	-
Stage 2	-	-	-	-	-	-	651	520	-	505	534	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.5	19.3	11.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	337	1103	-	-	1113	-	-	605
HCM Lane V/C Ratio	0.256	0.018	-	-	0.022	-	-	0.066
HCM Control Delay (s)	19.3	8.3	0	-	8.3	0.1	-	11.4
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1	0.1	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	0	0	0	5	3	69	0	3	19	10
Future Vol, veh/h	4	0	0	0	0	5	3	69	0	3	19	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	0	0	0	0	6	3	80	0	3	22	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	125	122	28	122	128	80	34	0	0	80	0	0
Stage 1	35	35	-	87	87	-	-	-	-	-	-	-
Stage 2	90	87	-	35	41	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	854	772	1053	858	766	986	1591	-	-	1531	-	-
Stage 1	986	870	-	926	827	-	-	-	-	-	-	-
Stage 2	922	827	-	986	865	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	846	769	1053	855	763	986	1591	-	-	1531	-	-
Mov Cap-2 Maneuver	846	769	-	855	763	-	-	-	-	-	-	-
Stage 1	984	868	-	924	825	-	-	-	-	-	-	-
Stage 2	915	825	-	984	863	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	8.7	0.3	0.7
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1591	-	-	846	986	1531	-	-
HCM Lane V/C Ratio	0.002	-	-	0.005	0.006	0.002	-	-
HCM Control Delay (s)	7.3	0	-	9.3	8.7	7.4	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	229	19	14	198	160	16	115	21	115	275	119
Future Volume (veh/h)	62	229	19	14	198	160	16	115	21	115	275	119
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	72	266	22	16	230	186	19	134	24	134	320	138
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	136	779	64	48	353	273	56	1288	226	171	918	780
Arrive On Green	0.08	0.23	0.23	0.03	0.18	0.18	0.03	0.42	0.42	0.09	0.48	0.48
Sat Flow, veh/h	1810	3379	278	1810	1939	1501	1810	3071	539	1810	1900	1615
Grp Volume(v), veh/h	72	141	147	16	213	203	19	78	80	134	320	138
Grp Sat Flow(s),veh/h/ln	1810	1805	1851	1810	1805	1635	1810	1805	1805	1810	1900	1615
Q Serve(g_s), s	2.7	4.6	4.6	0.6	7.7	8.1	0.7	1.8	1.9	5.1	7.3	3.4
Cycle Q Clear(g_c), s	2.7	4.6	4.6	0.6	7.7	8.1	0.7	1.8	1.9	5.1	7.3	3.4
Prop In Lane	1.00		0.15	1.00		0.92	1.00		0.30	1.00		1.00
Lane Grp Cap(c), veh/h	136	416	427	48	328	298	56	757	757	171	918	780
V/C Ratio(X)	0.53	0.34	0.34	0.33	0.65	0.68	0.34	0.10	0.11	0.78	0.35	0.18
Avail Cap(c_a), veh/h	181	464	476	181	464	420	181	757	757	259	918	780
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	22.5	22.5	33.4	26.6	26.7	33.2	12.3	12.3	31.0	11.2	10.2
Incr Delay (d2), s/veh	3.1	0.5	0.5	3.9	2.2	2.7	3.5	0.3	0.3	8.5	1.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	2.3	2.4	0.4	4.0	3.9	0.4	1.0	1.0	2.9	4.1	1.6
LnGrp Delay(d),s/veh	34.3	23.0	23.0	37.4	28.7	29.5	36.8	12.6	12.6	39.5	12.3	10.7
LnGrp LOS	C	C	C	D	C	C	D	B	B	D	B	B
Approach Vol, veh/h		360			432			177			592	
Approach Delay, s/veh		25.2			29.4			15.2			18.1	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.6	33.4	5.9	20.1	6.2	37.8	9.3	16.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	19.0	7.0	18.0	7.0	22.0	7.0	18.0
Max Q Clear Time (g_c+I1), s	7.1	3.9	2.6	6.6	2.7	9.3	4.7	10.1
Green Ext Time (p_c), s	0.1	2.9	0.0	3.3	0.0	2.7	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.5
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	20.8
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	53	297	38	0	10	238	50	0	8	90	5	0	68	225	74
Future Vol, veh/h	0	53	297	38	0	10	238	50	0	8	90	5	0	68	225	74
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82	0.92	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	65	362	46	0	12	290	61	0	10	110	6	0	83	274	90
Number of Lanes	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	16.7	14.7	13.4	32.2
HCM LOS	C	B	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	26%	0%	8%	0%	19%
Vol Thru, %	87%	74%	80%	92%	70%	61%
Vol Right, %	5%	0%	20%	0%	30%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	103	202	187	129	169	367
LT Vol	8	53	0	10	0	68
Through Vol	90	149	149	119	119	225
RT Vol	5	0	38	0	50	74
Lane Flow Rate	126	246	227	157	206	448
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.265	0.507	0.452	0.329	0.417	0.813
Departure Headway (Hd)	7.608	7.434	7.152	7.53	7.276	6.543
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	470	484	503	477	493	551
Service Time	5.694	5.202	4.919	5.3	5.046	4.597
HCM Lane V/C Ratio	0.268	0.508	0.451	0.329	0.418	0.813
HCM Control Delay	13.4	17.7	15.7	14	15.2	32.2
HCM Lane LOS	B	C	C	B	C	D
HCM 95th-tile Q	1.1	2.8	2.3	1.4	2	8

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	376	18	3	263	26	16
Future Vol, veh/h	376	18	3	263	26	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	476	23	4	333	33	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	499	0	661	487
Stage 1	-	-	-	-	487	-
Stage 2	-	-	-	-	174	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1075	-	415	585
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	845	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1075	-	413	585
Mov Cap-2 Maneuver	-	-	-	-	413	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	841	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	465	-	-	1075	-
HCM Lane V/C Ratio	0.114	-	-	0.004	-
HCM Control Delay (s)	13.7	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	401	2	5	257	10	30
Future Vol, veh/h	401	2	5	257	10	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	436	2	5	279	11	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	438	0	588	437
Stage 1	-	-	-	-	437	-
Stage 2	-	-	-	-	151	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1133	-	460	624
Stage 1	-	-	-	-	655	-
Stage 2	-	-	-	-	867	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1133	-	458	624
Mov Cap-2 Maneuver	-	-	-	-	458	-
Stage 1	-	-	-	-	655	-
Stage 2	-	-	-	-	863	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	572	-	-	1133	-
HCM Lane V/C Ratio	0.076	-	-	0.005	-
HCM Control Delay (s)	11.8	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	401	16	28	221	5	33	6	21	5	3	6
Future Vol, veh/h	7	401	16	28	221	5	33	6	21	5	3	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	9	501	20	35	276	6	41	8	26	6	4	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	283	0	0	521	0	0	739	882	511	895	888	141
Stage 1	-	-	-	-	-	-	529	529	-	349	349	-
Stage 2	-	-	-	-	-	-	210	353	-	546	539	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1291	-	-	1056	-	-	322	287	567	251	285	888
Stage 1	-	-	-	-	-	-	537	530	-	646	637	-
Stage 2	-	-	-	-	-	-	778	634	-	526	525	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1291	-	-	1056	-	-	304	273	567	226	271	888
Mov Cap-2 Maneuver	-	-	-	-	-	-	304	273	-	226	271	-
Stage 1	-	-	-	-	-	-	532	525	-	640	612	-
Stage 2	-	-	-	-	-	-	737	609	-	490	520	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1	17.7	15.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	358	1291	-	-	1056	-	-	350
HCM Lane V/C Ratio	0.209	0.007	-	-	0.033	-	-	0.05
HCM Control Delay (s)	17.7	7.8	0	-	8.5	0.1	-	15.8
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.8	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	0	3	0	0	1	1	31	0	9	42	2
Future Vol, veh/h	31	0	3	0	0	1	1	31	0	9	42	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	36	0	3	0	0	1	1	36	0	10	49	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	110	109	50	111	110	36	51	0	0	36	0	0
Stage 1	71	71	-	38	38	-	-	-	-	-	-	-
Stage 2	39	38	-	73	72	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	873	785	1024	872	784	1042	1568	-	-	1588	-	-
Stage 1	944	840	-	982	867	-	-	-	-	-	-	-
Stage 2	981	867	-	942	839	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	867	780	1024	864	779	1042	1568	-	-	1588	-	-
Mov Cap-2 Maneuver	867	780	-	864	779	-	-	-	-	-	-	-
Stage 1	943	835	-	981	866	-	-	-	-	-	-	-
Stage 2	979	866	-	933	834	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	8.5	0.2	1.2
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1568	-	-	879	1042	1588	-	-
HCM Lane V/C Ratio	0.001	-	-	0.045	0.001	0.007	-	-
HCM Control Delay (s)	7.3	0	-	9.3	8.5	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

APPENDIX E:

SIGNAL WARRANT ANALYSIS

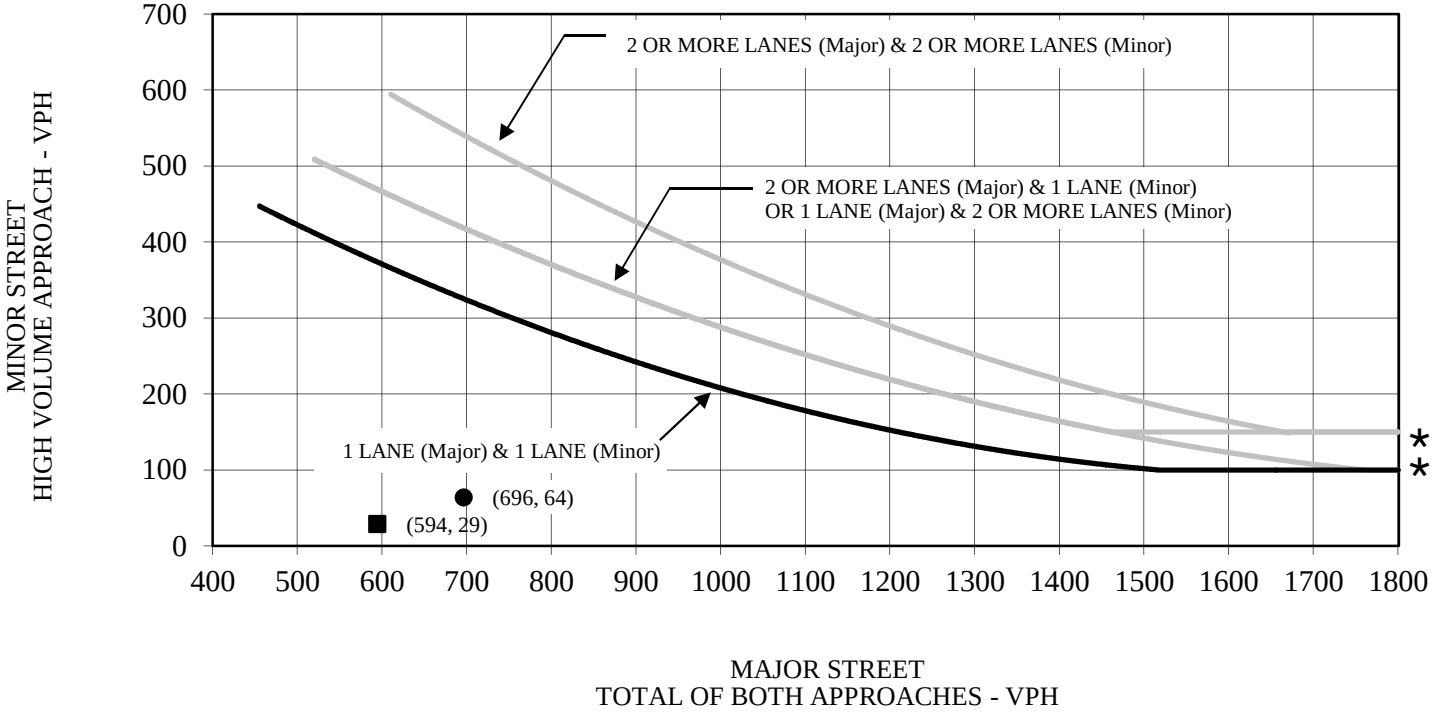
Table E-1 - Signal Warrant Analysis Summary

5 . Intersection Of Grace Street/Lincoln Avenue	Control	AM Peak Hour Worst Case Minor Street Approach	AM Peak Hour Major Street Approaches (Total)	PM Peak Hour Worst Case Minor Street Approach	PM Peak Hour Major Street Approaches (Total)	Signal Warranted[1]
Existing (2016) Conditions		64	696	29	594	NO
Existing (2016) with Project Conditions		68	748	60	642	NO
Project Completion (2017) Conditions		65	706	29	602	NO
Project Completion (2017) with Project Conditions		69	758	60	650	NO
Cumulative (2017) Conditions		65	726	29	630	NO
Cumulative (2017) with Project Conditions		69	778	60	678	NO

Notes:

[1] The plotted point representing the vph on the major street (total of both approaches) and the corresponding vph on the higher-volume minor-street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 of Chapter 4C of the CAMUTCD for the existing combination of lanes.

SIGNAL WARRANT 3



* 150 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 100 VPH applies as the lower threshold volume for a minor street approaching with one lane.

LSA

EXHIBIT E-1

● AM PEAK HOUR

■ PM PEAK HOUR

Lincoln Avenue Industrial Warehouse

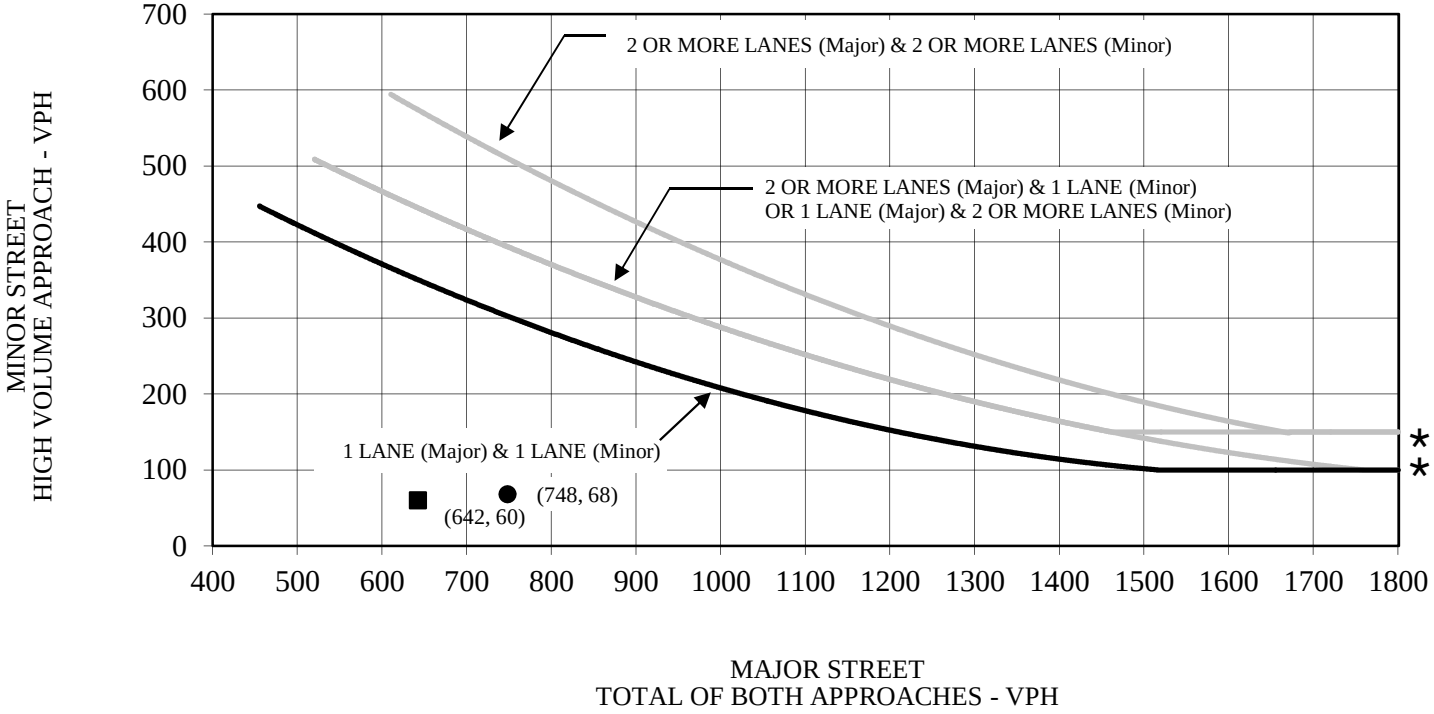
Intersection of Grace Street/Lincoln Avenue

Existing Conditions Peak Hour Warrant

SOURCE: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, FIGURE 4C-3

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\Exist _01 Warrant 3 (10/28/2016)

SIGNAL WARRANT 3



* 150 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 100 VPH applies as the lower threshold volume for a minor street approaching with one lane.

LSA

EXHIBIT E-2

● AM PEAK HOUR

■ PM PEAK HOUR

Lincoln Avenue Industrial Warehouse

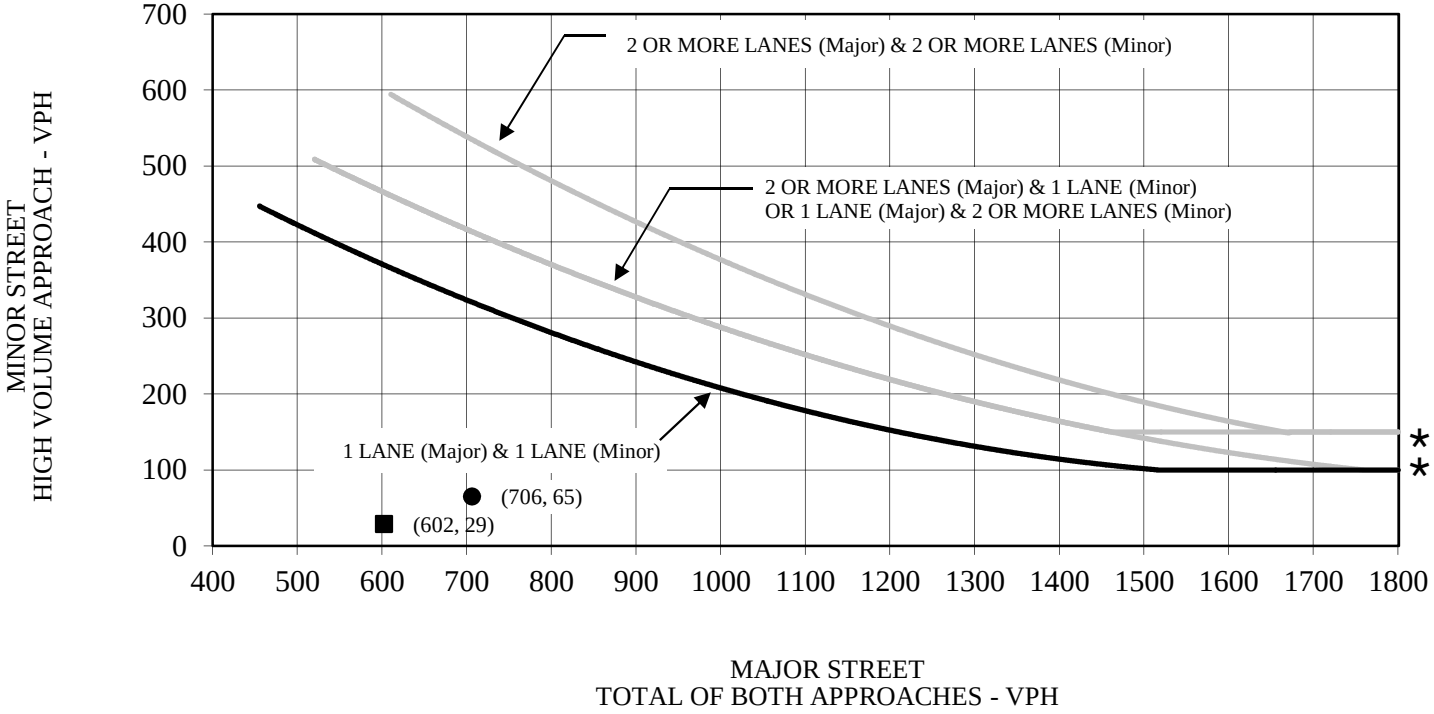
Intersection of Grace Street/Lincoln Avenue

Existing With Project Conditions Peak Hour Warrant

SOURCE: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, FIGURE 4C-3

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\Exist P_02 Warrant 3 (10/28/2016)

SIGNAL WARRANT 3



* 150 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 100 VPH applies as the lower threshold volume for a minor street approaching with one lane.

LSA

EXHIBIT E-3

● AM PEAK HOUR

■ PM PEAK HOUR

Lincoln Avenue Industrial Warehouse

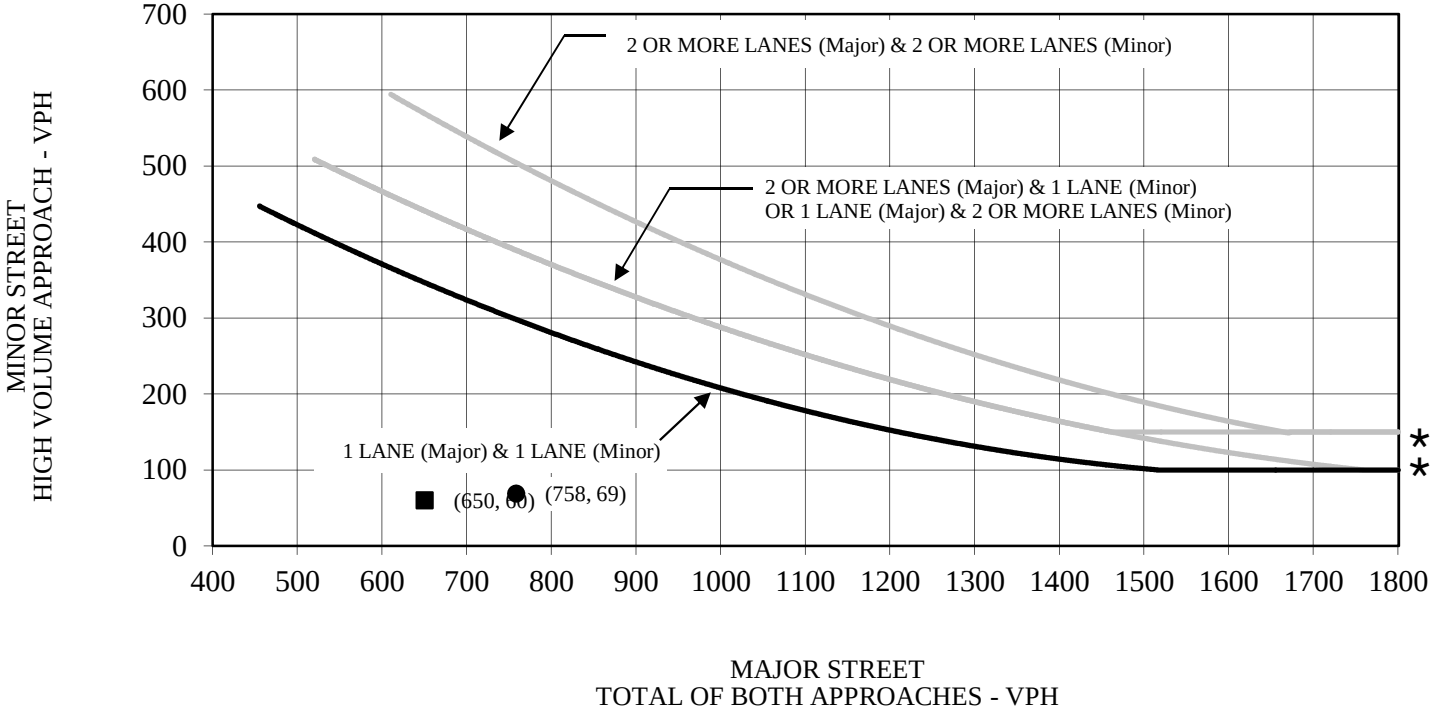
Intersection of Grace Street/Lincoln Avenue

Project Completion (2017) Conditions Peak Hour Warrant

SOURCE: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, FIGURE 4C-3

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\Pr Comp_03 Warrant 3 (10/28/2016)

SIGNAL WARRANT 3



* 150 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 100 VPH applies as the lower threshold volume for a minor street approaching with one lane.

LSA

EXHIBIT E-4

● AM PEAK HOUR

■ PM PEAK HOUR

Lincoln Avenue Industrial Warehouse

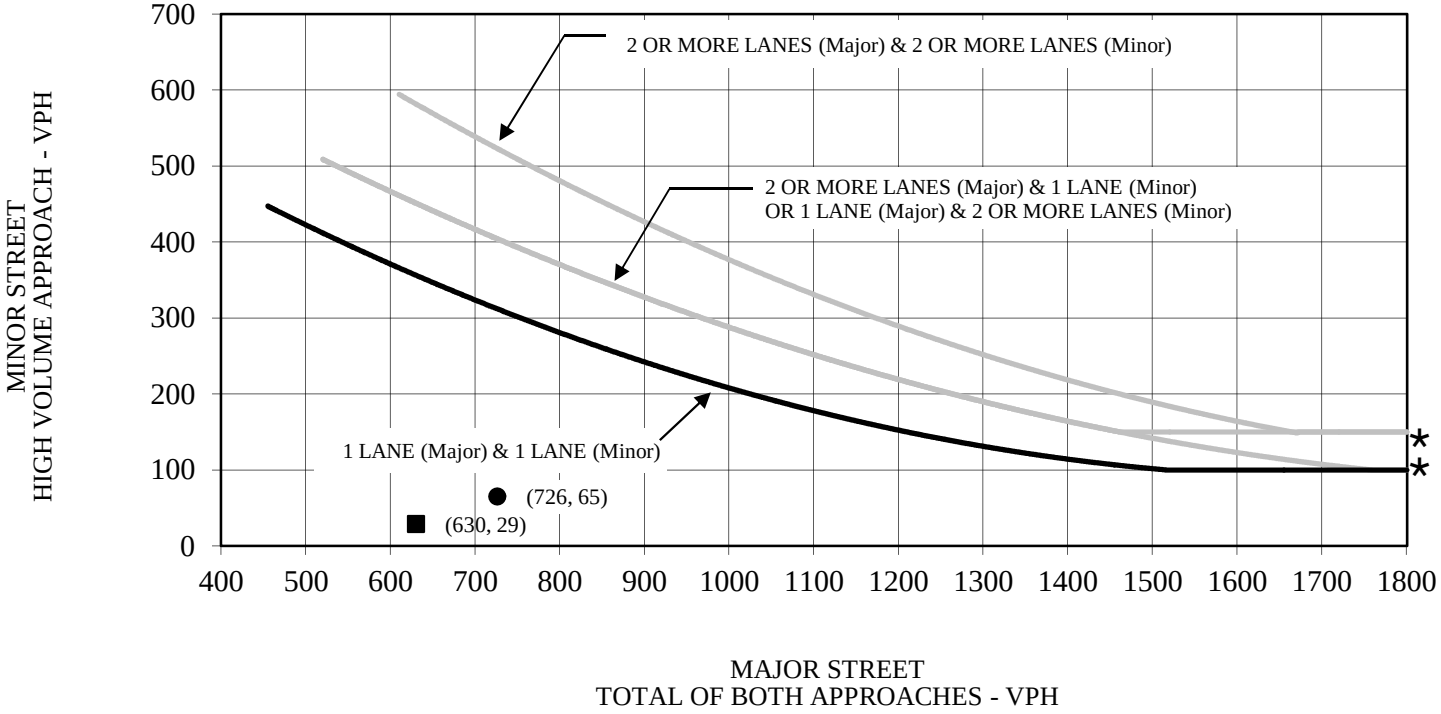
Intersection of Grace Street/Lincoln Avenue

Project Completion (2017) With Project Conditions Peak Hour Warrant

SOURCE: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, FIGURE 4C-3

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\Pr Comp P_04 Warrant 3 (10/28/2016)

SIGNAL WARRANT 3



* 150 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 100 VPH applies as the lower threshold volume for a minor street approaching with one lane.

LSA

EXHIBIT E-5

● AM PEAK HOUR

■ PM PEAK HOUR

Lincoln Avenue Industrial Warehouse

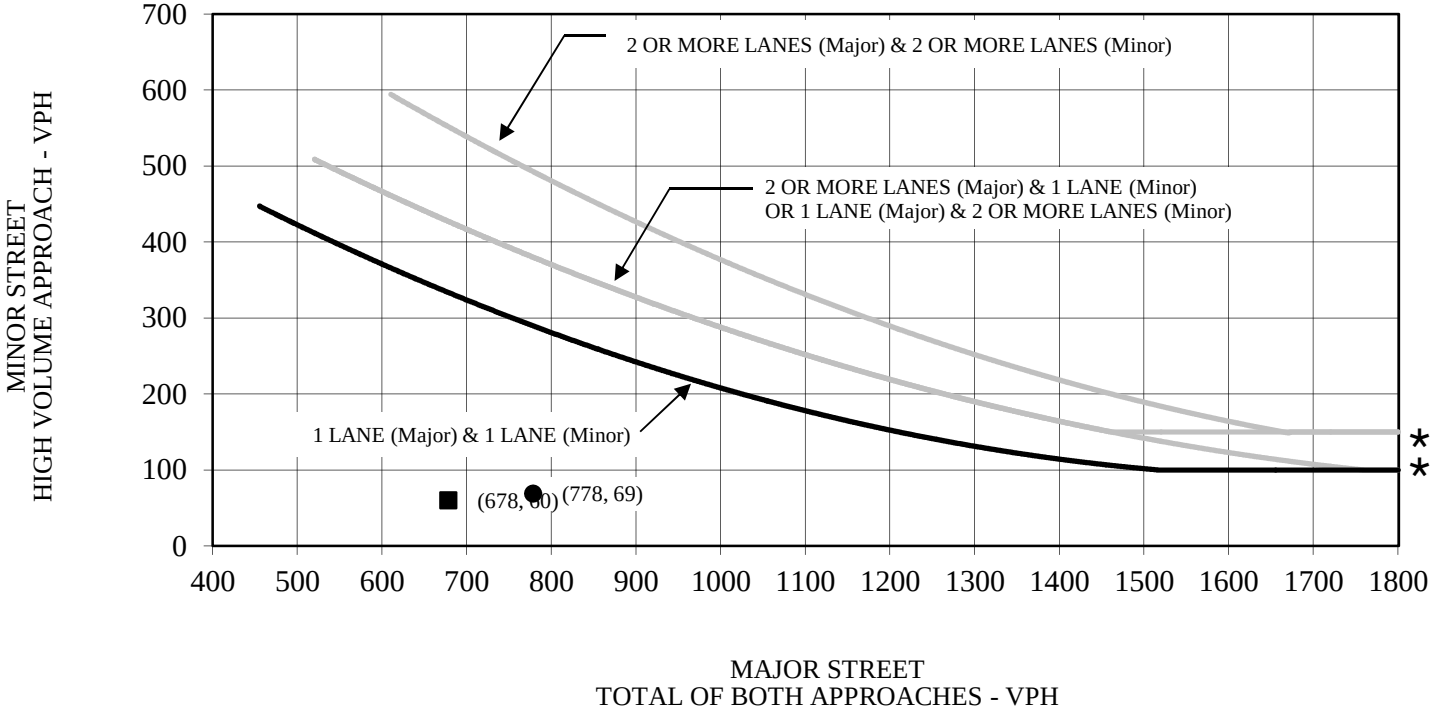
Intersection of Grace Street/Lincoln Avenue

Cumulative (2017) Conditions Peak Hour Warrant

SOURCE: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, FIGURE 4C-3

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\Cumul_05 Warrant 3 (10/28/2016)

SIGNAL WARRANT 3



* 150 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 100 VPH applies as the lower threshold volume for a minor street approaching with one lane.

LSA

EXHIBIT E-6

● AM PEAK HOUR

■ PM PEAK HOUR

Lincoln Avenue Industrial Warehouse

Intersection of Grace Street/Lincoln Avenue

Cumulative (2017) With Project Conditions Peak Hour Warrant

SOURCE: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, FIGURE 4C-3

R:\RVL1601_Lincoln Ave Warehouse\1.5_Traffic\Cumul P_06 Warrant 3 (10/28/2016)

APPENDIX I

NOISE IMPACT ANALYSIS

BERKELEY
CARLSBAD
FRESNO
IRVINE
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROCKLIN
SAN LUIS OBISPO

MEMORANDUM

DATE: January 25, 2017

TO: Kent Norton, LSA Riverside

FROM: Tony Chung, LSA Irvine

SUBJECT: Lincoln Avenue Warehouse Project Noise Impact Analysis

The following summarizes the discussion of regulatory requirements, impact analysis, and findings of the noise impact analysis for the Lincoln Avenue Warehouse Project (project).

PROJECT DESCRIPTION

The proposed project consists of one 100,974-square-foot industrial warehouse building. Access to the project site will be provided via three proposed driveways. The project will use an existing driveway (Project Driveway 1) located on the northwest portion of the project site, which is currently used by an adjacent industrial building. Two additional driveways are proposed on Lincoln Avenue (Project Driveway 2) and Grace Street (Project Driveway 3). All three driveways will allow full access to passenger vehicles. Truck access will be provided via Project Driveways 1 and 3.

Project Driveway 1 will allow full access for trucks, while Project Driveway 3 restricts truck access to egress left-turn movements. At Driveway 3, egress right-turns and ingress movements will be prohibited. Project Driveway 2 will not have truck access. All vehicle restrictions will be enforced with signage in conformance with the City of Riverside's (City) zoning code.

Thresholds of Significance

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with the adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site are the City's Noise Element of the General Plan and the Municipal Code.

City of Riverside Noise Standards

Noise Element of the General Plan. The City established Noise/Land Use Noise Compatibility Criteria in its General Plan Noise Element (City of Riverside 2007a). Single-family and multifamily residences are normally acceptable in exterior noise environments up to 60 A-weighted decibels (dBA) Community Noise Equivalent Level (CNEL) and conditionally acceptable in exterior noise environments of up to 65 dBA CNEL. Infill residential uses are normally acceptable in exterior noise

environments up to 65 dBA CNEL and conditionally acceptable in exterior noise environments of up to 75 dBA CNEL. Interior noise levels in residential structures are acceptable up to 45 dBA CNEL. Commercial uses are normally acceptable in exterior noise environments up to 65 dBA CNEL. Industrial uses are normally acceptable up to 70 dBA CNEL. For the purposes of this noise impact analysis, single-family residential uses with outdoor active use areas (e.g., back yards or balconies) exposed to noise levels exceeding 65 dBA CNEL would need to be mitigated.

Municipal Code. The City has incorporated the following measures in its Municipal Code to control loud, unnecessary, and unusual nuisance noises:

- **Exterior Sound Level Limits:** Unless a variance has been granted it shall be unlawful for any person to cause or allow the creation of any noise which exceeds the following:
    - The exterior noise standard of the applicable land use category (Table A), up to 5 dB, for a cumulative period of more than 30 minutes in an hour; or
    - The exterior noise standard of the applicable land use category, plus 5 dB, for a cumulative period of more than 15 minutes in any hour; or
    - The exterior noise standard of the applicable land use category, plus 10 dB, for a cumulative period of more than 5 minutes in any hour; or
    - The exterior noise standard of the applicable land use category, plus 15 dB, for a cumulative period of more than 1 minute in any hour; or
    - The exterior noise standard of the applicable land use category, plus 20 dB or the maximum measured ambient noise level, for any period of time.
- **Interior Sound Level Limits:** No person shall operate or cause to be operated any source of sound indoors which causes the noise level, when measured inside another dwelling unit, school or hospital, to exceed:
    - The interior noise standard for the applicable noise category (Table A), up to 5 dB, for a cumulative period of more than 5 minutes in any hour; or
    - The interior noise standard for the applicable land use category, plus 5 dB, for a cumulative period of more than 1 minute in any hour; or
    - The interior noise standard for the applicable land use category, plus 10 dB, or the maximum measured ambient noise level, for any period of time.

Based on Table A and Sections 7.25.010 and 7.30.015 of the City's Municipal Code, the maximum exterior noise level for residential uses is 75 dBA maximum instantaneous noise level (L_{max}; 55 decibels [dB] plus 20 dB) during daytime hours and 65 dBA L_{max} (45 dB plus 20 dB) during nighttime hours, or the maximum measured ambient noise level for any period of time. Similarly, maximum interior nuisance noise level for residential uses is 55 dBA L_{max} (45 dB plus 10 dB) during

Table A: City of Riverside Sound Level Limits

Land Use Category	Time Period	Exterior Noise Standard (dBA)	Interior Noise Standard (dBA)
Residential	Night (10:00 p.m. to 7:00 a.m.) Day (7:00 a.m. to 10:00 p.m.)	45 55	35 45
School	7:00 a.m. to 10:00 p.m. (while school is in session)	N/A[1]	45
Hospital	Anytime	N/A	45
Office/Commercial	Anytime	65	N/A
Industrial	Anytime	70	N/A
Community Support	Anytime	60	N/A
Public Recreation Facility	Anytime	65	N/A
Non-Urban	Anytime	70	N/A

Source: Municipal Code Noise Ordinances (City of Riverside 2005).
[1] The City of Riverside has not established a sound level limit for this land use.
dBA = A-weighted decibels
N/A = not applicable

daytime hours and 45 dBA L_{max} (35 dB plus 10 dB) during nighttime hours, or the maximum measured ambient noise level for any period of time.

Construction activities are restricted in the City to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between 8:00 a.m. and 5:00 p.m. on Saturday, and are prohibited on Sundays and federal holidays. Section 7.35.020.G, Exemptions, states that "Noise sources associated with construction, repair, remodeling, or grading of any real property; provided a permit has been obtained from the City as required; and provided said activities do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday" are exempt from the noise level limits of the Municipal Code. On August 18, 2016, the City of Riverside City Council adopted Ordinance 7341, amending the Noise Code to exempt construction noise between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. Saturdays from the standards of the Noise Code.

Vibration

The Federal Transit Administration (FTA) in its *Transit Noise and Vibration Impact Assessment* (2006) included ground-borne vibration and noise impact criteria guidance, as shown in Table B. Depending on the category of the nearest buildings adjacent to the project site, the potential vibration damage criteria vary.

The criteria presented in Table B account for variations in project type, as well as the frequency of events, which differ widely among transit projects. Although the criteria examine ground-borne vibration from rail rapid transit systems, they also provide useful guidelines for human response to exposure to vibration in general. Table C lists the vibration damage criteria for various structural categories.

Table B: Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment

Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 µin/sec)		Ground-Borne Noise Impact Levels (dB re 20 µPA)	
	Frequent Events[1]	Infrequent Events[2]	Frequent Events[1]	Infrequent Events[2]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[3]	65 VdB[3]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA

Source: Table 8-1. *Transit Noise and Vibration Impact Assessment* (FTA 2006).

[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

[2] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

[3] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research requires detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[4] Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

µin/sec = microinches per second
µPA = micropascals
dB = decibels
dBA = A-weighted decibels
HVAC = heating, ventilation, and air conditioning
N/A = not applicable
VdB = vibration velocity decibels

Table C: Construction Vibration Damage Criteria

Building Category	PPV (inch/sec)	Approximate Lv[1] (VdB)
Reinforced concrete, steel, or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: Table 12-3. *Transit Noise and Vibration Impact Assessment* (FTA 2006).

[1] RMS VdB re 1 microinch/sec.

inch/sec = inches per second
Lv = 20 log10 (V/V_{ref}) is the vibration velocity in decibels
microinch/sec = microinches per second
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The criteria in Table B (in terms of vibration velocity decibels [VdB]) and Table C (in terms of inches per second [in/sec] and VdB) are used to evaluate the effects of vibration on human response and structural damage. For example, for a building constructed with reinforced concrete with no plaster, the FTA guidelines demonstrate that a vibration level of up to 102 VdB (or 0.5 in/sec peak particle velocity [PPV]) is considered safe and would not result in any vibration damage (FTA 2006).

Ambient Noise Measurement. The project site is adjacent to Lincoln Avenue and Grace Street. Noise associated with these mobile sources would potentially affect the project site. To assess the existing

noise environment, three short-term (15 minutes each) noise measurements at three representative locations in the project area, as identified by City staff (shown in Attachment A), were conducted on December 20, 2016.

- **ST-1:** 2809 Grace Avenue, on the sidewalk of the Victoria Heights Apartments. The short-term 15-minute measurement at location 1 (ST-1) shows that noise levels measured at this location were 71.3 dBA L_{eq} (equivalent continuous sound level) and 84.6 dBA L_{max}, with the noise sources coming from traffic on Grace Street and Lincoln Avenue. There was also grading activity on the west side of Grace Street.

- **ST-2:** 7689 Lincoln Avenue, in front of the house, on the north side of Lincoln Avenue. The noise levels measured at this location were 64.5 dBA L_{eq} and 81.3 dBA L_{max}, with noise sources coming from Lincoln Avenue and Grace Street and little grading activity noise recorded.

- **ST-3:** At a location on the eastern portion of the project site, approximately 100 feet from Grace Street and 300 feet from Lincoln Avenue. The noise levels were 54.8 dBA L_{eq} and 64.0 dBA L_{max}. Noise sources contributing to this measurement included machinery hum from the industrial activity north of Lincoln Avenue and traffic on Lincoln Avenue.

Table D lists the measured noise levels. These noise levels represent the noise environment in a snapshot of time at the identified locations during that time period. These measurements should not be used for the determination of future noise impacts or used as the basis for mitigation measures.

Table D: Summary of Short-Term Noise Level Measurements

Location	Measured Ambient Noise Level (dBA)		
	L_{eq}	L_{max}	Noise Sources
ST-1 (2809 Grace Street, east of project site)	71.3	84.6	Traffic on Grace Street and Lincoln Avenue; grading activity on west side of Grace Street
ST-2 (7689 Lincoln Avenue, north of project site)	64.5	81.3	Traffic on Lincoln Avenue and Grace Street
ST-3 (on project site; 100 feet from Grace Street and 300 feet from Lincoln Avenue)	54.8	64.0	Traffic on Lincoln Avenue and Grace Street; machinery hum from industrial activity north of Lincoln Avenue

Source: Compiled by LSA (2016).
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
ST = short-term

Existing Vehicular Traffic Noise. The Federal Highway Administration (FHWA) highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate highway traffic-related noise conditions along the roadway segments in the project vicinity. Traffic volumes on Lincoln Avenue and Grace Street in the traffic study prepared for the proposed project (LSA 2016) were used to assess the existing traffic noise impacts. Table E provides the traffic noise levels along the roadways adjacent to the project site. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn.

Table E: Existing Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 dBA CNEL (Feet)	Centerline to 65 dBA CNEL (Feet)	Centerline to 60 dBA CNEL (Feet)	CNEL (dBA) 50 Feet from Centerline of Outermost Lane
Lincoln Avenue between Adams Street and Jefferson Street	6,300	< 50	64	135	64.6
Lincoln Avenue between Jefferson Street and Project Driveway 1	5,800	< 50	59	127	65.3
Lincoln Avenue between Project Driveway 1 and Project Driveway 2	5,800	< 50	59	127	65.3
Lincoln Avenue between Project Driveway 2 and Grace Street	5,800	< 50	59	127	65.3
Lincoln Avenue east of Grace Street	6,000	< 50	60	129	65.5
Grace Street between Lincoln Avenue and Project Driveway 3	780	< 50	< 50	< 50	52.2
Grace Street north of Lincoln Avenue	320	< 50	< 50	< 50	48.3
Grace Street south of Project Driveway 3	820	< 50	< 50	< 50	52.4

Source: LSA (December 2016).
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels

The Passenger Car Equivalent (PCE) turn volumes from the Lincoln Avenue Industrial Warehouse Traffic Impact Analysis (LSA, October 25, 2016) were used, multiplied by 10 to get the Average Daily Traffic (ADT) volume. The traffic distribution (fleet mix) included in the Riverside County set for roadways designated as "secondary", "collectors" or smaller" was used for respective roadway segment. The specific assumptions used in developing these noise levels and model printouts are provided in Attachment B.

Table E shows that traffic noise levels in the project vicinity vary from moderate (Lincoln Avenue) to low (Grace Street), with the 70 dBA CNEL confined to within the roadway right-of-way for both roads and the 65 dBA CNEL extending to 64 feet (ft) from the centerline of Lincoln Avenue and confined to within the roadway right-of-way along Grace Street. The project site is approximately 120 ft from the centerline of Lincoln Avenue and would be impacted by traffic noise from Lincoln Avenue reaching 60 dBA CNEL. The project site is approximately 108 ft from the centerline of Grace Street and would be potentially exposed to traffic noise from Grace Street reaching 48 dBA CNEL.

PROJECT IMPACTS

Construction Noise Impact

Short-term noise impacts would be associated with the excavation, grading, and erection of buildings on site during construction of the proposed project. Project construction would be phased and the timing of the phases would not overlap. Short-term construction-related noise levels would

be higher than existing ambient noise levels in the project area, but would no longer occur once construction of the project is complete.

Two types of short-term noise impacts could occur during construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site would incrementally increase noise levels on roadways in the project area. There will be a relatively high single-event noise exposure potential at a maximum level of 85 dBA L_{max} with trucks passing at 50 ft from receptors along roadway segments (Lincoln Avenue and Grace Street) leading to the project site. When compared to the existing traffic volumes on streets in the project vicinity, the projected construction traffic will be minimal and less than 10 percent of the average daily traffic (ADT) on any street segment in the project vicinity, and its associated long-term noise level change will not be perceptible. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would not be substantial.

The second type of short-term noise impact is related to noise generated during excavation, grading, and construction on the project site. Construction is performed in discrete steps, each of which has its own mix of equipment and noise characteristics; therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table F lists typical construction noise levels (L_{max}) included in the FHWA *Highway Construction Noise Handbook* (2006), based on a distance of 50 ft between the equipment and a noise receptor. Typical maximum noise levels from construction activity or the active construction area range up to 90 dBA at 50 ft during the noisiest construction phases.

The site preparation phase, which includes excavation and grading, tends to generate the highest noise levels because earthmoving equipment is the noisiest construction equipment. Earthmoving equipment includes excavating machinery (e.g., backfillers, bulldozers, draglines, and front loaders). Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment (e.g., earthmovers, bulldozers, water trucks, and pickup trucks) may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings. The following discussion addresses potential construction activity and equipment used on the project site and the noise levels associated with them.

Construction of the proposed project is expected to require the use of earthmovers, bulldozers, water trucks, and pickup trucks on site. Based on Table F, the maximum noise level generated by each earthmover on the proposed project site is assumed to be 84 dBA L_{max} at 50 ft from the scraper. Each bulldozer would generate 82 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks and pickup trucks is approximately 75 dBA L_{max} at 50 ft from these vehicles. Each doubling of a sound source with equal strength increases the noise level by 3 dBA. Several pieces of earthmovers and bulldozers are expected to be used on site. Two scrapers operating near each other would result in a combined noise level of 87 dBA L_{max} (i.e., 84 dBA + 84 dBA = 87 dBA) at 50 ft. Two bulldozers operating near each other would result in a combined noise level of 85 dBA L_{max} (i.e., 82 dBA + 82 dBA = 85 dBA) at 50 ft; however, four bulldozers operating near each other would generate a combined noise level of 88 dBA (82 dBA + 82 dBA + 82 dBA + 82 dBA = 88 dBA). When these machines are simultaneously working in close proximity to each other, their respective noise

levels would be added together and would result in a worst-case combined noise level of 90 dBA L_{max} (i.e., 88 dBA + 87 dBA = 90 dBA) at a distance of 50 ft from the active construction area.

Table F: RCNM Default Noise Emission Reference Levels and Usage Factors

Equipment Description	Impact Device?	Acoustical Usage Factor	Spec. 721.560 L_{max} at 50 ft (dBA, slow)	Actual Measured L_{max} at 50 ft (dBA, slow)	Number of Actual Data Samples (Count)
All other Equipment > 5 HP	No	50	85	N/A	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	N/A	0
Blasting	Yes	N/A	94	N/A	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	N/A	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (< 25 kVA, VMS Signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	N/A	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydraulic Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	N/A	0
Impact Derive	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarifier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/Chipping Gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (single nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12

Table F: RCNM Default Noise Emission Reference Levels and Usage Factors

Equipment Description	Impact Device?	Acoustical Usage Factor	Spec. 721.560 L_{max} at 50 ft (dBA, slow)	Actual Measured L_{max} at 50 ft (dBA, slow)	Number of Actual Data Samples (Count)
Sheers (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trench Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	N/A	0
Tractor	No	40	84	N/A	0
Vacuum Excavator (Vac-Truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder/Torch	No	40	73	74	5

Source: Table 9.1. *Highway Construction Noise Handbook* (FHWA 2006).
dBA = A-weighted decibels
FHWA = Federal Highway Administration
ft = feet
HP = horsepower
kVA = kilovolt-amperes
L_{max} = maximum instantaneous noise level
N/A = not applicable
RCNM = Roadway Construction Noise Model
VMS = variable-message sign

Residential properties adjacent to the project site would range from 80 to 100 ft from the nearest on-site construction areas and may be subject to short-term intermittent noise reaching 86 to 84 dBA L_{max}, respectively, from on-site construction activities. This range of noise levels would be similar to or lower than traffic noise along Lincoln Avenue and Grace Street.

The City's Municipal Code exempts noise associated with construction activity as long as it occurs within the permitted hours. Therefore, as long as project construction complies with the construction hours specified in the City's Municipal Code, in combination with other equipment-related standard condition measures described subsequently in this report, project construction will not result in any significant noise impacts.

Construction Vibration. Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernable.

The operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on nearby structures varies depending on soil type, ground strata, and construction characteristics of the receptor buildings. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels.

Construction-related ground-borne vibration rarely reaches levels that would damage structures. The California Department of Transportation and the FTA have published standard vibration

velocities for construction equipment operations. Table G lists the vibration source levels for construction equipment.

Table G: Vibration Source Levels for Construction Equipment

Equipment	Reference PPV/L_V at 25 ft	
	PPV (in/sec)	L_V (VdB)
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks	**0.076**	**86**
Jackhammer	**0.035**	**79**
Small Bulldozer	0.003	58

Source: Table 12-2. *Transit Noise and Vibration Impact Assessment* (FTA 2006).
Note: Equipment and associated source vibration levels that are expected to be used on the project site are shown in **bold**.
ft = feet
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
VdB = velocity decibels

The closest buildings/structures in the project vicinity are the existing office building to the south and residential buildings to the east approximately 80 ft from the project construction area. None of the construction equipment (e.g., bulldozers, trucks, and jackhammers) or activity expected on site would result in a vibration level greater than 0.12 in/sec at these nearest office/residential structures; therefore, no significant construction vibration impacts would occur and no mitigation is required. Based on Table G, the highest vibration level associated with construction equipment that would be used on the project site (i.e., large bulldozers) is 0.089 in/sec PPV or 87 VdB. With a 15 VdB reduction from the distance attenuation (80 ft versus 25 ft from the vibration source), this vibration level would be reduced to 72 VdB (or 0.016 in/sec PPV), which is much lower than any thresholds for building damages or human annoyance. No construction vibration impacts would occur and no mitigation measures would be required.

Long-Term Operational Vibration Impacts

Operation of the proposed project would not involve any significant vibration sources, as compared to those from construction equipment, to which people would be exposed or that would generate excessive ground-borne vibration or ground-borne noise. Vehicles with rubber tires on roadway segments surrounding the project site would not generate any significant ground-borne vibration that would exceed the 65 VdB perception threshold at the nearest sensitive receiver locations. As stated in Table B, the vibration threshold for Category 2 (buildings where people sleep) is 72 VdB for frequent events and 80 VdB for infrequent events. The level of on-site vibration resulting from operation of on-site uses would not exceed these vibration thresholds; therefore, no impacts would occur and no mitigation is warranted.

Long-Term Vehicular Traffic Noise Impacts

The FHWA Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used to evaluate highway traffic-related noise conditions along the roadway segments in the project vicinity. Traffic volumes on Lincoln Avenue and Grace Street projected in the traffic study for the proposed project (LSA 2016) were used to assess the potential traffic noise impacts along the street segments in the project vicinity. The Passenger Car Equivalent (PCE) turn volumes from the Lincoln Avenue Industrial Warehouse Traffic Impact Analysis (LSA, October 25, 2016) were used, multiplied by 10 to get the Average Daily Traffic (ADT) volume. The traffic distribution (fleet mix) included in the Riverside County set for roadways designated as "secondary", "collectors" or smaller" was used for respective roadway segment. The project-related changes (0.5 dBA or less along Lincoln Avenue and 1.9 dBA or less along Grace Street) would be small enough to not have any significant impacts on off-site land uses along these roadway segments.

Tables H and I provide the traffic noise levels for the existing and cumulative (2017), respectively, with and without project scenarios. These noise levels represent the worst-case scenario, which assumes no shielding is provided between the traffic and the location where the noise contours are drawn. The specific assumptions used in developing these noise levels and model printouts are provided in Attachment B.

Table I shows that in the cumulative (2017) scenarios, traffic volumes on Lincoln Avenue and Grace Street would be the highest among the two with project scenarios and traffic noise levels under this scenario are used to determine the potential traffic noise impacts on the proposed on-site land uses.

Table I shows that in the cumulative (2017) with project scenario the 70 dBA CNEL along Lincoln Avenue would continue to be confined to within the roadway right-of-way and the 65 dBA CNEL would extend to 66 ft from the centerline of Lincoln Avenue. The 70, 65, and 60 dBA CNEL noise contour from Grace Street would continue to remain within the roadway right-of-way. The project building is approximately 120 ft from the centerline of Lincoln Avenue and would be impacted by traffic noise from Lincoln Avenue reaching 61 dBA CNEL. The project site is approximately 108 ft from the centerline of Grace Street and would be potentially exposed to traffic noise from Grace Street reaching 50 dBA CNEL. Because the proposed land use is a warehouse and is not considered noise-sensitive, no significant traffic noise impact would occur and no mitigation measures would be required.

Long-Term Stationary Noise Impacts

The proposed project would potentially result in stationary source noise impacts from loading and unloading activities and parking lot activities associated with on-site uses.

Truck Delivery and Loading/Unloading. Delivery trucks for the on-site industrial uses would result in a maximum noise level similar to noise readings from loading and unloading activities for other industrial/commercial use projects, which generate a noise level of 75 dBA L_{max} at 50 ft based on measurements conducted by LSA in past years. On-site industrial use loading areas are located on the south side of the proposed on-site industrial buildings and would be completely shielded by the building itself from the residences to the north, northwest, and east. The distance from the dock

doors would range from approximately 280 ft to 640 ft from the nearest residences along Lincoln Avenue to the north of the project site and along Grace Street to the east of the project site. Delivery trucks would park at the loading areas to unload goods. On-site industrial uses may have multiple deliveries occurring throughout the day. The 280 ft to 640 ft distance would provide a noise reduction of 15 to 22 dBA, respectively, compared to the noise level measured at 50 ft from the noise source. The loading and unloading noise associated with the on-site industrial uses would be reduced to 60 dBA L_{max} or lower at the nearest outdoor living area (i.e., back yards and/or balconies)

Table H: Existing Traffic Noise Levels Without and With Project

Roadway Segment	Existing Without Project					Existing With Project						
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Change in ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase over Baseline CNEL (dBA) 50 ft from Centerline of Outermost Lane
Lincoln Avenue between Adams Street and Jefferson Street	6,300	< 50	64	135	64.6	6,900	600	< 50	68	143	65.0	0.4
Lincoln Avenue between Jefferson Street and Project Driveway 1	5,800	< 50	59	127	65.3	6,400	600	< 50	63	135	65.8	0.5
Lincoln Avenue between Project Driveway 1 and Project Driveway 2	5,800	< 50	59	127	65.3	6,300	500	< 50	62	134	65.7	0.4
Lincoln Avenue between Project Driveway 2 and Grace Street	5,800	< 50	59	127	65.3	6,600	800	< 50	64	138	65.9	0.6
Lincoln Avenue east of Grace Street	6,000	< 50	60	129	65.5	6,500	500	< 50	64	137	65.8	0.3
Grace Street between Lincoln Avenue and Project Driveway 3	780	< 50	< 50	< 50	52.2	1,200	420	< 50	< 50	< 50	54.1	1.9
Grace Street north of Lincoln Avenue	320	< 50	< 50	< 50	48.3	320	0	< 50	< 50	< 50	48.3	0.0
Grace Street south of Project Driveway 3	820	< 50	< 50	< 50	52.4	760	-60	< 50	< 50	< 50	52.1	-0.3

Source: LSA (December 2016).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet

Table I: Cumulative 2017 Traffic Noise Levels Without and With Project

Roadway Segment	Cumulative 2017 Without Project					Cumulative 2017 With Project						
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Change in ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase over Baseline CNEL (dBA) 50 ft from Centerline of Outermost Lane
Lincoln Avenue between Adams Street and Jefferson Street	6,700	< 50	67	140	64.9	7,300	600	< 50	71	148	65.3	0.4
Lincoln Avenue between Jefferson Street and Project Driveway 1	6,100	< 50	61	131	65.6	6,800	700	< 50	66	141	66.0	0.4
Lincoln Avenue between Project Driveway 1 and Project Driveway 2	6,200	< 50	62	132	65.6	6,700	500	< 50	65	139	66.0	0.4
Lincoln Avenue between Project Driveway 2 and Grace Street	6,200	< 50	62	132	65.6	6,900	700	< 50	66	142	66.1	0.5
Lincoln Avenue east of Grace Street	6,000	< 50	60	129	65.5	6,600	600	< 50	64	138	65.9	0.4
Grace Street between Lincoln Avenue and Project Driveway 3	790	< 50	< 50	< 50	52.3	1,200	410	< 50	< 50	< 50	54.1	1.8
Grace Street north of Lincoln Avenue	320	< 50	< 50	< 50	48.3	320	0	< 50	< 50	< 50	48.3	0.0
Grace Street south of Project Driveway 3	830	< 50	< 50	< 50	52.5	770	-60	< 50	< 50	< 50	52.1	-0.4

Source: LSA (December 2016).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet

to the north or east of the project site. With the shielding by the building itself to receptors to the north and east, a minimum of 15 dBA reduction would be provided, thus reducing the loading and unloading noise to 45 dBA L_{max} or lower. Although a typical truck unloading process takes an average of 15 to 20 minutes, this maximum noise level occurs in a much shorter period of time (i.e., in a few minutes). In addition, traffic noise associated with Lincoln Avenue and Grace Street would mask most of the loading and unloading noise in this area. This range of noise levels is below the City's maximum exterior noise standard of 75 dBA L_{max}. Therefore, noise associated with loading and unloading activities at on-site industrial uses would not result in noise levels exceeding the typical standards at the nearest off-site outdoor living area. No mitigation is required.

Parking Lot Activity. Representative parking activities (e.g., employees conversing or doors slamming) on the project site would generate approximately 60 to 70 dBA L_{max} at 50 ft. This level of noise is lower than that of the truck delivery and loading and unloading activities and is intermittent in nature. All of the on-site parking areas are provided on level surfaces. Parking areas on the surface level are more than 100 ft (6 dBA reduction compared to the level measured at 50 ft) and 150 ft (10 dBA reduction compared to the level measured at 50 ft) from the nearest off-site outdoor living areas to the east and north, respectively, as discussed above. Noise from the on-site parking areas would be reduced to 64 and 60 dBA L_{max} or lower at the nearest off-site outdoor living areas to the east and north, respectively, of the project site and, therefore, is not anticipated to be a significant issue. Because this noise would be intermittent in nature and would rarely occur in the evening and would not occur at night in the off-hour periods for the on-site industrial use employees, no significant noise impacts would occur and no mitigation measures are required. Because parking lot activity would occur intermittently throughout the day and each time would last less than 1 minute, noise associated with these parking lot activities when averaged over a 24-hour period and weighted for evening and nighttime quieter ambient noise levels would not contribute significantly to the CNEL level in the project area. The CNEL levels associated with these parking lot activities would not exceed the City's 65 dBA CNEL exterior noise standard for off-site noise-sensitive uses; therefore, no mitigation is required.

On-site Heating, Ventilation, and Air Conditioning Mechanical Equipment Noise. The proposed buildings are expected to have rooftop heating, ventilation, and air conditioning (HVAC) equipment for the central air system. The representative HVAC equipment would generate approximately 65 dBA L_{max} at 3 ft. The shortest distance between the residences to the east, north, and northwest and where the HVAC units would be located is approximately 100 ft (30 dBA noise reduction compared to the noise level measured at 3 ft) and would be reduced to 35 dBA L_{max} by distance attenuation alone. Under the most stringent assumption that the maximum noise level would last over the entire period the HVAC is used, then the noise level from this stationary source would be 35 dBA L_{eq}. This range of noise levels would be lower than the ambient noise levels dominated by traffic noise from the Lincoln Avenue and would not exceed the City's 45 dBA exterior noise level threshold from stationary sources under the nighttime conditions (10:00 p.m. to 7:00 a.m.). No significant noise impacts at residences adjacent to the project site would occur and no mitigation would be required.

STANDARD CONDITIONS

Construction Impacts

The following measures would reduce short-term construction-related noise impacts resulting from the proposed project:

- Construction activities are restricted within the City of Riverside to the hours between 7:00 a.m. and 7:00 p.m. Monday through Friday and between 8:00 a.m. and 5:00 p.m. on Saturdays, and are prohibited on Sundays and federal holidays.
- During all project site demolition, excavation, and grading on site, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
- The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

MITIGATION MEASURES

Traffic Noise Impacts

No mitigation measures are required for the proposed project.

Operational/Stationary Sources Noise Impacts

No mitigation measures are required for the proposed project.

Attachments: A – Noise Measurement Data Sheet and Location Map
B – FHWA Highway Traffic Noise Prediction Model Printout

REFERENCES

City of Riverside. 2005. Municipal Code Noise Ordinances. Website: https://www.riversideca.gov/municode/title7.asp, accessed December 2015.

———. 2007. General Plan 2025. November. Website: https://www.riversideca.gov/planning/gp2025program/general-plan.asp, accessed December 2015.

Federal Highway Administration (FHWA). 2006. *Highway Construction Noise Handbook*.

Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Impact Assessment*.

ATTACHMENT A

NOISE MEASUREMENT DATA SHEET AND LOCATION MAP

Noise Measurement Survey

Project Number: RVL1601
Project Name: Lincoln Avenue Warehouse

Test Personnel: Daniel Kaufman
Equipment: Larson Davis 824

Site Number: ST-1 Date: 12/20/2016

Time: From 9:55 AM To 10:15 AM

Site Location: 2809 Grace Avenue. On the sidewalk, west of the Victoria Heights Apartments.

Primary Noise Sources: Loader machine and grading activity on the west side of Grace Street.

Comments: Grading/roadwork.

Adjacent Roadways: Grace Street and Lincoln Avenue.

Measurement Results	
L_{eq}	71.3
L_{max}	84.6
L_{min}	48.9
L_2	77.0
L_8	75.1
L_{25}	72.7
L_{50}	69.7
L_{90}	61.3
L_{99}	56.0

Atmospheric Conditions	
Average Wind Velocity (mph)	0.7
Maximum Wind Velocity (mph)	3.2
Temperature (F)	66.1
Relative Humidity (%)	18.0

Map:

Location Photo:

Noise Measurement Survey

Project Number: RVL1601
Project Name: Lincoln Avenue Warehouse

Test Personnel: Daniel Kaufman
Equipment: Larson Davis 824

Site Number: ST-2 Date: 12/20/2016

Time: From 9:16 AM To 9:37 AM

Site Location: In front of 7689 Lincoln Avenue. On the sidewalk, in front of the house, near the north corner of the intersection of Lincoln Avenue and Grace Street.

Primary Noise Sources: Traffic on Lincoln Avenue.

Comments:

Adjacent Roadways: Lincoln Avenue and Grace Street.

Measurement Results	
L_{eq}	64.5
L_{max}	81.3
L_{min}	45.8
L_2	73.9
L_8	69.2
L_{25}	63.0
L_{50}	56.5
L_{90}	49.7
L_{99}	47.5

Atmospheric Conditions	
Average Wind Velocity (mph)	0.7
Maximum Wind Velocity (mph)	2.3
Temperature (F)	72.0
Relative Humidity (%)	18.8

Map:

Location Photo:

Noise Measurement Survey

Project Number: RVL1601
Project Name: Lincoln Avenue Warehouse

Test Personnel: Daniel Kaufman
Equipment: Larson Davis 824

Site Number: ST-3 Date: 12/20/2016

Time: From 10:25 AM To 10:45 AM

Site Location: Eastern portion of the project site. Approximately 100 feet from Grace Street and 300 feet from Lincoln Avenue.

Primary Noise Sources: Machinery hum from the industrial activity northwest of Lincoln Avenue and traffic on Lincoln Avenue.

Comments:

Adjacent Roadways: Grace Street and Lincoln Avenue.

Measurement Results	
L_{eq}	54.8
L_{max}	64.0
L_{min}	50.5
L_2	58.8
L_8	56.9
L_{25}	55.2
L_{50}	54.2
L_{90}	52.6
L_{99}	51.4

Atmospheric Conditions	
Average Wind Velocity (mph)	1.8
Maximum Wind Velocity (mph)	4.1
Temperature (F)	68.0
Relative Humidity (%)	16.3

Map:

Location Photo:

ATTACHMENT B

FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL PRINTOUT

TABLE Existing-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Adams Street and Jefferson Street
NOTES: Lincoln Avenue Industrial Warehouse - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6300 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 18 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.63

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.5	134.6	287.9

TABLE Existing-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Jefferson Street and Project Driveway 1
NOTES: Lincoln Avenue Industrial Warehouse - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5800 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	59.0	126.6	272.4

TABLE Existing-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 1 and Project Driveway 2
NOTES: Lincoln Avenue Industrial Warehouse - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5800 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	59.0	126.6	272.4

TABLE Existing-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 2 and Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5800 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	59.0	126.6	272.4

TABLE Existing-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue east of Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6000 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.49

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	60.3	129.4	278.6

TABLE Existing-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street between Lincoln Avenue and Project Driveway 3
NOTES: Lincoln Avenue Industrial Warehouse - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 780 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.20

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street north of Lincoln Avenue
NOTES: Lincoln Avenue Industrial Warehouse - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 320 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 48.33

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street south of Project Driveway 3
NOTES: Lincoln Avenue Industrial Warehouse - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 820 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.42

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing with Project-01

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Adams Street and Jefferson Street
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6900 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 18 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.02

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	68.2	142.9	305.9

TABLE Existing with Project-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Jefferson Street and Project Driveway 1
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6400 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.77

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	63.0	135.1	290.8

TABLE Existing with Project-03

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 1 and Project Driveway 2
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6300 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.70

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	62.3	133.7	287.8

TABLE Existing with Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 2 and Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6600 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.91

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.3	137.9	296.9

TABLE Existing with Project-05

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue east of Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6500 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.84

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	63.6	136.5	293.9

TABLE Existing with Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street between Lincoln Avenue and Project Driveway 3
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 54.07

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing with Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street north of Lincoln Avenue
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 320 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 48.33

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing with Project-08

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street south of Project Driveway 3
NOTES: Lincoln Avenue Industrial Warehouse - Existing with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 760 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.09

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2017 Cumulative w/o Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Adams Street and Jefferson Street
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6700 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 18 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.90

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	67.0	140.2	299.9

TABLE 2017 Cumulative w/o Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Jefferson Street and Project Driveway 1
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6100 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.56

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	61.0	130.9	281.7

TABLE 2017 Cumulative w/o Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 1 and Project Driveway 2
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6200 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.63

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	61.7	132.3	284.7

TABLE 2017 Cumulative w/o Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 2 and Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6200 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.63

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	61.7	132.3	284.7

TABLE 2017 Cumulative w/o Project-05

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue east of Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6000 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.49

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	60.3	129.4	278.6

TABLE 2017 Cumulative w/o Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street between Lincoln Avenue and Project Driveway 3
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 790 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.26

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2017 Cumulative w/o Project-07

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street north of Lincoln Avenue
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 320 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 48.33

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2017 Cumulative w/o Project-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street south of Project Driveway 3
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 830 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.47

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2017 Cumulative with Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Adams Street and Jefferson Street
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 7300 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 18 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.27

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	70.7	148.3	317.5

TABLE 2017 Cumulative with Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Jefferson Street and Project Driveway 1
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6800 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.04

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	65.5	140.7	302.8

TABLE 2017 Cumulative with Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 1 and Project Driveway 2
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6700 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.97

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.9	139.3	299.9

TABLE 2017 Cumulative with Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue between Project Driveway 2 and Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6900 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	66.2	142.1	305.8

TABLE 2017 Cumulative with Project-05

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Lincoln Avenue east of Grace Street
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6600 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.91

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.3	137.9	296.9

TABLE 2017 Cumulative with Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/21/2016
ROADWAY SEGMENT: Grace Street between Lincoln Avenue and Project Driveway 3
NOTES: Lincoln Avenue Industrial Warehouse - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 54.07

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0