COMMUNITY & ECONOMIC DEVELOPMENT DEPARTMENT
Planning Division

Draft Mitigated Negative Declaration

WARD: 6

1. **Case Number:** P13-0529 (Tentative Parcel Map) and P13-0530 (Comprehensive Design Review)

2. **Project Title:** IBG 58 Magnolia Business Center

3. **Lead Agency:** City of Riverside
Community & Economic Development Department
Planning Division
3900 Main Street, 3rd Floor
Riverside, CA 92522

4. **Contact Person:** Matthew Taylor, Assistant Planner
Phone Number: (951) 826-5944

5. **Project Location:** 12000 Magnolia Avenue

6. **Project Applicant/Project Sponsor's Name and Address:**
Brian Bargemann
(949) 263-1111
Investment Building Group
5100 Campus Drive, Suite 300
Newport Beach, CA 92660

7. **General Plan Designation:** B/OP – Business/Office Park

8. **Zoning:** BMP-SP – Business and Manufacturing Park, Specific Plan (Magnolia Avenue) Overlay

9. **Description of Project:**

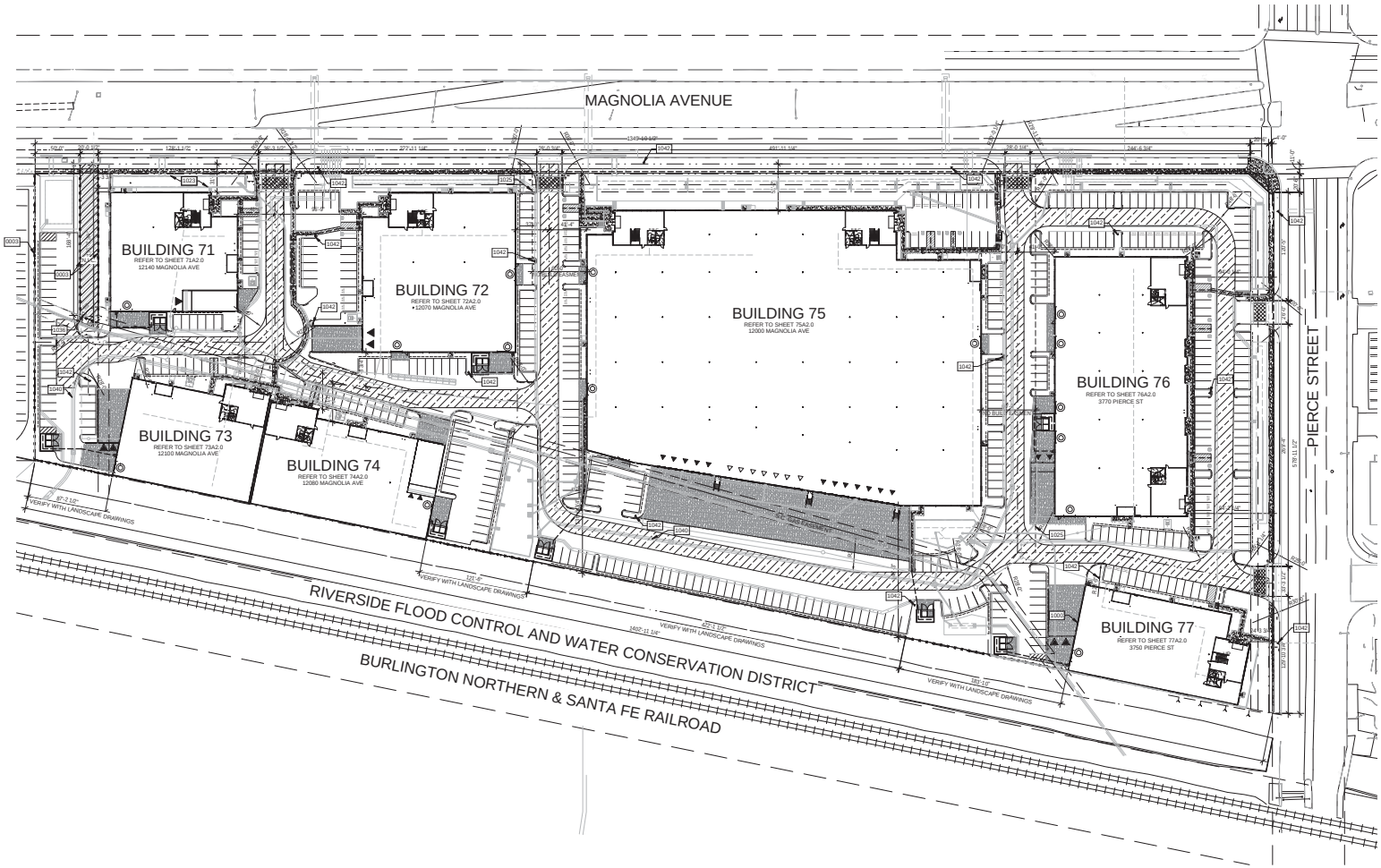
Proposal by Brian Bargemann, of Investment Building Group, to consider: 1) a Parcel Map to subdivide 14.74 acres into seven parcels ranging in size from 0.95 to 6.08 acres; and 2) Design Review of plot plans and elevations for a multi-tenant light industrial complex totaling 280,598 square feet comprised of seven industrial buildings, 434 parking stalls and related landscaping, water quality treatment facilities and site improvements on a vacant five-parcel site located at 12000 Magnolia Avenue, at the southwest corner of Pierce Street. Building 1 will contain 18,864 square feet of gross floor area, including 2,138 square feet of office area and 16,726 square feet of warehouse floor, and an interior truck well with a single dock door on a 0.992-acre parcel fronting on Magnolia Avenue with 26 parking spaces. Building 2 will contain 30,451 square feet of gross floor area, including 2,916 square feet of office area and 27,535 square feet of warehouse floor with an exterior truck ramp serving two dock-high doors on the west side of the building, two drive-up doors on the south side of the building and a single drive-up door on the east side of the building, on a 1.485-acre parcel fronting on Magnolia Avenue with 41 parking spaces. Building 3 will contain 17,931 square feet of gross floor area, including 1,857 square feet of office area and 16,074 square feet of warehouse floor with an exterior truck loading platform to accommodate two tractor-trailers served by a single roll-up door on the west side of the building, on a 1.002-

acre parcel adjacent to the southerly project boundary with 25 parking spaces. Building 4 will contain 22,140 square feet of gross floor area, including 1,943 square feet of office area and 20,197 square feet of warehouse floor with an interior truck well to accommodate two tractor-trailers accessed via a single roll-up door on the north side of the building, on a 1.082-acre parcel adjacent to the southerly project boundary with 35 parking spaces. Building 5 is the largest building proposed at 129,911 square feet of gross floor area, divisible into up to two units, including two potential office areas totaling 6,034 square feet and 123,877 square feet of warehouse floor, served by 12 dock-high truck doors on the south side of the building, expandable to up to 19 dock-high doors with the inclusion of 7 knock-out panels, two drive-up doors on the west side and one drive up door on the east side of the building, on a 6.081-acre parcel fronting on Magnolia Avenue with 153 parking spaces. Building 6 will contain 42,158 square feet of gross floor area, divisible into up to four units, including two potential office areas totaling 4,406 square feet and 37,752 square feet of warehouse floor, with an exterior truck loading platform to accommodate two tractor-trailers accessed via a single roll-up door on the west side of the building in addition two three drive-up doors on the west side and one drive-up door on the south side of the building, on a 2.763-acre parcel fronting on Magnolia Avenue and Pierce Street with 125 parking spaces. Building 7 will contain 19,143 square feet of gross floor area, including 2,757 square feet of office area and 16,386 square feet of warehouse floor with an exterior truck loading platform to accommodate two tractor-trailers served by a single roll-up door on the west side of the building. Access and circulation to the project will be served by five driveways including a 36-foot two-way commercial drive way on Magnolia Avenue near the westerly project boundary (Driveway 1), a 28-foot two-way commercial driveway central to the project's Magnolia Avenue frontage (Driveway 2), a 28-foot two-way commercial driveway on Magnolia Avenue approximately 270 feet westerly of the intersection with Pierce Street (Driveway 3); a 26-foot two-way commercial driveway on Pierce Street approximately 152 southerly of the intersection with Magnolia Avenue (Driveway 4); and a 33-foot, two way commercial driveway on Pierce Street near the southerly project boundary (Driveway 5). Driveways 2, 3 and 4 are proposed to allow right-in/right-out ingress and egress movements only. Driveway 1 will be served by a new unsignalized left-turn lane installed within the landscaped median of Magnolia Avenue to allow left-in ingress in addition to right-in and right-out movements. Driveway 5 will align with the uncontrolled intersection of Pierce Street and Sterling Avenue and will allow ingress and egress in all directions.

Figure 1 - Project Vicinity Map

0 220 440 880 1,320 1,760 Feet

CAUTION: IF THIS SHEET IS NOT 30"x42" IT IS A REDUCED PRINT



1"=50'
0 25' 50' 100' 250'

OVERALL SITE PLAN
SCALE: 1" = 50'-0"

AREA SUMMARY PROJECT DATA

PARCEL #	NET AREA	F.A.R.
PARCEL 1	0.992 AC	.42
PARCEL 2	1.485 AC	.46
PARCEL 3	1.002 AC	.41
PARCEL 4	1.082 AC	.47
PARCEL 5	6.081 AC	.48
PARCEL 6	2.763 AC	.35
PARCEL 7	0.946 AC	.44
TOTAL	14.351 AC	.44

BLDG #	S-1 WAREHOUSE	B OFFICE	B MEZZANINE	TOTAL	PLATFORM (NOT INCL.)	REQ. (W) PARK (1/1000)	REQ. (O) PARK (1/250)	REQ. TOTAL	PROVIDED PKG. RATIO
BLDG 1	16,862 S.F.	1,232 S.F.	981 S.F.	19,075 S.F.	0	17	9	26	26
BLDG 2	27,826 S.F.	1,829 S.F.	966 S.F.	30,621 S.F.	690	28	12	40	41
BLDG 3	16,074 S.F.	1,857 S.F.	0 S.F.	17,931 S.F.	1,941	17	8	25	25
BLDG 4	20,197 S.F.	1,943 S.F.	0 S.F.	22,140 S.F.	2,025	22	8	30	35
BLDG 5	124,248 S.F.	4,212 S.F.	1,928 S.F.	130,388 S.F.	6,032	125	25	150	153
BLDG 6	38,601 S.F.	4,172 S.F.	0 S.F.	42,773 S.F.	4,344	39	17	56	125
BLDG 7	16,388 S.F.	1,781 S.F.	978 S.F.	19,140 S.F.	495	17	12	29	29
TOTAL	260,194 S.F.	17,026 S.F.	4,853 S.F.	282,071 S.F.	15,531	265	91	356	435

(W) WAREHOUSE
(O) OFFICE

SITE LEGEND

- PEDESTRIAN PATH OF TRAVEL
- 8' TALL DECORATIVE WALL. REFER TO LANDSCAPE DRAWINGS.
- 8' TALL TUBULAR STEEL FENCE WITH PICKETS. REFER TO LANDSCAPE DRAWINGS.
- ACCESS POINT
- POLE MOUNTED LIGHT FIXTURE, SEE ELECTRICAL DRAWINGS
- WALLPACK LIGHT FIXTURE, SEE ELECTRICAL DRAWINGS
- TRANSFORMER WITH CONCRETE PAD. SEE ELECTRICAL DRAWINGS. (PROVIDE PROTECTION BOLLARDS PER LOCAL UTILITY OR PUBLIC WORK STANDARDS)
- FIRE LANE (HATCHED)
- CONCRETE
- REINFORCED CONCRETE
- DOCK HIGH TRUCK DOOR OR POSITION
- GRADE LEVEL TRUCK DOOR
- FUTURE DOCK HIGH TRUCK DOOR
- FIRE HYDRANT (VERIFY LOCATION WITH CIVIL DRAWINGS)

NOTES

SEE SHEET A0.2 FOR GENERAL NOTES

0003 EXISTING FENCE TO REMAIN.
1000 SITE NOTES
1023 RETENTION BASIN.
1025 60'-0" NO BUILT EASMENT RECORDED WITH COUNTY TO ALLOW AN ULIMITED AREA FOR BUILDING 75.
1036 NEW FENCE TO MATCH EXISTING FENCE. VERIFY IN FIELD.
1040 CONCRETE GUTTER. SEE CIVIL DRAWINGS.
1042 FIRE HYDRANT.

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f 949.863.1581

58 MAGNOLIA PROJECT
RIVERSIDE, CALIFORNIA

SITE PLAN

DATE	REMARKS
03/15/2016	BUILDING SUBMITTAL
03/25/2016	BID SET
03/30/2016	BUILDING RESUBMITTAL

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
JOB NO.:	IRV09-0116-00

SHEET
A1.0

7/12/2016 8:02:58 AM -

Figure 2 - Project Site Plan

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, Specific Plan Overlay (BMP-SP)
North	Multi-tenant commercial and light industrial complexes	Business/Office Park (B/OP); Commercial (C)	Business and Manufacturing Park Zone, Specific Plan Overlay (BMP-SP); Commercial Retail Zone, Specific Plan Overlay(CR-SP)
East	Multi-tenant commercial retail and office complexes	Commercial (C); Business/Office Park (B/OP)	Business and Manufacturing Park Zone, Building Stories – 2 Story, Special Setback – 10 Feet, and Specific Plan Overlays (BMP-S-2-X-10-SP)
South	Flood control channel and railroad; single-family residential beyond	Business/Office Park (B/OP)	Railway Zone (RWY)
West	Warehouse	Business/Office Park (B/OP)	Business and Manufacturing Park Zone, Specific Plan Overlay (BMP-SP)

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 EIR (FPEIR)
    c. Magnolia Avenue Specific Plan
    d. Title 19, Zoning Code
    e. Title 20, Cultural Resources
    f. Title 17, Grading Code

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. Rincon Band of Luiseño Indians

14. List of Appendices

    a. Appendix A: Project Plans
    b. Appendix B: Air Quality Analysis
    c. Appendix C: Phase II Burrowing Owl Survey and Report
    d. Appendix D: Noise Impact Analysis
    e. Appendix E: Traffic Impact Analysis
    f. Appendix F: Preliminary Water Quality Management Plan

15. **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	☐ 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

Environmental Initial Study

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, General Plan 2025 FPEIR Figure 5.1-1 – Scenic and Special Boulevards and Parkways, Table 5.1-A – Scenic and Special Boulevards, and Table 5.1-B – Scenic Parkways; Magnolia Avenue Specific Plan Chapter 3, Section A – Corridor Wide Vision, Objectives and Policies, and Table 6.1 – Magnolia Avenue Landscape Palette)***

Less Than Significant Impact. The City's General Plan 2025 policies aim at balancing development interests with broader community preservation objectives. While there are no scenic vistas within the immediate project vicinity, the nearby La Sierra/Norco Hills to the north and Arlington Mountain to the south are partially visible from the project site. Views may be blocked with the development of the proposed project; however, the project is proposed within an area designated for business and manufacturing park uses and surrounding properties along Magnolia Avenue and Pierce Street are developed with similar uses. The project site and vicinity are not designated by the City's General Plan for the preservation or uniqueness of scenic views. Further, the Riverside Municipal Code, Chapter 19.130 (Industrial Zones) requires that all development in the Business Manufacturing Park (BMP) zone have a maximum building height of 45 feet with an additional 10-foot allowance for any portion of the building intended for screening purposes. The proposed buildings will have a maximum height of 39 feet for the highest proposed parapet screen walls. Through compliance with and implementation of General Plan Land Use Policies LU-21.1 (Gateways), LU-12.1 and LU12.2 (Magnolia Avenue); General Plan Circulation and Community Mobility Policy CCM-2.10 (Boulevard Landscaping; Magnolia Avenue Specific Plan Corridor Objective 1 (Scenic Roadway); and Zoning Code building height, setback and landscaping requirements, direct, indirect and cumulative impacts to scenic vistas are **less than significant impact**.

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, General Plan 2025 FPEIR 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 the Magnolia Avenue Specific Plan)***

Less Than Significant Impact. The project is not adjacent to a designated scenic highway as identified on the California Scenic Highway Mapping System. However, the General Plan 2025 designates several roadways as Scenic Boulevards and Parkways in order to protect scenic resources and enhance the visual character of Riverside. The proposed project is located along Magnolia Avenue which is designated as a Special Scenic Boulevard within the Circulation and Community Mobility Element of the General Plan 2025. The proposed development has the potential to affect the scenic nature of Magnolia Avenue through the construction of buildings and site improvements adjacent to the roadway. The General Plan 2025 includes policies intended to minimize aesthetic impacts and impacts on visual resources (Land Use Policy LU-11.2, LU-12.1 and LU-12.2; Circulation and Community Mobility Policy CCM-2.10; Open Space and Conservation Policy OS-1.6) and this project will comply with these policies. Further, the Magnolia Avenue Specific Plan contains specific design standards for right-of-way width, public improvements and parkway landscaping along the Magnolia Avenue corridor intended to preserve and restore the corridor's status as a scenic thoroughfare (Magnolia Avenue Specific Plan Figures 6.1A and 6.1B). Finally, Chapter 19.130 of the Municipal Code (Industrial Zones) requires landscaped setbacks of 20 feet for buildings under 30 feet in height and 40 feet for buildings taller than 30 feet. The project has been designed to be consistent with these land use policies and development standards. These measures result directly, indirectly and cumulatively in a **less than significant impact**.

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

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

1c. Response: ***(Source: General Plan 2025, General Plan 2025 FPEIR, Zoning Code, Citywide Design and Sign Guidelines and Magnolia Avenue Specific Plan)***

Less Than Significant Impact. Construction of the proposed building on the existing vacant site would alter the existing visual character of the vacant site. However, the project site is located in an area designated for business and office park use. Surrounding areas on Magnolia Avenue and Pierce Street are developed with similar uses with multi-tenant light industrial, retail and service commercial complexes to the north and east, and is buffered from single-family residential development to the south by the Riverside County Flood Control District channel and AT&SF Railroad right-of-way. The proposed project is required to implement the General Plan 2025 goals and policies (Land Use and Urban Design Policies LU-12.1, LU12.2, LU-27.1, LU-65.2) and will be subject to Design Review consistent with established Citywide Design and Sign Guidelines. The project is also required to comply with the applicable development standards pertaining to the BMP – Business and Manufacturing Park Zone and the streetscape improvement policies of the Magnolia Avenue Specific Plan. The project will comply with all pertinent design requirements of the Zoning Code and Citywide Design Guidelines, to assure quality site design and building architecture that is well constructed. This includes installation of landscaping, articulated and decorative screening walls and facades, window fenestration, and varying roof design. Due to all these factors, direct, indirect and cumulative impacts on the visual character and quality of the area are a **less than significant impact**.

d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

1d. Response: ***(Source: General Plan 2025, Title 19 – Article VIII – Chapter 19.556 – Lighting, Citywide Design and Sign Guidelines, Magnolia Avenue Specific Plan)***

Less Than Significant Impact: New sources of light, in this area from streets, commercial parking lots, building, landscaping and ancillary outdoor industrial activities all have the potential to contribute to light and glare and affect the nighttime sky. Development of the proposed project will require installation of outdoor lighting necessary for public safety and maintenance, as well as to accommodate nighttime business operations. All lighting will comply with the development standards contained in the City's Zoning Code (Title 19). Chapter 19.590 (Performance Standards) requires that on-site lighting be arranged as to reflect away from adjoining property or any public streets. Light shall not be directed skyward or in a manner that interferes with aircraft operation.

The proposed project could involve nighttime activities that would result in additional sources of light in the night. However, the project site is surrounded by light industrial and commercial uses to the west, north and east. There is currently substantial nighttime lighting in the surrounding areas of the project site due to the nature of the adjacent developments and the general urban character of the area. Residential uses are located approximately 170 feet to the south of the project site that could potentially be affected by new sources of light; as such, the project has been designed to incorporate dense landscape screening including large tree plantings of a species with a spreading canopy habit to shield these receptors from direct and indirect glare. Addition of new sources of permanent light and glare as a result of implementation of the proposed project would not significantly increase ambient lighting in the project vicinity. Moreover, due to the built nature of the project area, there is a significant existing amount of ambient light both in the project area and in the immediately surrounding vicinity. A site lighting plan and photometric study will be required to be submitted prior to the issuance of building permits that demonstrates compliance with all applicable performance standards relating to light and glare, including the orientation, direction and shielding of all exterior lighting to prevent shining onto adjacent properties and rights-of-way. Compliance with Zoning Code and California Building and Green Code standards will reduce the impact to day or nighttime views to **less than significant impact** directly, indirectly and cumulatively.

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

No Impact. The Project is located within an urbanized area. A review of Figure OS-2 – Agricultural Suitability of the General Plan 2025 reveals that the project site is not designated as, and is not adjacent to or in proximity to any land classified 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** directly, indirectly or cumulatively to agricultural uses.

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, General Plan 2025 FPEIR – 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 General Plan 2025 FPEIR reveals that 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 and is not adjacent to land zoned for agricultural use; therefore, the project will have **no impact** directly, indirectly or cumulatively.

c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) timberland (as defined in Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒

2c. Response: ***(Source: GIS Map – Forest Data)***

No Impact. The City of Riverside has no forest land that can support 10-percent native tree cover nor does it have any timberland. Therefore, **no impacts** will occur from this project directly, indirectly or cumulatively.

ISSUES (AND SUPPORTING INFORMATION SOURCES):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
2d. Response: ***(Source: GIS Map – Forest Data)*** **No Impact.** The City of Riverside has no forest land that can support 10-percent native tree cover nor does it have any timberland, therefore **no impacts** will occur from this project directly, indirectly or cumulatively.				
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, and GIS Map – Forest Data)*** **No Impact**. The project is located in an urbanized area of the City designated as "Urban/Built-Out Land" in Figure OS-2 (Agricultural Suitability) of the Open Space and Conservation Element of the General Plan 2025. Additionally, the site is identified as urban/built out land and therefore does not support agricultural resources or operations. The project will not result in the conversion of designated farmland to non-agricultural uses. In addition, there are no agricultural resources or operations, including farmlands within proximity of the subject site. The City of Riverside has no forest land that can support 10-percent native tree cover. Therefore, **no impacts** will occur from this project directly, indirectly or cumulatively to conversion of Farmland, to non-agricultural use or to the loss of forest land.				

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: South Coast Air Quality Management District's 2012 Air Quality Management Plan (AQMP); Air Quality Analysis prepared by LSA Associates in February 2015)***

Less Than Significant Impact. The proposed multi-tenant warehousing and light industrial complex is consistent with the General Plan 2025 Program "Typical Growth Scenario" in all aspects. The Air Quality Management Plan (AQMP) for the South Coast Air Basin (SCAB) sets forth a comprehensive program that will lead the SCAB into compliance with all Federal and State air quality standards. The City of Riverside is located within the Riverside County sub region of the SCAG projections.

The AQMP is based on regional growth projections developed by SCAG. The proposed project is an industrial development and is not defined as a regionally significant project under CEWA; therefore, it does not meet SCAG's Intergovernmental Review (IGR) criteria.

Pursuant to the methodology provided in Chapter 12 of the 1993 South Coast Air Quality Management District (SCAQMD) CEQA Air Quality Handbook, consistency with the South Coast Air Basin 2012 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.7 A 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, as demonstrated in Section 3b of this report; therefore the project could not result in an increase in the frequency or severity of any air quality standards violation and will not cause a new air quality 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 project is not defined as significant.

The City's General Plan designation for the site is B/OP – Business/Office Park, and the site is located within the Magnolia Avenue Specific Plan. To accommodate the proposed uses, the proposed project will not require either a General or Specific Plan Amendment. Therefore, the proposed uses are consistent with the General Plan and the regional AQMP. Based on the consistency analysis presented above, the proposed project is consistent with the General Plan and the regional AQMP. The project therefore will have **less than significant impacts** on the implementation of the AQMP.

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

3b. Response: ***(Source: General Plan 2025 FPEIR Table 5.3-B SCAQMD CEQA Regional Significance Thresholds, South Coast Air Quality Management District's 2012 AQMP, CalEEMod, and Air Quality Analysis prepared by LSA Associates in February 2015)***

Less Than Significant Impact. Per General Plan 2025 FPEIR MM Air 1 and 7, a CalEEMod Version 2013.2.2 computer model analysis was conducted for both short-term construction and long-term operational impacts.

Short-term impacts

Construction activities produce combustion emissions from various sources, such as demolition, grading, site preparation, utility engines, and motor vehicles transporting the construction crew. Exhaust emissions from construction activities envisioned on site would vary daily as construction activity levels change. The use of construction equipment on site would result in localized exhaust emissions. Grading is expected to be balanced on-site, with little or no off-site transport of soils/dirts. Based on the SCAQMD guidelines, this project is not expected to disturb more than 5 acres on a daily basis.

The most recent version of the CalEEMod model (v2013.2.2) was used to calculate the construction emissions, as summarized in the table below. The emissions rates shown are derived from the default CalEEMod construction emission input variables, which assume compliance with standard construction emissions control regulatory measures. Since no exceedances of any criteria pollutants are expected, no significant impacts would occur for project construction.

CalEEMod v2013.2.2 MODEL RESULTS SHORT-TERM IMPACTS								
Activity	Daily Emissions (lbs/day)							
	VOC	**NO_X**	**CO**	**SO_2**	**Fugitive PM_{10}**	**Exhaust PM_{10}**	**Fugitive $PM_{2.5}$**	**Exhaust $PM_{2.5}$**
SCAQMD Daily Thresholds Construction	75	100	550	150	150	150	55	55
Daily Project - Emissions Construction	**73**	**79**	**55**	**0.096**	**10**	**10**	**6.7**	**6.7**
Exceeds Y/N Threshold?	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**

Source: Air Quality Analysis, LSA Associates, Inc., February 2015, Table H (See Appendix **B**)
Note: Peak daily emissions are based on assumption that the Building Construction and Architectural Coating phases would overlap.

Long-term impacts

Long-term air pollutant emission impacts are those associated with stationary and mobile sources involving any project-related changes. The proposed project would result in area-, energy- and mobile-source emissions. Area sources include architectural coatings, consumer products, hearths and landscaping. Energy sources include natural gas consumption for heating.

Based on trip generation factors included in the Institute of Transportation Engineers (ITE) Trip Generation Manual (Ninth Edition), which are also provided in the trip generation study prepared for the project in (LSA, February 2015; See Appendix E), the project's daily trips were entered in the CalEEMod model. As the project consists of smaller light-industrial buildings in a primarily industrial and commercial area, it is expected that truck traffic will be primarily local, thus the CalEEMod trip length of 16.6 miles for work vehicles was used. Long-term operational emissions associated with the project are shown in the table below. The peak daily emissions of all criteria pollutants as a result of the project would not exceed the corresponding SCAQMD daily emission thresholds; therefore, project-related long-term air quality impacts would be less than significant.

CalEEMod v2013.2.2 MODEL RESULTS LONG-TERM IMPACTS						
Activity	Daily Emissions (lbs/day)					
	VOC	**NO_X**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**

SCAQMD Daily Thresholds Operation	55	55	550	150	150	55
Daily Project - Emissions Operational	**26**	**48**	**130**	**0.29**	**19**	**5.8**
Exceeds Y/N Threshold?	**N**	**N**	**N**	**N**	**N**	**N**

Source: Air Quality Analysis, LSA Associates, Inc., February 2015, Table J (See Appendix **B**)

The above tables compare the project emissions (short-term/construction-related and long-term/operational) to the SCAQMD daily thresholds and shows that established thresholds will not be exceeded. To ensure short term emissions are further reduced the General Plan 2025 Program required mitigation measures that have been applied to this project, MM AIR 2, 4 and 5. Therefore, because the project will not violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, and will be subject to further mitigation the impacts directly, indirectly and cumulatively will be **less than significant impacts** to ambient air quality and to contributing to an existing air quality violation.

CO Hot Spots

In order to ensure that the State and Federal ambient air quality standards for CO are not violated, the SCAQMD recommends that projects with a potential to generate heavy volumes of traffic, and which can lead to high levels of CO, use hot spot modeling to determine the potential to create a CO "Hot Spot". A CO "Hot Spot" is a localized concentration of CO that is above the State or Federal 1-hour or 8-hour ambient air standards. A localized high CO level is associated with traffic congestion and idling or slow-moving vehicles and requires additional analysis beyond total project emissions quantification.

The significance of localized project impacts under CEQA depends on whether ambient CO levels in the project vicinity 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 part per million (ppm) or more or 8-hour 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; and
- California State 8-hour CO standard of 9.0ppm.

Because vehicular trips associated with the project would contribute to congestion at intersections and along roadway segments in the project vicinity (see Appendix **E, Traffic Impact Analysis**), Air Quality analysis was prepared by LSA Associates in February 2015 (Appendix B. The analysis included a CO hot spot model using project-specific traffic data. Existing CO concentrations in the immediate project vicinity are not available; however, ambient CO levels monitored in the nearby Riverside-Magnolia and Riverside-Rubidoux monitoring stations showed a highest recorded 1-hour CO concentration of 3.1 ppm and a highest 8-hour concentration of 1.6 ppm during the past three years:

Table 3b.C: Ambient Air Quality Monitored in the Project Vicinity at the Riverside-Magnolia and Riverside-Rubidoux Stations

Pollutant	**Standard**	**2011**	**2012**	**2013**
Carbon Monoxide (CO)				
Maximum 1-hr concentration (ppm)		**3.1**	**2.7**	**2.3**
Number of days exceeded:	State: > 20.0 ppm	0	0	0
	Federal: > 35.0 ppm	0	0	0
Maximum 8-hr concentration (ppm)		**1.49**	**1.46**	**1.6**
Number of days exceeded:	State: > 9.0 ppm	0	0	0
	Federal: > 9.0 ppm	0	0	0

Source: Air Quality Analysis prepared by LSA Associates in February 2015, Table E (see Appendix B)

Given the relatively low level of CO concentrations in the project area, project-related vehicles are not expected to result in CO concentrations exceeding the State or federal standards. Thus, the projects impacts related to localized CO concentrations are expected to be **less than significant**.

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: General Plan 2025 FPEIR Table 5.3-B SCAQMD CEQA Regional Significance Thresholds, South Coast Air Quality Management District's 2012 Air Quality Management Plan, CalEEMod Model Version 2013.2.2, and Air Quality Analysis prepared by LSA Associates in February 2015)***

Less Than Significant Impact. Per the GP 2025 FPEIR, AQMP thresholds indicate future construction activities under the General Plan are projected to result in significant levels of NOx and VOC, both ozone precursors, PM_{10}, $PM_{2.5}$ and CO. Although long-term emissions are expected to decrease by 2025, all criteria pollutants remain above the SCAQMD thresholds.

The portion of the Basin within which the City is located is designated as a non-attainment area for ozone, PM_{10} and $PM_{2.5}$ under State standards, and as a non-attainment area for ozone and $PM_{2.5}$ under Federal standards (Appendix **B**, Air Quality Analysis [LSA 2015], Table D).

Because the proposed project is consistent with the General Plan 2025, cumulative impacts related to criteria pollutants as a result of the project were previously evaluated as part of the cumulative analysis of build-out anticipated under the General Plan 2025 Program. As a result, the proposed project does not result in any new significant impacts that were not previously evaluated and for which a statement of overriding considerations was adopted as part of the General Plan 2025 FPEIR. Therefore, cumulative air quality emissions impacts are **less than significant**.

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

3d. Response: ***(Source: General Plan 2025 FPEIR Table 5.3-B SCAQMD CEQA Regional Significance Thresholds, South Coast Air Quality Management District's 2013 Air Quality Management Plan, CalEEMod Version 2013.2.2, and Air Quality Analysis prepared by LSA Associates in February 2015)***

Less Than Significant Impact. As part of SCAQMD's environmental justice program, attention has recently been focusing more on the localized effects of air quality. Although the region may be in attainment for a particular criteria pollutant, localized emissions from construction activities coupled with ambient pollutant levels can cause localized increases in criteria pollutant that exceed national and/or State air quality standards. The SCAQMD has issued guidance on applying CalEEMod modeling results to Localized Significance Thresholds (LST) analyses. Sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to noise and air pollutants. There are existing residential uses approximately 200 feet to the south of the project site, and Alvord Continuation High School is situated approximately 650 feet south of the project site.

Short-term impacts

Methodologically speaking, using an LST receptor buffer of 60 meters (164 feet) would be considered a conservative analysis. Since the construction activities associated with the project are not expected to disturb more than five acres on a daily basis, using the LST levels for a five-acre project is reasonable and adequate for this analysis. The table below shows that emissions of the pollutants on peak construction days will result in criteria pollutant concentrations at the nearest sensitive receptors that are all below the SCAQMD thresholds of significance.

LOCAL SIGNIFICANCE THRESHOLDS FOR CRITERIA POLLUTANTS SHORT-TERM IMPACTS				
Emissions Sources	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**
On-site emissions	79	51	10	6.7
LST Threshold (50m)	317	2,430	44	11
Significant (Y/N)	N	N	N	N

Source: Air Quality Analysis, LSA Associates, Inc., February 2015, Table J (See Appendix **B**)
Notes: All figures expressed in lbs/day.
SRA: Metropolitan Riverside County, 5 acres, 200 foot distance

Long-term impacts

Operation-related significance thresholds become a concern when there are substantial on-site stationary and on-site mobile sources that could impact surrounding receptors. The proposed buildings do not have a tenants and are speculatively considered for warehousing, distribution and manufacturing uses, thus the type and extent of on-site stationary or on-site mobile sources is unknown.

LOCAL SIGNIFICANCE THRESHOLDS FOR CRITERIA POLLUTANTS LONG-TERM IMPACTS				
Emissions Sources	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**
On-site emissions	7.0	15	2.4	0.7
LST Threshold (50m)	317	2,430	11	3.2
Significant (Y/N)	N	N	N	N

Source: Air Quality Analysis, LSA Associates, Inc., February 2015, Table J (See Appendix **B**)
Notes: All figures expressed in lbs/day.
SRA: Metropolitan Riverside County, 5 acres, 200 foot distance, on-site traffic 5% of total

The table above shows the calculated emissions for the proposed operational activities compared with the appropriate SCAQMD localized significance thresholds. The localized impact analysis by design only includes on-site sources; however, the CalEEMod modeling outputs for operations do not separate on- and off-site emissions. Rather, the model lists emissions by the categories of Area, Energy and Mobile. For this LST analysis, it is assumed that all of the area emissions occur on site; all of the energy emissions occur off site (at regional power plants); and some portion of the mobile source emissions occur on site. While some of the mobile source emissions will occur from vehicles driving on nsite, most of the mobile source emissions calculated by the CalEEMod software would occur after the vehicles have left the project site.

Most on-site vehicle maneuvering would be of short distance. It is unlikely that the average on-site distance driven by vehicles, including trucks, will be 1,000 feet, which is less than 2% of the average trip length of 16.6 miles. For a conservative analysis, the emissions shown in the table above include 5% if the mobile emissions added to the area source emissions. Operational on-site emissions rates for the specified criteria pollutants would not exceed any of the localized impact thresholds, and therefore operational activity associated with the project would result in less than significant local air quality impacts.

Short-term impacts associated with construction from General Plan 2025 typical build out will result in increased air emissions from grading, earthmoving, and construction activities. Mitigation Measures of the General Plan 2025 FPEIR requires individual development to employ construction approaches that minimize pollutant emissions (General Plan 2025 FPEIR MM AIR 1- MM AIR 5, e.g., watering for dust control, tuning equipment, limiting truck idling times). In conformance with the General Plan 2025 FPEIR MM AIR 1 and MM AIR 7 a CalEEMod v2013.2.2 emissions simulations was conducted for short-term construction and long-term operational related impacts of the project and determined that the proposed project would not exceed SCAQMD thresholds for short-term construction and long-term operational impacts. Therefore, the project will not expose sensitive receptors to substantial pollutant concentrations and a **less than siginificant impact** will occur directly, indirectly or cumulatively for this project.

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

3e. Response: ***(Source: Air Quality Analysis prepared by LSA Associates in February 2015)***

Less Than Significant Impact. Heavy-duty equipment in the project area during construction would emit odors. However, the construction activity would cease to occur after individual construction is completed. No other sources of objectionable odors have been identified for the proposed project.

While the future uses identified for the industrial project may potentially expose people to objectionable odors, industrial and commercial uses that could generate objectionable odors are subject to SCAQMD Rule 402 governing odor emissions. Through compliance with SCAQMD Rule 402, the proposed project is not anticipated to cause objectionable odors affecting a substantial number of people and a **less than significant impact** directly, indirectly and cumulatively will occur.

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 Game 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 – MSHCP Cores and Linkages, Figure OS-8 – MSHCP Cell Areas, General Plan 2025 FPEIR 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 and Habitat Assessment prepared by Chambers Group in June 2006 and supplemented November 2015)***

Less Than Significant Impact. The vacant project site is located within an urban built-up area and is surrounded by existing development. General Plan 2025 Figure OS-5 (Habitat and Vegetation Communities) identifies a portion of the site as non-native grassland; General Plan 2025 FPEIR Figure 5.4-8 (Burrowing Owl Survey Area) and the MSHCP database identify the site as potential habitat for burrowing owls, which are considered a California Species of Special Concern. A Phase II Burrowing Owl survey conducted in June 2006 identified no presence or signs of potential presence for this species on the project site, and recommended no further action. The findings of the survey and report determined that the project is in compliance with the MSHCP. Further, no indication or potential habitat for other candidate, sensitive or special status species, Federal Species of Concern, other California Species of Special Concern, and California Species Animal or Plants on lists 1-4 of the California Native plant Society (CNPS) Inventory were identified.

At the time the survey was conducted, red-tailed hawk nesting activity was observed on the site. While not a species of concern, this activity may pose seasonal constraints on proposed construction activities. Construction activities within 500 feet of any raptor nest should be scheduled outside the nesting season, which occurs from March 1 through July 31. Similarly, to comply with the Federal Migratory Bird Treaty Act (MBTA), vegetation clearing and tree removal activities should be conducted outside the bird-nesting season, which typically occurs from February 15 through August 31. As a standard practice, a condition of approval will be added specifying that, in the event that vegetation clearing is necessary during the nesting season, a qualified biologist should conduct a preconstruction survey to identify the locations of nests within the areas affected by clearing activities. An exclusionary zone should be established around any active nest. The dimensions of the zone should be determined by a qualified biologist and is dependent on the species of bird detected. This zone should be clearly marked in the field, and construction or clearing should not be conducted within this zone until the biologist determines the nest is no longer active.

As an additional precaution, a Condition of Approval will be added requiring a standard 14-day preconstruction survey for potential burrowing owl activity or habitat be conducted by a qualified biologist prior to commencement of ground-disturbing activities (i.e., grading). This condition is consistent with GP 2025 FPEIR Mitigation Measure Bio-1, as well as Open Space and Conservation Element Policy OS-5.2. With the above noted condition of approval in place, a **less than significant impact** directly, indirectly and cumulatively will occur to federally endangered threatened, or rare species or their habitats.

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

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, General Plan 2025 FPEIR 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, MSHCP Section 6.1.2 - Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools)***

No Impact. General Plan 2025 Open Space and Conservation Element Figure OS-5 identifies the project site as a Non-Native Grassland vegetation community. No wetland or riparian vegetation exists on the project site. Furthermore, the project

site is located within a built-up urban area. Generally, the surrounding area has been developed for many years and a long history of severe disturbance exists in the area, such that there is little chance that any riparian habitat could have persisted. Therefore, **no impact** to 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 Game or U.S. Fish and Wildlife Service with implementation of the proposed project will occur directly, indirectly and cumulatively.

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

4c. Response: ***(Source: City of Riverside GIS/CADME USGS Quad Map Layer)***

No Impact. The project 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, coastal, etc.) 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 USACOE jurisdictional drainages or wetlands. Therefore, the proposed project would have **no impact** to federally protected wetlands as defined by Section 404 of the Clean Water Act directly, indirectly and cumulatively.

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 and Phase II Burrowing Owl Survey conducted by Chambers Group in June 2006 and supplemented in November 2015)***

Less Than Significant Impact. The proposed project is subject to the MSHCP and is consistent with the General Plan 2025. The project is consistent with General Plan 2025 Policy OS-6.1 which addresses preserving wildlife migration areas in general. The Phase II Burrowing Owl survey and report prepared for the project site in 2006 and supplemented in November 2015 identified potential nesting activity for the red-tailed hawk species and, in compliance with the Federal Migratory Bird Treaty Act (MBTA) recommended the coordination of vegetation clearing and construction activities with the nesting off-season or, if clearing or construction is to take place in the active nesting season, recommended a qualified biologist be retained to conduct a preconstruction survey to identify any potential nesting activity and establish safeguards for active nests until they are no longer active. Therefore, through implementation of the General Plan 2025 policies discussed here, as well as the recommended MBTA compliance surveys, the project will have a **less than significant impact** directly, indirectly and cumulatively for impacts to the movement of any native resident or migratory fish or wildlife species or the establishment of native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

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

4e. Response: ***(Source: MSHCP, Title 16 Section 16.72.040 – Establishing the Western Riverside County MSHCP Mitigation Fee, Title 16 Section 16.40.040 – Establishing a Threatened and Endangered Species Fees, City of Riverside Urban Forest Tree Policy Manual)***

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

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, with specifications based on national standards for tree care established by the International Society of Arboriculture, the National Arborists Association, and the American National Standards Institute.

In addition, the General Plan 2025 includes policies to ensure that future development would not conflict with any local policies or ordinances protecting biological resources, including tree preservation policies and specifically policies LU-2.1 (Magnolia corridor landscape preservation and enhancement), LU-27.1 (parkway canopy trees) and LU-27.4 (private property trees, enhancement of urban forest). This project has been reviewed against these policies and found to be in compliance with the policies. For these reasons, the project will have a **less than significant impact** directly, indirectly and cumulatively on local policies or ordinances protecting biological resources and tree preservation.

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: MSHCP, General Plan 2025 – Figure OS-6 – Stephen's Kangaroo Rat (SKR) Core Reserve and Other Habitat Conservation Plans (HCP), Stephens' Kangaroo Rat Habitat Conservation Plan, Lake Mathews Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan, and El Sobrante Landfill Habitat Conservation Plan, Phase 2 Burrowing Owl Survey and Report prepared by Chambers Group in June 2006 and supplemented November 2015)***

Less Than Significant Impact. The project site is located within the Western Riverside County MSHCP. The City of Riverside, as the lead agency for the project, requires that the project comply with the Western Riverside County MSHCP. The MSHCP includes a program for the collection of development mitigation fees, policies for the review of projects in areas where habitat must be conserved and policies for the protection of riparian areas, vernal pools, and narrow endemic plants. It also includes requirements to perform plant, bird, reptile, and mammal surveys in certain areas. The primary intent of the MSHCP is to provide for the conservation of a range of plants and animals and in return, provide take coverage and mitigation for projects throughout Western Riverside County to avoid the cost and delays of mitigating biological impacts on a project-by-project basis. It would allow the incidental take (for development purposes) of species and their habitat from development.

The MSHCP identifies that the project area is located in a burrowing owl survey area. Therefore, as required, surveys were conducted to assess potential habitat and to ensure that no burrowing owl or narrow endemic plant species have potential to occur on the project site. The biological field surveys conducted in June 2006 and November 2015 revealed that no suitable burrowing owl habitat exists on the project site. As a precaution, a preconstruction survey, to be conducted by a qualified biologist, will be required to be conducted 14 days prior to the commencement of grading or other ground-disturbing activities to assess any new evidence of burrowing owl habitat on the site. Further, the project will comply with measures identified in the MSHCP and will not conflict with the MSCHP. Impacts will be less than significant with implementation of standard MSHCP measures and proposed conditions of approval.

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: GP 2025 FPEIR Table 5.5-A Historical Districts and Neighborhood Conservation Areas and Appendix D, Title 20 of the Riverside Municipal Code)***

No Impact. The project is located on a site where no historic resources are known or suspected to exist as defined in Section 15064.5 of the CEQA Guidelines. because the project currently is provide brief description of the site. Therefore, **no impacts** directly, indirectly and cumulatively to historical resources are expected.

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

5b. Response: ***(Source: GP 2025 FPEIR Figure 5.5-1 - Archaeological Sensitivity and Figure 5.5-2 - Prehistoric Cultural Resources Sensitivity, Appendix D – Cultural Resources Study)***

Less Than Significant Impact with Mitigation. The project site is not located within an area of potential archaeological sensitivity as indicated by the literature and records search performed as part of the General Plan 2025 Program EIR in 2003 (GP 2025 FPEIR Figure 5.5-1 – Archaeological Sensitivity). There are no known archeological resources present on the site. However, GP 2025 FPEIR Mitigation Measure Cultural 6 requires projects within the Magnolia Avenue Specific Plan boundaries proposed for undeveloped sites to comply with specified procedures for the evaluation, documentation and treatment of potential undiscovered archaeological resources.

Pursuant to California Assembly Bill 52 (A.B. 52) (California Public Resources Code §21080.3.1), a Notice of Application was sent to all 8 tribal representatives on the referral list provided by the Native American Heritage Commission (NAHC) and the organizations they represent to notify them of their right to request consultation on this project with respect to potential tribal cultural resources that may be affected by the project.

Three of the tribal representatives contacted provided written responses to the original notification, dated November 19, 2015. In a letter dated November 24, 2015, Daniel McCarthy, Cultural Resources Management Director for the San Manuel Band of Mission Indians, states that the tribe has no concerns about the project. On December 8, 2016, correspondence received from Vincent Whipple, Cultural Resources Director for the Rincon Band of Luiseno Indians, stated that the project is within the traditional territory of the Luiseno people, but outside of the Rincon Band's Historic Boundaries, and thus deferred further review of the project to the Pechanga Band of Luiseno Indians.

On November 23, 2015, Ebru Ozdil, Planning Specialist for the Pechanga Cultural Resources Department, responded with a request to initiate formal consultation pursuant to A.B. 52. Attempts to coordinate consultation with Tribal representatives were made on November 30, 2015; December 18, 2015, and January 9, 2016, with no responses received. The City of Riverside, acting in good faith and exerting reasonable effort, therefore concluded consultation on February 9, 2016, notifying the Tribe electronically and by mail. No further responses to the A.B. 52 Tribal notification were received.

Prior to the initiation of the A.B. 52 Tribal Consultation process, correspondence dated August 13, 2013 received from Franklin Dancy, Planning Director for the Morongo Band of Mission Indians, states that the project site is within an area that may be considered a traditional use area for the Tribe. Dancy requested that specific conditions regarding cultural and/or archaeological resources and buried cultural materials be applied to the project:

- If human remains are encountered during grading and other construction excavation, work in the immediate vicinity shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5.

- In the event that Native American cultural resources are discovered during project development/construction, all work in the immediate vicinity of the find shall cease and a qualified archaeologist meeting Secretary of Interior Standards shall be hired to assess the find. Work on the overall project may continue during this assessment period.

In response to the A.B. 52 correspondence received and the project's location within the applicable area of GP 2025 FPEIR MM Cultural 6, the following mitigation measures are proposed:

MM CUL-1: Treatment and Disposition of Cultural Resources

In the event that Native American cultural resources are inadvertently discovered during the course of grading for this Project, the following procedures will be carried out for treatment and disposition of the discoveries:

a. Temporary Curation and Storage: During the course of construction, all discovered resources shall be temporarily curated in a secure location onsite; and
b. Treatment and Final Disposition: The landowner(s) shall relinquish ownership of all cultural resources, including sacred items, burial goods, and all archaeological artifacts and non-human remains as part of the required mitigation for impacts to cultural resources. The applicant shall relinquish the artifacts through one or more of the following methods and provide the City of Riverside Community and Economic Development Department with evidence of same:
    i. Accommodate the process for onsite reburial of the discovered items with the consulting Native American tribes or bands. This shall include measures and provisions to protect the future reburial area from any future impacts. Reburial shall not occur until all cataloguing and basic recordation have been completed;
    ii. A curation agreement with an appropriate qualified repository within Riverside County that meets federal standards per 36 CFR Part 79 and therefore would be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to an appropriate curation facility within Riverside County, to be accompanied by payment of the fees necessary for permanent curation;
    iii. For purposes of conflict resolution, if more than one Native American tribe or band is involved with the project and cannot come to an agreement as to the disposition of cultural materials, they shall be curated at the Western Science Center or Riverside Metropolitan Museum by default.

Through implementation of the proposed mitigation measures, in compliance with GP 2025 FPEIR MM Cultural 6, impacts to archeological resources directly, indirectly and cumulatively as a result of the project can be reduced to a **less than significant level**.

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

5c. Response: ***(Source: General Plan 2025 Policy HP-1.3; GP 2025 FPEIR Figure 5.5-2 – Prehistoric Cultural Resources Sensitivity)***

Less than Significant With Mitigation. Activities including construction-related and earth-disturbing actions, could damage or destroy fossils in rock units. As with archaeological resources, paleontological resources are generally considered to be historical resources, as defined in CEQA Guidelines Section 15064.5(a)(3)(D). Consequently, damage or destruction to these resources could cause a significant impact.

According to the General Plan 2025 FPEIR, the project site is located in an area with low prehistoric cultural resource sensitivity. General Plan Policy HP-1.3 states that the City shall protect sites of archaeological and paleontological significance and ensure compliance with the Federal Native American Graves Protection and Repatriation Act in its planning and project review process. In the event that paleontological materials are uncovered, the following mitigation measure is incorporated to ensure that uncovered resources are evaluated, left in place if possible, or curated as recommended by a qualified paleontologist. Impacts to paleontological resources will be **less than significant with mitigation incorporated**:

MM CUL-2: Unanticipated Paleontological Finds

If paleontological materials are uncovered during grading or other earth moving activities, the contractor shall be required to halt work in the immediate area of the find, and to retain a professional paleontologist to examine the materials to determine whether it is a significant paleontological resource. If this determination is positive, resource shall be left in place, if determined feasible by the project paleontologist. Otherwise, the scientifically consequential information shall be fully recovered by the paleontologist. Work may continue outside of the area of the find; however, no further work shall occur in the immediate location of the find until all information recovery has been completed and a report concerning it filed with the Community and Economic Development Director. The applicant shall bear the cost of implementing this mitigation.

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

5d. Response: ***(Source: GP 2025 FPEIR Figure 5.5-1 - Archaeological Sensitivity and Figure 5.5-2 - Prehistoric Cultural Resources Sensitivity)***

Less Than Significant Impact. Where construction is proposed in undeveloped areas, disturbance on vacant lands could have the potential to disturb or destroy buried Native American human remains as well as other human remains, including those interred outside of formal cemeteries. Consistent with State laws protecting these remains, sites containing human remains must be identified and treated in a sensitive manner. In the event that Native American human remains are inadvertently discovered during project-related construction activities, there would be unavoidable significant adverse impacts to Native American resources, but implementation of the GP 2025 FPEIR Cultural Resources Mitigation Measures 1 through 6 and compliance with applicable state laws will, however, reduce impacts to human remains, including those interred outside of formal cemeteries to a **less than significant** level.

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.	☐	☐	☐	☒

6i. Response: ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones & General Plan 2025 FPEIR Appendix E – Geotechnical Report, and Soils Investigation prepared by John R. Byerly, Inc. in December 2008 and supplemented in May 2015)***

No Impact. Seismic activity is to be expected in Southern California. In the City of Riverside, there are no Alquist-Priolo zones. The project site does not contain any known fault lines and the potential for fault rupture or seismic shaking is low. Compliance with the California Building Code regulations will ensure that **no impacts** related to strong seismic ground will occur directly, indirectly and cumulatively.

ii. Strong seismic ground shaking?	☐	☐	☐	☒

6ii. Response: ***(Source: General Plan 2025 FPEIR Appendix E – Geotechnical Repor, and Soils Investigation prepared by John R. Byerly, Inc. in December 2008 and supplemented in May 2015t)***

No Impact. The Elsinore Fault Zone, located in the southern portion of the City's Sphere of Influence, has the potential to cause moderate to large earthquakes that would cause intense ground shaking in certain areas of the city. Peak ground acceleration and velocity at the project site deriving from a seismic event related to the Elsinore Fault Zone are not expected to exceed 0.12g and 10.0g, respectively, and the site has a modified Mercalli intensity (MMI) of 6.0. Peak spectral acceleration over a 3-second period should not exceed 0.08g during an Elsinore Fault Zone event, 0.12g over a 1-second period and 0.32g over a 0.3-second period. Seismic ground shaking resulting from an event related to the more distance San Jacinto fault would be considerably lower by all the measures previously discussed.

The accelerations expected within the project area are within the limits of current standard structural design requirements of the California Building Code. Because the proposed project complies with California Building Code regulations, impacts associated with strong seismic ground shaking will have **no impact** directly, indirectly and cumulatively.

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

6iii. Response: ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones, Figure PS-2 – Liquefaction Zones, General Plan 2025 FPEIR Figure PS-3 – Soils with High Shrink-Swell Potential, Appendix E – Geotechnical Report, and Soils Investigation prepared by John R. Byerly, Inc. in December 2008 and supplemented in May 2015)***

Less Than Significant Impact. The project site is located in an area with a potential moderate to high risk of liquefaction per the GP 2025 Liquefaction Zones Map – Figure PS-2. A preliminary soils report has been prepared to determine the soil properties and specific potential for liquefaction for the proposed development. Incorporation of the recommended design measures of the geotechnical study/preliminary soils report for compliance with the California Building Code regulations will ensure that impacts related to seismic-related ground failure, including liquefaction, are reduced to **less than significant impact** levels directly, indirectly and cumulatively.

iv. Landslides?	☐	☐	☐	☒

6iv. Response: ***(Source: General Plan 2025 FPEIR Figure 5.6-1 – Areas Underlain by Steep Slope, Appendix E – Geotechnical Report, Title 18 – Subdivision Code, Title 17 – Grading Code)***

No Impact. 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 General Plan 2025 Program Final PEIR. Therefore, there will be **no impact** related to landslides directly, indirectly and cumulatively.

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

6b. Response: ***(Source: General Plan 2025 FPEIR 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 SWPPP)***

Less Than Significant Impact. Erosion and loss of topsoil could occur as a result of the project. 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, with the erosion control standards for which all development activity must comply (Title 18), the Grading Code (Title 17) also requires the implementation of measures designed to minimize soil erosion. Compliance with State and Federal requirements as well as with Titles 18 and 17 will ensure that soil erosion or loss of topsoil will be **less than significant impact** directly, indirectly and cumulatively.

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, General Plan 2025 FPEIR 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, Appendix E – Geotechnical Report, and Soils Investigation prepared by John R. Byerly, Inc. in December 2008 and supplemented in May 2015)***

Less Than Significant Impact. The general topography of the subject site is relatively flat, with an average 2-4% slope and drains to the west. Compliance with the City's existing codes and the policies contained in the General Plan 2025 help to ensure that impacts related to geologic conditions are reduced to **less than significant impacts** level directly, indirectly and cumulatively, as discussed below:

Landslides: See response 6(a)(iv).
Lateral spreading: Adherence to the City's Grading and Subdivision Codes as well as the California Building Code in the design of this project will prevent lateral spreading. The project site is generally flat and thus exhibits relatively low susceptibility to lateral spreading.
Subsidence: The soils investigation prepared for this project indicates that, based upon the soil properties of the subject site, subsidence could occur. However, compliance with applicable provisions of the California Building Code, Title 18 (Grading) and adherence to the recommendations found in the soils investigation will reduce the impact of soil subsidence to less than significant levels.
Liquefaction: See response 6(a)(iii).
Collapse: Adherence to the City's grading and building requirements will ensure that the property is adequately prepared to prevent the collapse of the graded pad and/or slopes.

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: General Plan 2025 FPEIR 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 E – Geotechnical Report, and California Building Code as adopted by the City of Riverside and set out in Title 16 of the Riverside Municipal Code, and Soils Investigation prepared by John R. Byerly, Inc. in December 2008 and supplemented in May 2015)***

No Impact. The project is located on a site that does not have expansive soils and therefore there will be **no impact** directly, indirectly or cumulatively.

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: General Plan 2025 FPEIR Figure 5.6-4 – Soils, Table 5.6-B – Soil Types, and Percolation Report prepared by John R. Byerly, Incorporated in October 2015)*** **No Impact.** The proposed project will be served by sewer infrastructure. Therefore, the project will have **no impact.**

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: GHG Analysis prepared by LSA Associates in February 2015, Riverside Restorative Growthprint Climate Action Plan [RRG-CAP] Figure B.2-1 – Communitywide Baseline Emissions and Figure B.2-2 – Communitywide GHG Emissions by Sector, RRG-CAP Section 3.1 – Reduction Measures)***

Less Than Significant Impact. A numerical threshold for determining the significance of greenhouse gas emissions in the South Coast Air Basin (Basin) has not been established by the South Coast Air Quality Management District (SCAQMD). As an interim threshold based on guidance provided in the CAPCOA *CEQA and Climate Change* handbook, a non-zero threshold approach based on Approach 2 of the handbook has been used. Threshold 2.5 (Unit-Based Thresholds Based on Market Capture) establishes a numerical threshold based on capture of approximately 90 percent of emissions from future development. The latest threshold developed by SCAQMD using this method is 10,000 metric tons carbon dioxide equivalent ($MTCO_2e$) per year for industrial projects.14 This threshold is based on the review of 711 CEQA projects. This threshold will be utilized herein to determine if emissions of greenhouse gases from this project will be significant.

The proposed project will include activities that emit greenhouse gas emissions over the short- and long-term. While one project could not be said to cause global climate change, individual projects contribute cumulatively to greenhouse gas emissions that result in climate change. A greenhouse gas emissions inventory was prepared for the project using under business-as-usual conditions and is analyzed below.

Project Activities Which Generate GHG Emissions

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 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_20. 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% of the total electricity used in the state per year (California Energy Commission, *Water Energy Use in California,* 2004).
- **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. 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.

The table below lists the annual GHG emissions estimated to be produced by project activities in the construction phase. Total GHG emissions for the whole construction process are expected to be 660 $MTCO_2e$.

Construction Phase	Total Regional Pollutant Emissions, MT/yr			
	CO_2	CH_4	N_2O	CO_2e
Site Preparation	9.8	0.0028	0	9.9
Grading	30	0.0088	0	31
Building Construction	540	0.059	0	550
Architectural Coating	49	0.0039	0	49
Paving	23	0.0064	0	23

Source: LSA Associates, February 2015

The GHG emission estimates presented in the table below show the emissions associated with the level of development envisioned by the proposed project, as calculated using Version 2013.2.2 of the California Emissions Estimator Model (CalEEMod). The project is expected to produce 6,300 MTCO2e per year, or 0.0063 million metric tons of CO_2 equivalent per year.

Source	Pollutant Emissions, MT/yr					
	Bio-CO_2	NBio-CO_2	Total CO_2	CH_4	N_2O	CO_2e
Construction emissions (amortized over 30 years)	0	22	22	0.0027	0	22
Operational Emissions						
Area sources	0	0.0071	0.0071	0.00002	0	0.0075
Energy sources	0	2,500	2,500	0.053	0.018	2,500
Mobile sources	0	3,000	3,000	0.12	0	3,000
Waste sources	69	0	69	4.1	0	160
Water Usage	20	500	520	2.1	0.051	180
Total Project Emissions	**89**	**6,000**	**6,100**	**6.4**	**0.069**	**6,300**

Source: LSA Associates, February 2015

For comparison, the existing emissions from the entire SCAG region are estimated to be approximately 176.79 million metric tons of CO_2 equivalent per year. The proposed project thus represents an increase in regional GHG emissions of approximately 0.00004% annually. According to the Riverside Restorative Growthprint Climate Action Plan Table B.2-3 (Communitywide Business-as-Usual Emissions Forecast), the City of Riverside's estimated annual GHG emissions were equivalent to 2,617,540 metric tons of CO_2 per year. At 6,300 $MTCO_2e$/yr, this project's estimated annual GHG emissions represent an increase of 0.0024% over the citywide baseline. Further, the expected annual GHG emissions associated with the project are less than the recommended SCAQMD threshold of 10,000 $MTCO_2e$/yr for industrial projects.

As a user of electricity generated and sourced by Riverside Public Utilities, it is likely that the project's GHG emissions deriving from energy use will decline over the life of the project as RPU pursues its Renwable Portfolio Standard of 33% retail electricity sales from renewable sources by 2020 (RRG-CAP Reduction Measure SR-1). Taken together, these factors lead to the conclusion that the project will have a **less than significant impact** on GHG emissions directly, indirectly and cumulatively.

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: Greenhouse Gas Emissions Analysis prepared by LSA Associates in February 2015; Riverside Restorative Growthprint Climate Action Plan)***

Less Than Significant Impact. The SCAQMD supports State, Federal and international policies to reduce levels of ozone depleting gases through its Global Warming Policy and rules and has established an interim Greenhouse Gas (GhG) threshold. As indicated in Question A, above, the project would comply with the City's General Plan policies and State Building Code provisions designed to reduce GhG emissions. As a user of electricity generated and sourced by Riverside Public Utilities, it is likely that the project's GHG emissions deriving from energy use will decline over the life of the project as RPU pursues its Renwable Portfolio Standard of 33% retail electricity sales from renewable sources by 2020 (RRG-CAP Reduction Measure SR-1).

In addition, the project would comply with all SCAQMD applicable rules and regulations during construction the construction phase and, as demonstrated in the GHG Analysis, will not interfere with the State's goals of reducing GhG emission to 1990 levels by the year 2020 as stated in AB 32 and an 80 percent reduction in GhG emissions below 1990 levels by 2050 as stated in Executive Order S-3-05. Based upon the prepared Climate Change Analysis for this project and the discussion above, the project will not conflict with any applicable plan, policy or regulation related to the reduction in the emissions of GhG and thus a **less than significant impact** will occur directly, indirectly and cumulatively in this regard.

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: General Plan 2025 Public Safety Element, GP 2025 FPEIR, California Health and Safety Code, Title 49 of the Code of Federal Regulations, California Building Code, Riverside Fire Department EOP, 2002 and Riverside Operational Area – Multi-Jurisdictional LHMP, 2004 Part 1, OEM's Strategic Plan)***

Less Than Significant Impact. The proposed project does not directly involve the transport, use, or disposal of any hazardous material because the use is a speculative light industrial development, and no specific land uses are contemplated at this time. Future tenants of the proposed project will not necessarily, but may, engage in the routine transport, use, or disposal of hazardous materials or wastes. If hazardous materials are proposed on site in the future, they will be subject to state and federal regulation for permitting and inspection by the Hazardous Materials Division of the City Fire Department. The General Plan 2025 Public Safety Element also specifies a number of policies regarding the safe handling, transport and disposal of hazardous materials, with which the project will comply (GP 2025 Policies PS-3.1 through 3.5).

Widely used hazardous materials common at any warehouse land use include paints and other solvents, cleaners, automobile fluids, and pesticides. The remnants of these and other products are disposed of as household hazardous waste (HHW) that includes used motor oil, dead batteries, electronic wastes, and other wastes that are prohibited or discouraged from being disposed of at local landfills. Use of common household hazardous materials and their disposal does not present a substantial health risk to the community. Impacts associated with the routine transport, use of hazardous materials or wastes will be **less than significant**.

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: General Plan 2025 Public Safety Element, GP 2025 FPEIR Tables 5.7 A – D, California Health and Safety Code, Title 49 of the Code of Federal Regulations, California Building Code, City of Riverside's EOP, 2002 and Riverside Operational Area – Multi-Jurisdictional LHMP, 2004 Part 1, OEM's Strategic Plan)***

Less Than Significant Impact. Construction of the proposed project and future tenant improvements will require the use and transport of hazardous materials such as asphalt, paints, and other solvents. Construction activities could also produce hazardous wastes associated with the use of such products. Construction of the proposed project requires ordinary construction activities and will not require a substantial or uncommon amount of hazardous materials to complete.

Compliance with existing regulations would ensure that the public would not be exposed to any unusual or excessive risks related to hazardous materials as a result of this project. As such, impacts associated with the upset and accident conditions involving the release of hazardous materials into the environment would be a **less than significant impact** directly, indirectly and cumulatively.

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 and Education Elements, GP 2025 FPEIR Table 5.7-D - CalARP RMP Facilities in the Project Area, 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. The project site is located approximately 650 feet north of the Alvord Continuation High School Campus on Pierce Street. Although a limited amount of hazardous materials will be transported and used at the project site during the construction phase of the proposed development, all construction activities and businesses that handle or have on-site transportation of hazardous materials are required to comply with the provisions of the City's Fire Code and any additional regulations as required in the California Heath and Safety Code Article 1 Chapter 6.95 for the Business Emergency

Plan. Compliance with existing Federal and State regulations impacts associated with the exposure of schools to hazardous materials caused by this project will be a **less than significant impact** directly, indirectly and cumulatively.

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, GP 2025 FPEIR Tables 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. A review of hazardous materials site lists compiled pursuant to Government Code Section 65962.5 found that the project site is not included on any such lists. Therefore, the project would have **no impact** to creating any significant hazard to the public or environment directly, indirectly or cumulatively.

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)***

No Impact. The project site is not located within any airport land use plan area or compatibility zone. Therefore, the project will have **no impact** resulting in a safety hazard for people residing or working in the project area directly, indirectly or cumulatively.

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)***

No Impact. Because the proposed project is not located within proximity of a private airstrip, and does not propose a private airstrip, the project will not expose people residing or working in the City to excessive noise levels related to a private airstrip and would have **no impact** directly, indirectly or cumulatively.

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

8g. Response: ***(Source: GP 2025 FPEIR Chapter 7.5.7 – Hazards and Hazardous Materials, City of Riverside's EOP, 2002 and Riverside Operational Area – Multi-Jurisdictional LHMP, 2004 Part 1, and OEM's Strategic Plan)***

Less Than Significant Impact. The project will be served by existing, fully improved streets (Magnolia Avenue and Pierce Street) as well as a network of on-site driveways and fire access lanes. All streets have been designed to meet the Public Works and Fire Departments' specifications. As part of the project's construction, a temporary street closing may be necessary. Any street closing will be of short duration so as not to interfere or impede with any emergency response or evacuation plan. Therefore, the project will have a **less than significant impact** directly, indirectly and cumulatively to an emergency response or evacuation plan.

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

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 proposed project is located in an urbanized area where no wildlands exist and the property is no located within a Very High Fire Severity Zone (VHFSZ) or adjacent to wildland areas or a VHFSZ; therefore **no impact** regarding wildland fires either directly, indirectly or cumulatively from this project will occur.

9. HYDROLOGY AND WATER QUALITY. Would the project:				
a. Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐

9a. Response: ***(Source: GP 2025 FPEIR Table 5.8-A – Beneficial Uses Receiving Water and Approved Project-Specific Preliminary Water Quality Management Plan prepared by Thienes Engineering in January 2016)***

Less Than Significant Impact. The Santa Ana Regional Water Quality Control Board (RWQCB) administers the National Pollutant Discharge Elimination System (NPDES) permit in the region. The City is required to implement all pertinent regulations of the program to control pollution discharges from new development. These regulations reduce NPS pollutant loading through the implementation of Best Management Practices (BMPs) and other control measures that minimize or eliminate pollutants from urban runoff, thereby protecting downstream water resources. BMPs implemented to address commercial pollutant sources generally involve maintenance of storm drain facilities, parking lots, vegetated areas, and educational programs. Violations of water quality standards due to urban runoff can be prevented through the continued implementation of existing regional water quality regulations. The proposed project would not interfere with the implementation of NPDES water quality regulations and standards.

The proposed project would disturb approximately 14.74 gross acres of land and therefore will be subject to National Pollutant Discharge Elimination System (NPDES) permit requirements during construction activities in addition to standard NPDES operational requirements. The proposed project will require submittal to the local reviewing agency, the Santa Ana RWQCB, a Storm Water Pollution Prevention Plan (SWPPP) that will include BMPs protects water quality during construction activities. The City will require BMPs as listed in the California Stormwater Quality Association's California Storm Water Best Management Practice Handbooks. These measures, which include owner education, activity restrictions, parking lot sweeping, basin inspection, landscaping, roof runoff controls, efficient irrigation, slope and channel protection, storm drain signage, trash racks, and trash storage areas, will reduce pollutants in storm water runoff and reduce non-storm water discharges to the City's storm water drainage through controlling the discharge of pollutants. Operational BMPs will be identified in a Stormwater Runoff Management Plan that will be submitted to the City for review and approval. Impacts related to violation of water quality standards will be **less than significant** with implementation of these existing regulations.

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 Table PF-1 – 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,)***

No Impact. The proposed project is located within the Arlington Water Supply Basin. The project is required to connect to the City's sewer system and comply with all NPDES and WQMP requirements that will ensure the proposed 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.

The proposed project will construct impervious pavement with areas of landscaping as well as one water quality basin that could provide for similar levels of groundwater recharge compared to the existing conditions. The site does not accommodate any substantial natural drainage or managed recharge areas. The project site is surrounded by multi-tenant commercial and light industrial complexes to the west, north and east, and by flood control and railroad infrastructure to the south, with single family residential neighborhoods beyond. The City of Riverside is served by City of Riverside Public Utilities (RPU). Domestic water is provided via groundwater basins. According to the General Plan EIR, recharge areas for the primary groundwater aquifer utilized by RPU is located in other jurisdictions. Therefore, development within the City of Riverside will not affect groundwater recharge. The project site is not the location of an existing groundwater spreading basin and will not significantly change the runoff from the project that may otherwise recharge groundwater basins; therefore, impacts to groundwater recharge will be less than significant. Therefore, there will be **no impact** to groundwater supplies and recharge either directly, indirectly or cumulatively.

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

9c. Response: ***(Source: Preliminary grading plan, and Project-Specific Preliminary Water Quality Management Plan prepared by Thienes Engineering in January 2016)***

Less Than Significant Impact. The project is subject to NPDES requirements; areas of one acre or more of disturbance are subject to preparing and implementing a Storm Water Pollution Prevention Plan (SWPPP) for the prevention of runoff during construction. Further, existing drainage patterns on the project site, which has been designed with minimal grading, flows from east to west; proposed drainage patters after construction of the project mimic the pre-development conditions. Erosion, siltation and other possible pollutants associated with long-term implementation of projects are addressed as part of the Water Quality Management Plan (WQMP) and grading permit process. Proposed on-site low impact development (LID) principles include the implementation of BMPs including landscaping and an infiltration basin. The Project-Specific Preliminary Water Quality Management Plan (PWQMP) (See Appendix **F**) identifies proposed drainage management areas and the effectiveness of proposed BMPs.

According to the PWQMP, the design capture volume required to capture on-site runoff is 24,875 cubic feet, for a design storm depth of 0.62 inches. The proposed infiltration basins will capture approximately 49,782 cubic feet of runoff and infiltrate at a rate of ten inches per hour. According to the WQMP, proposed LID BMPs fully address all drainage management areas and no alternative compliance measures are required for the proposed project. The design of the proposed project will not substantially alter drainage patterns in the area to the extent that substantial on- or off-site erosion or siltation will occur; therefore, impacts will be **less than significant**.

d. 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?	☐	☐	☒	☐

9d. Response: ***(Source: Preliminary grading plan, and Project Specific Preliminary Water Quality Management Plan prepared by Thienes Engineering in January 2016)***

Less Than Significant Impact. As was previously detailed in Response 9c herein, the project will not result in an alteration of the drainage pattern or increase in flows that would result in flooding on- or off-site because all on- and off-site drainage will be controlled by storm drain and flood control facilities. The proposed project's infiltration basin has been designed to accommodate on-site runoff and infiltrate runoff into the soil at a rate of ten inches per hour. Impacts to flooding on- or off-site as a result of a change in the drainage pattern or increase in runoff will thus be less than significant.

e. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐

9e. Response: ***(Source: Preliminary Grading Plan, and Project Specific Preliminary Water Quality Management Plan prepared by Thienes Engineering in January 2016)***

Less Than Significant Impact. The proposed development will increase the amount of impervious surface area in the City. This impervious area includes paved parking areas, sidewalks, roadways, and building rooftops; all sources of runoff that may carry pollutants and therefore has the potential to degrade water quality. This development has been required to prepare and implement a WQMP. Preliminary BMP's, in compliance with the WQMP, have been approved by Public Works. Expected stormwater pollutants will be treated through the incorporation of the site design, source control and treatment control measures specified in the project specific WQMP. As was previously detailed in Response 9c, project-related stormwater flows will be directed to the proposed infiltration basins and infiltrate into the soil. The proposed water quality function of the basin would reduce the amount of polluted runoff that would be conveyed into the ground water. Therefore, as the expected pollutants will be mitigated through the project site design, source control, and treatment controls already integrated into the project design, the project will not create or contribute runoff water exceeding capacity of existing or

planned stormwater drainage systems or provide substantial additional sources of polluted runoff and there will be a **less than significant impact** directly, indirectly or cumulatively.

f. Otherwise substantially degrade water quality?	☐	☐	☒	☐

9f. Response: ***(Source: Project Specific Preliminary Water Quality Management Plan prepared by Thienes Engineering in January 2016)***

Less Than Significant Impact. The project is over one are in size and is required to have coverage under 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. Furthermore, the City has ensured that the development does not cause adverse water quality impacts, pursuant to its Municipal Separate Storm System (MS4) permit through the project's WQMP.

The proposed development will increase the amount of impervious surface area in the City. This impervious area includes paved parking areas, sidewalks, roadways, and building rooftops; all sources of runoff that may carry pollutants and therefore has the potential to degrade water quality. This development has been required to prepare preliminary BMP's that have been reviewed and approved by Public Works. Final BMP's will be required prior to grading permit issuance. The purpose of this requirement is to insure treatment BMP's are installed/constructed as part of the project so that the pollutants generated by the project will be treated in perpetuity. Therefore, impacts related to degrading water quality are **less than significant** directly, indirectly and cumulatively.

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 Maps 06065C-0715G)***

No Impact. This project does not involve the construction of housing. There will be **no impact** caused by this project directly, indirectly or cumulatively as it will not place housing within a 100-year flood hazard area.

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, and FEMA Flood Hazard Maps 06065C-0715G)***

No Impact. The project site is not located within or near a 100-year flood hazard area as depicted on General Plan 2025 Program FPEIR Figure 5.8-2 – Flood Hazard Areas and the National Flood Insurance Rate Map (Map Number 06065C-0715G, 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 and **no impact** will occur directly, indirectly or cumulatively.

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: General Plan 2025 Figure PS-4 – Flood Hazard Areas, and FEMA Flood Hazard Maps Number 06065C0715G)***

Less Than Significant. The project is located within the Cajalco Dam inundation area that may be affected in the event of a dam failure. In the event of a dam failure, first flow waters are expected to reach the site in approximately 25 minutes. Therefore, the project will place a structure within a dam inundation area that would expose people or structures to a significant risk of loss, injury or death as a result of the failure of a levee or dam.

The City Municipal Code, Title 16 Buildings & Construction, Chapter 16.18 Flood Hazard Area & Implementation of National Flood Insurance Program, Sec. 16.8050 requires new construction located in areas subject to flood hazards to employ enhanced construction methods to reduce the risk of damage in the event of flooding. Further, the State Civil Code Section 1103 through 1103.4 requires notification to those potentially affected of the risk involved in locating within a flood

hazard or dam inundation area. Thus, through compliance with the applicable provisions of local, state and federal regulations relating to flood hazards, the potential to place a structure within an area that would expose people or 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** directly, indirectly or cumulatively.

j. Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

9j. Response: ***(Source: GP 2025 FPEIR Chapter 7.5.8 – Hydrology and Water Quality)***

No Impact. Tsunamis are large waves that occur in coastal areas; therefore, since the City is not located in a coastal area, no impacts due to tsunamis will occur directly, indirectly or cumulatively.

Additionally, the proposed project site and its surroundings have generally flat topography and is 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 9 arroyos which transverse the City and its sphere of influence; therefore, **no impact** potential for seiche or mudflow exists either directly, indirectly or cumulatively.

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, Magnolia Avenue Specific Plan, Project site plan, City of Riverside GIS/CADME map layers)***

No Impact. The project is an infill project currently served by fully improved public streets and other infrastructure. The project involves the subdivision of the project site into seven parcels for financial purposes. The project will be governed by a Master Property Association which addresses shared maintenance and reciprocal access and parking. This financial subdivision, which does not create any new public streets or otherwise alter traffic circulation patterns in the immediate area, will result in a project that is visually and functionally one complex. Further, the project is consistent with the General Plan 2025, the Zoning Code, the Subdivision Code and the Citywide Design and Sign Guidelines, as well as the Magnolia Avenue Specific Plan Policies applicable to the La Sierra Subdistrict. Therefore, **no impact** directly, indirectly or cumulatively to an established community will occur.

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, General Plan 2025 Figure LU-10 – Land Use Policy Map, Table LU-5 – Zoning/General Plan Consistency Matrix, Magnolia Avenue Specific Plan, Title 19 – Zoning Code, 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)***

Less Than Significant Impact. The project is an infill project consistent with the General Plan 2025 and the Magnolia Avenue Specific Plan, La Sierra Subdistrict. The proposed project consists of seven light industrial and warehouse buildings ranging in size from 17,931 to 129,911 square feet, totaling 280,598 square feet on a 14.74-acre site. The project would not conflict with any plans or programs adopted to avoid or mitigate an environmental impact because it is consistent with the objectives of the 2025 General Plan and the mitigating policies of the General Plan EIR, as summarized below.

The vision set forth by the City of Riverside in the General Plan to guide industrial development through year 2025 focuses on the attraction and retention of "clean" industrial uses (General Plan 2025, *Preservation of Industrial Land*, pages LU-38 through LU-39). Objectives LU-24 through LU-25, establish the overarching goals, objectives and policies for Riverside's industrial land. The City is clear in its resolve to support clean, economically rich enterprises by limiting any redesignation or rezoning of land from industrial use. Avoid encroachments of incompatible land uses within close proximity of industrial land. . . (Policy LU-24.2)" to ". . . ensure that future uses are in concert with the City's wider policy goals . . .(Policy 24.1)" for industrial and business/office park uses.

The project site zoning is consistent with the site's General Plan Land Use Designation of B/OP – Business/Office Park. The project site is located in the Business and Manufacturing Park Zone (BMP), which is consistent with the General Plan designation by permitting a ". . . wide variety of industrial, manufacturing, and support uses . . ." in ". . . a district for low-intensity and low-impact industrial, office, and related uses (Section 19.130.010(A))". The Zoning Code specifically prohibits heavier industrial uses that generate odors (e.g. animal slaughtering, fat rendering, wood distillation), noise (e.g. gravel excavation, automobile wrecking), dust or smoke (e.g. petroleum refining, steel mills, sand excavation), and other causes of nuisance (Sections 19.130.025(A)(1) through (24)); further, the BMP zone further limits the permitted industrial uses on the project site (as opposed to the broader range of allowed uses in the General Industrial Zone), consistent with the policies of the General Plan.

The proposed building is a speculative shell that has the potential to accommodate a variety of uses permitted within the BMP Zone, including; warehousing, light manufacturing and goods processing, and ancillary office uses. As is documented in this Initial Study, the proposed building will not result in significant impacts to the environment including those related to odors, dust, smoke, noise, or vibration. The proposed project is notably permitted, by right, in the BMP zone and by extension is consistent with the General Plan because it will:

1. Accommodate a variety of manufacturing, office, or warehousing uses;
2. Not generate nuisance or other impacts;

3. Be located in an existing industrial area on a currently underutilized site; and
4. Be physically developable on the site pursuant to City zoning requirements.

The City recognizes that the project is permitted in the BMP zone and is consistent with the General Plan; therefore, any applicable General Plan EIR mitigating policies or measures will be applied to the project, as is standard practice for all development proposals subject to environmental review. The Project Proponent has not requested any General Plan amendments, variances, or other requests that could modify or recuse the project from the applicability of required mitigation. General Plan 2025 EIR mitigation measures are designed to avoid cumulative and site specific environmental impacts in concert with other applicable regulations required to mitigate or avoid environmental impacts. Impacts will be less than significant based on these findings.

For these reasons, this project will have **less than significant impacts** on an applicable land use plan, policy or regulation directly, indirectly or cumulatively.

c. Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☒	☐

10c. Response: ***(Source: General Plan 2025, General Plan 2025 – Figure LU-10 – Land Use Policy Map, Western Riverside County MSCHP, Phase 2 Burrowing Owl Survey and Report prepared by Chambers Group in June 2006 and supplemented November 2015)***

Less Than Significant Impact. The project site is located within the Western Riverside County MSHCP. The City of Riverside, as the lead agency for the project, requires that the project comply with the Western Riverside County MSHCP. The MSHCP includes a program for the collection of development mitigation fees, policies for the review of projects in areas where habitat must be conserved and policies for the protection of riparian areas, vernal pools, and narrow endemic plants. It also includes requirements to perform plant, bird, reptile, and mammal surveys in certain areas. The primary intent of the MSHCP is to provide for the conservation of a range of plants and animals and in return, provide take coverage and mitigation for projects throughout Western Riverside County to avoid the cost and delays of mitigating biological impacts on a project-by-project basis. It would allow the incidental take (for development purposes) of species and their habitat from development.

The MSHCP identifies that the project area is located in a burrowing owl survey area. Therefore, as required, surveys were conducted to assess potential habitat and to ensure that no burrowing owl or narrow endemic plant species have potential to occur on the project site. The biological field surveys conducted in June 2006 and November 2015 revealed that no suitable burrowing owl habitat exists on the project site. As a precaution, a preconstruction survey, to be conducted by a qualified biologist, will be required to be conducted 14 days prior to the commencement of grading or other ground-disturbing activities to assess any new evidence of burrowing owl habitat on the site. Further, the project will comply with measures identified in the MSHCP and will not conflict with the MSCHP. Impacts will be **less than significant** with implementation of standard MSHCP measures and proposed conditions of approval.

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: General Plan 2025 Figure – OS-1 – Mineral Resources, California Division of Mines and Geology Surface Mining and Reclamation Policies and Procedures)***

Less Than Significant Impact. State-classified MRZ-2 and MRZ-4 Mineral Resource Zones are shown in Figure 5.10-1, Mineral Resources of the GP 2025 FPEIR. The proposed project is located in MRZ-4, which indicates that the presence or absence of mineral resources under the site are not known. The California Department of Conservation Division of Mines and Geology emphasizes that this does not necessarily mean that the presence of mineral resources at the site is unlikely; rather just that there is insufficient information available to determine presence or absence.

However, mining operations in the City have not been active for decades. According to the Riverside General Plan EIR, the maximum potential for mineral extraction has occurred; therefore the proposed project would not result in any loss of availability of any known or unknown mineral resource than currently already occurs. There are no known mining operations within the vicinity of the project site and surrounding land uses would preclude mining from occurring. Further, the designated land uses for the project site and for the surrounding area are incompatible for mining operations. **Less than significant** impact will occur.

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: General Plan 2025 Figure – OS-1 – Mineral Resources)***

No Impact. The GP 2025 FPEIR determined that there are no specific areas with the City of Sphere Area which have locally-important mineral resource recovery sites and that the implementation of the General Plan 2025 would not significantly preclude the ability to extract state-designated resources. The proposed project is consistent with the General Plan 2025. Therefore, there is **no impact**.

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: General Plan Figure N-1 – 2003 Roadway Noise, Figure N-2 – 2003 Freeway Noise, Figure N-3 – 2003 Railway Noise, Figure N-5 – 2025 Roadway Noise, Figure N-6 – 2025 Freeway Noise, Figure N-7 – 2025 Railroad Noise, Figure N-10 – Noise/Land Use Noise Compatibility Criteria, FPEIR Table 5.11-I – Existing and Future Noise Contour Comparison, Table 5.11-E – Interior and Exterior Noise Standards, Appendix G – Noise Existing Conditions Report, Title 7 – Noise Code, and Project Specific Noise Impact Analysis prepared by LSA Associates in February 2015)***

Less Than Significant with Mitigation. 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 the City's Municipal Code. A Noise Impact Analysis (Appendix D) was prepared for the project by LSA Associates in February 2015. The analysis concludes that the project has the potential to expose persons to or generate of noise levels in excess of standards established in the General Plan 2025 and Noise Code (Title 7).

The closest sensitive receptors to the project site are the single-family residences approximately 200 feet south of the project site's southern boundary, across the Riverside County Flood Control channel and the BNSF Railroad right-of-way. 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 and commercial 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. For the purposes of the noise and vibration impact analysis, the single-family residential uses with outdoor active use areas located to the southeast 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 provisions in its Municipal Code to control loud, unnecessary, and unusual nuisance noises by establishing standards for maximum acceptable levels of both interior and exterior noise for various land uses. 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.

Construction Impacts. Short-term noise impacts will be associated with 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. The City's Noise Code (Title 7) restricts construction activities to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday, 8:00 a.m. to 5:00 p.m. on Saturdays, and are prohibited on Sundays and federal holidays. Construction activities conducted in compliance with these provisions of the Noise Code are exempt from the established sound level limits set forth in Tables 7.25.010A (Exterior Noise Standards) and 7.30.015 (Interior Noise Standards) (RMC 7.35.020[G]); therefore, construction activities related to the project will not result in the exposure of persons to or generation of noise in excess of established standards and **no impact** will occur.

Operational Impacts. 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 commercial- and industrial-related noise sources that currently exist adjacent to the north, east and west of the project site.

The proposed on-site industrial uses will generate noise from slow-moving trucks on the driveways, 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 west side of Building 6 and the south sides of Buildings 5 and 7, which could potentially affect existing residential uses located south of the project site.

Slow-Moving Trucks on Driveways. Large trucks entering and leaving the project site at low speeds on the driveways would result in a maximum noise level of 75 dBA L_{max} at 50 feet. This nosie level is used for this analysis. The closest residences to the south of the project site are approximately 215 feet from the driveway along the south side of Building 5 and would be potentially exposed to truck pass-by noise intermittently reaching 62 dBA $L_{max.}$ These existing residences are within 100 feet of the BNSF Railroad right-of-way and are exposed to maximum train pass-by noise ranging from 70 to 90 dBA L_{max}, which is higher than from the truck passby noise along the project's southern driveway. Depending on the number of trucks driving by on the southern project driveway and the times they would occur, the effects of the 24-hour weighted average CNEL would vary. However, it is not expected that, by the slow-moving trucks on the southern driveway alone, the CNEL level would reach or exceed those resulting from passing trains on the BNSF tracks. No significant operational noise impacts would occur for residences to the south. However, as an extra precaution, **Mitigation Measure MM NOI-1** will require the construction of a sound wall with a minimum height of 8 feet along the south side of the project boundary between buildings 4 and 7.

Loading/Unloading Activities at Docks. Trucks at the on-site dock loading and unloading areas would result in a maximum noise level similar to noise readings from loading and unloading activities for other industrial projects, which generate a noise level of 75 dBA L_{max} at 50 feet. Based on the site plan, the closest residences to the south of the project site are approximately 370 feet from the nearest loading areas facing south on Building 5, and would potentially be exposed to truck loading/unloading noise intermittently reaching 57 dBA L_{max}. Similarly, docks at Building 6 are located approximately 500 feet from the nearest residences to the south. Loading docks at Buildings 1 and 2 would be partially blocked by buildings 3 and 4 to the south; docks at Buildings 3, 4 and 7 are facing north and activity inside the loading dock would be blocked by the building itself.

Although a typical truck unloading process takes an average of 10 to 15 minutes, this maximum noise level occurs in a much shorter period of time (i.e., in only a few minutes). It is not expected that truck loading/unloading activities would result in this maximum noise level lasting more than 5 minutes in any hour when it occurs. Depending on the number of trucks on the loading docks with loading/unloading operations and the times they would occur (during day, evening or nighttime hours) effects to the 24-hour weighted CNEL levels would vary. However, it is not expected that, by the loading/unloading operations on the docks alone, the CNEL level would reach or exceed those levels resulting from passby train traffic on the BNSF tracks. Implementation of **Mitigation Measure MM NOI-1** will require the construction of a minimum 8-foot-high sound wall along the south side of the project boundary between buildings 4 and 7 to further reduce potential noise impacts from loading and unloading activities to less than significant.

Parking Lot Activity Noise. The representative parking lot activities, such as door slamming, engine starting and slow-moving vehicles, would generate approximately 60 to 70 dBA L_{max} at 50 feet. The closest off-site residences to the south that are approximately 215 feet away from the driveway and parking area to the south of Building 5 would be exposed to noises from the project's parking areas ranging from 47 to 57 dBA Lmax from the nearest parking lot activities. With implementation of **Mitigation Measure MM NOI-1**, no significant impacts related to parking lot activity will occur.

The following mitigation measure will ensure that impacts to nearby sensitive receptors related to construction and operational activities associated with the project will be reduced to a level that is **less than significant** either directly, indirectly or cumulatively:

Mitigation Measure NOI-1: Operational Noise. The project shall incorporate the construction of a solid noise barrier wall a minimum 8 feet in height along the southern project boundary spanning from Building 4 to Building 7 to reduce noise impacts to sensitive receptors located to the south of the project site.

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

12b. Response: ***(Source: Project Specific Noise Impact Analysis prepared by LSA Associates in February 2015; 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)***

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. Construction on the project site would result in the exposure of persons to excessive groundborne vibration or groundborne noise levels. Groundborne vibration during construction activity is temporary and would cease to occur after project construction is completed.

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 12b.A. The criteria presented in Table 12b.A 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 12b.B 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 12b.A: 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]	footnote[4]	footnote[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 12b.B: 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

The proposed project would require the use of excavators, scrapers and graders during the grading process, as well as a bulldozer and other construction equipment. As shown in Table 12b.C, a large bulldozer would generate a peak particle velocity (PPV) of approximately 0.089 inches per second when measured at 25 feet, while a loaded truck would generate 0.076 PPV (in/sec) at 25 feet. Table 12b.C also shows that caisson drilling and a jackhammer would generate 0.089 and 0.035 PPV (in/sec), respectively, when measured at 25 feet.

Table 12b.C: 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

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 groundborne vibration problems at some distance from the source. Other 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, sandly soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

Regarding the potential for building damage, Table 12b.C shows that vibration levels from construction equipment and activities, including bulldozers, drilling, trucks and jackhammers, would be less than 0.1 in/sec at 25 feet from the project site and lower than the PPV of 0.2 in/sec vibration damage criteria at the nearest sensitive uses for nonengineered timber and masonry buildings (Table 12b.B). For new residential buildings, the vibration damage potential threshold recommended by the California Department of Transportation (Caltrans) is 1 in/sec PPV from transient sources (such as pile driving or blasting). Caltrans also states that it takes at least 0.9 in/sec PPV for the human response to be strongly perceptible, or 0.25 in/sec to be distinctly perceptible. The nearest residences are more than 200 feet to the south, and no commercial or industrial buildings are within 100 feet of the project construction area. None of the predicted construction-related vibration levels (all below 0.1 in/sec PPV) for sensitive uses in the project vicinity would reach either the FTA or Caltrans established threshold levels. Thus, no significant vibration impacts are anticipated.

Similarly, regarding human perception of vibration, bulldozers and other heavy-tracked construction equipment generate approximately 92 velocity decibels (VdB) of groundborne vibration when measured at 50 feet (FTA 2006). According to Caltrans, the vibration level at 100 feet is approximately 6 VdB lower than the vibration level at 50 feet. Vibration at 200 feet from the source is more than 6 VdB lower than the vibration level at 100 feet, or more than 12 VdB lower than the vibration level at 50 feet. Thus, receptors at 200 feet from the construction activity may be exposed to groundborne vibration up to 80 VdB. Since the nearest residential uses, located approximately 200 feet to the south of the southerly project boundary, they would not be exposed to groundborne noise or vibration exceeding 80 VdB deriving from construction activity, thus impacts will be **less than significant**.

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, and Project Specific Noise Impact Analysis prepared by LSA Associates in February 2015)***

Less Than Significant Impact. The primary existing noise sources in the project area are transportation facilities. Vehicular traffic along Magnolia Avenue, Pierce Street and other local streets is the dominant source of ambient noise. Portions of the project site are also located within the 60- and 65-dB CNEL contours for freeway noise related to State Route 91 approximately 830 feet to the north, and the entire site is situated within the 70-dB CNEL railroad noise contour due to the BNSF rail right-of-way to the south of the project site. Although individual activity associated with the proposed project may generate additional noise, these noise levels will be compatible with noise levels generated by other commercial- and light industrial-related noise sources that currently exist to the west, north and east of the project site.

A substantial permanent increase in ambient noise levels associated with the proposed project would occur if the proposed project would cause noise levels to increase by 3 dBA or more. An increase or decrease in noise level of at least 5 dBA is required before any noticeable change in community response would be expected. Therefore, a clearly perceptible increase (+5 dB) in noise exposure of sensitive receptors could be considered significant (GP 2025 FPEIR).

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 obtained from the project's Traffic Impact Analysis (LSA 2016, Appendix E) were used to assess the potential traffic noise impacts along street segments in the project vicinity.

Tables 12c.A, 12c.B and 12c.C provide the traffic noise levels for the Existing Plus Project, Future Cumulative Without Project and Future Cumulative With Project traffic noise scenarios, respectively. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where CNEL noise contours are drawn (Noise Impact Analysis, Appendix D).

Table 12c.A: Existing Traffic Noise Levels With Project

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (ft)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase CNEL (dBA) 50 Feet from CL of Outermost Lane
Magnolia Ave west of Project Drwy #1	21,600	62	126	268	68.7	0.1
Magnolia Ave between Project Drwy #1 and Pierce St	23,000	65	131	279	69.0	0.4
Magnolia Ave east of Pierce St	25,700	69	141	301	69.5	0.3
Pierce St north of SR-91 WB Ramps	30,300	62	129	276	69.4	0.1
Pierce St between SR-91 EB ramps and Magnolia Ave	19,000	61	118	247	67.8	0.3
Pierce St between Magnolia Ave and Sterling Ave	10,000	<50	65	133	64.5	0.6
Pierce St south of Sterling Ave	8,000	<50	56	115	63.6	0.1

Source: LSA Associates, Inc., February 2015.
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
dBA = A-weighted decibels
EB = eastbound
SR-91 = State Route 91
WB = westbound

Table 12c.B: Future Cumulative Traffic Noise Levels Without Project

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (ft)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Magnolia Ave west of Project Drwy #1	21,600	62	126	268	68.7
Magnolia Ave between Project Drwy #1 and Pierce St	21,600	62	126	268	68.7
Magnolia Ave east of Pierce St	24,600	67	137	292	69.3
Pierce St north of SR-91 WB Ramps	30,600	62	130	278	69.4
Pierce St between SR-91 EB ramps and Magnolia Ave	18,200	59	115	240	67.6
Pierce St between Magnolia Ave and Sterling Ave	9,000	<50	60	124	64.1
Pierce St south of Sterling Ave	8,300	<50	57	118	63.7

Source: LSA Associates, Inc., February 2015.
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
dBA = A-weighted decibels
EB = eastbound
SR-91 = State Route 91
WB = westbound

Table 12c.C: Existing Traffic Noise Levels With Project

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (ft)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase CNEL (dBA) 50 Feet from CL of Outermost Lane
Magnolia Ave west of Project Drwy #1	22,100	63	128	272	68.8	0.1
Magnolia Ave between Project Drwy #1 and Pierce St	23,500	65	133	283	69.1	0.4
Magnolia Ave east of Pierce St	26,100	70	143	304	69.5	0.2
Pierce St north of SR-91 WB Ramps	30,700	63	130	278	69.4	0.0
Pierce St between SR-91 EB ramps and Magnolia Ave	19,400	61	119	250	67.9	0.3
Pierce St between Magnolia Ave and Sterling Ave	10,400	<50	65	136	64.7	0.6
Pierce St south of Sterling Ave	8,400	<50	57	119	63.8	0.1

Source: LSA Associates, Inc., February 2015.
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
dBA = A-weighted decibels
EB = eastbound
SR-91 = State Route 91
WB = westbound

Tables 12c.A and 12c.C show, in the Existing Plus Project and Future Cumulative With Project scenarios, traffic noise levels would increase up to 0.6 dBA over their corresponding without project levels. This range of traffic noise level increases is small and not discernible to the human ear in an outdoor environment. No project-related traffic noise impact on off-site land uses would occur.

For on-site proposed land uses, the 70 dBA and 65 dBA CNEL contour associated with Magnolia Avenue would extend to 65 feet and 133 feet from the roadway centerline, respectively. The 70 dBA CNEL contour associated with Pierce Street would continue to be confined to within the roadway right-of-way. The existing 60 and 65 dBA CNEL contours associated with SR-91 would not be affected by the project, nor would the existing 70 dBA CNEL contour for the BNSF rail right-of-way. The proposed on-site industrial uses are not considered noise-sensitive, and would be exposed to ambient traffic-related

noise levels below the City's acceptable noise level of 70 dBA CNEL for industrial uses associated with both Magnolia Avenue and Pierce Streets, in addition to existing ambient and periodic noise from nearby railways and freeways. Therefore, the project will have a **less than significant impact** on existing ambient noise levels.

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

12d. Response: ***(Source: FPEIR Table 5.11-J – Construction Equipment Noise Levels, Appendix G – Noise Existing Conditions Report and Project Specific Noise Impact Analysis prepared by LSA Associates in February 2015)***

Less Than Significant With Mitigation. As discussed in checklist response 12a, implementation of the proposed project will include construction activities that will result in a substantial temporary increase in ambient noise levels in the project site vicinity above levels existing without the project, but which will no longer occur once construction is completed. Sensitive receptors in the project vicinity are as close as 200 feet from proposed construction areas. Further, as discussed in checklist response 12a, the project will potentially expose nearby sensitive receptors to temporary increases in ambient noise related to on-site operational activities such as truck dock loading and unloading, slow-moving trucks and passenger vehicles circulating throughout the project and parking lot activity. Compliance with the hours specified in the City's Municipal Code regarding construction activities, as well as with construction of a minimum 8-foot solid sound barrier wall along the project's southern boundary (**Mitigation Measure NOI-1**), will reduce construction noise impacts on adjacent noise-sensitive land uses when construction occurs near the project boundaries. With implementation of **Mitigation Measure NOI-1**, the impact related to temporary or periodic increases in ambient noise levels will be **less than significant**.

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: ***(Source: General Plan 2025 Figure N-8 – Riverside and Flabob Airport Noise Contours, Figure N-9 – March ARB Noise Contour, Figure N-10 – Noise/Land Use Noise Compatibility Criteria, RCALUCP***

No Impact. The proposed project is not located within an airport land use plan or within two miles of a public airport or public use airport and as such will have **no impact** on people residing or working in the project area to excessive noise levels either directly, indirectly or cumulatively.

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, RCALUCP***

No Impact. Per the GP 2025 Program FPEIR, there are no private airstrips within the City that would expose people working or residing in the City to excessive noise levels. Because the proposed project consists of development anticipated under the General Plan 2025, is not located within proximity of a private airstrip, and does not propose a private airstrip, the project will not expose people residing or working in the City to excessive noise levels related to a private airstrip and would have **no impact** directly, indirectly or cumulatively.

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, FPEIR 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 project involves the construction of approximately 280,000 square feet of new warehousing and light industrial space that may directly induce population growth through the provision of new employment opportunities within the City, and may involve additional infrastructure that could indirectly induce population growth. 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 project is consistent with BMP zone and the B/OP land use designation established under the General Plan 2025 Program and the additional infrastructure is consistent with the General Plan 2025 Program. The General Plan 2025 Final PEIR determined that Citywide, future development anticipated under the General Plan 2025 Typical Growth scenario would not have significant population growth impacts. Because the proposed project is consistent with the General Plan 2025 Typical growth scenario and population growth impacts were previously evaluated in the GP 2025 FPEIR the project does not result in new impacts beyond those previously evaluated in the GP 2025 FPEIR; therefore, the impacts will be **less than significant** both directly and indirectly.

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

13b. Response: ***(Source: CADME Land Use 2003 Layer, site photographs)***

No Impact. The project will not displace existing housing, necessitating the construction of replacement housing elsewhere because the project site is proposed on vacant land that has no existing housing that will be removed or affected by the proposed project. Therefore, there will be **no impact** on existing housing either directly, indirectly or cumulatively.

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

13c. Response: ***(Source: CADME Land Use 2003 Layer, site photographs)***

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

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: FPEIR Table 5.13-B – Fire Station Locations, Table 5.13-C – Riverside Fire Department Statistics and Ordinance 5948 § 1)***

Less Than Significant Impact. There are 14 fire stations strategically placed throughout the City. The "first in" station to serve the project site will be Fire Station 8 located at 10692 Indiana Avenue, approximately 1.8 miles 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 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.

Since the project proposes light industrial, not 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 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**.

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)***

No Impact. The project consists of multi-tenant light industrial buildings totaling approximately 280,000 square feet on a 14.34-acre site. Adequate police facilities and services are provided by the Magnolia Neighborhood Policing Center located at 10450 Magnolia Avenue to serve this project.

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, there will be **no impact** on the demand for additional police facilities of services either directly, indirectly or cumulatively.

c. Schools?	☐	☐	☐	☒

14c. Response: ***(Source: FPEIR 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 edit as necessary)***

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.

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, GP 2025 FPEIR 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 Department, 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.

e. Other public facilities?	☐	☐	☐	☒

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

No Impact. The project consists of a multi-tenant light industrial and warehousing complex. Adequate public facilities and services, including libraries and community centers, are provided in the La Sierra Neighborhood to serve this project. In addition, with implementation of General Plan 2025 policies, compliance with existing codes and standards, and through Park and Recreation and Community Services and Library practices, there will be **no impacts** on the demand for additional public facilities or services either directly, indirectly or cumulatively.

15. RECREATION.				
a. Would the project 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, FPEIR 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 Department, 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.

b. Does the project 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: Project Plans)***

No Impact. The project will not include new recreational facilities or require the construction or expansion of recreational facilities. 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; there will be **no impact** directly, indirectly or cumulatively.

16. TRANSPORTATION/TRAFFIC. Would the project result in:				
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: Traffic Impact Analysis prepared by LSA Associates in December 2015 [Appendix E], Transportation Research Board Special Report 209 – 2010 Highway Capacity Manual – Institute of Transportation Engineers (ITE)*** **Trip Generation–** ***9th Edition, General Plan 2025 Circulation and Community Mobility Element)***

Less Than Significant Impact. The project consists of seven light industrial and warehousing buildings totaling approximately 280,000 square feet. The project site is located on the southwest corner of the intersection of Pierce Street and Magnolia Avenue. Access to the project is provided by five proposed driveways. As part of the proposed project, a left-turn lane is proposed on Magnolia Avenue. The left-turn lane would encroach into the existing median and provide access to the project site via the westerly project driveway located on Magnolia Avenue (Project Driveway 1). This driveway will be designed to prohibit left-turn egress movements from the project site while allowing right-in/right-out movements and left-turn ingress movements into the project site. Two additional driveways on Magnolia Avenue are proposed as right-in/right-out only (Project Driveways 2 and 3). In addition, two project driveways are proposed on Pierce Street. The northerly driveway will be right-in/right-out only and will align with the existing shopping center driveway across the street (Project Driveway 4). The southerly driveway is proposed as a full-access driveway and will align with Sterling Avenue (Project Driveway 5).

Consistent with the City of Riverside's traffic study guidelines, the 2010 *Highway Capacity Manual* (HCM 2010) analysis methodologies were used to determine intersection Levels of Service (LOS) for all study area intersections. The study area intersections fall under the jurisdictions of the City of Riverside and Caltrans. 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 LOS D (i.e., to LOS E or F) per Policy CCM-2.3 of the 2025 General Plan, which strives to maintain LOS D or better on arterial streets wherever possible. The project is consistent with the existing General Plan Land Use Designation for the project site, as well as other applicable General Plan policies, and as such the Traffic Impact Analysis considers a reduction of peak hour LOS at study intersections below LOS D (i.e., LOS E or F) to be a significant impact. Caltrans considers acceptable level of service to be between C and D for all intersections under its jurisdiction; therefore, all signalized intersections under Caltrans jurisdiction must operate with a weighted average delay of 45 seconds or less. Signalized study intersections under the jurisdiction of Caltrans operating at delays of more than 45 seconds are required to be mitigated to acceptable standards. The study area includes the following eight intersections (Fig. X):

- Project Driveway 1 at Magnolia Avenue;
- Project Driveway 2 at Magnolia Avenue;
- Project Driveway 3 at Magnolia Avenue;
- Pierce Street at State Route 91 (SR-91) Westbound Ramps;
- Pierce Street at SR-91 Eastbound Ramps;
- Pierce Street at Magnolia Avenue;
- Pierce Street at Project Driveway 4;
- Pierce Street at Project Driveway 5/Sterling Avenue.

[INSERT STUDY AREA INTERSECTION MAP FIGURE]

The Traffic Study examined traffic operations in the project vicinity under the following 6 scenarios:

- Existing conditions;
- Existing Plus Project conditions;
- Project Completion Year (PCY) Without Project conditions;

- Project Completion Year (PCY) Plus Project conditions;
- Cumulative PCY Without Project conditions; and
- Cumulative PCY Plus Project 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*, August 2003. 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 16a.A, the project is expected to generate 2,442 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. Tables 16a.B, 16a.C, and 16a.D summarize the delay and LOS at the study area intersections under "existing" and "plus project" conditions for the project completion year and cumulative project completion year scenarios, respectively.

Table 16a.A: Project Trip Generation

	A.M. Peak Hour			P.M. Peak Hour			
Land Use: 276.0 TSF General Light Industrial	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**Daily**
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)	176	24	200	26	184	210	1,512
Trip Generation (2-Axle Trucks)	18	2	20	2	20	22	154
Trip Generation (3-Axle Trucks)	9	1	10	1	9	10	75
Trip Generation (4+ Axle Trucks)	21	3	24	3	22	25	183
Trip Generation (Total, unconverted)	**224**	**30**	**254**	**32**	**235**	**267**	**1,924**
Trip Generation (Cars)	176	24	200	26	184	210	1,512
PCE Trip Generation (2-Axle Trucks)	27	3	30	3	30	33	231
PCE Trip Generation (3-Axle Trucks	18	2	20	2	18	20	150
PCE Trip Generation (4+ Axle Trucks)	63	9	72	9	66	75	549
Total PCE Trips	**284**	**38**	**322**	**40**	**298**	**338**	**2,442**

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

Table 16a.B: Existing Intersection Levels of Service

			Without Project				Plus 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	Project Drwy 1/Magnolia Ave	TWSC	*Future Intersection*				12.3	B	14.7	B	No
2	Project Drwy 2/Magnolia Ave	TWSC	*Future Intersection*				12.0	B	14.5	B	No

3	Project Drwy 3/ Magnolia Ave	TWSC	*Future Intersection*				11.9	B	14.4	B	No
4	Pierce St/SR-91 WB Ramps	Signal	10.2	B	9.7	A	13. 3	B	10.5	B	No
5	Pierce St/SR-91 EB Ramps	Signal	17.1	B	13.5	B	17.9	B	15.5	B	No
6	Pierce St/Magnolia Ave	Signal	37.3	D	31.3	C	43.7	D	35.3	D	No
7	Pierce St/Project Drwy 4	TWSC	13.6	B	10.2	B	17.6	C	10.8	B	No
8	Pierce St/Project Drwy 5-Sterling Ave	TWSC	13.1	B	12.1	B	26.3	D	21.3	C	

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 16a.C: Project Completion Year Levels of Service

			Without Project				Plus 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	Project Drwy 1/Magnolia Ave	TWSC	*Future Intersection*				12.3	B	14.9	B	No
2	Project Drwy 2/Magnolia Ave	TWSC	*Future Intersection*				12.1	B	14.6	B	No
3	Project Drwy 3/ Magnolia Ave	TWSC	*Future Intersection*				12.0	B	14.5	B	No
4	Pierce St/SR-91 WB Ramps	Signal	13.7	B	9.8	A	13. 7	B	10.6	B	No
5	Pierce St/SR-91 EB Ramps	Signal	17.4	B	13.6	B	18.2	B	15.7	B	No
6	Pierce St/Magnolia Ave	Signal	41.6	D	34.2	C	46.5	D	36.3	D	No
7	Pierce St/Project Drwy 4	TWSC	13.7	B	10.3	B	18.0	C	10.8	B	No
8	Pierce St/Project Drwy 5-Sterling Ave	TWSC	13.2	B	12.2	B	27.0	D	21.7	C	No

Source: Traffic Impact Analysis (Appendix E)
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 16a.D: Project Completion Year Levels of Service

			Without Project				Plus 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	Project Drwy 1/Magnolia Ave	TWSC	*Future Intersection*				12.4	B	15.0	B	No
2	Project Drwy 2/Magnolia Ave	TWSC	*Future Intersection*				12.1	B	14.8	B	No

3	Project Drwy 3/ Magnolia Ave	TWSC	*Future Intersection*				12.0	B	14.6	B	No
4	Pierce St/SR-91 WB Ramps	Signal	15.3	B	9.8	A	16.0	B	10.8	B	No
5	Pierce St/SR-91 EB Ramps	Signal	17.4	B	15.6	B	18.3	B	15.3	B	No
6	Pierce St/Magnolia Ave	Signal	42.9	D	34.5	C	46.7	D	36.8	D	No
7	Pierce St/Project Drwy 4	TWSC	13.8	B	10.1	B	18.2	C	10.9	B	No
8	Pierce St/Project Drwy 5-Sterling Ave	TWSC	13.3	B	12.3	B	27.6	D	22.6	C	No

Source: Traffic Impact Analysis (Appendix E)
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 16a.B reveals in the "existing" scenario, all study area intersections operate at satisfactory levels of service. Tables 16a.C and 16a.D reveal all study area intersections are projected to operate at satisfactory levels of service under the "with the project" condition for the Project Completion Year and Cumulative Project Completion Year 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, in accordance with General Plan Policy CCM-2.3. All study intersections are located on either Magnolia Avenue, which is designated as a 110-foot Scenic Special Design Parkway, or Pierce Street, an 88-foot arterial. Since the proposed project is consistent with the City's General Plan and LOS D or better will be maintained under the "with the project" for the Project Completion Year and Cumulative Project Completion Year 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.**

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

Less Than Significant. 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 at both Pierce Street and Magnolia Avenue, which are the designated arterial streets connecting the project site with State Route 91. Since these intersections and highway segment included in the study area are 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 D or better under the "with the project" for the Project Completion Year and Cumulative Project Completion Year 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**.

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, RCALUCP)***

No Impact. The project will not change air traffic patterns, increase air traffic levels or change the location of air traffic patterns. It is not located within an airport influence area. As such, this project will have **no impact** directly, indirectly or cumulatively on air traffic patterns.

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: Project Site Plans, Lane Striping and Signing Plans and Project Specific Traffic Impact Analysis prepared by LSA Associates in December 2015)***

Less Than Significant Impact. The proposed project is compatible with adjacent existing uses, which include light industrial and commercial complexes to the west, north and east. Vehicle traffic to and from the project site will utilize the existing network of regional and local roadways that serve the project site. Vehicular ingress and egress to the project site will be provided by five proposed driveways. As part of the proposed project, a left-turn lane is proposed on Magnolia Avenue. The left-turn lane would encroach into the existing median and provide access to the project site via the westerly project driveway located on Magnolia Avenue (Project Driveway 1). This driveway will be designed to prohibit left-turn egress movements from the project site while allowing right-in/right-out movements and left-turn ingress movements into the project site. Two additional driveways on Magnolia Avenue are proposed as right-in/right-out only (Project Driveways 2 and 3). In addition, two project driveways are proposed on Pierce Street. The northerly driveway will be right-in/right-out only and will align with the existing shopping center driveway across the street (Project Driveway 4). The southerly driveway is proposed as a full-access driveway and will align with Sterling Avenue (Project Driveway 5).

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, the project will have a **less than significant impact** on increasing hazards through design or incompatible uses either directly, indirectly or cumulatively.

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

16e. Response: ***(Source: California Department of Transportation Highway Design Manual, Municipal Code, and Fire Code, and Project Specific Traffic Impact Analysis prepared by LSA Associates in December 2015)***

Less Than Significant Impact. Emergency vehicle access to the project site will be provided via five driveways, which include three driveways ranging from 28 to 36 feet in width on Magnolia Avenue and two additional driveways 26 and 33 feet in width on Pierce Street. All 5 driveways will allow full access to emergency vehicles. Sufficient space and turning radius for fire trucks will be provided on the project site 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.

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: FPEIR, 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!)***

Less Than Significant Impact. The project site is served by Riverside Transit Agency bus routes on Magnolia Avenue and Merced Street, with the nearest stops located approximately 215 and 725 feet to the east of the project site, respectively. The proposed project will not require, permanently or temporarily, the relocation or closure of any RTA or other agency transit stops. Bicycle infrastructure is accommodated by an existing Class 2 bikeway on Magnolia Avenue, and off-site street improvements to Pierce Street will be designed in compliance with the designated Class 1 bikeway indicated in the General Plan 2025 Circulation and Community Mobility Element on Pierce Street. The project will also provide bicycle parking facilities in compliance with the California Green Building Code. Pedestrian infrastructure will be served by the installation of parkway-protected sidewalks along both Magnolia and Pierce Streets, as well as lighted pedestrian pathways throughout the project site. The proposed project as designed is not in conflict with adopted policies, plans or programs supporting alternative transportation. Therefore, the proposed project impacts related to adopted policies, plans or programs supporting alternative transportation are **less than significant** directly, indirectly and cumulatively.

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

17a. Response: ***(Source: General Plan 2025 Figure PF-2 – Sewer Facilities Map, FPEIR Figure 5.16-5 – Sewer Service Areas, Table 5.16-K - Estimated Future Wastewater Generation for the City of Riverside's Sewer Service Area, Table 5.16-L - Estimated Future Wastewater Generation for the Planning Area Served by WMWD, Figure 5.8-1 – Watersheds, Wastewater Integrated Master Plan and Certified EIR)***

Less Than Significant Impact. 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 Regional Water Quality Control Board (RWQCB). Therefore, the proposed project would not exceed applicable wastewater treatment requirements of the RWQCB with respect to discharges to the sewer system or stormwater 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.

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?	☐	☐	☒	☐

17b. Response: ***(Source: General Plan 2025 Table PF-1 – RPU PROJECTED DOMESTIC WATER Supply (AC-FT/YR), Table PF-2 – RPU Projected Water Demand, , FPEIR Table 5.16-G – General Plan Projected Water Demand for RPU Including Water Reliability for 2025, Table 5.16-K - Estimated Future Wastewater Generation for the City of Riverside's Sewer Service Area, Figure 5.16-4 – Water Facilities and Figure 5.16-6 – Sewer Infrastructure and Wastewater Integrated Master Plan and Certified EIR.)***

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[1] under a Typical Growth Scenario.[2] 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

[1] 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).

[2] *Section 5.16 Utilities and Service Systems*, Riverside General Plan and Supporting Documents Environmental Impact Report. Page 5.16-33. November 2007.

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.

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 and zoning ordinance and will construct a multi-tenant light industrial building with seven units totaling 17,026 square feet of office uses and 260,194 square feet of warehouse, plus 4,851 square feet of mezzanine area (total 282,071 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.

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.

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?	☐	☐	☒	☐

17c. Response: ***(Source: FPEIR Figure 5.16-2 - Drainage Facilities, Water Quality Management Plan prepared by Thienes Engineering, Inc., April 22, 2016)***

Less Than Significant. The proposed is located on a 14.35 acres site within the Santa Ana River Watershed. The project site is currently vacant but was previously disturbed and mass graded. The proposed improvements project will result in an increase of impervious surface areas of 84% which will generate increased storm water flows with potential to impact drainage facilities and require the provision of additional facilities.

The proposed project will direct runoff from the project site into bioretention and biotreatment facilities located within landscaped areas along Magnolia Avenue, Pierce Street, and within the 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 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.

In addition, the Subdivision Code (Title 18, Section 18.48.020) requires drainage fees to be paid to the City for new construction. Fees are transferred into a drainage facilities fund that is maintained by Riverside County Flood Control and Water Conservation District. This Section also complies with the California Government Code (section 66483), which provides for the payment of fees for construction of drainage facilities. Fees are required to be paid as part of the conditions of approval/waiver for filing of a final map or parcel map.

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. The General Plan 2025 also includes policies and programs that will minimize the environmental effects of the development of such facilities. Therefore, the project will have **less than significant on existing** storm water drainage facilities that would not require the expansion of existing facilities directly, indirectly or cumulatively.

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

17d. Response: ***(Source: FPEIR 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)***

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[3] under a Typical Growth Scenario.[4] 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 Zone (BMP). The proposed project is consistent with the City General Plan 2025 and zoning ordinance and will construct seven multi-tenant light industrial buildings totaling approximately 280,000 square feet. Since the proposed project consists of speculative light industrial and warehousing uses, the actual uses of the proposed warehouse facilities, and therefore the amount of employment generated, could vary depending on the building occupants.

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). With a City projected water surplus of approximately 12,836 acre-feet per year[5] under a Typical Growth Scenario, the proposed project was found to have a **less than significant impact** on water supplies either directly, indirectly or cumulatively. 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?	☐	☐	☐	☒

[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] *Section 5.16 Utilities and Service Systems*, Riverside General Plan and Supporting Documents Environmental Impact Report. Page 5.16-33. November 2007.

[5] 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).

17e. Response: ***(Source: FPEIR 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)***

No Impact. The project will not exceed wastewater treatment requirements of (Regional Water Quality Control Board). The project is consistent with the General Plan 2025 Typical Growth Scenario where future wastewater generation was determined to be adequate (see Table 5.16-K of the General Plan 2025 Final PEIR). Further, the current Wastewater Treatment Master Plan anticipates and provides for this type of project. Therefore, **no impact** to wastewater treatment directly, indirectly or cumulatively will occur.

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

17f. Response: ***(Source: FPEIR Table 5.16-A – Existing Landfills and Table 5.16-M – Estimated Future Solid Waste Generation from the Planning Area)***

No Impact. The project is consistent with the General Plan 2025 Typical Build-out Project level where future landfill capacity was determined to be adequate (see Tables 5.16-A and 5.16-M of the General Plan 2025 Final PEIR). Therefore, **no impact** to landfill capacity will occur directly, indirectly or cumulatively.

g. Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

17g. Response: ***(Source: California Integrated Waste Management Board 2002 Landfill Facility Compliance Study)***

No Impact. The California Integrated Waste Management Act under the Public Resource Code requires that local jurisdictions divert at least 50% of all solid waste generated by January 1, 2000. The City is currently achieving a 60% diversion rate, well above State requirements. In addition, the California Green Building Code requires all developments to divert 50% of non-hazardous construction and demolition debris for all projects and 100% of excavated soil and land clearing debris for all non-residential projects beginning January 1, 2011. The proposed project must comply with the City's waste disposal requirements as well as the California Green Building Code and as such would not conflict with any Federal, State, or local regulations related to solid waste. Therefore, **no impacts** related to solid waste statutes will occur directly, indirectly or cumulatively.

18. 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?	☐	☒	☐	☐

18a. 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, General Plan 2025 FPEIR 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, MSHCP Section 6.1.2 - Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools, and Habitat Assessment prepared by Chambers Group in June 2006 and supplemented November 2015), FPEIR Table 5.5-A Historical Districts and Neighborhood Conservation Areas, Figure 5.5-1 - Archaeological Sensitivity, Figure 5.5-2 - Prehistoric Cultural Resources Sensitivity, Appendix D, Title 20 of the Riverside Municipal Code)***

Less Than Significant with Mitigation. As discussed in the Biological Resources Section of this Initial Study, potential impacts related to habitat of fish or wildlife species were all found to be **less than significant with mitigation**. The vacant project site is located within an urban built-up area and is surrounded by existing development. General Plan 2025 Figure OS-5 (Habitat and Vegetation Communities) identifies a portion of the site as non-native grassland; General Plan 2025 FPEIR Figure 5.4-8 (Burrowing Owl Survey Area) and the MSHCP database identify the site as potential habitat for burrowing owls, which are considered a California Species of Special Concern. A Phase II Burrowing Owl survey conducted in June 2006 identified no presence or signs of potential presence for this species on the project site, and recommended no further action. The findings of the survey and report determined that the project is in compliance with the MSHCP. Further, no indication or potential habitat for other candidate, sensitive or special status species, Federal Species of Concern, other California Species of Special Concern, and California Species Animal or Plants on lists 1-4 of the California Native plant Society (CNPS) Inventory were identified.

At the time the survey was conducted, red-tailed hawk nesting activity was observed on the site. While not a species of concern, this activity may pose seasonal constraints on proposed construction activities. A Condition of Approval will be added requiring a standard 14-day preconstruction survey for potential burrowing owl activity or habitat be conducted by a qualified biologist prior to commencement of ground-disturbing activities (i.e., grading). This condition is consistent with GP 2025 FPEIR Mitigation Measure Bio-1, as well as Open Space and Conservation Element Policy OS-5.2.

Additionally, potential impacts to cultural, archaeological and paleontological resources related to major periods of California and the City of Riverside's history or prehistory were discussed in the Cultural Resources Section of this Initial Study, and were found to be **less than significant with mitigation**.

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)?	☐	☐	☒	☐

18b. Response: ***(Source: FPEIR Section 6 – Long-Term Effects/ Cumulative Impacts for the General Plan 2025 Program)***

Less Than Significant Impact. 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 are primarily project-specific in nature. In addition, since the project is consistent with the General Plan 2025, no new cumulative impacts are anticipated and therefore cumulative impacts of the proposed project beyond those previously considered in the GP 2025 FPEIR are **less than significant**.

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

18c. Response: ***(Source: FPEIR Section 5 – Environmental Impact Analysis for the General Plan 2025 Program; Air Quality Analysis prepared by LSA Associates in February 2015 [Appendix B]; Noise Impact Analysis prepared by LSA Associates in February 2015 [Appendix D])***

Less Than Significant Impact with Mitigation. Effects on human beings were evaluated as part of the aesthetics, air quality, hydrology & water quality, noise, population and housing, public facilities, hazards and hazardous materials, recreation, and transportation traffic sections of this initial study. Project impacts related to air quality and noise are potentially significant; however, as discussed in Sections 3 and 12 of this initial study, and pursuant to the professional recommendations set forth in Technical Appendices B (Air Quality) and D (Noise), these impacts can be mitigated to a less than significant level. Based on the analysis and conclusions in this initial study, the project, with mitigation, will not cause substantial adverse effects, directly or indirectly to human beings. Therefore, potential direct and indirect impacts on human beings that result from the proposed project are **less than significant with mitigation**.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code. Reference: Sections 21080(c), 21080.1, 21080.3, 21082.1, 21083, 21083.3, 21093, 21094, 21151, Public Resources Code; Sundstrom v. County of Mendocino, 202 Cal.App.3d 296 (1988); Leonoff v. Monterey Board of Supervisors, 222 Cal.App.3d 1337 (1990)

APPENDIX A

PROJECT PLANS

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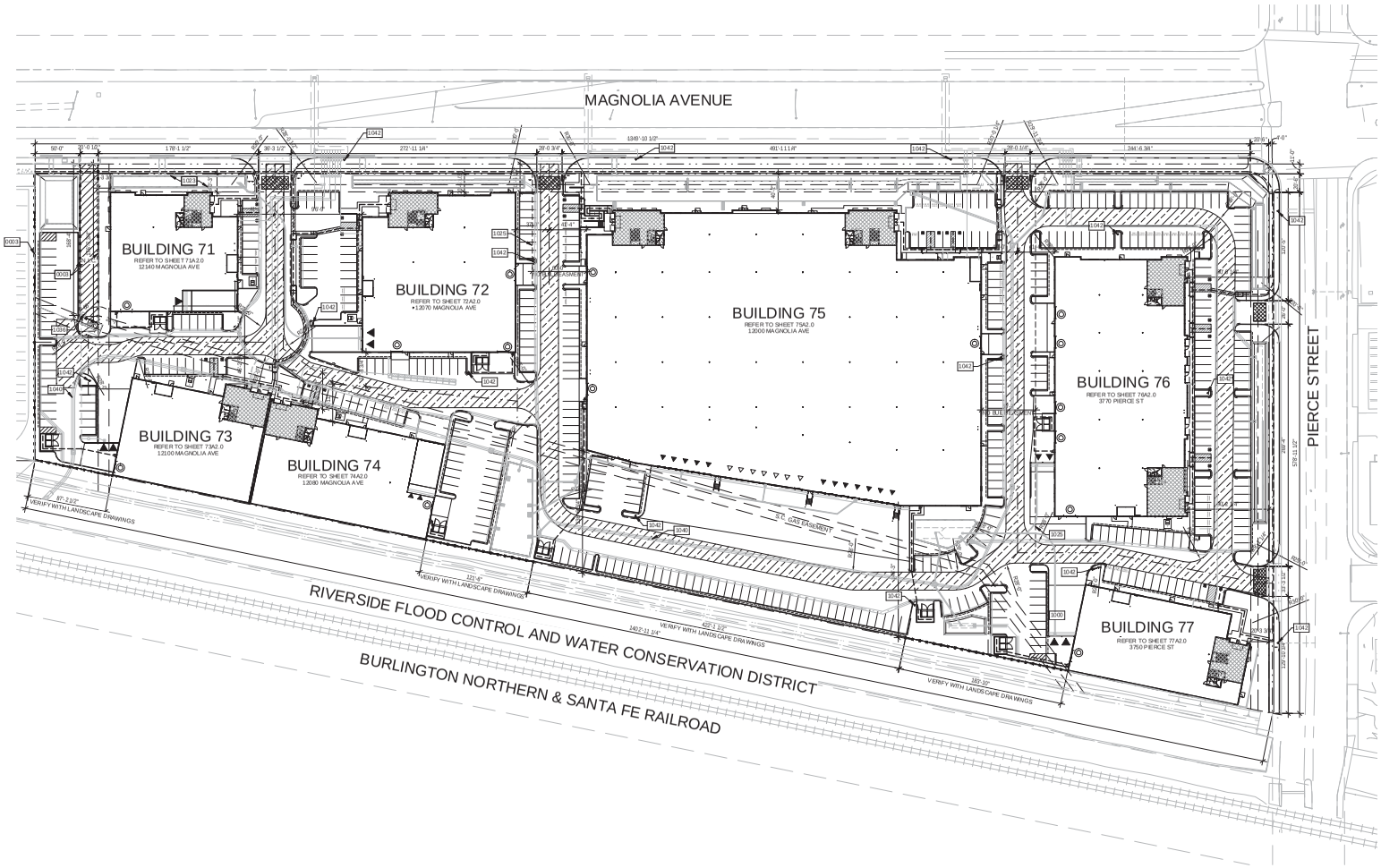

1" = 50'
0 25' 50' 100' 250'

OVERALL SITE PLAN

SCALE: 1" = 50'-0"

AREA SUMMARY PROJECT DATA

PARCEL #	NET AREA	F.A.R.
PARCEL 1	0.992 AC	.42
PARCEL 2	1.485 AC	.46
PARCEL 3	1.002 AC	.41
PARCEL 4	1.082 AC	.47
PARCEL 5	6.081 AC	.48
PARCEL 6	2.763 AC	.35
PARCEL 7	0.946 AC	.44
TOTAL	14.351 AC	.44

BLDG #	S-1 W AREA	S-1 OFFICE	B MEZZANINE	B TOTAL	PLATFORM (NOT INCL.)	REQ. (W) PARK (1/1000)	REQ. (O) PARK (1/250)	REQ. TO TAL	PROVIDED PKG. RATIO
BLDG 1	16,726 S.F.	1,238 S.F.	913 S.F.	18,864 S.F.	0	17	9	26	26
BLDG 2	27,535 S.F.	1,948 S.F.	998 S.F.	30,481 S.F.	701	28	12	40	41
BLDG 3	16,074 S.F.	1,857 S.F.	0 S.F.	17,931 S.F.	1,941	17	8	25	25
BLDG 4	20,197 S.F.	1,943 S.F.	0 S.F.	22,140 S.F.	2,025	22	8	30	35
BLDG 5	123,877 S.F.	4,204 S.F.	1,830 S.F.	129,911 S.F.	5,698	124	25	149	153
BLDG 6	37,752 S.F.	4,408 S.F.	0 S.F.	42,158 S.F.	4,570	38	18	56	135
BLDG 7	16,388 S.F.	1,781 S.F.	976 S.F.	19,143 S.F.	499	17	12	29	29
TOTAL	258,547 S.F.	17,364 S.F.	4,887 S.F.	280,598 S.F.	15,434	263	92	355	434

(W) WAREHOUSE
(O) OFFICE

SITE LEGEND

- PEDESTRIAN PATH OF TRAVEL
- 8' TALL DECORATIVE WALL. REFER TO LANDSCAPE DRAWINGS.
- 8' TALL TUBULAR STEEL FENCE WITH PICKETS. REFER TO LANDSCAPE DRAWINGS.
- ACCESS POINT
- POLE MOUNTED LIGHT FIXTURE, SEE ELECTRICAL DRAWINGS
- WALLPACK LIGHT FIXTURE, SEE ELECTRICAL DRAWINGS
- TRANSFORMER WITH CONCRETE PAD. SEE ELECTRICAL DRAWINGS. (PROVIDE PROTECTION BOLLARDS PER LOCAL UTILITY OR PUBLIC WORK STANDARDS)
- FIRE LANE (HATCHED)
- CONCRETE PAVEMENT (HATCHED)
- CONCRETE SIDEWALK (HATCHED)
- LANDSCAPE AND IRRIGATION AREA (HATCHED)
- DOCK HIGH TRUCK DOOR OR POSITION
- GRADE LEVEL TRUCK DOOR
- FUTURE DOCK HIGH TRUCK DOOR
- FIRE HYDRANT (VERIFY LOCATION WITH CIVIL DRAWINGS)
- OFFICE LOCATION (HATCHED)

NOTES

SEE SHEET A0.2 FOR GENERAL NOTES.

0003 EXISTING FENCE TO REMAIN.
1023 RETENTION BASIN.
1025 60'-0" NO BUILT EASEMENT RECORDED WITH COUNTY TO ALLOW AN ULIMITED AREA FOR BUILDING 75.
1036 NEW FENCE TO MATCH EXISTING FENCE. VERIFY IN FIELD.
1040 CONCRETE GUTTER. SEE CIVIL DRAWINGS.
1042 FIRE HYDRANT.

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SITE PLAN

DATE	REMARKS

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
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SHEET
A1.0

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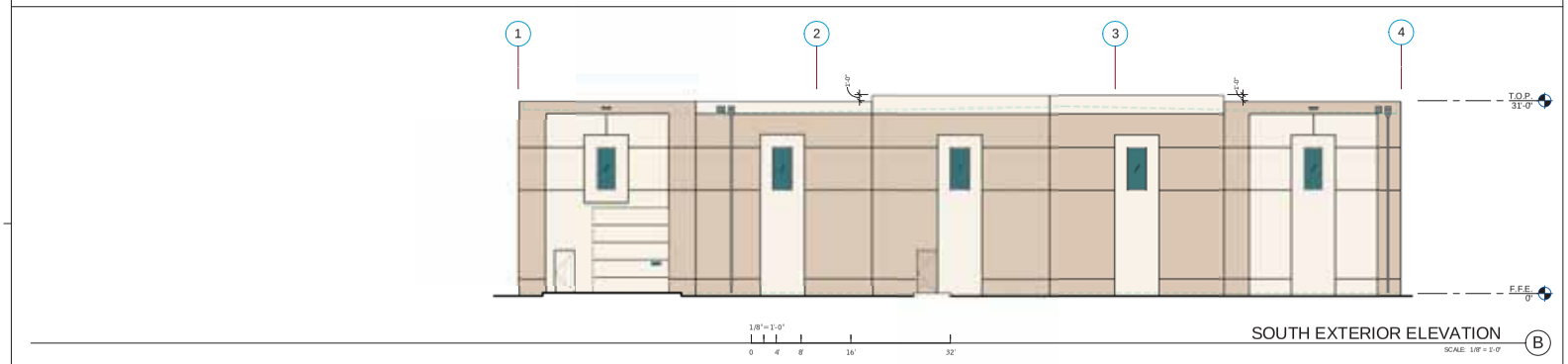
EAST EXTERIOR ELEVATION (A)

SCALE: 1/8" = 1'-0"



SOUTH EXTERIOR ELEVATION (B)

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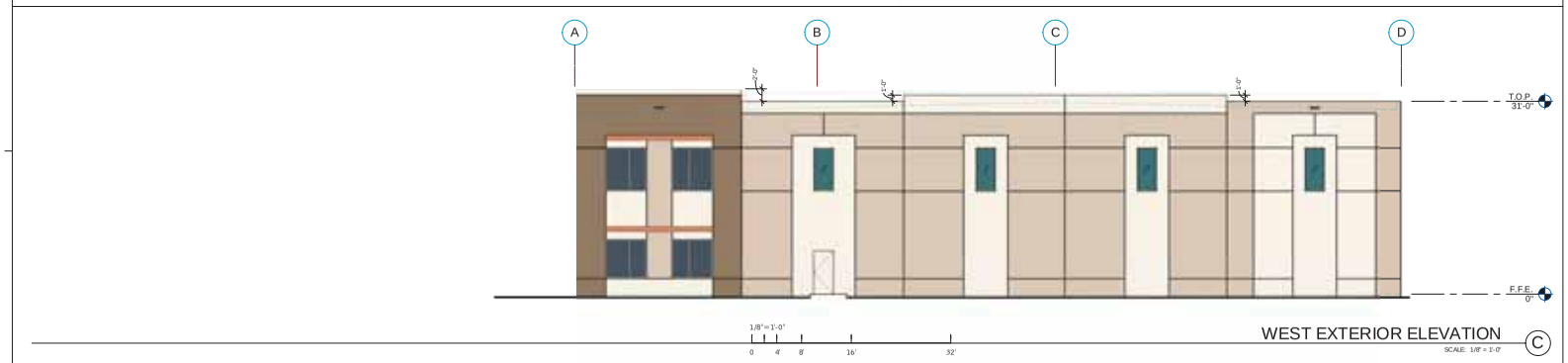
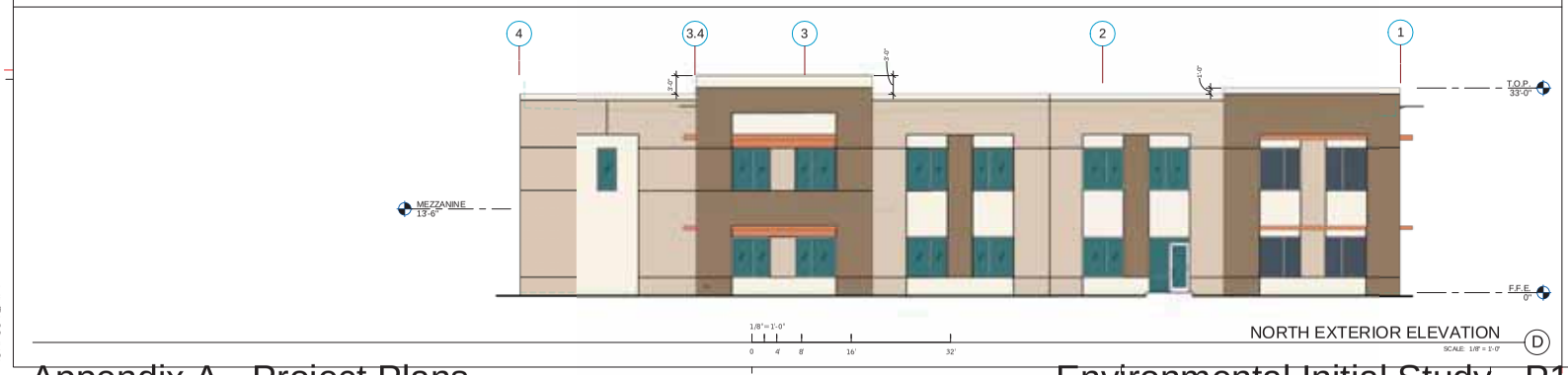


WEST EXTERIOR ELEVATION (C)

SCALE: 1/8" = 1'-0"



NORTH EXTERIOR ELEVATION (D)

SCALE: 1/8" = 1'-0"

LEGEND

- VISION GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- TEMPERED GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- SPANDREL GLASS
  MANUFACTURER: ICD HIGH PERFORMANCE COATINGS
  COLOR/NO.: #6-0025 HARMONY BLUE - PPG CLEAR
- BASE COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: DESERT SUEDE - DE6205
- SECONDARY COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: RIDGECREST - DE6174
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: TRITE WHITE - DE6204
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: HARVEST TIME - DES208

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DRAWN BY.:	A.L.
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71A4.1
BUILDING 71

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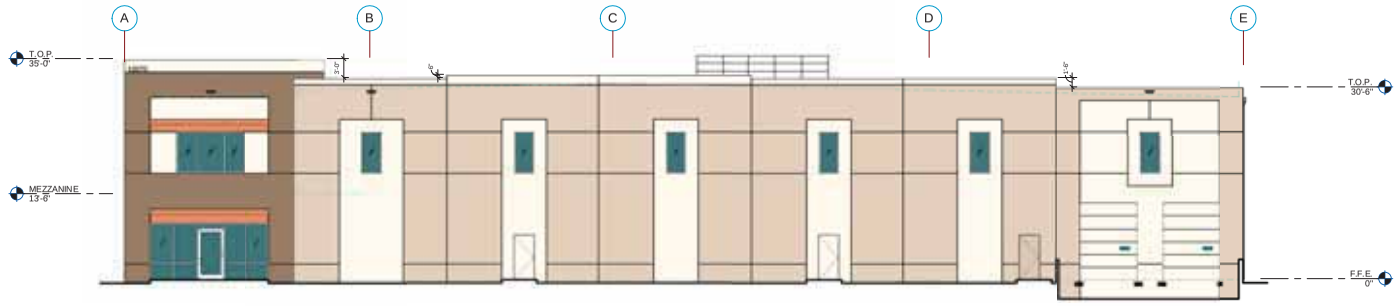

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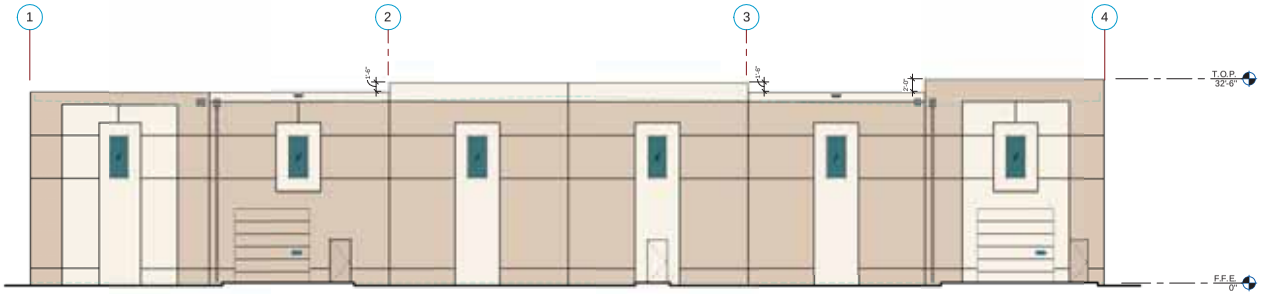

SOUTH EXTERIOR ELEVATION (B)

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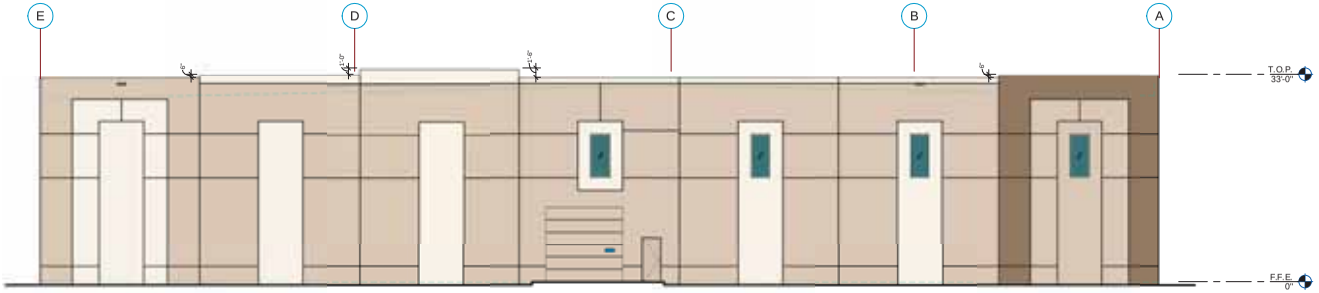

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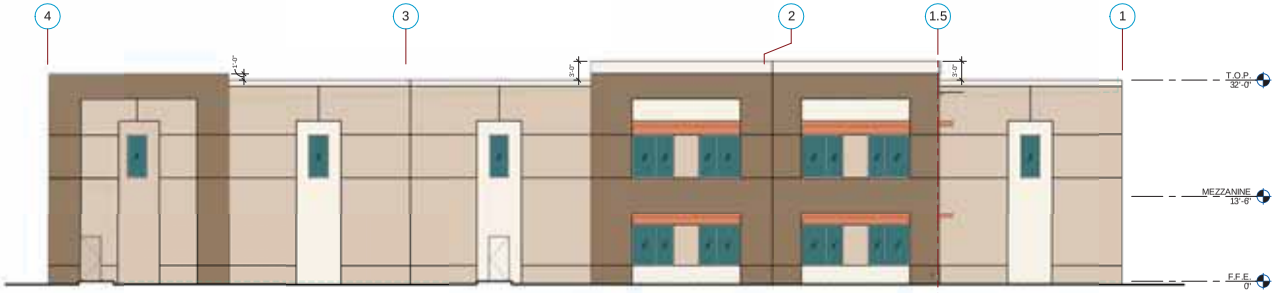

NORTH EXTERIOR ELEVATION (D)

SCALE 1/8" = 1'-0"

LEGEND

- VISION GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- TEMPERED GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- BASE COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: DESERT SUEDE - DE6205
- SECONDARY COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: RIDGECREST - DE6174
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: TRITE WHITE - DE6204
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: HARVEST TIME - DE5208

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72A4.1
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OVERALL NORTH ELEVATION (1)

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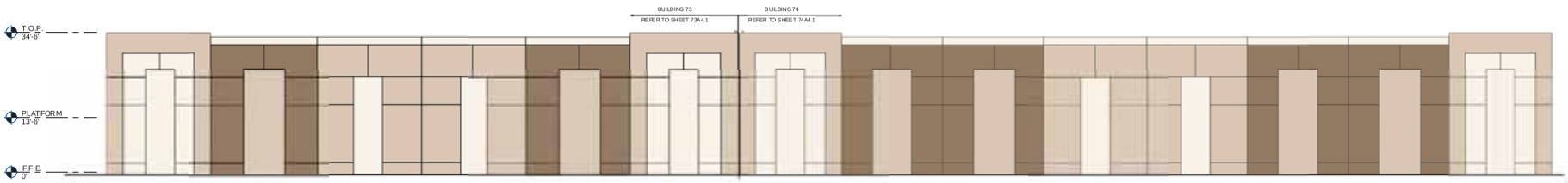

3/32"=1'-0'

0 4' 8' 16' 24' 48'

OVERALL SOUTH ELEVATION (2)

SCALE: 3/32" = 1'-0"

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OVERALL EXTERIOR ELEVATIONS

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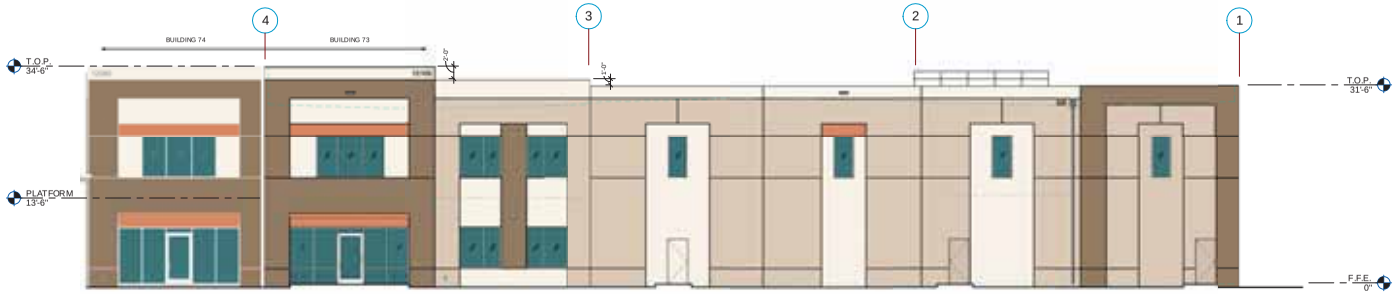

NORTH EXTERIOR ELEVATION (A)
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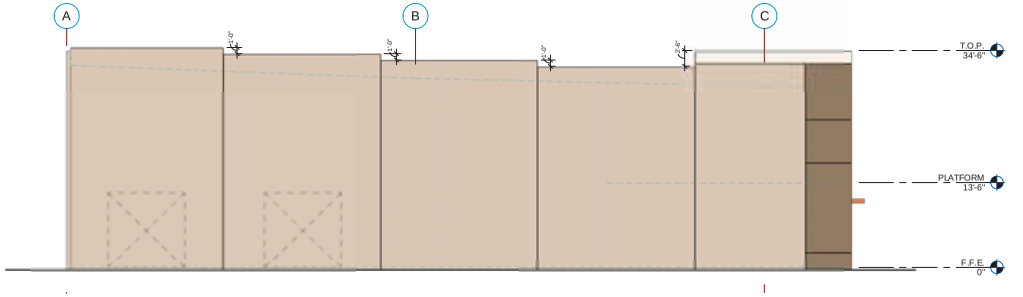

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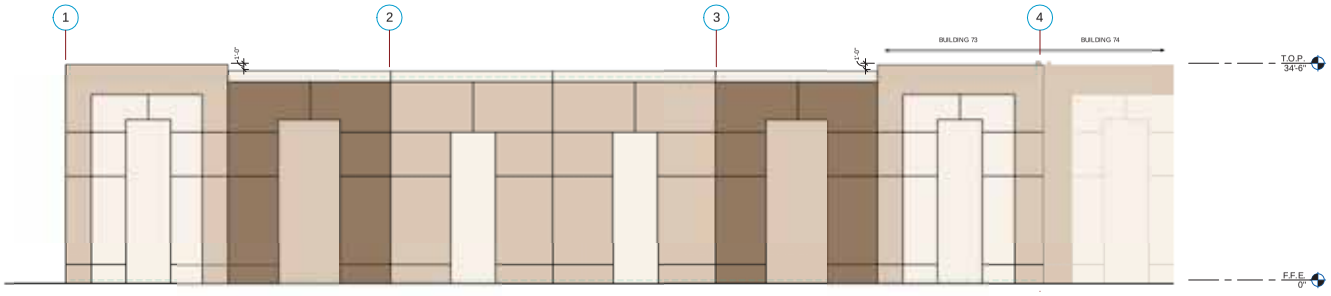

SOUTH EXTERIOR ELEVATION (C)
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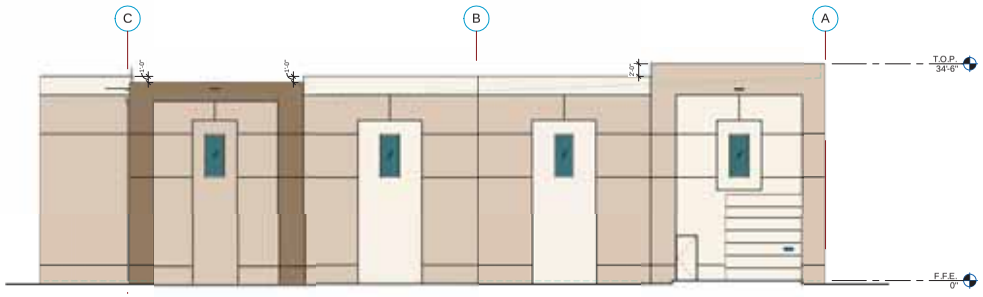

WEST EXTERIOR ELEVATION (D)
SCALE: 1/8" = 1'-0"

LEGEND

- VISION GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- TEMPERED GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- BASE COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO: DESERT SUEDE - DE6205
- SECONDARY COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: RIDGECREST - DE6174
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: TRITE WHITE - DE6204
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: HARVEST TIME - DE5208

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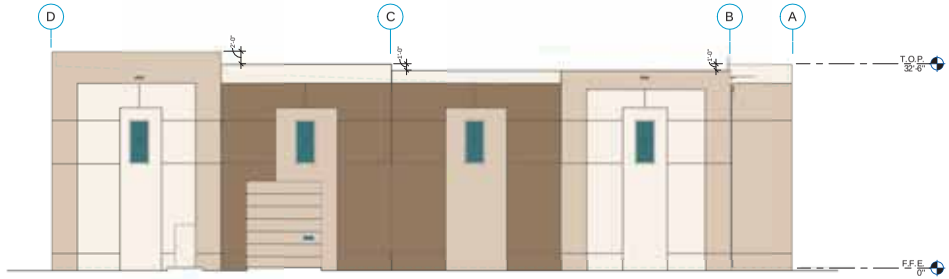
SCALE: 1/8" = 1'-0"



EAST EXTERIOR ELEVATION (B)

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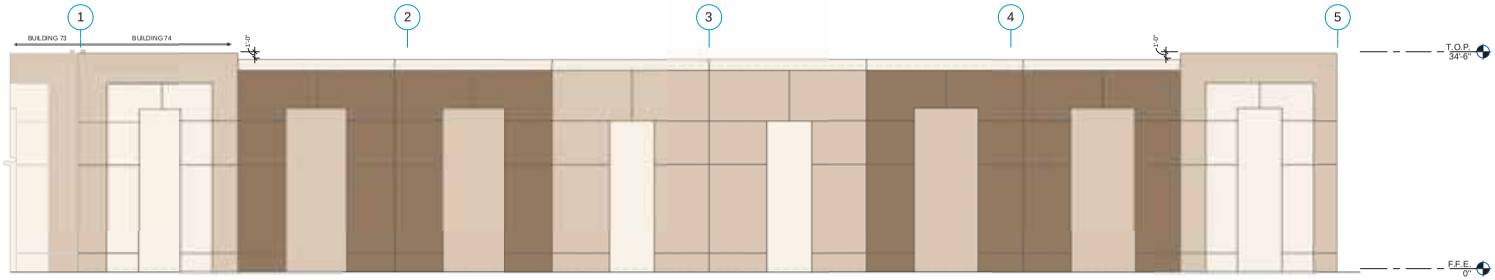

SOUTH EXTERIOR ELEVATION (C)

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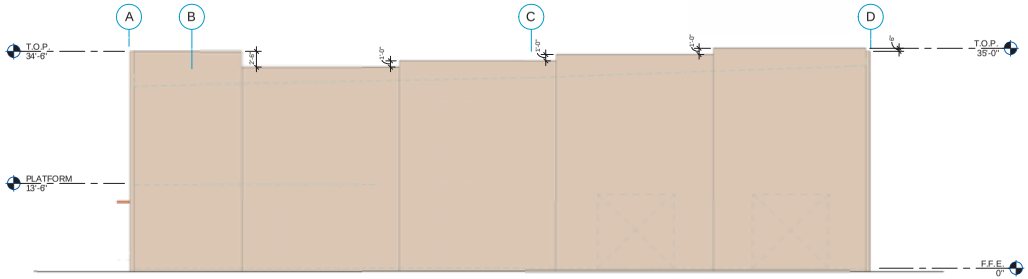
0 4' 8' 16' 32'

SCALE: 1/8" = 1'-0"



WEST EXTERIOR ELEVATION (D)

1/8" = 1'-0"

0 4' 8' 16' 32'

SCALE: 1/8" = 1'-0"

LEGEND

- VISION GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR NO.: SOLARCOOL (2) PACIFICA
- TEMPERED GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR NO.: SOLARCOOL (2) PACIFICA
- BASE COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO: DESERT SUEDE - DE6305
- SECONDARY COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO.: REDCEDREST - DE6174
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO.: TRITE WHITE - DE6204
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO.: HARVEST TIME - DE5208

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EXTERIOR ELEVATIONS

DATE	REMARKS

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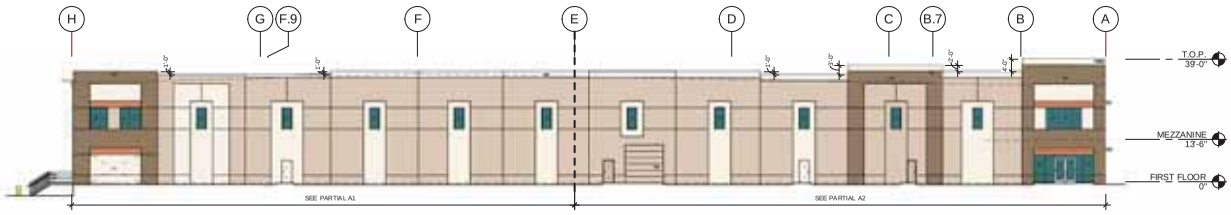

1/16" = 1'-0"
0 8' 16' 32' 64'

OVERALL EAST EXTERIOR ELEVATION (A)

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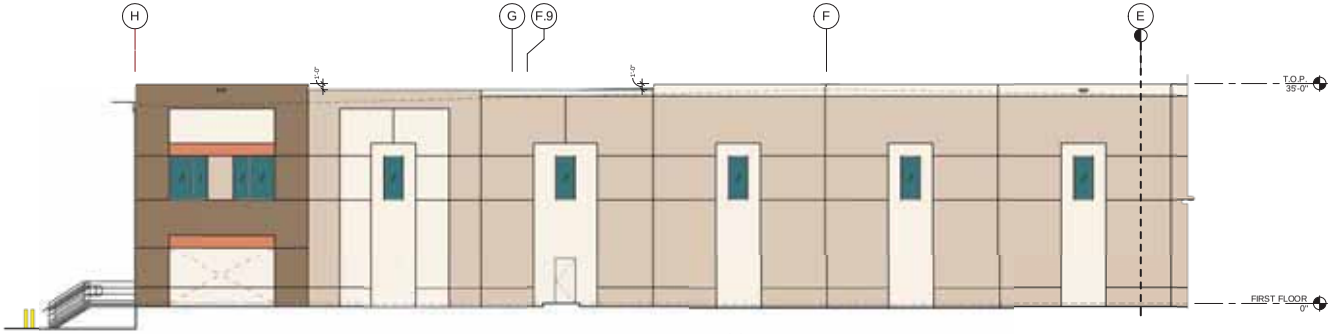
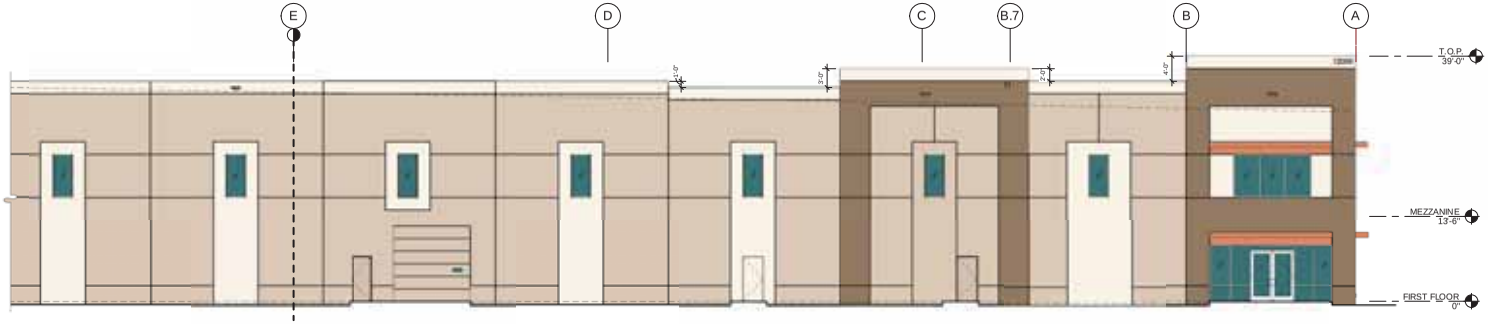


- A1 -



- A2 -

1/8" = 1'-0"
0 4' 8' 16' 32'

ENLARGED EAST EXTERIOR ELEVATION (A)

SCALE: 1/8" = 1'-0"

LEGEND

VISION GLASS
MANUFACTURER: PPG IDEASCAPES
COLOR/NO.: SOLARCOOL (2) PACIFICA

TEMPERED GLASS
MANUFACTURER: PPG IDEASCAPES
COLOR/NO.: SOLARCOOL (2) PACIFICA

BASE COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO: DESERT SUEDE - DE6205

SECONDARY COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: RIDGECREST - DE6174

ACCENT COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: TIRTE WHITE - DE6204

ACCENT COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: HARVEST TIME - DE5208

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58 MAGNOLIA
RIVERSIDE, CALIFORNIA

EXTERIOR ELEVATIONS

DATE	REMARKS

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
JOB NO.:	IRV09-0116-00

SHEET
75A4.1
BUILDING 75

10/27/2016 2:57:29 PM - PLANNING RESUBMITTAL

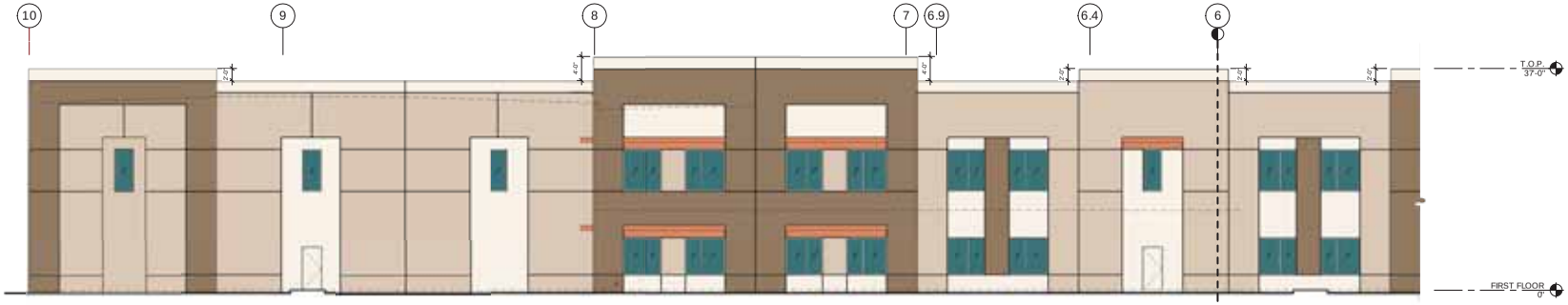
CAUTION: IF THIS SHEET IS NOT 30"x42" IT IS A REDUCED PRINT

1/16" = 1'-0"

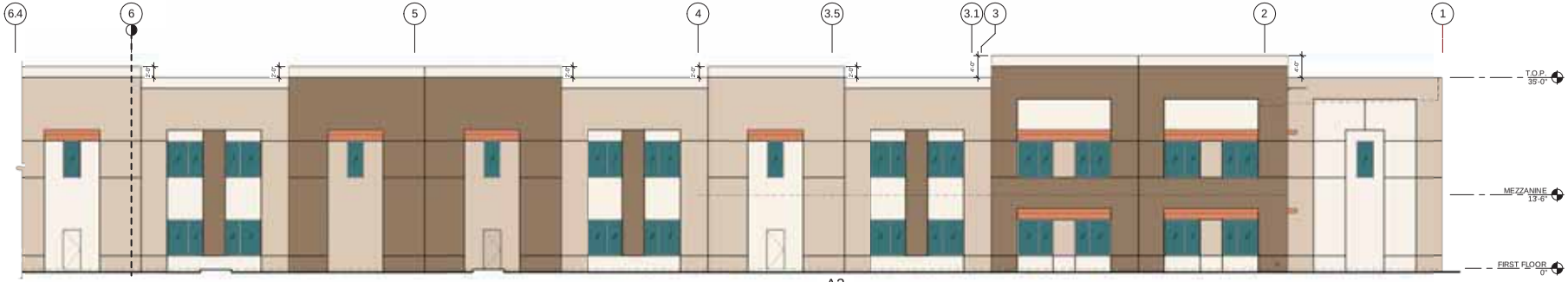
0 8' 16' 32' 64'

OVERALL NORTH EXTERIOR ELEVATION (A)

SCALE: 1/16" = 1'-0"



- A1 -



- A2 -

1/8" = 1'-0"

0 4' 8' 16' 32'

ENLARGED NORTH EXTERIOR ELEVATION (A)

SCALE: 1/8" = 1'-0"

LEGEND

- VISION GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- TEMPERED GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- BASE COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO: DESERT SUEDE - DE6205
- SECONDARY COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: RIDGECREST - DE6174
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: TRITE WHITE - DE6204
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: HARVEST TIME - DES208

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58 MAGNOLIA
RIVERSIDE, CALIFORNIA

EXTERIOR ELEVATIONS

DATE	REMARKS

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
JOB NO.:	IRV08-0116-00

SHEET
75A4.2
BUILDING 75

10/27/2016 2:57:29 PM - PLANNING RESUBMITTAL

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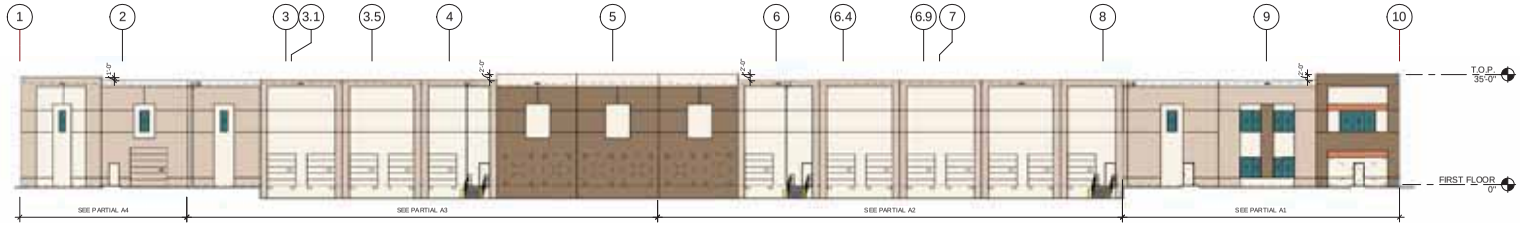
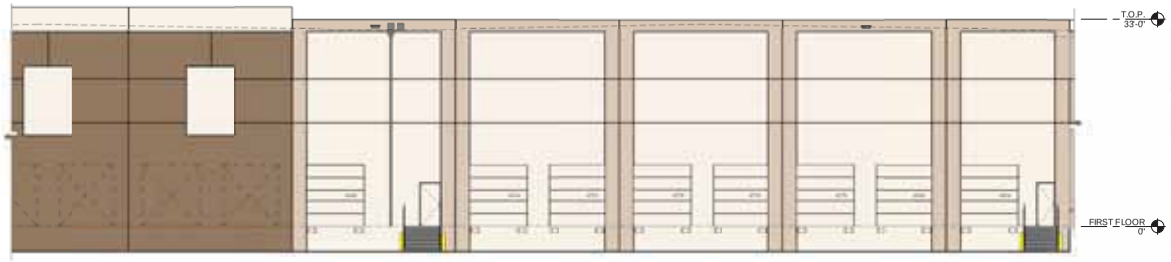


1/16" = 1'-0"
0 8' 16' 32' 64'

OVERALL SOUTH EXTERIOR ELEVATION (A)

SCALE: 1/16" = 1'-0"



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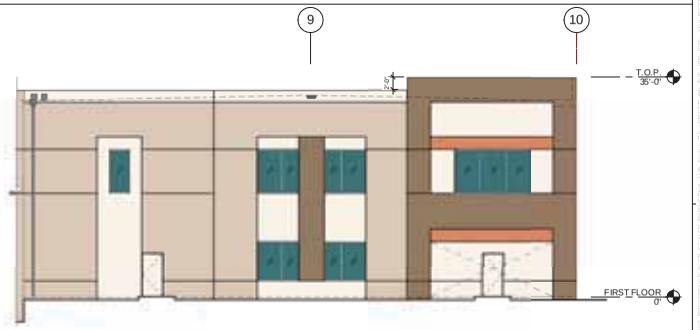

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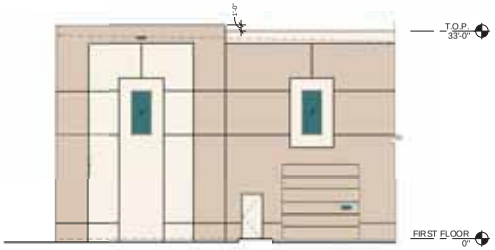
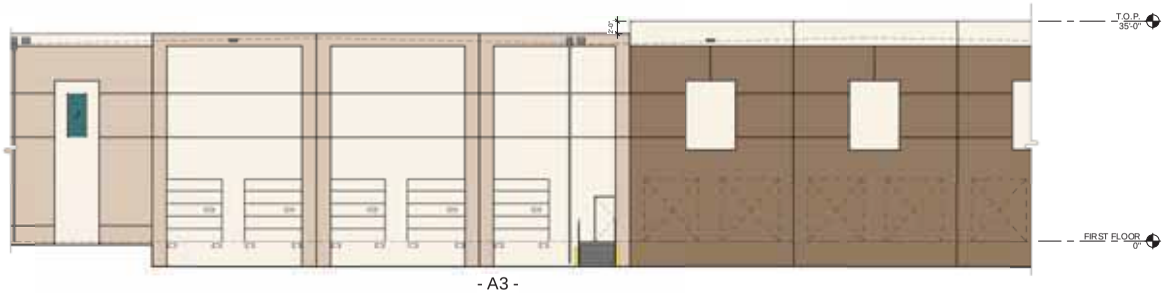


- A4 -



- A3 -

1/8" = 1'-0"
0 4' 8' 16' 32'

ENLARGED SOUTH EXTERIOR ELEVATION (A)

SCALE: 1/8" = 1'-0"

LEGEND

VISION GLASS
MANUFACTURER: PPG IDEASCAPES
COLOR/NO.: SOLARCOOL (2) PACIFICA

TEMPERED GLASS
MANUFACTURER: PPG IDEASCAPES
COLOR/NO.: SOLARCOOL (2) PACIFICA

BASE COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO: DESERT SUEDE - DE6205

SECONDARY COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: RIDGECREST - DE6174

ACCENT COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: TRITE WHITE - DE6204

ACCENT COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: HARVEST TIME - DE5208

4016 PAINT CONCRETE PANEL TO MATCH GLASS.

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58 MAGNOLIA
RIVERSIDE, CALIFORNIA

EXTERIOR ELEVATIONS

DATE	REMARKS

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
JOB NO.:	IRV08-0116-00

SHEET
75A4.3
BUILDING 75

10/27/2016 2:57:29 PM - PLANNING RESUBMITTAL

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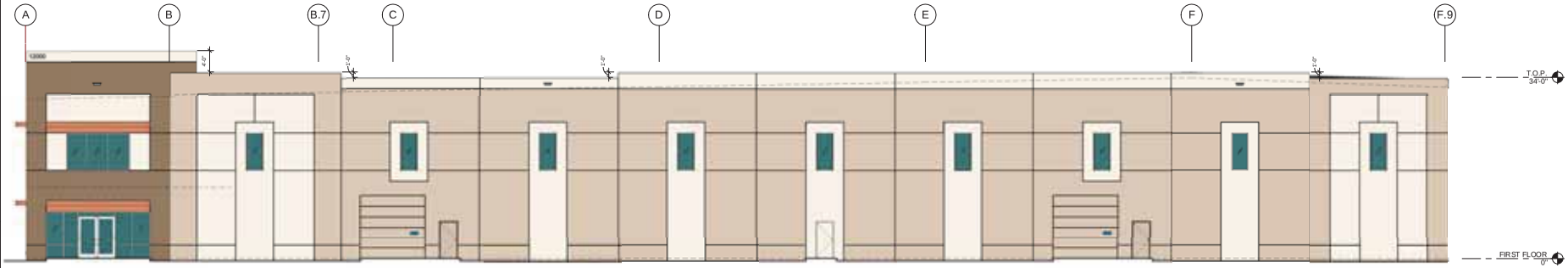

1/8" = 1'-0"

0 4' 8' 16' 32'

ENLARGED WEST EXTERIOR ELEVATION (A1)

SCALE: 1/8" = 1'-0"

LEGEND

VISION GLASS
MANUFACTURER: PPG IDEASCAPES
COLOR/NO.: SOLARCOOL (2) PACIFICA

TEMPERED GLASS
MANUFACTURER: PPG IDEASCAPES
COLOR/NO.: SOLARCOOL (2) PACIFICA

BASE COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO: DESERT SUEDE - DE6205

SECONDARY COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: RIDGECREST - DE6174

ACCENT COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO.: TRITE WHITE - DE6204

ACCENT COLOR
MANUFACTURER: DUNN EDWARDS
COLOR/NO: HARVEST TIME - DE5208

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EXTERIOR ELEVATIONS

DATE	REMARKS

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
JOB NO.:	IRV09-0116-00

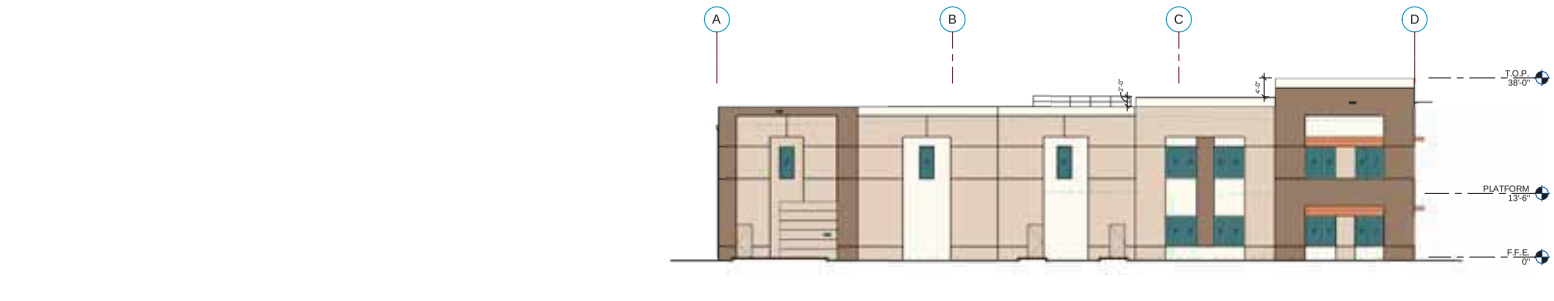
SHEET
75A4.4
BUILDING 75

10/27/2016 2:57:29 PM - PLANNING RESUBMITTAL

CAUTION: IF THIS SHEET IS NOT 30"x42" IT IS A REDUCED PRINT

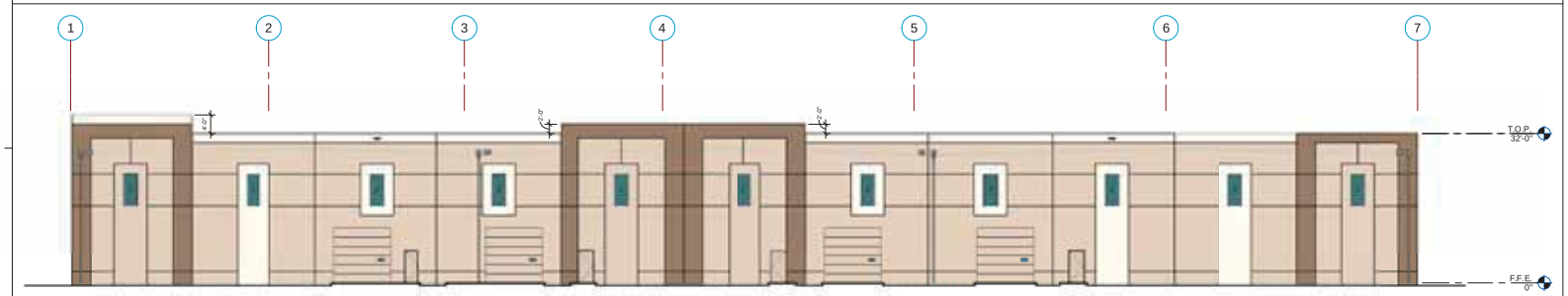
EAST EXTERIOR ELEVATION (A)

SCALE: 3/32" = 1'-0"



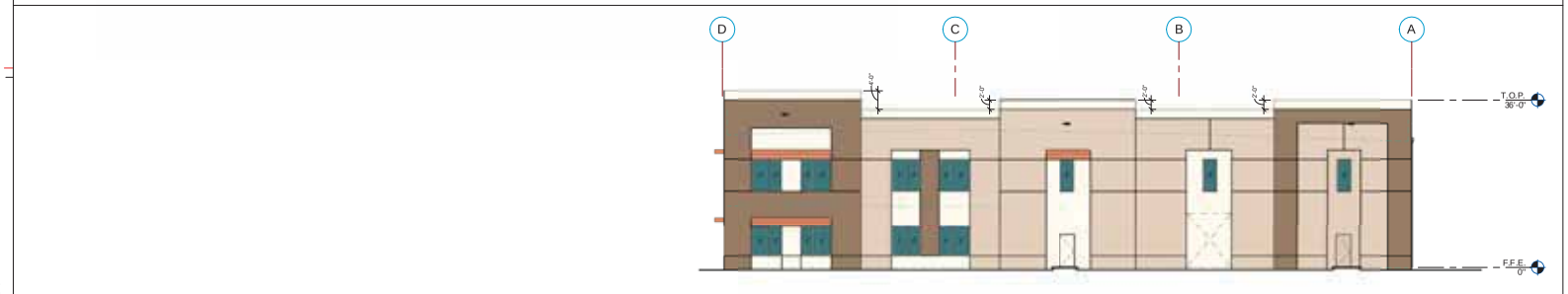
SOUTH EXTERIOR ELEVATION (B)

SCALE: 3/32" = 1'-0"



WEST EXTERIOR ELEVATION (C)

SCALE: 3/32" = 1'-0"



NORTH EXTERIOR ELEVATION (D)

SCALE: 3/32" = 1'-0"

LEGEND

- VISION GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR NO.: SOLARCOOL (2) PACIFICA
- TEMPERED GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR NO.: SOLARCOOL (2) PACIFICA
- BASE COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO: DESERT SUEDE - DE6205
- SECONDARY COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO.: RIDGECREST - DE6174
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO.: TRITE WHITE - DE6204
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR NO.: HARVEST TIME - DE5208

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58 MAGNOLIA
RIVERSIDE, CALIFORNIA

EXTERIOR ELEVATIONS

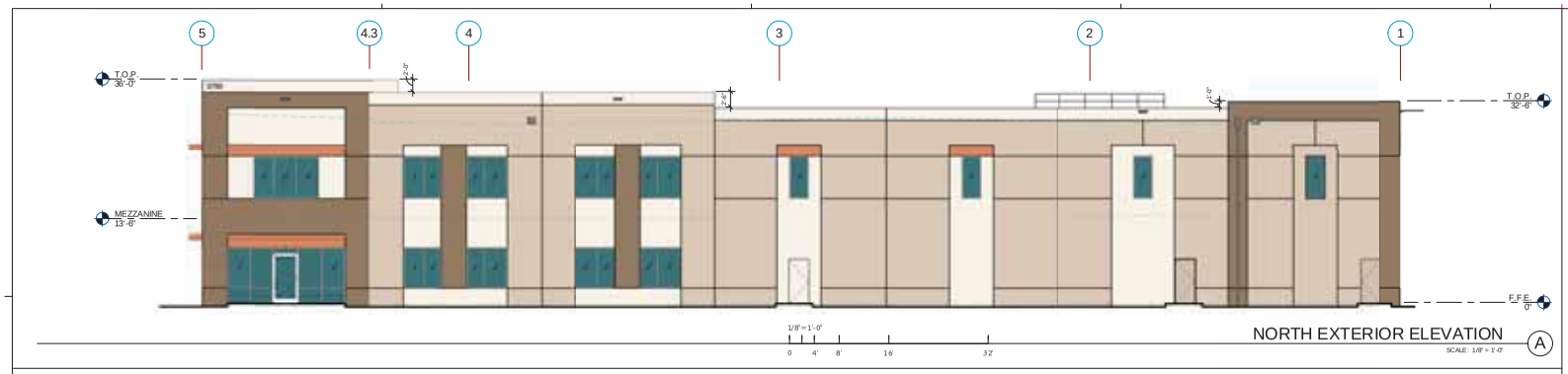
DATE	REMARKS

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
JOB NO.:	IRV09-0116-00

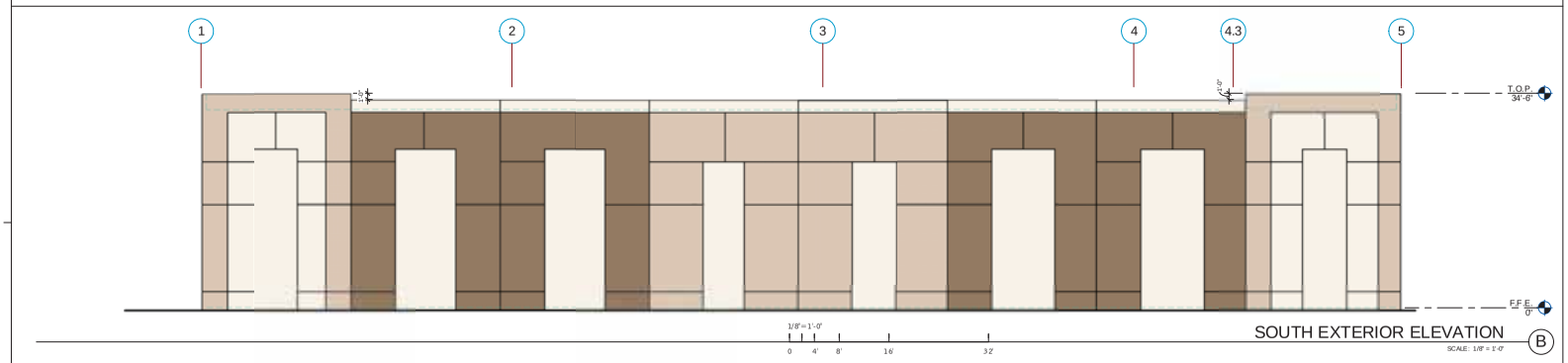
SHEET
76A4.1
BUILDING 76

10/27/2016 2:57:29 PM - PLANNING RESUBMITTAL

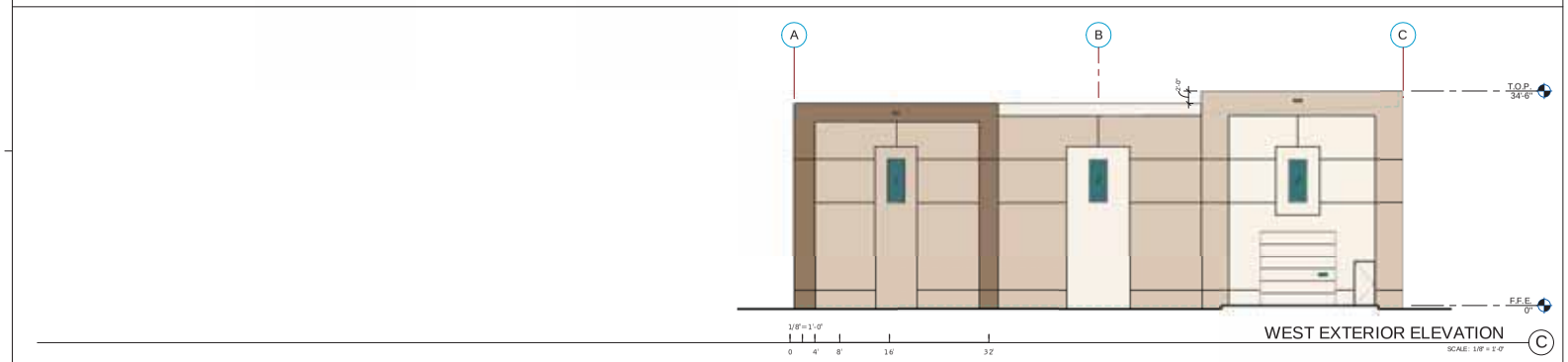
CAUTION: IF THIS SHEET IS NOT 30"x42" IT IS A REDUCED PRINT



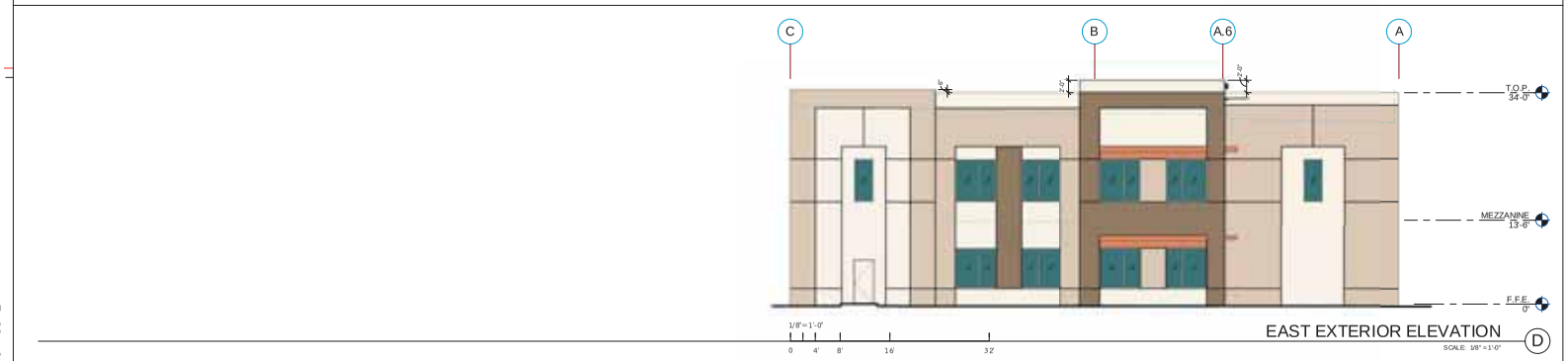
NORTH EXTERIOR ELEVATION (A)
SCALE: 1/8" = 1'-0"



SOUTH EXTERIOR ELEVATION (B)
SCALE: 1/8" = 1'-0"



WEST EXTERIOR ELEVATION (C)
SCALE: 1/8" = 1'-0"



EAST EXTERIOR ELEVATION (D)
SCALE: 1/8" = 1'-0"

LEGEND

- VISION GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- TEMPERED GLASS
  MANUFACTURER: PPG IDEASCAPES
  COLOR/NO.: SOLARCOOL (2) PACIFICA
- BASE COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO: DESERT SUEDE - DE6305
- SECONDARY COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: RIDGECREST - DE6174
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: TRITE WHITE - DE6304
- ACCENT COLOR
  MANUFACTURER: DUNN EDWARDS
  COLOR/NO.: HARVEST TIME - DE5208

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58 MAGNOLIA
RIVERSIDE, CALIFORNIA

EXTERIOR ELEVATIONS

DATE	REMARKS

PA/PM:	J. GONZALEZ
DRAWN BY.:	A.L.
JOB NO.:	IRV09-0166-00

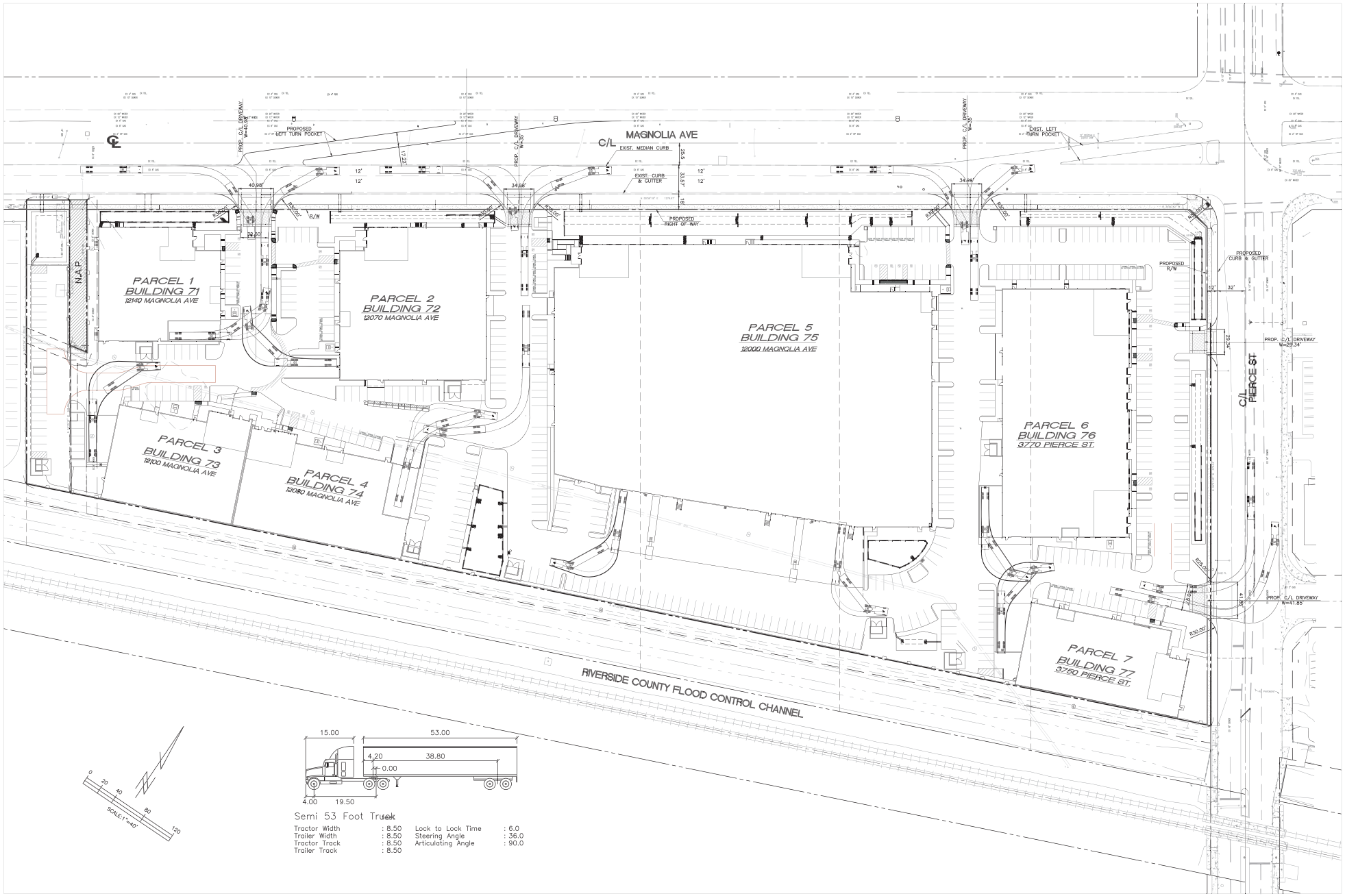
SHEET
77A4.1
BUILDING 77

10/27/2016 2:57:29 PM - PLANNING RESUBMITTAL

PREPARED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

TRUCK TURNING AT TRUCK WELL EXHIBIT
IBG MAGNOLIA CENTER

SHEET 2 OF 2



Last Update 3/16/14

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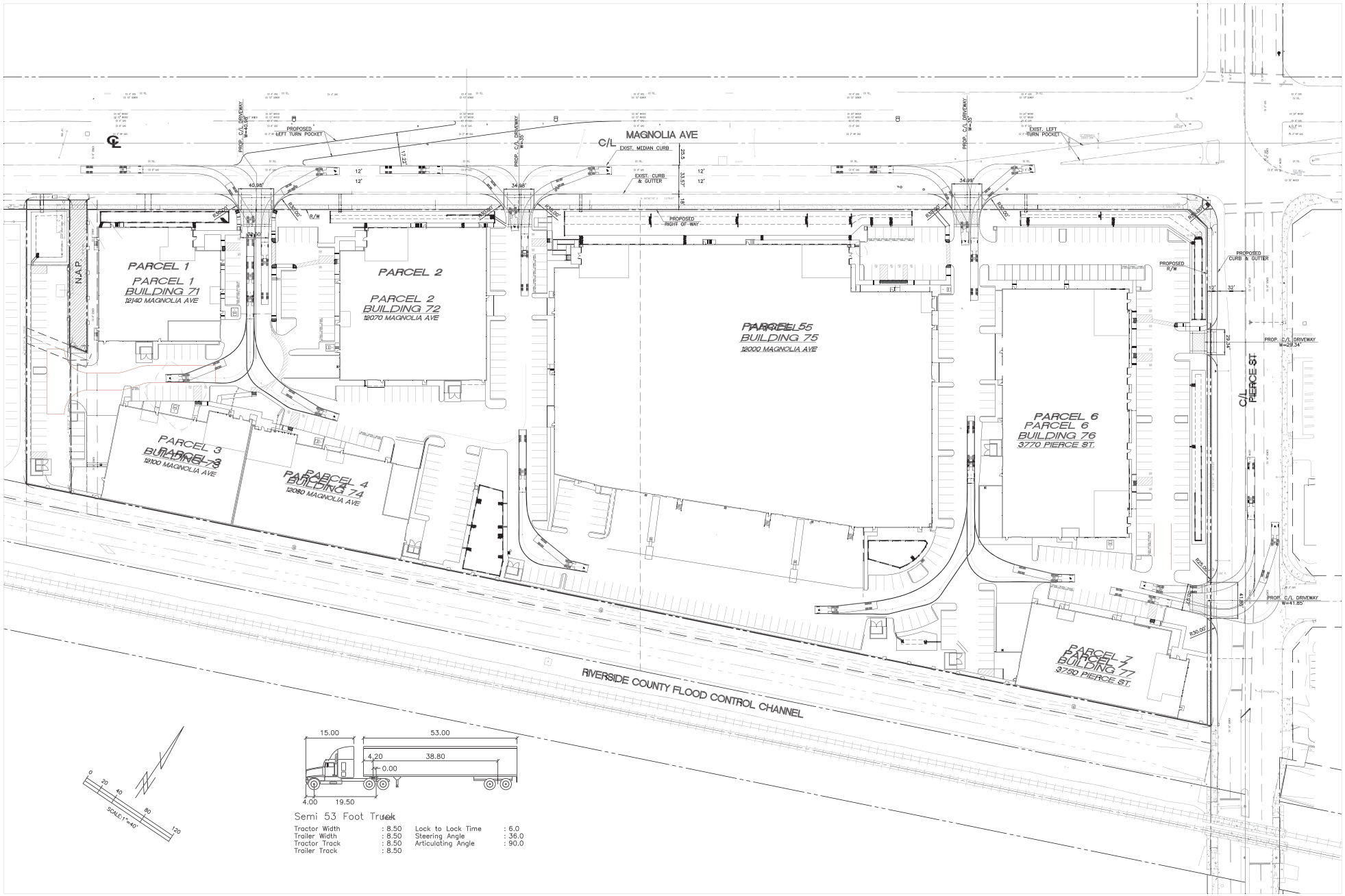
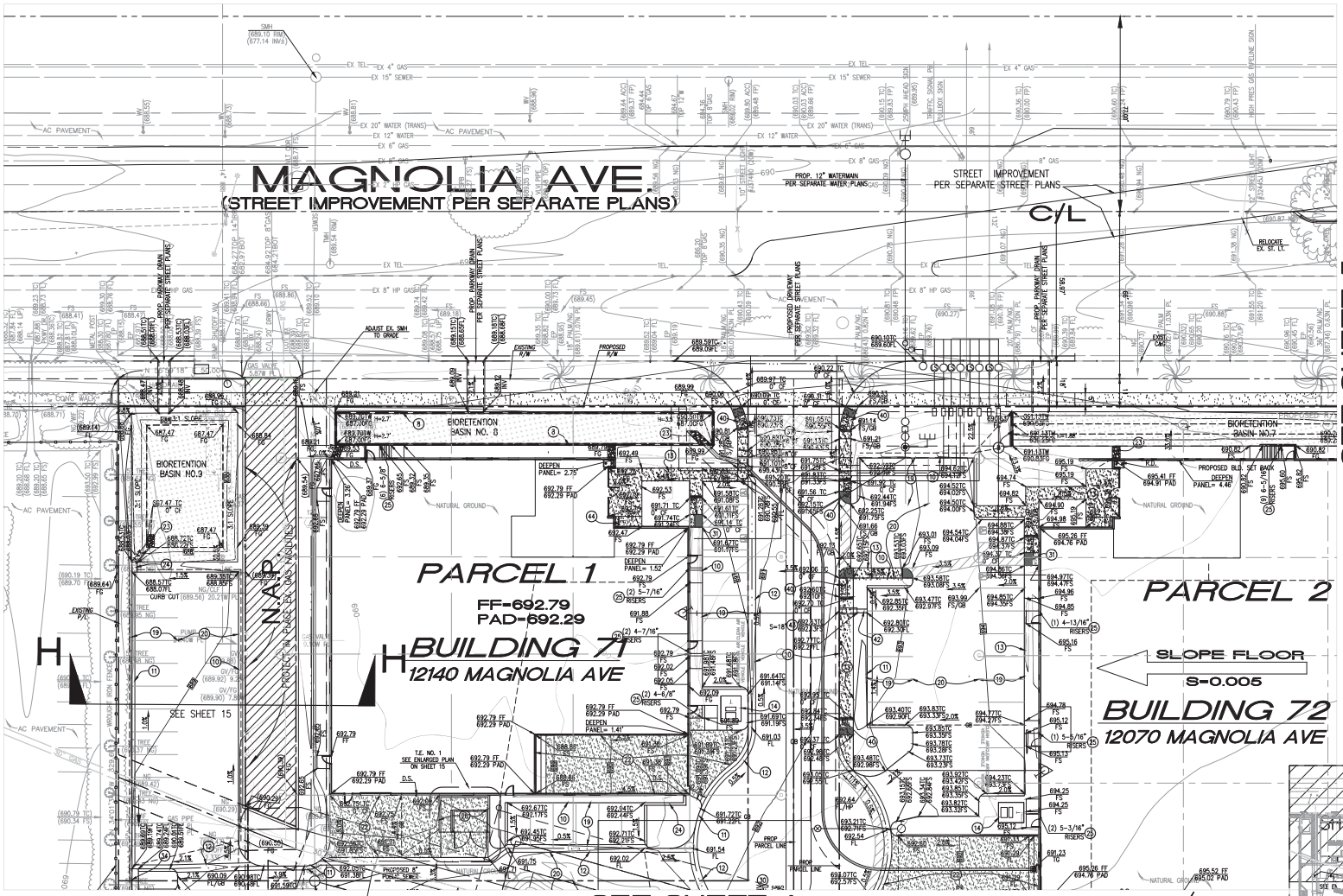
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

TRUCK TURNING AT DRIVE AISLES EXHIBIT
IBG MAGNOLIA CENTER

SHEET 1 OF 2



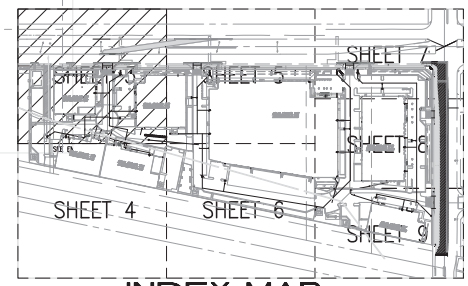
Last Update 7/14/16
H:\2600-2699\2650\2630T\2630C-TRUCK TURNING EXHIBIT.dwg



GRADING CONSTRUCTION NOTES

✳ PAVEMENT SECTIONS ARE APPROXIMATE VALUES, EXACT SECTION SHALL BE DETERMINED IN FIELD BY SOILS ENGINEER AFTER ROUGH GRADING. DESIGN FOR THE EXACT SECTION SHALL BE SUBMITTED TO THE CITY OF RIVERSIDE GRADING SECTION

1 — PROTECT IN PLACE (ITEM PER PLAN)
2 — REMOVE EXISTING PIPE, PUMP, GATE VALVES AND ATTACHED APPURTENANCES (PER SEPARATE PERMIT)
3 — REMOVE EXIST. CONC. SLAB (PER SEPARATE PERMIT)
4 — REMOVE EXISTING TREES
5 — SAW-CUT, REMOVE AND REPLACE 1' WIDE STRIP EXISTING PAVEMENT. PER SEPARATE STREET IMP. PLANS
6 — CONSTRUCT GUTTER PER DETAIL ON SHEET 2
7 — CONSTRUCT SIDEWALK PER CITY OF RIVERSIDE STD. 325 PER SEPARATE STREET IMPROVEMENT PLANS
8 — CONSTRUCT GRAVITY WALL (BASIN) PER DETAIL ON SHEET 2 OR APPROVED EQUAL.
9 — RETAINING WALL PER STRUCTURAL PLANS
10 — CONSTRUCT 6" CURB PER DETAIL SHEET 2 (PER SEPARATE PERMIT)
11 — CONSTRUCT 6" CURB AND GUTTER PER DETAIL SHEET 2 (PER SEPARATE PERMIT)
12 — CONSTRUCT 3' WIDE V-GUTTER PER DETAIL ON SHEET 2
13 — CONSTRUCT CONCRETE WALK PER ARCHITECT PLAN.
14 — CONSTRUCT TRANSFORMER PAD PER ELECTRICAL PLAN.
15 — LANDSCAPE PER LANDSCAPE ARCH. PLANS.
16 — CONSTRUCT 8" CURB & GUTTER PER CITY OF RIVERSIDE STD. PER SEPARATE STREET IMPROVEMENT PLANS
17 — CONSTRUCT CROSS GUTTER PER CITY OF RIVERSIDE STD PER SEPARATE STREET IMPROVEMENT PLANS (PER SOIL ENGINEER RECOMMENDATION)
18 — CONSTRUCT 10 MIL VAPOR BARRIER OVERLAIN BY 2" OF CLEAN SAND
✳ 19 — CONSTRUCT 2.5" AC. OVER 7.5" CMB T.I.=4.5 (PARKING)
✳ 20 — CONSTRUCT 2.5" AC. OVER 9" CMB T.I.=5.0 (AUTO DRIVE)
✳ 21 — CONSTRUCT 3" AC. OVER 11" CMB T.I.=6.0 (TRUCK DRIVE)
✳ 22 — CONSTRUCT 7" CONCRETE PAVEMENT OVER 5" A.B. (PER SOIL RECOMMENDATION)
23 — CONSTRUCT RIPRAP PER DETAIL ON SHEET 2
24 — CONSTRUCT 12" CONCRETE CHANNEL PER DETAIL ON SHEET 2
25 — CONCRETE STEPS AND HANDRAIL PER ARCHITECTURAL PLANS
26 — TRASH ENCLOSURE PER ARCHITECHTURAL PLANS
27 — SCREEN WALL PER ARCHITECHTURAL PLANS
28 — CONST. 0"-6" CURB TRANSITION. (3LF) (PER SEPARATE PERMIT)
29 — WATERPROOF BUILDING WALL PER ARCHITECTURAL PLANS
30 — CONSTRUCT ROOF DRAIN THRU CURB PER DETAIL ON SHEET 2
31 — CONSTRUCT ADA CURB RAMP PER SPPWC STD. NO. 111-3, CASE B, TYPE 1 (PER SEPARATE PERMIT)
32 — ADJUST TO GRADE EXIST. SEWER MH.
33 — ADJUST TO GRADE EXIST. GAS VALVE
34 — CONSTRUCT 30" CONCRETE CHANNEL PER DETAIL ON SHEET 2
35 — CONSTRUCT ADA CURB RAMP PER SPPWC STD. NO. 111-3, CASE D, TYPE 1 (PER SEPARATE PERMIT)
36 — CONSTRUCT ADA RAMP W/HAND RAIL PER ARCHITECT PLANS.
37 — CONSTRUCT DECORATIVE PAVER PER ARCH.
38 — CONSTRUCT 12' CONCRETE V-DITCH PER DETAIL ON SHEET 2
39 — CONSTRUCT 30" FLAT CONCRETE CHANNEL PER DETAIL ON SHEET 2
40 — CONSTRUCT ADA CURB RAMP PER SPPWC STD. NO. 111-3, CASE D, TYPE 2 (PER SEPARATE PERMIT)
41 — CONSTRUCT GRAVITY CURB PER DETAIL ON SHEET 2
42 — CONSTRUCT 18" CONCRETE CHANNEL PER DETAIL ON SHEET 2
43 — CONSTRUCT PARKWAY DRAIN PER SPPWC STD. NO. 151-2, TYPE 2, S=PER PLAN
44 — BIKE RACK PER ARCHITECHTURAL PLANS



INDEX MAP
NTS

0 10 20 40 60
SCALE:1"=20'

SOILS ENGINEER:
JOHN R. BYERLY, INC
2257 SOUTH LILAC AVE
BLOOMINGTON, CA 92316
PHONE: 909-877-1324

OWNER:
58 MAGNOLIA PARTNERSHIP L.P.
C/O INVESTMENT BUILDING GROUP
5100 CAMPUS DRIVE, SUITE 300
NEWPORT BEACH, CA 92660
PHONE:949-263-1111

BUSINESS TAX CERTIFICATION # 041318 EXP. DATE 09-30-16

Underground Service Alert
Call: TOLL FREE
1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

PRIVATE ENGINEERING NOTE

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE ACCEPTED AS SOLELY RESPONSIBLE FOR JOB SITE SAFETY AND FOR THE SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

REGISTERED PROFESSIONAL ENGINEER
HAIDOOK I. AGHAIAN
R.C.E. NO. 43293
Exp. 3-31-18
STATE OF CALIFORNIA CIVIL

PREPARED UNDER THE DIRECTION OF:
HAIDOOK I. AGHAIAN
R.C.E. 043293 – EXP. 3/31/18
DATE

PREPARED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

AS SHOWN
DATE

CITY OF RIVERSIDE BENCHMARK NO. "E2-J3"
P.K. NAIL AND CITY ENGINEER TAG IN THE NORTHWESTERLY CURB RETURN OF MAGNOLIA AVENUE AND PIERCE STREET.
ELEV. = 694.500' (NGVD '29 / ADJUSTMENT YEAR: 1971)

MARK	REVISIONS	APPR.	DATE

DESIGNED BY CMR DRAWN BY JC CHECKED BY HIA

CITY OF RIVERSIDE– PLANNING
APPROVED _____ DATE _____

CITY OF RIVERSIDE
PROJECT NO. PW16-0058

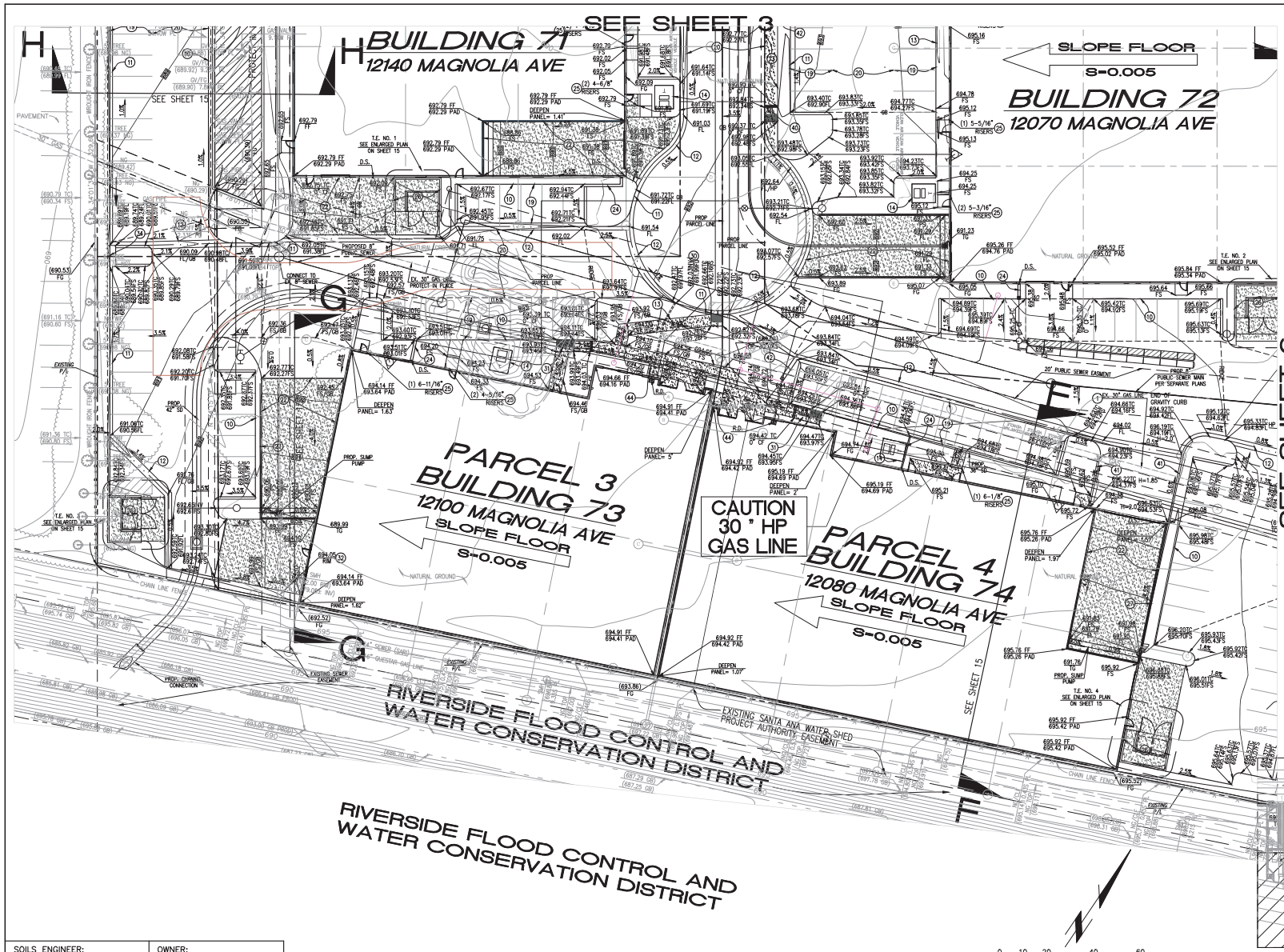
PRECISE GRADING PLAN
FOR
58 MAGNOLIA CENTER
PIERCE ST. AND MAGNOLIA AVE.

FOR: INVESTMENT BUILDING GROUP

SHEET 3 OF 15

Last Update: 4/29/16
N:\2600-2699\2609\2609E\2609eGP-03.dwg

2nd PLAN CHECK-04-28-16



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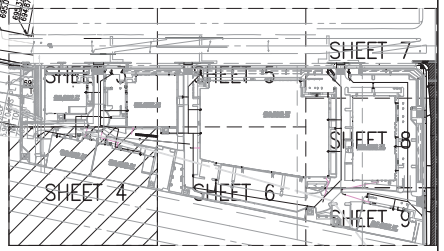

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R.C.E. NO. 43293
Exp. 3-31-18
CIVIL
STATE OF CALIFORNIA

PREPARED UNDER THE DIRECTION OF:
HAIDOOK I. AGHAIAN — DATE
R.C.E. 043293 – EXP. 3/31/18

BUSINESS TAX CERTIFICATION # 041318 EXP. DATE 09-30-16

PREPARED BY:
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LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

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PRECISE GRADING PLAN
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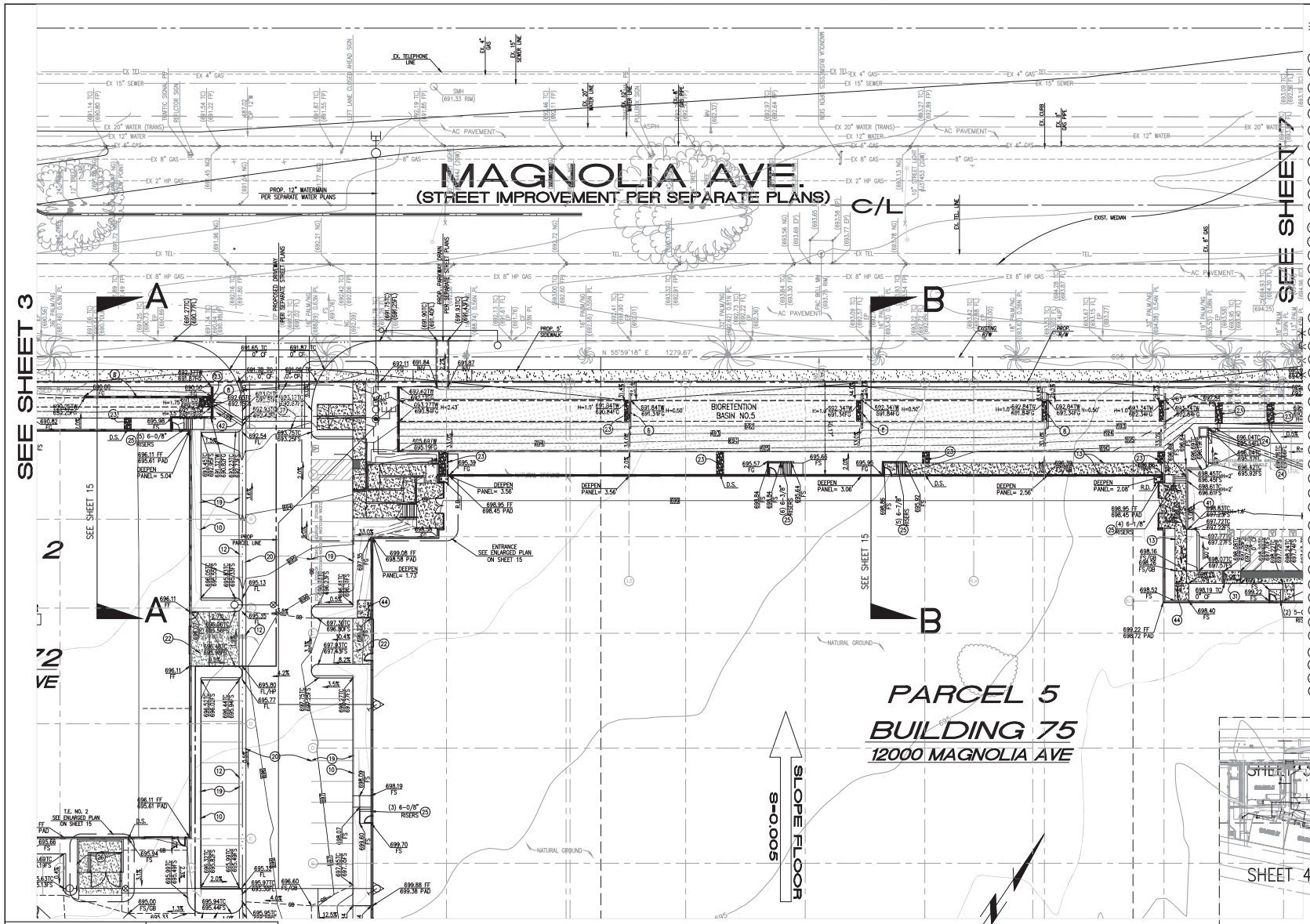
PIERCE ST. AND MAGNOLIA AVE.

FOR: INVESTMENT BUILDING GROUP

SHEET 4 OF 15

2nd PLAN CHECK-04-28-16



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HAIDOOK I. AGHAIAN — DATE
R.C.E. 043293 – EXP. 3/31/18

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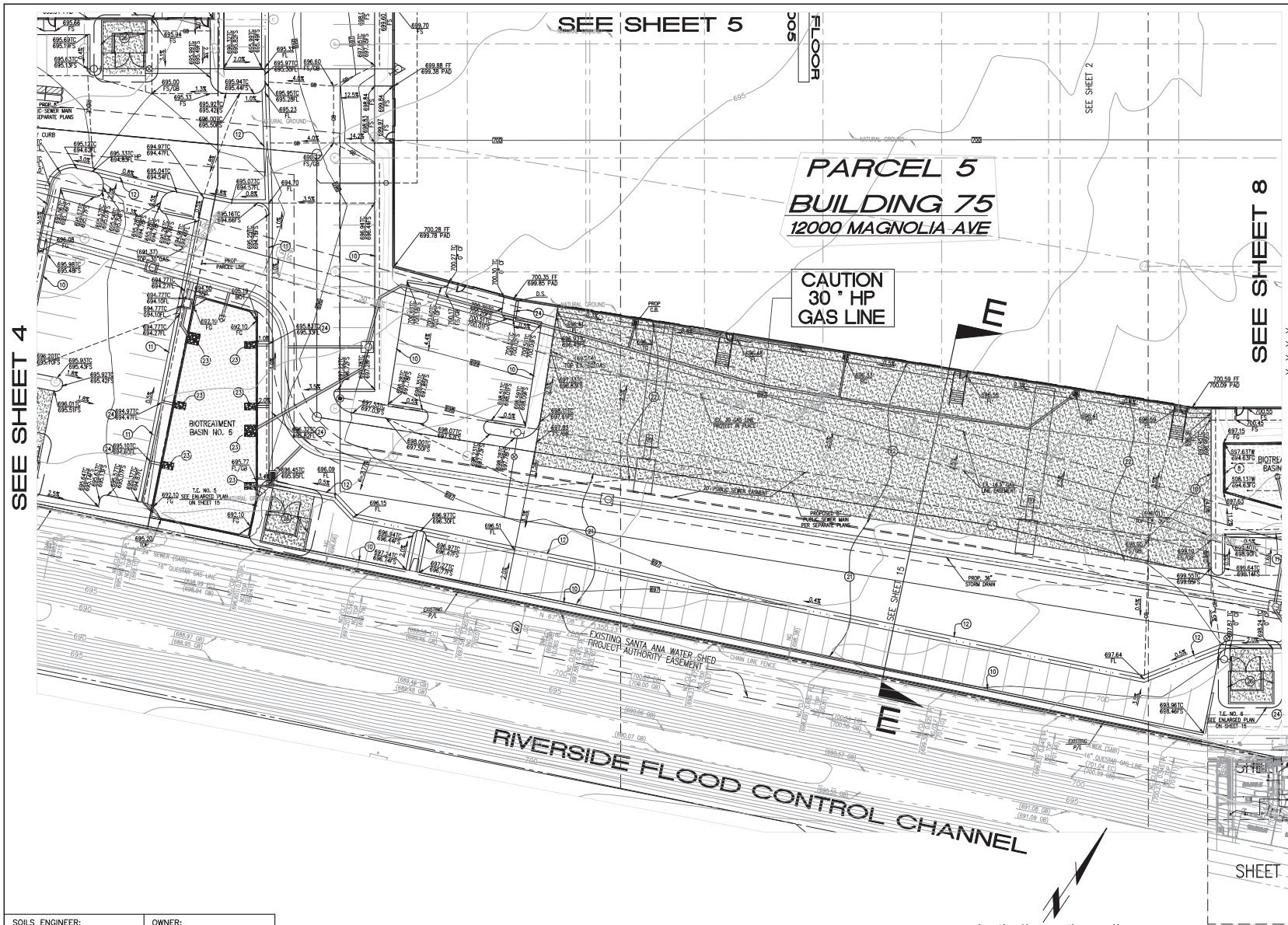

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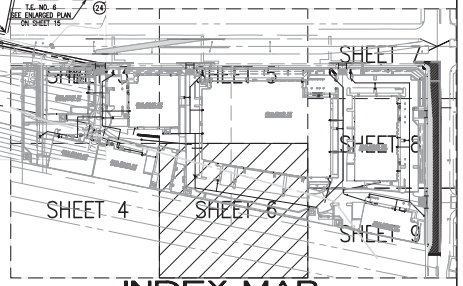

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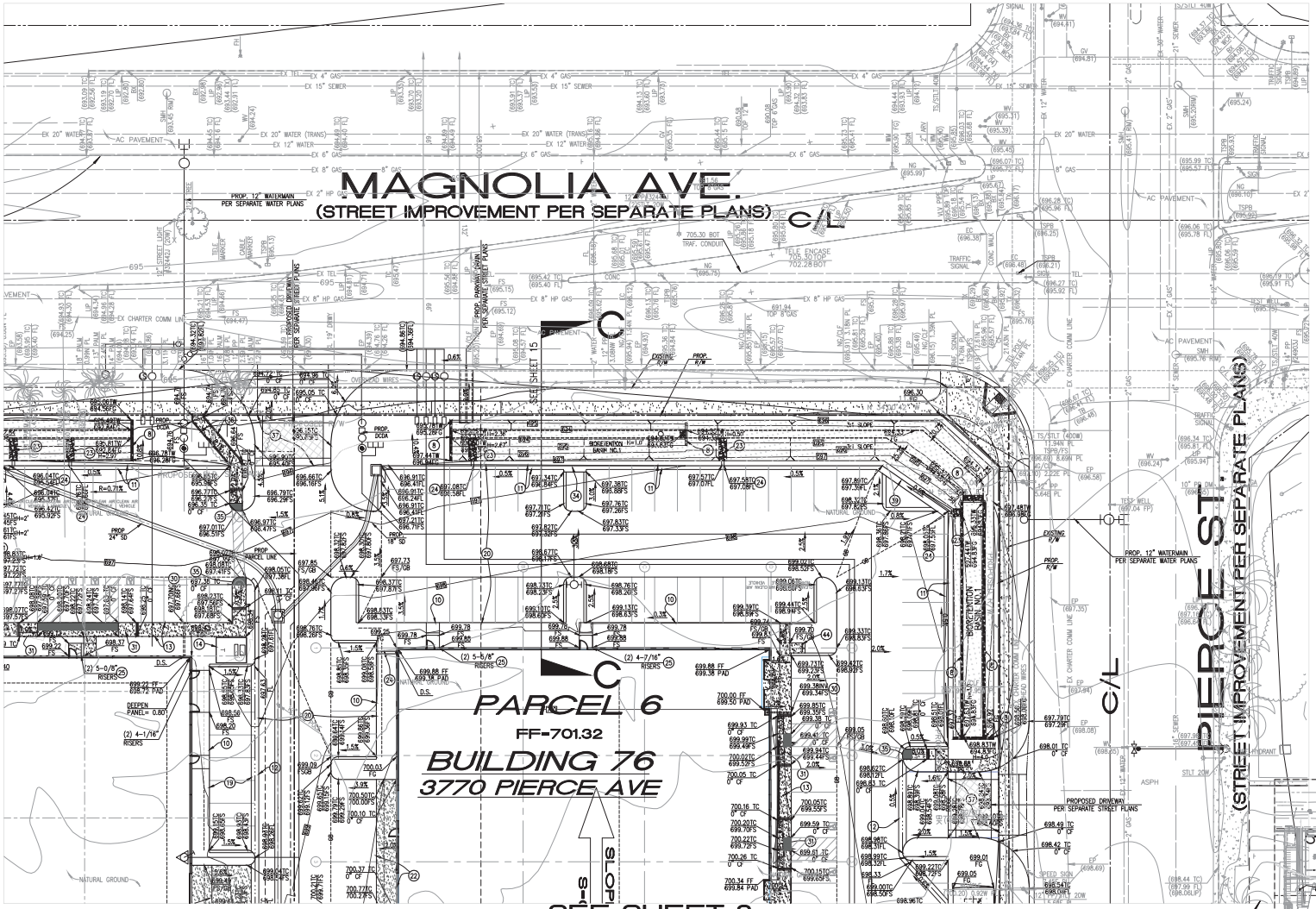

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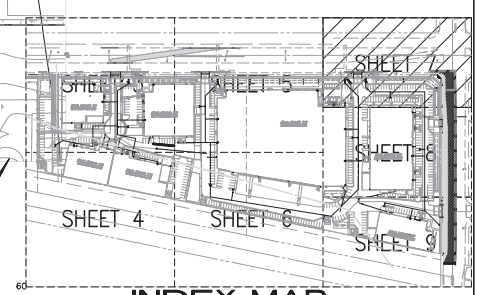

INDEX MAP
NTS
WDID NO. –

Last Updated: 4/27/16
N:\2600–2699\2609\2609E\2609eGP–07.dwg

SOILS ENGINEER:
JOHN R. BYERLY, INC
2257 SOUTH LILAC AVE
BLOOMINGTON, CA 92316
PHONE: 909–877–1324

OWNER:
58 MAGNOLIA PARTNERSHIP L.P.
C/O INVESTMENT BUILDING GROUP
5100 CAMPUS DRIVE, SUITE 300
NEWPORT BEACH, CA 92660
PHONE:949–263–1111

BUSINESS TAX CERTIFICATION # 041318 EXP. DATE 09–30–16

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REGISTERED PROFESSIONAL ENGINEER — HAIDOOK I. AGHAIAN — R.C.E. NO. 43293 — Exp. 3-31-18 — CIVIL — STATE OF CALIFORNIA

PREPARED UNDER THE DIRECTION OF:
HAIDOOK I. AGHAIAN
R.C.E. 043293 – EXP. 3/31/18
DATE

PREPARED BY: Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

AS SHOWN
DATE

CITY OF RIVERSIDE BENCHMARK NO. "E2–J3"
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MARK	REVISIONS	APPR.	DATE

DESIGNED BY CMR DRAWN BY JC CHECKED BY HIA

CITY OF RIVERSIDE– PLANNING
APPROVED _____ DATE _____

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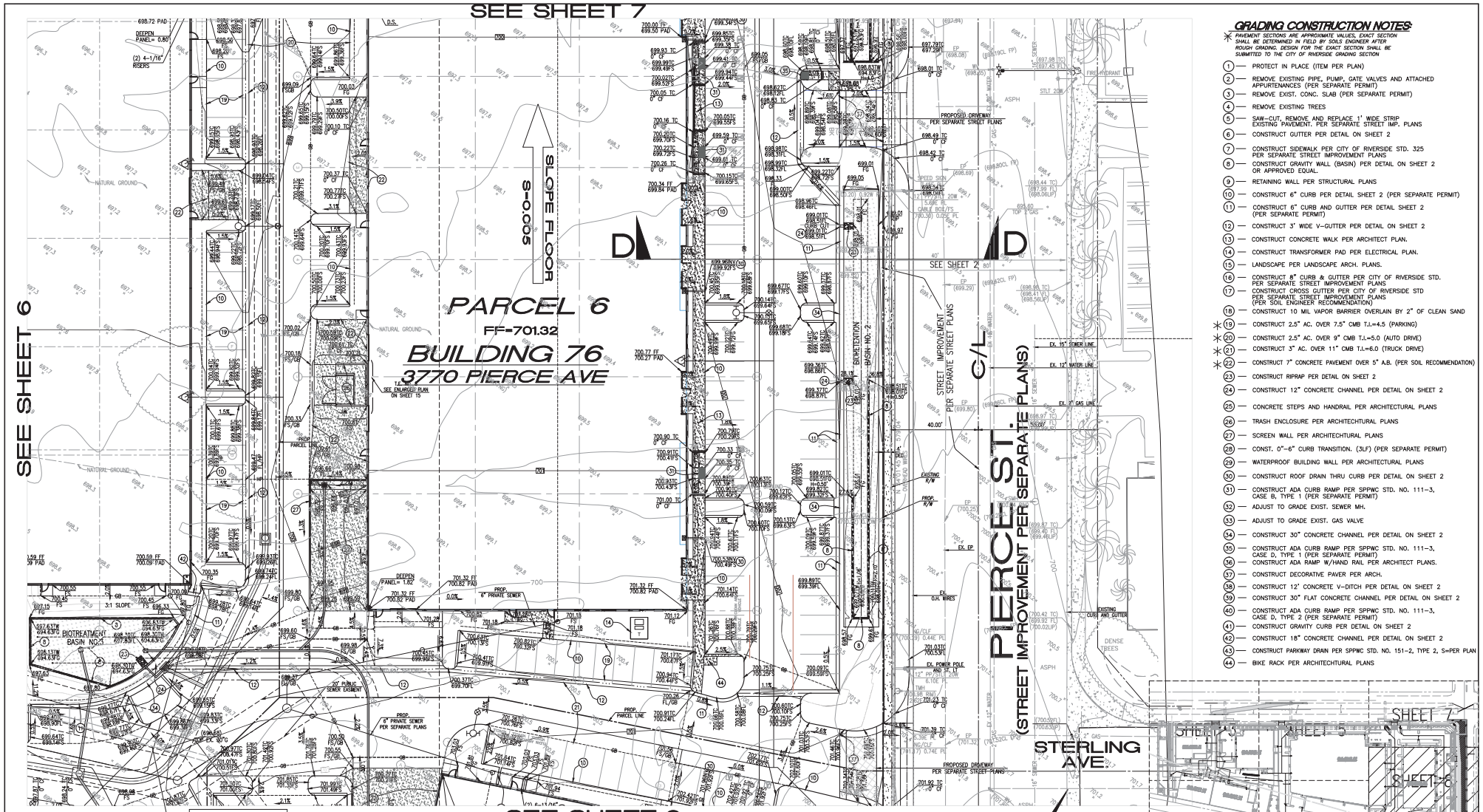
PROJECT NO. PW16–0058

PRECISE GRADING PLAN
FOR
58 MAGNOLIA CENTER
PIERCE ST. AND MAGNOLIA AVE.

FOR: INVESTMENT BUILDING GROUP

SHEET 7 OF 15

2nd PLAN CHECK–04–28–16



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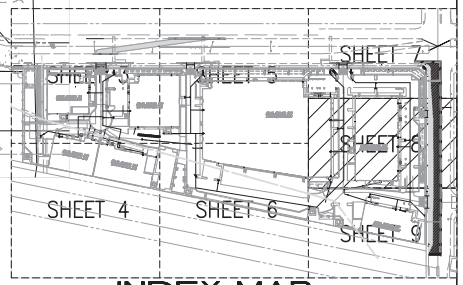

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R.C.E. NO. 43293
Exp. 3-31-18
STATE OF CALIFORNIA CIVIL

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CITY OF RIVERSIDE

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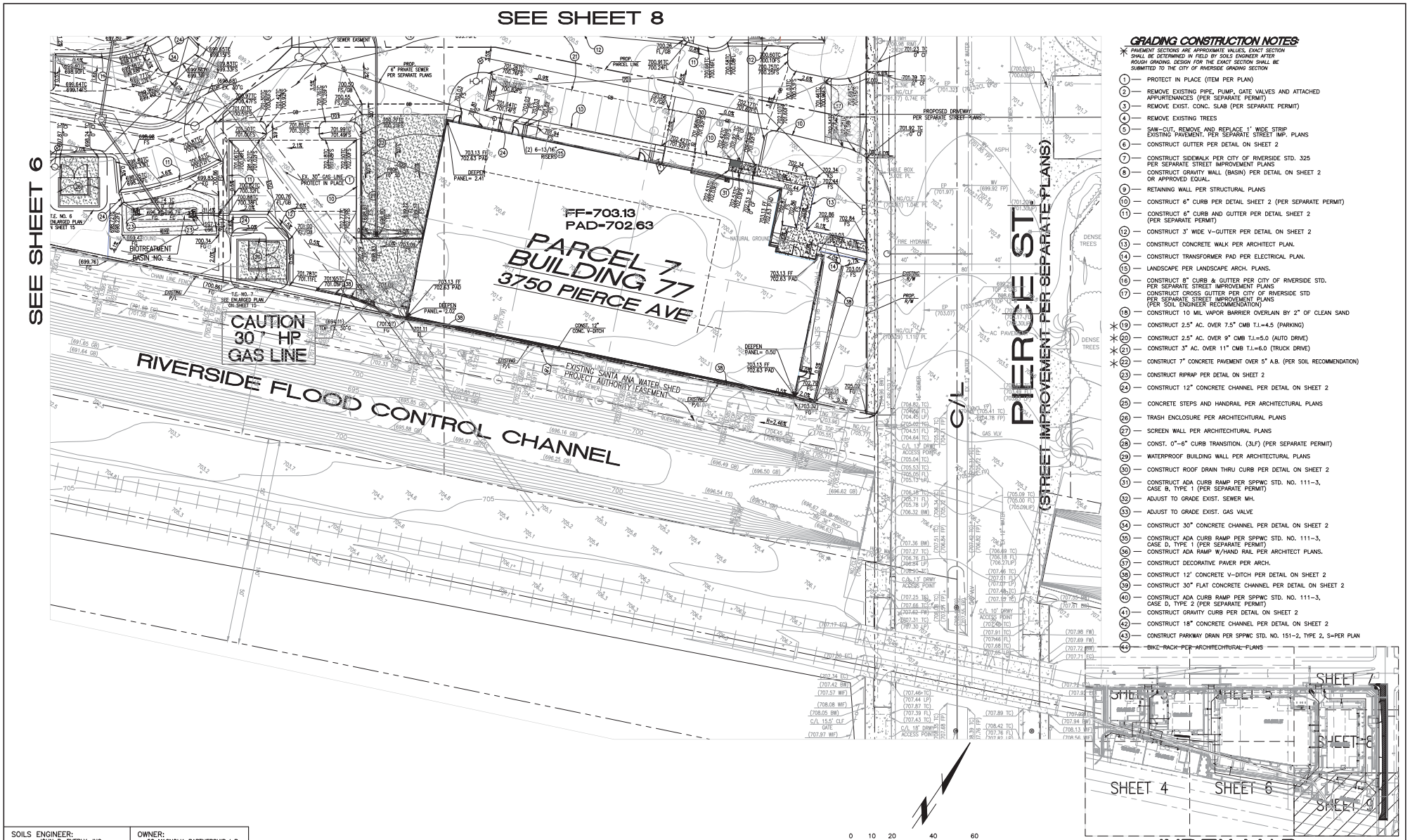
PRECISE GRADING PLAN
FOR
58 MAGNOLIA CENTER
PIERCE ST. AND MAGNOLIA AVE.

FOR: INVESTMENT BUILDING GROUP

SHEET 8 OF 15

2nd PLAN CHECK-04-28-16



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PROJECT NO. PW16-0058
SHEET 9 OF 15

Last Updated 4/28/16
N:\2600-2699\2608\2608E\2608eGP-09.dwg

2nd PLAN CHECK-04-28-16

Date of Survey: October 1, 2015

TENTATIVE PARCEL MAP NO. 34605

IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

BEING A SUBDIVISION OF A PORTION OF LOTS 1, 2 AND 3 OF BLOCK 51 OF LAND OF RIVERSIDE LAND AND IRRIGATING COMPANY, CALIFORNIA, AS PER MAP RECORDED IN BOOK 1 PAGE 70 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PREPARED BY / APPLICANT:

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CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
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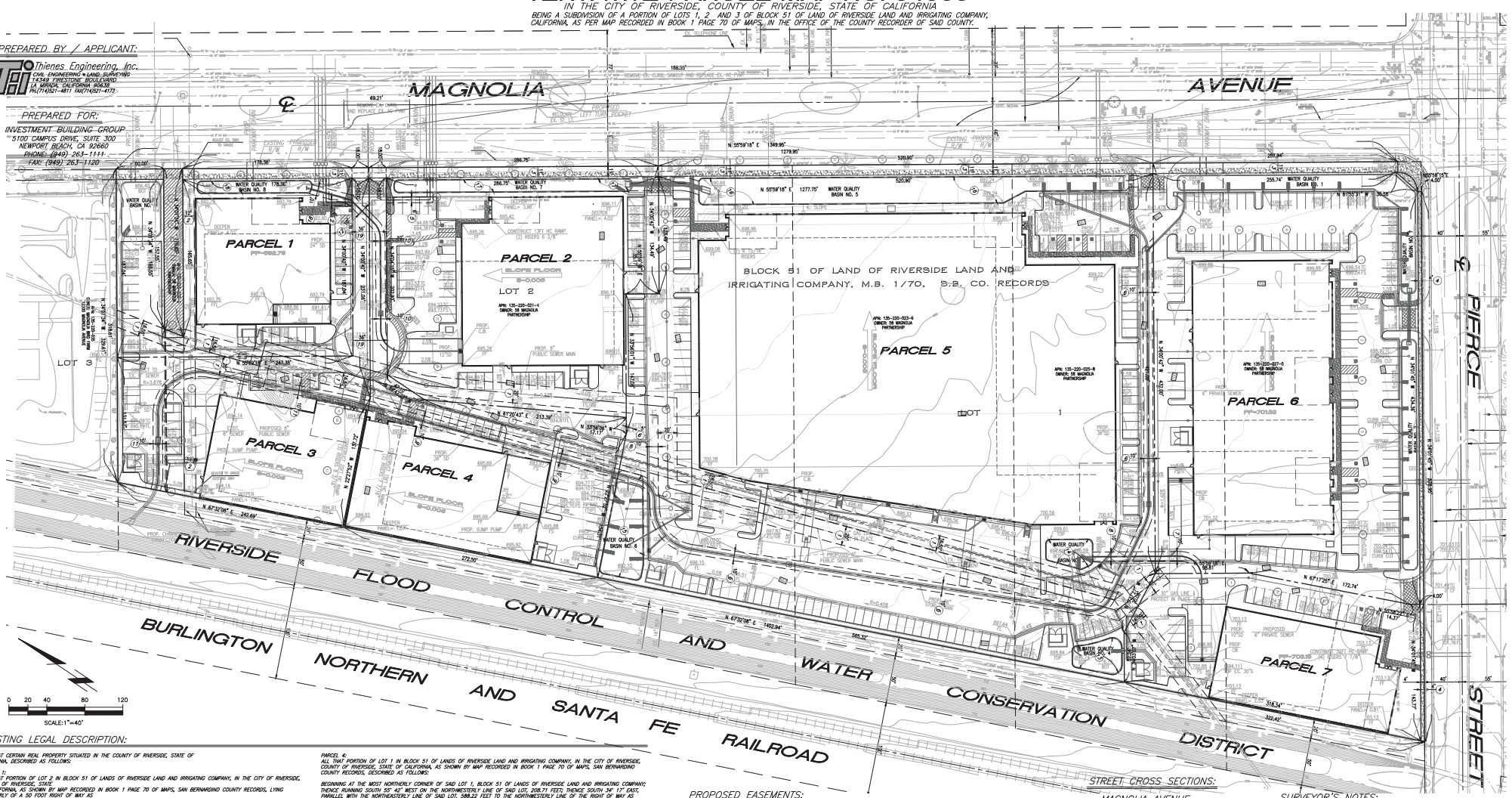


EXISTING LEGAL DESCRIPTION:

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

PARCEL 1:
ALL THAT PORTION OF LOT 2 IN BLOCK 51 OF LANDS OF RIVERSIDE LAND AND IRRIGATING COMPANY, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP RECORDED IN BOOK 1 PAGE 70 OF MAPS, SAN BERNARDINO COUNTY RECORDS, LYING NORTHERLY OF A 50 FOOT RIGHT OF WAY AS GRANTED TO SOUTHERN PACIFIC COMPANY BY DEED RECORDED AUGUST 27, 1897 IN BOOK 45 PAGE 298 OF DEEDS.

EXCEPT THAT PORTION CONVEYED TO THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT BY DEED RECORDED MAY 5, 1949 AS INSTRUMENT NO. 512, IN BOOK 1073, PAGE 563 OF OFFICIAL RECORDS.

ALSO EXCEPT THAT PORTION CONVEYED TO THE SOUTHERN CALIFORNIA GAS COMPANY BY DEED RECORDED AUGUST 9, 1956 AS INSTRUMENT NO. 53730 IN BOOK 1956, PAGE 134 OF OFFICIAL RECORDS. ALSO EXCEPT THAT PORTION CONVEYED TO RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT BY DEED RECORDED DECEMBER 13, 1984 AS INSTRUMENT NO. 266623 OF OFFICIAL RECORDS.

PARCEL 2:
ALL THAT PORTION OF LOT 1 IN BLOCK 51 OF LANDS OF RIVERSIDE LAND AND IRRIGATING COMPANY, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP RECORDED IN BOOK 1 PAGE 70 OF MAPS, SAN BERNARDINO COUNTY RECORDS, LYING NORTHERLY OF A 50 FOOT RIGHT OF WAY AS GRANTED TO SOUTHERN PACIFIC COMPANY BY DEED RECORDED AUGUST 27, 1897 IN BOOK 45 PAGE 298 OF DEEDS, AND SOUTHWESTERLY OF A LINE BEGINNING AT THE NORTHWESTERLY LINE OF LOT 1 OF SAID BLOCK 51 AT A POINT 430.63 FEET SOUTHWESTERLY FROM THE MOST NORTHERLY CORNER THEREOF; THENCE SOUTH 34° 17' EAST, PARALLEL TO THE SOUTHEASTERLY LINE OF LOT 1, TO THE RIGHT OF WAY GRANTED TO SOUTHERN PACIFIC COMPANY BY THE ABOVE MENTIONED DEED.

EXCEPT THOSE PORTIONS CONVEYED TO THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT BY DEED RECORDED MAY 5, 1949 AS INSTRUMENT NO. 512, IN BOOK 1073, PAGE 563 AND DECEMBER 13, 1984 AS INSTRUMENT NO. 266623 BOTH OF OFFICIAL RECORDS.

PARCEL 3:
ALL THAT PORTION OF LOT 1 IN BLOCK 51 OF LANDS OF RIVERSIDE LAND AND IRRIGATING COMPANY, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP RECORDED IN BOOK 1 PAGE 70 OF MAPS, SAN BERNARDINO COUNTY RECORDS, LYING NORTHEASTERLY OF A LINE BEGINNING AT THE NORTHWESTERLY CORNER OF SAID LOT 1; THENCE SOUTH 65° 15' EAST, ALONG THE NORTHWESTERLY LINE OF SAID RIGHT OF WAY TO A POINT 213.1 FEET, MORE OR LESS, ALONG SAID RIGHT OF WAY FROM THE NORTHEASTERLY LINE OF LOT 1, SAID POINT ALSO BEING THE INTERSECTION OF SAID NORTHWESTERLY LINE OF RIGHT OF WAY WITH A LINE PARALLEL TO AND AT RIGHT ANGLES A DISTANCE OF 208.71 FEET FROM THE NORTHEASTERLY LINE OF LOT 1, SAID 208.71 FEET MEASURED ON THE NORTHWESTERLY LINE OF LOT 1; THENCE NORTH 34° 17' WEST, ALONG SAID PARALLEL LINE, 588.22 FEET TO THE POINT OF BEGINNING.

EXCEPT THOSE PORTIONS CONVEYED TO THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT BY DEED RECORDED MAY 5, 1949 AS INSTRUMENT NO. 512, IN BOOK 1073, PAGE 563 AND DECEMBER 13, 1984 AS INSTRUMENT NO. 266623 BOTH OF OFFICIAL RECORDS.

PARCEL 4:
ALL THAT PORTION OF LOT 1 IN BLOCK 51 OF LANDS OF RIVERSIDE LAND AND IRRIGATING COMPANY, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP RECORDED IN BOOK 1 PAGE 70 OF MAPS, SAN BERNARDINO COUNTY RECORDS, DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST NORTHERLY CORNER OF SAID LOT 1, BLOCK 51 OF LANDS OF RIVERSIDE LAND AND IRRIGATING COMPANY; THENCE RUNNING SOUTH 55° 42' WEST ON THE NORTHWESTERLY LINE OF SAID LOT, 258.71 FEET; THENCE SOUTH 34° 17' EAST, PARALLEL WITH THE NORTHEASTERLY LINE OF SAID LOT, 588.22 FEET TO THE NORTHWESTERLY LINE OF THE RIGHT OF WAY AS GRANTED TO THE SOUTHERN PACIFIC COMPANY, BY DEED RECORDED AUGUST 27, 1897 IN BOOK 45 PAGE 298 OF DEEDS; THENCE NORTH 67° 15' EAST, ALONG THE NORTHWESTERLY LIE OF SAID 50 FOOT RIGHT OF WAY, 213.1 FEET, MORE OR LESS, TO THE INTERSECTION OF THE NORTHEASTERLY LINE OF SAID LOT 1; THENCE NORTH 34° 17' WEST ALONG THE NORTHEASTERLY LINE OF SAID LOT 1 TO THE TRUE POINT OF BEGINNING.

EXCEPT THOSE PORTIONS CONVEYED TO THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT BY DEED RECORDED MAY 5, 1949 AS INSTRUMENT NO. 512, IN BOOK 1073, PAGE 563 AND DECEMBER 13, 1984 AS INSTRUMENT NO. 266623 BOTH OF OFFICIAL RECORDS.

ALSO EXCEPT THAT PORTION CONVEYED TO THE CITY OF RIVERSIDE BY DEED RECORDED AUGUST 15, 1980 AS INSTRUMENT NO. 148574 OF OFFICIAL RECORDS.

PARCEL 5:
ALL THAT PORTION OF LOT 3 IN BLOCK 51 OF LANDS OF THE RIVERSIDE LAND AND IRRIGATING COMPANY, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 1, PAGE 70, OF MAPS, SAN BERNARDINO COUNTY RECORDS, AND ALL THAT PORTION OF MAGNOLIA AVENUE, AS SHOWN ON SAID MAP OF RIVERSIDE LAND AND IRRIGATING COMPANY, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST NORTHERLY CORNER OF SAID LOT 3; THENCE SOUTH 34° 18 30" EAST ALONG THE NORTHEASTERLY LINE OF SAID LOT 3, A DISTANCE OF 363.26 FEET TO A POINT ON THE NORTHERLY LINE OF THE LAND FIRST DESCRIBED IN DEED TO SOUTHERN PACIFIC, A CORPORATION, DATED AUGUST 3, 1897, AND RECORDED AUGUST 27, 1897, IN BOOK 45, PAGE 298 OF DEEDS, SAID POINT BEING 50.00 FEET NORTHERLY OF, AND MEASURED AT RIGHT ANGLES TO, THE NORTHERLY LINE OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY, A RIGHT OF WAY AS DESCRIBED IN DEED TO RIVERSIDE, SANTA ANA AND LOS ANGELES RAILWAY COMPANY, DATED SEPTEMBER 8, 1896, AND RECORDED JULY 8, 1897 IN BOOK 63, PAGE 111 OF DEEDS, SAN BERNARDINO COUNTY RECORDS; THENCE SOUTH 67° 14' WEST ALONG THE NORTHERLY LINE FIRST DESCRIBED IN DEED TO SAID SOUTHERN PACIFIC COMPANY, A CORPORATION, AND PARALLEL WITH AND DISTANT 50.00 FEET NORTHEASTERLY OF, AND MEASURED AT RIGHT ANGLES TO, SAID NORTHERLY LINE OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY'S RIGHT OF WAY, A DISTANCE OF 51.53 FEET TO A POINT 50.00 FEET SOUTHWESTERLY OF AND MEASURED AT RIGHT ANGLES TO SAID NORTHEASTERLY LINE OF LOT 3; THENCE NORTH 34° 18' 30" WEST AND PARALLEL WITH SAID NORTHEASTERLY LINE OF SAID LOT 3, A DISTANCE OF 391.05 FEET TO A POINT IN A LINE PARALLEL WITH AND DISTANT 41.00 FEET NORTHWESTERLY FROM, MEASURED AT RIGHT ANGLES TO, THE NORTHWESTERLY LINE OF SAID LOT 3; THENCE NORTH 55° 41' 30" EAST ALONG SAID PARALLEL LINE, A DISTANCE OF 50.00 FEET TO AN INTERSECTION WITH THE SOUTHWESTERLY PROLONGATION OF SAID NORTHEASTERLY LINE OF SAID LOT 3; THENCE SOUTH 34° 18' 30" EAST ALONG SAID NORTHWESTERLY PROLONGATION, A DISTANCE OF 41.00 FEET TO THE POINT OF BEGINNING.

EXCEPT AN UNDIVIDED ONE-HALF INTEREST IN AND TO ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES AND MINERALS BELOW ABOVE DESCRIBED DEPTH OF 500 FEET FROM THE SURFACE, WITH NO SURFACE RIGHT OF ENTRY TO THE PREMISES, AS RESERVED BY METWORTH CORPORATION, A CALIFORNIA CORPORATION, ET AL., RECORDED DECEMBER 26, 1967 AS INSTRUMENT NO. 113293, OF OFFICIAL RECORDS.

EXCEPTING THEREFROM THAT PORTION INCLUDED IN MAGNOLIA AVENUE, 132 FEET WIDE AS SHOWN ON SAID MAP OF LAND OF THE RIVERSIDE LAND AND IRRIGATING COMPANY AND RECORDED IN BOOK 1, PAGE 70, OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA.

ALSO EXCEPTING THEREFROM THAT PORTION GRANTED TO THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, IN GRANT DEED RECORDED FEBRUARY 25, 1988 AS INSTRUMENT NO. 85-37940, OF OFFICIAL RECORDS.

LEGEND:

1045	INDICATES PROPOSED CONTOUR
1045	INDICATES EXISTING CONTOUR
	EXISTING RIGHT-OF-WAY OR PROPERTY LINE
	PROPOSED RIGHT-OF-WAY OR PROPERTY LINE

PROPOSED EASEMENTS:

1. A 20' WIDE EASEMENT FOR SEWER PURPOSES TO BE DEDICATED TO THE CITY OF RIVERSIDE.
2. A 10' WIDE EASEMENT FOR WATER PURPOSES OVER PARCEL 1 FOR THE BENEFIT OF PARCEL 3.
3. A 11' WIDE EASEMENT FOR STREET AND UTILITY PURPOSES TO BE DEDICATED TO THE CITY OF RIVERSIDE.
4. A 4' WIDE EASEMENT FOR STREET AND UTILITY PURPOSES TO BE DEDICATED TO THE CITY OF RIVERSIDE.
5. A 10' WIDE EASEMENT FOR WATER PURPOSES OVER PARCEL 2 FOR THE BENEFIT OF PARCEL 4.
6. A 10' WIDE EASEMENT FOR STORM DRAIN PURPOSES OVER PARCEL 5 FOR THE BENEFIT OF PARCEL 6 & 7.
7. A 10' WIDE EASEMENT FOR STORM DRAIN PURPOSES OVER PARCEL 6 FOR THE BENEFIT OF PARCEL 7.
8. A 10' WIDE EASEMENT FOR STORM DRAIN PURPOSES OVER PARCEL 5 FOR THE BENEFIT OF PARCELS 6 & 7.
9. A 10' WIDE EASEMENT FOR STORM DRAIN PURPOSES OVER PARCEL 4 FOR THE BENEFIT OF PARCELS 5, 6 & 7.
10. A 10' WIDE EASEMENT FOR STORM DRAIN PURPOSES OVER PARCEL 4 FOR THE BENEFIT OF PARCELS 5.
11. A 10' WIDE EASEMENT FOR STORM DRAIN PURPOSES OVER PARCEL 3 FOR THE BENEFIT OF PARCELS 4, 5, 6, & 7.
12. A 10' WIDE EASEMENT FOR STORM DRAIN PURPOSES OVER PARCEL 3 FOR THE BENEFIT OF PARCEL 5.
13. AN EASEMENT FOR DETENTION BASIN PURPOSES OVER PARCEL 5 FOR THE BENEFIT OF PARCEL 7.
14. AN EASEMENT FOR DETENTION BASIN PURPOSES OVER PARCEL 5 FOR THE BENEFIT OF PARCEL 6.
15. AN EASEMENT FOR DETENTION BASIN PURPOSES OVER PARCEL 5 FOR THE BENEFIT OF PARCELS 4.
16. AN EASEMENT FOR DETENTION BASIN PURPOSES OVER PARCEL 5 FOR THE BENEFIT OF PARCEL 6.
17. AN EASEMENT FOR DETENTION BASIN PURPOSES OVER PARCEL 2 FOR THE BENEFIT OF PARCEL 5 & 6.
18. AN EASEMENT FOR DETENTION BASIN AND STROM DRAIN PURPOSES OVER PARCEL 1 FOR THE BENEFIT OF PARCEL 2.
19. A RECIPROCAL ACCESS AND UTILITY EASEMENT OVER PARCEL 3 & 4 FOR THE BENEFIT OF ALL PARCELS.

ALL DRIVEWAYS SHALL BE USED AS FOR INGRESS AND EGRESS PURPOSES AND CROSS LOT DRAINAGE FOR THE BENEFIT OF ALL PARCELS.

UTILITY PROVIDERS:

TELEPHONE
AT&T
CONTACT: CARLONE BOSTROM
PHONE: 714-237-7140

CABLE
CHARTER COMMUNICATIONS
CONTACT: JORGE CANSECO
PHONE: 951-343-5100 EXT: 4110

SEWER
CITY OF RIVERSIDE
CONTACT: ROBERT VAN ZANTEN
3900 MAIN STREET, 4TH FLOOR
RIVERSIDE, CA 92522
PHONE: 951-826-5875

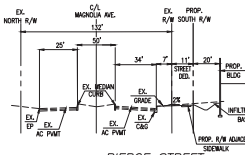
WATER
CITY OF RIVERSIDE
CONTACT: TONI REDMAN
3900 MAIN STREET,
RIVERSIDE, CA 92522
PHONE: 951-826-2126

GAS
THE GAS COMPANY
CONTACT: YOLANDA ALAMILO
1981 W. LUGONIA AVENUE,
REDLANDS, CA 92374
PHONE: 909-335-7629

STREET CROSS SECTIONS:

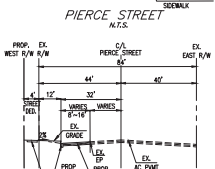
MAGNOLIA AVENUE

N.T.S.



PIERCE STREET

N.T.S.



AREA SUMMARY

PARCEL #	GROSS (SF)	(AC.)	NET (SF)	(AC.)
PARCEL 1	45,728	1.050	43,216	0.992
PARCEL 2	67,823	1.557	64,669	1.485
PARCEL 3	43,868	1.007	43,671	1.002
PARCEL 4	47,349	1.087	47,151	1.082
PARCEL 5	270,623	6.213	264,853	6.081
PARCEL 6	124,949	2.868	120,374	2.763
PARCEL 7	41,793	0.959	41,218	0.946
TOTAL	642,133	14.741	625,189	14.351

SURVEYOR'S NOTES:

1. TITLE TO SAID ESTATE OR INTEREST AT THE DATE HEREOF IS VESTED IN: LA-MAGNOLIA SPECTRUM, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY.
2. PROJECT ADDRESSES: SOUTHWEST CORNER OF PIERCE ST. & MAGNOLIA AVE. RIVERSIDE, CALIFORNIA
3. ASSESSOR'S PARCEL NUMBERS: 135-220-021, 135-220-023, 135-220-025, 135-220-027, 135-220-030
4. ZONING INFORMATION: (THE FOLLOWING ZONE DESIGNATIONS ARE PER CITY OF RIVERSIDE ZONING MAP) GENERAL PLAN DESIGNATION: "BP" (INDUSTRIAL BUSINESS PARK) ZONE DESIGNATION: "M-1" (LIGHT MANUFACTURING) REDEVELOPMENT ZONE: LASERRA ARLANZA PROJECT AREA

EXISTING EASEMENTS:

1. AN EASEMENT FOR PIPE LINE AND INCIDENTAL PURPOSES GRANTED TO SOUTHERN CALIFORNIA GAS COMPANY, A CORPORATION AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA, RECORDED MAY 1, 1948 IN BOOK 904 PAGE 528 OF OFFICIAL RECORDS. (SAID EASEMENT IS PLOTTED HEREON BASED ON FIELD-MEASURED LOCATION OF GAS PIPELINE.)
2. AN EASEMENT FOR SANITARY SEWER FACILITES AND INCIDENTAL PURPOSES GRANTED TO CITY OF RIVERSIDE, A MUNICIPAL CORPORATION, RECORDED NOVEMBER 18, 1983 AS INSTRUMENT NO. 241684 OF OFFICIAL RECORDS. (SAID EASEMENT IS PLOTTED HEREON.)

SURVEYOR:

PREPARED UNDER THE SUPERVISION OF:

BRIAN L. THIENES
P.L.S. NO. 5750
REG. EXP: 12/31/15

10/01/15
DATE

PROFESSIONAL LAND SURVEYOR BRIAN L. THIENES NO. 5750 STATE OF CALIFORNIA

Last Updated: 10/1/15
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APPENDIX B

AIR QUALITY ANALYSIS

AIR QUALITY ANALYSIS

58 MAGNOLIA INDUSTRIAL PROJECT

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

LSA

February 2015

AIR QUALITY ANALYSIS

58 MAGNOLIA INDUSTRIAL PROJECT

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

Investment Building Group
5100 Campus Drive, Suite 300
Newport Beach, California 92660

Prepared by:

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614-4731
(949) 553-0666

Project No. IBG1501

LSA

February 2015

TABLE OF CONTENTS

PROJECT DESCRIPTION 3
INTRODUCTION 3
PROJECT DESCRIPTION 3
Surrounding Land Uses in the Project Vicinity 3
SETTING 6
REGIONAL AIR QUALITY 6
Climate/Meteorology 9
Description of Global Climate Change and Its Sources 10
Emissions Sources and Inventories 14
Air Pollution Constituents and Attainment Status 16
LOCAL AIR QUALITY 18
REGULATORY SETTINGS 19
Federal Regulations/Standards 19
State Regulations/Standards 21
Regional Air Quality Planning Framework 24
Regional Air Quality Management Plan 24
THRESHOLDS OF SIGNIFICANCE 25
REGIONAL THRESHOLDS FOR CONSTRUCTION EMISSIONS 26
REGIONAL THRESHOLDS FOR OPERATIONAL EMISSIONS 26
Local Microscale Concentration Standards 26
THRESHOLDS FOR LOCALIZED SIGNIFICANCE 27
GLOBAL CLIMATE CHANGE 28
IMPACTS AND MITIGATION 30
CONSTRUCTION IMPACTS 30
Equipment Exhausts and Related Construction Activities 30
Fugitive Dust 32
Localized Impact Analysis 33
Architectural Coatings 33
Odors 33
Naturally Occurring Asbestos 34
Construction Emissions Conclusions 34
LONG-TERM REGIONAL AIR QUALITY IMPACTS 34
Long-Term Project Operational Emissions 34
Localized Impacts Analysis 35
Greenhouse Gas Emissions 36
LONG-TERM MICROSCALE (CO HOT SPOT) ANALYSIS 38
AIR QUALITY MANAGEMENT PLAN CONSISTENCY 39
STANDARD CONDITIONS 39
Construction Operations 39
Operations 40
REFERENCES 41

FIGURES

Figure 1: Project Location Map 4
Figure 2: Site Plan 5

TABLES

Table A: Ambient Air Quality Standards 7
Table B: Summary of Health Effects of the Major Criteria Air Pollutants 9
Table C: Global Warming Potential of Greenhouse Gases 13
Table D: Attainment Status of Criteria Pollutants in the South Coast Air Basin 16
Table E: Ambient Air Quality Monitored in the Project Vicinity at the Riverside-Magnolia and Riverside-Rubidoux Stations 20
Table F: Construction Schedule 30
Table G: Diesel Construction Equipment Utilized by Construction Phase 31
Table H: Short-Term Regional Construction Criteria Pollutant Emissions 32
Table I: Construction LST Impacts 33
Table J: Opening Year Regional Operational Emissions 35
Table K: Long-Term Operational LST 35
Table L: Regional Construction GHG Emissions 37
Table M: Long-Term Operational Greenhouse Gas Emissions 37

APPENDIX

A: CALEEMOD MODEL PRINTOUTS

EXECUTIVE SUMMARY

LSA Associates, Inc. (LSA) was retained by the City of Riverside to prepare an air quality study for a proposed industrial use project (project) located in the City of Riverside (City), in Riverside County (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 default trip generation for the proposed uses included in the project.

Regional emissions during project construction/demolition, calculated with the CalEEMod (Version 2013.2.2) model, 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 have been identified for short-term construction to meet the SCAQMD emissions thresholds. The proposed project would not exceed the localized significance thresholds (LSTs) for construction.

Historical air quality data show that existing carbon monoxide (CO) levels for the project area and the general vicinity do not exceed either State or federal ambient air quality standards (AAQS). The CO concentrations in the project area are much lower than the federal and State CO standards. The proposed project would not result in any significant increase in CO concentrations at intersections in the project vicinity. Therefore, project-related traffic would not significantly affect local CO levels and the CO concentrations would be below the State and federal standards. No significant impact on local CO levels would occur.

The proposed project is located in Riverside County, which is not among the counties that are found to have serpentine and ultramafic rock in their soils. In addition, no serpentine or ultramafic rock has been found in the project vicinity in the past 10 years. Therefore, the potential risk for naturally occurring asbestos (NOA) during project construction is small and 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 greenhouse gases (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 is discussed. The proposed project will not exceed any proposed GHG emissions thresholds or conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions.

The proposed uses are consistent with General Plan of the City, which is consistent with the Southern California Association of Governments (SCAG) Regional Comprehensive Plan (RCP) Guidelines and the SCAQMD 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 California Environmental Quality Act (CEQA) Air Quality Handbook* (SCAQMD 1993) and associated updates. Air quality data posted on the California Air Resources Board (ARB) and United States Environmental Protection Agency (EPA) websites are included to document the local air quality environment.

PROJECT DESCRIPTION

INTRODUCTION

This air quality impact analysis has been prepared to evaluate the potential air quality impacts and mitigation measures associated with the proposed industrial project (project) in the City of Riverside (City), Riverside County (County), California. This report provides a project-specific air quality impact analysis by examining the impacts of the proposed action on adjacent sensitive uses, and evaluating the mitigation measures required as part of the project. Guidelines identified by the South Coast Air Quality Management District (SCAQMD) in its California Environmental Quality Act (*CEQA*) *Air Quality Handbook* (SCAQMD, April 1993) and associated updates will be followed in this air quality impact analysis.

PROJECT DESCRIPTION

The proposed project consists of seven light industrial buildings, averaging about 40,000 sq. ft. each, located at the southwest corner of the intersection of Pierce Street and Magnolia Avenue in the City of Riverside in the County of Riverside, California. Figure 1 shows the project location.

The project involves the construction of six smaller buildings totaling 148,700 sq. ft. and one multitenant larger building of 127,300 sq. ft. Figure 2 illustrates the site plan.

The project site is located on the southwest corner of the intersection of Pierce Street and Magnolia Avenue. Access to the project site is provided by five proposed driveways. Three of the proposed driveways would be from Magnolia Avenue and two driveways would be from Pierce Street.

Surrounding Land Uses in the Project Vicinity

Land uses surrounding the project site consist primarily industrial uses with the nearest residential uses approximately 200 ft to the south from project boundary. The areas adjacent to the project site include the following uses:

- Riverside Flood Control and Water Conservation District vacant land, Burlington Northern & Santa Fe Railroad Tracks, and residential uses beyond (south);
- Pierce Street and commercial uses beyond (east);
- Magnolia Avenue and industrial uses beyond (south); and
- Vacant land and commercial uses beyond (west).

LSA

FIGURE 1

N

0 1000 2000

FEET

SOURCE: Bing Maps

58 Magnolia Industrial

Project Location

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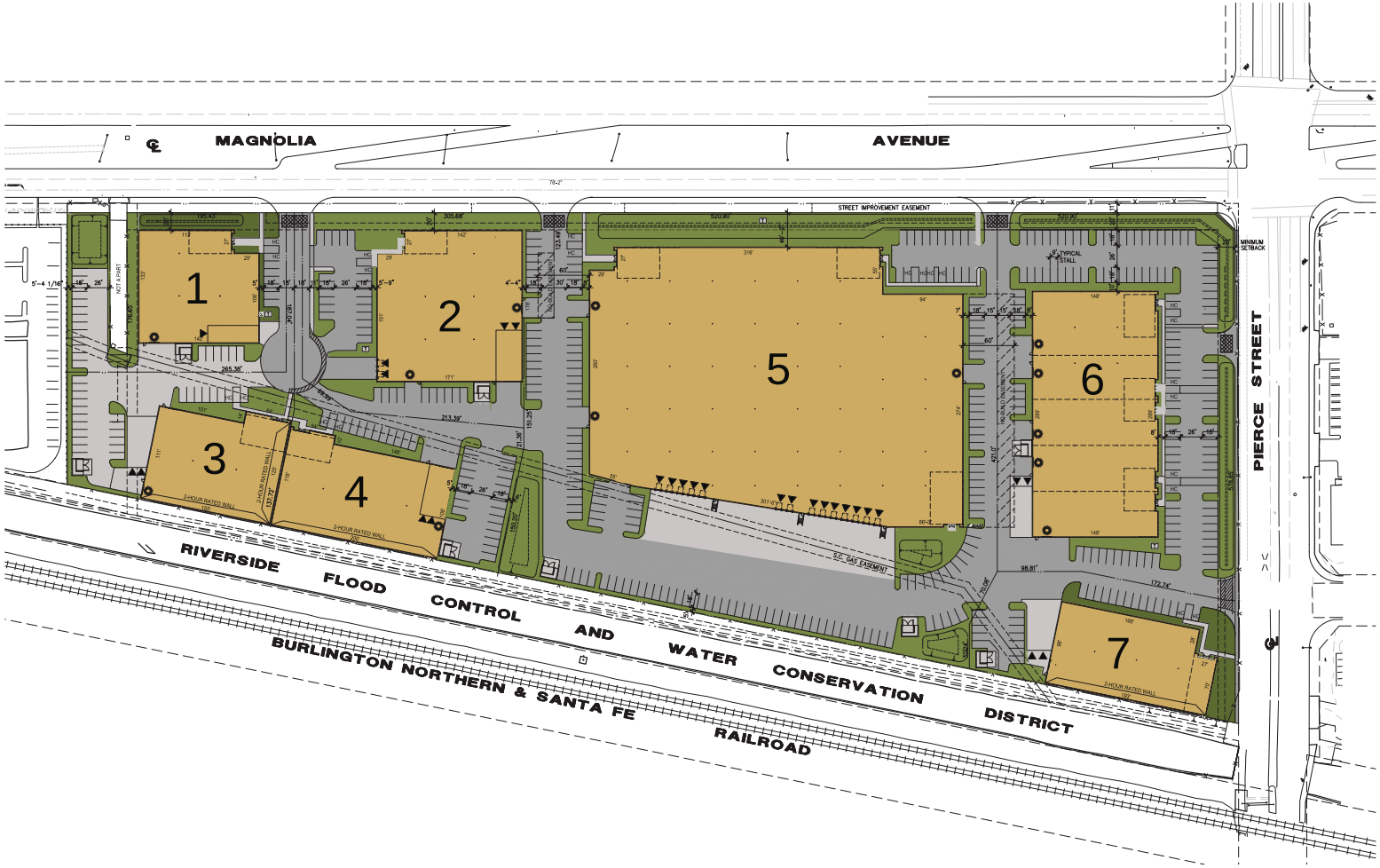

LSA

FIGURE 2

N

0 100 200
FEET

SOURCE: Ware Malcomb

I:\IBG1501\G\Site Plan.cdr (2/18/15)

58 Magnolia Industrial

Site Plan

SETTING

REGIONAL AIR QUALITY

The project site is located in the nondesert portion of Riverside County, California, which is part of the South Coast Air Basin (Basin) and 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, such as the SCAQMD, have created guidelines and requirements to conduct air quality analyses. The SCAQMD's current guidelines, included in its *CEQA Air Quality Handbook* (April 1993) and associated updates, were adhered to 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 AAQS for seven air pollutants. As detailed in Table A, these pollutants include ozone (O_3), 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.

In addition to setting out primary and secondary AAQS, the State has established a set of episode criteria for O_3, CO, NO_2, SO_2, and PM_{10}. These criteria refer to episode levels representing periods of short-term exposure to air pollutants that actually threaten public health. Health effects are progressively more severe as pollutant levels increase from Stage One to Stage Three. An alert level is that concentration of pollutants at which initial stage control actions are to begin. An alert will be declared when any one of the pollutant alert levels is reached at any monitoring site and meteorological conditions is such that the pollutant concentrations can be expected to remain at these levels for 12 or more hours or to increase; or, in the case of oxidants, if the situation is likely to recur within the next 24 hours unless control actions are taken.

Pollutant alert levels:

- **O_3:** 392 micrograms per cubic meter ($\mu g/m^3$) (0.20 parts per million [ppm]), 1-hour average
- **CO:** 17 milligrams per cubic meter (mg/m^3) (15 ppm), 8-hour average
- **NO_2:** 1,130 $\mu g/m^3$ (0.6 ppm), 1-hour average; 282 $\mu g/m^3$ (0.15 ppm), 24-hour average
- **SO_2:** 800 $\mu g/m^3$ (0.3 ppm), 24-hour average
- **Particulates measured as PM_{10}:** 350 $\mu g/m^3$, 24-hour average

Table A: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)	1-Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	--	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM_{10})[8]	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 ($PM_{2.5}$)[8]	24-Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m^3)		35 ppm(40 mg/m^3)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2)[9]	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1-Hour	0.18 ppm (339 µg/m^3)		100 ppb (188 µg/m^3)	—	
Sulfur Dioxide (SO_2)[10]	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (for certain areas)[9]	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	24-Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[9]	—	
	3-Hour	—		—	0.5 ppm (1300 µg/m^3)	
	1-Hour	0.25 ppm (655 µg/m^3)		75 ppb (196 µg/m^3)	—	
Lead[11,12]	30-Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	
	Rolling 3-Month Average[11]	—		0.15 µg/m^3		
Visibility-Reducing Particles[13]	8-Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	**No Federal 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[11]	24-Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: ARB (June 4, 2013).

Footnotes:

1 California standards for O_3; CO (except Lake Tahoe); SO_2 (1- and 24-hour); NO_2; 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 O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once per year. The O_3 standard is attained when the fourth-highest 8-hour concentration 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 µg/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 Federal policies.

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

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

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

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

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

[8] 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.

[9] To attain the 1-hour standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum 1-hour average at each monitor within an area 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 1-hour standard 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.

[10] On June 2, 2010, the 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.

[11] 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.

[12] 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 standards are approved.

[13] 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 Basins, respectively.

°C = degrees Celsius

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

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 (EPA), 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 regional pollutants, while the others have more localized effects.

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

Pollutant	Health Effects	Examples of Sources
Particulate matter (PM_{10}: less than or equal to 10 microns)	• Increased respiratory disease • Lung damage • Premature death	• Cars and trucks, especially diesels • Fireplaces, wood stoves • Windblown dust from roadways, agriculture, and construction
Ozone (O_3)	• Breathing difficulties • Lung damage	• Formed by chemical reactions of air pollutants in the presence of sunlight; common sources are motor vehicles, industries, and consumer products
Carbon monoxide (CO)	• Chest pain in heart patients • Headaches, nausea • Reduced mental alertness • Death at very high levels	• Any source that burns fuel, such as cars, trucks, construction and farming equipment, and residential heaters and stoves
Nitrogen dioxide (NO_2)	• Lung damage	• 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: ARB (2010).

The California Clean Air Act (CCAA) provides SCAQMD and other air districts with the authority to manage transportation activities at indirect sources. Indirect sources of pollution are generated when minor sources collectively emit a substantial amount of pollution. 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 ARB.

Climate/Meteorology

Air quality in the planning area is not only affected by various emission sources (mobile, industry, etc.), but also by atmospheric conditions such as wind speed, wind direction, temperature, rainfall, etc. The combination of topography, low mixing height, abundant sunshine, and emissions from the second largest urban area in the United States gives the Basin the worst air pollution problem in the nation.

The annual average temperature varies little throughout the Basin, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The

climatological station closest to the site is the Riverside Citrus Experiment Station.[1] The monthly average maximum temperature recorded at this station from July 1948 to September 2009 ranged from 66.6°F in January to 94.4°F in August, with an annual average maximum of 79.0°F. The monthly average minimum temperature recorded at this station ranged from 41.3°F in December to 61.3°F in August, with an annual average minimum of 50.5°F. January and December are typically the coldest months, and August is typically the warmest month 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 thundershowers in coastal regions and slightly heavier showers in the eastern portion of the Basin and along the coastal side of the mountains. The Riverside Citrus Experiment Station also monitored precipitation. Average monthly rainfall during the period from July 1948 to September 2009 varied from 2.16 inches in February to 0.32 inch or less from May to October, with an annual total of 9.86 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. 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 in the vicinity of the project area blow predominantly from the south-southwest, with relatively low velocities. Wind speeds in the project area average about 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, dispersing air contaminants. The Santa Ana conditions tend to last for several days at a time.

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 pollutant concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas are transported predominantly on shore 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.

Description of Global Climate Change and Its Sources

GCC is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other significant changes in climate (such as precipitation or wind) that last for an extended

[1] Western Regional Climate Center, www.wrcc.dri.edu.

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 (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from natural factors, such as changes in the sun's intensity; natural processes within the climate system (e.g., changes in ocean circulation) or human activities, such as 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 may induce additional changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and the environment of California 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 California might include a decline in the Sierra Nevada snowpack, erosion of California'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.[2] The latest projections, based on state-of-the art climate models, indicate that temperatures in California are expected to rise 3–10.5°F by the end of the century.[3] The prevailing scientific opinion on climate change is that "most of the warming observed over the last 60 years is attributable to human activities."[4] Increased amounts of CO_2 and other GHGs are the primary causes 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.[5]

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:[6]

- CO_2
- CH_4

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

2 Intergovernmental Panel on Climate Change (IPCC), 2013. *Climate Change 2013: The Physical Science Basis.*

3 California Climate Change Portal website, www.climatechange.ca.gov, accessed December 2014.

4 IPCC, *Climate Change 2013: The Physical Science Basis,* http://www.ipcc.ch.

5 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 nitrous oxide (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.

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

- 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 scientist believe can cause global warming. While GHGs produced by human activities include naturally occurring GHGs such as CO_2, CH_4, and N_2O, some gases, like HFCs, PFCs, and SF_6, are completely new to the atmosphere. Certain other gases, such as water vapor, are short-lived in the atmosphere as compared to these GHGs that remain in the atmosphere for significant periods of time, contributing to climate change in the long term. Water vapor is generally excluded from the list of GHGs because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as 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 that the gas remains in the atmosphere ("atmospheric lifetime"). GWP of each gas is measured relative to CO_2, 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 (MT)[1] of "CO_2 equivalents" (CO_2e). For example, SF_6 is 22,800 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.

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, and consequently the gas is building up in the atmosphere.

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

Table C: Global Warming Potential of Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100-year Time Horizon)
Carbon Dioxide (CO_2)	50–200	1
Methane (CH_4)	12	25
Nitrous Oxide (NO_X)	114	298
HFC-23	270	14,800
HFC-134a	14	1,430
HFC-152a	1.4	124
PFC: Tetrafluoromethane (CF_4)	50,000	7,390
PFC: Hexafluoromethane (C_2F_6)	10,000	12,200
Sulfur Hexafluoride (SF_6)	3,200	22,800

Source: IPCC (2007). *Climate Change 2007: The Physical Science Basis.* Contribution of Working Group I to the Fourth Assessment Report of the IPCC.
HFC = hydrofluorocarbons
IPCC = Intergovernmental Panel on Climate Change
PFC = perfluorocarbons

The concentration of CO_2 in the atmosphere has risen approximately 30 percent since the late 1800s.[1]

The transportation sector remains the largest source of GHG emissions in 2012 with 36 percent of California's GHG emission inventory. The largest emissions category within the transportation sector is on-road, which consists of passenger vehicles (cars, motorcycles, and light-duty trucks) and heavy duty trucks and buses. Emissions from on-road constitute over 92 percent of the transportation sector total. Industry and electricity generation were California'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).[2] Anthropogenic sources include rice cultivation, livestock, landfills and waste treatment, biomass burning, and fossil fuel combustion (burning of coal, oil, and natural gas, etc.). 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

1 California Environmental Protection Agency (CalEPA). 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.
2 *Methane and Nitrous Oxide Emissions From Natural Sources*, EPA, April 2010.

well as maintenance and operating practices. Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N_2O emissions in California. N_2O emissions accounted for nearly 7 percent of human-made GHG emissions (CO_2e) in California in 2002.

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 California; however, the rapid growth in the semiconductor industry, which is active in California, has led to greater use of PFCs. There are no known project-related 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, California, and local GHG emission inventories. However, because GHGs persist for a long time in the atmosphere (see previously referenced 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 2004 totaled 27 billion MT of CO_2e per year (CO_2e/yr).[2] 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 2008, the United States emitted approximately 7.0 billion MT of CO_2e, or approximately 25 tons per year (tpy) per person. Of the six major sectors nationwide—electric power industry, transportation, industry, agriculture, commercial, and residential—the electric power industry and transportation sectors combined account for approximately 62 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. Between 1990 and 2006, total United States GHG emissions rose approximately 14.7 percent.[3]

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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.

2 Combined total of Annex I and Non-Annex I Country CO_2e emissions. UNFCCC, 2007. *Greenhouse Gas Inventory Data.* Information available at http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php and http://maindb.unfccc.int/library/view_pdf.pl?url=http://unfccc.int/resource/docs/2005/sbi/eng/18a02.pdf.

3 EPA. 2010. The 2010 U.S. Greenhouse Gas Inventory Report. http://www.epa.gov/climatechange/emissions/usinventoryreport.html (accessed September 2010).

State of California Emissions. According to ARB emission inventory estimates, California emitted approximately 474 million metric tons of CO_2e ($MMTCO_2e$) emissions in 2008.[1] This large number is due primarily to the sheer size of California compared to other states. By contrast, California has the fourth-lowest per-capita CO_2 emission rate from fossil fuel combustion in the country due to the success of its energy efficiency and renewable energy programs and commitments that have lowered the State's GHG emissions rate of growth by more than half of what it would have been otherwise.[2]

The California Environmental Protection Agency (CalEPA) Climate Action Team (CAT)[3] stated in its March 2006 report that the composition of gross climate change pollutant emissions in California in 2002 (expressed in terms of CO_2e) was as follows:

- CO_2 accounted for 83.3 percent
- CH_4 accounted for 6.4 percent
- N_2O accounted for 6.8 percent
- HFCs, PFC, and SF_6 accounted for 3.5 percent[4]

The ARB estimates that transportation was the source of approximately 38 percent of the State's GHG emissions in 2011, followed by electricity generation (both in-State and out-of-State) at 19 percent and industrial sources at 21 percent. The remaining sources of GHG emissions were residential and commercial activities at 10 percent, agriculture at 7 percent, high-GWP gases at 3 percent, and recycling and waste at 2 percent.[5]

The ARB is responsible for developing the California Greenhouse Gas Emission Inventory. This inventory estimates the amount of GHGs emitted to and removed from the atmosphere by human activities within the State of California and supports the AB 32 Climate Change Program. The ARB's current GHG emission inventory covers the years 1990–2004 and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, agricultural lands). The emission inventory estimates are based on the actual amount of all fuels combusted in the State, which accounts for over 85 percent of the GHG emissions within California.

The ARB staff has projected statewide unregulated GHG emissions for 2020, which represent the emissions that would be expected to occur in the absence of any GHG reduction actions, at 596 $MMTCO_2e$. GHG emissions from the transportation and electricity sectors as a whole are expected to increase but remain at approximately 36 percent and 22 percent of total CO_2e emissions, respectively. The industrial sector consists of large stationary sources of GHG emissions, and the percentage of the total 2020 emissions is projected to be 18 percent of total CO_2e emissions. The

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1 ARB, Greenhouse Gas Inventory Data – 1990 to 2004. http://www.arb.ca.gov/cc/inventory/data/data.htm (accessed September 2010).

2 California Energy Commission (CEC), 2007. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 – Final Staff Report, publication # CEC-600-2006-013-sf, Sacramento, CA, December 22, 2006; and January 23, 2007, update to that report.

3 CAT is a consortium of representatives from State agencies who have been charged with coordinating and implementing GHG emission reduction programs that fall outside of ARB's jurisdiction.

4 CalEPA. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

5 ARB, 2013. http://www.arb.ca.gov/cc/inventory/data/data.htm (October 2013).

remaining sources of GHG emissions in 2020 are high-GWP gases at 7 percent, residential and commercial activities at 9 percent, agriculture at 6 percent, and recycling and waste at 2 percent.[1]

Air Pollution Constituents and Attainment Status

The ARB coordinates and oversees both State and federal air pollution control programs in California. The ARB oversees activities of local air quality management agencies and maintains air quality monitoring stations throughout the State in conjunction with the 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 3 calendar years compared with the AAQS. Attainment areas may be the following:

- Attainment/Unclassified (“Unclassifiable” in some lists), which have never violated the air quality standard of interest or don’t have enough monitoring data to establish attainment or nonattainment status; or
- Attainment-Maintenance (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 U.S. EPA with a Maintenance SIP; or
- Attainment (usually only for 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[1]	Attainment[1]
All others	Attainment/Unclassified	Attainment/Unclassified

Source: California Air Resources Board (2013) (http://www.arb.ca.gov/desig/desig.htm).
[1] Except in Los Angeles County.
CO = carbon monoxide
N/A = not applicable
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
PM_{10} = particulate matter less than 10 microns in diameter
SO_2 = sulfur dioxide

[1] ARB, 2013. http://www.arb.ca.gov/cc/inventory/data/data.htm (October 2013).

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 such as 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 impairments to 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 re-designated 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}) derive 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.

Reactive Organic Compounds. Reactive organic compounds (ROCs; also known as ROGs and volatile organic compounds [VOCs]) are formed from the combustion of fuels and the evaporation of organic solvents. ROCs are not defined as criteria pollutants, but are a prime component of the photochemical smog reaction. Consequently, ROC accumulates in the atmosphere more quickly during the winter when sunlight is limited and photochemical reactions are slower. There are no attainment designations for ROC.

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 California 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. Also, 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.

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-Magnolia Station, which

monitors CO, PM_{10}, $PM_{2.5}$, and NO_2.[1] The air quality monitoring station closest to the site monitoring the other criteria pollutants is the Riverside-Rubidoux Station, which monitors all criteria air pollutant data. The air quality trends from these stations are used to represent the ambient air quality in the project area. The ambient air quality data in Table E show that NO_2, SO_2, and CO levels are below the applicable State and federal standards.

The State 1-hour O_3 standard was exceeded 13 to 52 times per year in the past 3 years. The federal 8-hour O_3 standard was exceeded 26 to 47 days per year in the past 3 years, and the State 8-hour O_3 standard was exceeded 38 to 92 times per year in the past 3 years. The State 24-hour PM_{10} standard was exceeded 10 to 97 days per year in the past 3 years, and the federal 24-hour standard was not exceeded. The federal 24-hour $PM_{2.5}$ standard was exceeded 5 to 7 days per year in the past 3 years. The State annual average $PM_{2.5}$ standards were exceeded in each of the last 3 years and the federal annual average $PM_{2.5}$ standards have not been exceeded in the past 3 years.

REGULATORY SETTINGS

Federal Regulations/Standards

Pursuant to the Federal Clean Air Act (CAA) of 1970, the EPA established national ambient air quality standards (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 met the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. The EPA has designated the SCAG as the Metropolitan Planning Organization (MPO) responsible for ensuring compliance with the requirements of the CAA for the Basin.

The EPA established new national air quality standards for ground-level O_3 and $PM_{2.5}$ 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.

[1] Air quality data, 2011–2013; Environmental Protection Agency (www.epa.gov/air/data/index.html) and California Air Resources Board (www.arb.ca.gov/adam/welcome.html) websites.

Table E: Ambient Air Quality Monitored in the Project Vicinity at the Riverside-Magnolia and Riverside-Rubidoux Stations

Pollutant	Standard	2011	2012	2013
Carbon Monoxide (CO)				
Maximum 1-hr concentration (ppm)		3.1	2.7	2.3
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8-hr concentration (ppm)		1.49	1.46	1.6
Number of days exceeded:	State: ≥ 9.0 ppm	0	0	0
	Federal: ≥ 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1-hr concentration (ppm)		0.128	0.126	0.123
Number of days exceeded:	State: > 0.09 ppm	52	27	13
Maximum 8-hr concentration (ppm)		0.115	0.102	0.103
Number of days exceeded:	State: > 0.07 ppm	92	70	38
	Federal: > 0.075 ppm	67[1]	47	26
Coarse Particulates (PM_{10})				
Maximum 24-hr concentration (μg/m^3)		89.4	72.0	152.0
Number of days exceeded:	State: > 50 μg/m^3	ND[2]	ND	ND
	Federal: > 150 μg/m^3	0	0	0
Annual arithmetic average concentration (μg/m^3)		33.2	32.1	33.2
Exceeded for the year:	State: > 20 μg/m^3	Yes	Yes	Yes
Fine Particulates ($PM_{2.5}$)				
Maximum 24-hr concentration (μg/m^3)		51.6	30.2	53.7
Number of days exceeded:	Federal: > 35 μg/m^3	2	0	1
Annual arithmetic average concentration (μg/m^3)		11.7	ND	11.2
Exceeded for the year:	State: > 12 μg/m^3	No	ND	No
	Federal: > 15 μg/m^3	No	No	No
Nitrogen Dioxide (NO_2)				
Maximum 1-hr concentration (ppm)		0.057	0.060	0.057
Number of days exceeded:	State: > 0.18 ppm	0	0	0
Annual arithmetic average concentration (ppm)		ND	ND	ND
Exceeded for the year:	State: > 0.030 ppm	ND	ND	ND
	Federal: > 0.053 ppm	ND	ND	ND
Sulfur Dioxide (SO_2)				
Maximum 24-hr concentration (ppm)		0.001	0.001	0.001
Number of days exceeded:	State: > 0.04 ppm	0	0	ND
	Federal: > 0.14 ppm	0	0	ND
Annual arithmetic average concentration (ppm)		0.001	ND	ND
Exceeded for the year:	Federal: > 0.030 ppm	No	ND	ND

Sources: Environmental Protection Agency (www.epa.gov/air/data/index.html) and California Air Resources Board (www.arb.ca.gov/adam/welcome.html) websites. (Note that full 2012 data are not yet available.)

[1] The exceedances of the federal 8-hr O_3 standard are based on the old 0.08 ppm standard. In April 2008, the EPA revised the standard to 0.075 ppm.

[2] No data available.

EPA = United States Environmental Protection Agency
hr = hour
μg/m^3 = micrograms per cubic meter
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
ppm = parts per million

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 mentioned 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/Standards

In 1967, the California 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 California's air pollution problems.

The ARB identified particulate emissions from diesel-fueled engines (diesel particulate matter [DPM]) as toxic air contaminants (TACs) in August 1998. Following the identification process, the ARB was required by law to determine whether there is 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.

In a response to the transportation sector's significant contribution to California's CO_2 emissions, AB 1493 (Pavley) was enacted on July 22, 2002. AB 1493 requires the ARB to set GHG emission standards for passenger vehicles and light-duty trucks (and other vehicles whose primary use is noncommercial personal transportation in the State) manufactured in 2009 and all subsequent model years. In setting these standards, the ARB considered cost effectiveness, technological feasibility, and economic impacts. The ARB adopted the standards in September 2004. When fully phased in, the near-term (2009 to 2012) standards would result in a reduction in GHG emissions of approximately 22 percent compared to the emissions from the 2002 fleet, while the midterm (2013 to 2016) standards would result in a reduction of approximately 30 percent. To set its own GHG emissions limits on motor vehicles, California must receive a waiver from the EPA. However, in December 2007, the EPA denied the request from California for the waiver. In January 2008, the California Attorney General filed a petition for review of the EPA's decision in the Ninth Circuit Court of Appeals; however, no decision on that petition has been published as of January 2009. On January 26, 2009, President Barack Obama issued an Executive Memorandum directing the EPA to reassess its decision to deny the waiver and to initiate any appropriate action.[1] On May 18, 2009, the President announced the enactment of a 35.5 mpg fuel economy standard for automobiles and light-duty trucks, which began to take effect in 2012. This standard is approximately the same standard that was proposed by California; therefore, the California waiver request was shelved.

In June 2005, Governor Schwarzenegger established California's GHG emissions reduction targets in Executive Order (EO) S-3-05. This EO established the following goals for the State of California: GHG emissions should be reduced to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

California's major initiative for reducing GHG emissions is outlined in AB 32, the "Global Warming Solutions Act," passed by the California State legislature on August 31, 2006. AB 32 requires the ARB to do the following:

- Establish a statewide GHG emissions cap for 2020, based on 1990 emissions, by January 1, 2008;
- Adopt mandatory reporting rules for significant sources of GHG emissions by January 1, 2008;
- Adopt an emissions reduction plan by January 1, 2009, indicating how emissions reductions will be achieved via regulations, market mechanisms, and other actions; and
- Adopt regulations to achieve the maximum technologically feasible and cost-effective reductions of GHGs by January 1, 2011.

The ARB has established the level of GHG emissions in 1990 at 427 $MMTCO_2e$. The emissions target of 427 MMT requires the reduction of 169 MMT from the State's projected business-as-usual (BAU) 2020 emissions of 596 MMT. AB 32 requires the ARB to prepare a Scoping Plan that outlines the main State strategies for meeting the 2020 deadline and to reduce GHGs that contribute to GCC. The Scoping Plan was approved by the ARB on December 11, 2008, and includes measures to

[1] President Barack Obama. 2009. Memorandum to the Administrator of the EPA. State of California Request for Waiver Under 42 United States Code (USC) 7543(b), the Clean Air Act (January 26).

address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures.[1] Emission reductions that are projected to result from the recommended measures in the Scoping Plan are expected to total 174 $MMTCO_2e$, which would allow California to attain the emissions goal of 427 $MMTCO_2e$ by 2020. The Scoping Plan includes a range of GHG reduction actions that may include direct regulations, alternative compliance mechanisms, monetary and nonmonetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. The Scoping Plan, even after Board approval, remains a recommendation. The measures in the Scoping Plan will not be binding until after they are adopted through the normal rulemaking process. The ARB rule-making process includes preparation and release of each of the draft measures, public input through workshops, and a public comment period, followed by an ARB Board hearing and rule adoption.

In addition to reducing GHG emissions to 1990 levels by 2020, AB 32 directed the ARB and the newly created CAT to identify a list of "discrete early action GHG reduction measures" that could be adopted and made enforceable by January 1, 2010. On January 18, 2007, Governor Schwarzenegger signed EO S-1-07, further solidifying California's dedication to reducing GHGs by setting a new Low Carbon Fuel Standard. This EO set a target to reduce the carbon intensity of California transportation fuels by at least 10 percent by 2020 and directed the ARB to consider the Low Carbon Fuel Standard as a discrete early action measure.

In June 2007, the ARB approved a list of 37 early action measures, including three discrete early action measures (Low Carbon Fuel Standard, Restrictions on High Global Warming Potential Refrigerants, and Landfill Methane Capture). Discrete early action measures are measures that were required to be adopted as regulations and made effective no later than January 1, 2010, the date established by Health and Safety Code (HSC) Section 38560.5. The ARB adopted additional early action measures in October 2007[2] that tripled the number of discrete early action measures. These measures relate to truck efficiency, port electrification, reduction of PFCs from the semiconductor industry, reduction of propellants in consumer products, proper tire inflation, and SF_6 reductions from the non-electricity sector. The combination of early action measures is estimated to reduce statewide GHG emissions by nearly 16 MMT.[3]

To assist public agencies in the mitigation of GHG emissions or analyzing the effects of GHGs under CEQA, including the effects associated with transportation and energy consumption, Senate Bill (SB) 97 (Chapter 185, 2007) requires the Governor's Office of Planning and Research (OPR) to develop CEQA guidelines on how to minimize and mitigate a project's GHG emissions. The OPR prepared, developed, and transmitted these guidelines in May 2009, the Resources Agency certified and adopted them on December 30, 2009, and they became effective on March 18, 2010. The amendments encourage lead agencies to consider many factors in performing a CEQA analysis but preserve the discretion granted by CEQA to lead agencies in making their own determinations.

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1 ARB. 2008. *Climate Change Proposed Scoping Plan: a Framework for Change* (October).

2 ARB. 2007. *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration* (October).

3 ARB. 2007. "ARB approves tripling of early action measures required under AB 32." News Release 07-46. http://www.arb.ca.gov/newsrel/nr102507.htm (October 25).

SB 375, signed into law on October 1, 2008, is intended to enhance the ARB's ability to reach AB 32 goals by directing the ARB to develop regional GHG emissions reduction targets to be achieved within the automobile and light truck sectors for 2020 and 2035. The ARB will work with California's 18 MPOs to align their regional transportation, housing, and land use plans and prepare a "Sustainable Communities Strategy" to reduce the number of vehicle miles traveled (VMT) in their respective regions and demonstrate each region's ability to attain its GHG reduction targets.

Additionally, SB 375 provides incentives for creating attractive, walkable, and sustainable communities and revitalizing existing communities. The bill exempts homebuilders from certain CEQA requirements if they build projects consistent with the new sustainable community strategies. It also encourages the development of more alternative transportation options to promote healthy lifestyles and reduce traffic congestion.

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 of the State.

The ARB is responsible for incorporating air quality management plans for local air basins into a State Implementation Plan (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 the SCAG are responsible for formulating and implementing the Air Quality Management Plan (AQMP) for the Basin. Every 3 years the SCAQMD prepares a new AQMP, updating the previous plan and setting a 20-year horizon.

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 prepares a new AQMP, updating the previous plan and having a 20-year horizon. The SCAQMD adopted the 2012 AQMP in December 2012, ARB approved it on January 23, 2013 and forwarded it to the EPA.

The 2012 AQMP incorporates the latest scientific and technological information and planning assumptions, including the 2012 Regional Transportation Plan/Sustainable Communities Strategy and updated emission inventory methodologies for various source categories. The 2012 AQMP included the new and changing federal requirements, implementation of new technology measures, and the continued development of economically sound, flexible compliance approaches.

THRESHOLDS OF SIGNIFICANCE

A number of modeling tools are available to assess air quality impacts of projects. In addition, certain air districts, such as the SCAQMD, have created guidelines and requirements to conduct air quality analysis. SCAQMD's current guidelines, *CEQA Air Quality Handbook* (April 1993) with associated updates, and the City of Riverside were adhered to in the assessment of air quality impacts for the proposed project. The current air quality, CalEEMod Version 2013.2.2, was used to estimate project-related mobile- and stationary-source emissions in this Air Quality Analysis.

The Air Quality 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 (maximum 3.1 ppm for the 1-hour period and 1.6 ppm for the 8-hour period) 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 federal and State AAQS.

On December 5, 2008, the SCAQMD adopted an interim GHG significance threshold for projects where the lead agency is using a tiered approach for determining significance. The objective of the SCAQMD's interim GHG significance threshold proposal was to achieve a GHG emission capture rate of 90 percent for all new or modified stationary-source projects.

Based on *Guidelines for the Implementation of California Environmental Quality Act,* Appendix G, Public Resource 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 AAQS, 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.

In addition to the federal and State AAQS, the SCAQMD has established daily emissions thresholds for construction and operation of a 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 (EPA), these emissions thresholds are regarded as conservative and would overstate an individual project's contribution to health risks.

REGIONAL THRESHOLDS FOR CONSTRUCTION EMISSIONS

The following CEQA significance thresholds for construction emissions have been established for the Basin:

- 75 pounds per day (lbs/day) of ROC
- 100 lbs/day of NO_X
- 550 lbs/day of CO
- 150 lbs/day of PM_{10}
- 55 lbs/day of $PM_{2.5}$
- 150 lbs/day of SO_2

Projects in the Basin with construction-related emissions that exceed any of these emission thresholds are considered to be significant under the SCAQMD guidelines.

REGIONAL THRESHOLDS FOR OPERATIONAL EMISSIONS

The following CEQA significance thresholds for operational emissions have been established for the Basin:

- 55 lbs/day of ROC
- 55 lbs/day of NO_X
- 550 lbs/day of CO
- 150 lbs/day of PM_{10}
- 55 lbs/day of $PM_{2.5}$
- 150 lbs/day of SO_2

Projects in the Basin with operational emissions that exceed any of these emission thresholds are considered to be significant under the SCAQMD guidelines.

Local Microscale Concentration Standards

The significance of localized project impacts under CEQA 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 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

THRESHOLDS FOR LOCALIZED SIGNIFICANCE

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 national or State AAQS, as previously shown in Table A. 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 Localized impacts analysis 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 (and may apply to operational emissions at aggregate handling facilities). The Rule 1301 threshold of 2.5 $\mu g/m^3$ applies to nonaggregate handling 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 ac in size 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 or not 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. Since the total gross area for the project site is larger than 5 ac, the LST screening thresholds for 5 ac are used in this analysis for construction emissions for a screening-level analysis first. Since the project is not an aggregate handling facility, operational LSTs are assessed with the SCAQMD screening thresholds as well.

Sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to adverse air quality. Existing single-family residences nearest to the project site are approximately 200 feet (ft) (60 meters [m]) from the project site. Using the operations LST thresholds for receptors at 60 m from a 5 ac site for this project would result in a conservative analysis. Therefore, the following emissions thresholds apply during project construction:

Construction

- **LST Thresholds, 5 ac, 200 ft distance**
  - 317 lbs/day of NO_X
  - 2,430 lbs/day of CO
  - 44 lbs/day of PM_{10}
  - 11 lbs/day of $PM_{2.5}$

Operation

- **LST Thresholds, 5 ac, 200 ft distance**
  - 317 lbs/day of NO_X
  - 2,430 lbs/day of CO
  - 11 lbs/day of PM_{10}
  - 3.2 lbs/day of $PM_{2.5}$

GLOBAL CLIMATE CHANGE

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."

Appendix G of the CEQA Guidelines includes the following questions related to greenhouse gas emissions that are intended to encourage thoughtful assessment of impacts, and do not necessarily represent thresholds of significance:

- Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?

However, despite this, currently neither the CEQA statutes nor any applicable guidelines, prescribe thresholds of significance or a particular methodology for performing an impact analysis. As with most environmental topics, significance criteria are left to the judgment and discretion of the lead agency.

The SCAQMD adopted a significance threshold for industrial sources of 10,000 metric tons (MT) of CO_2e per year on December 5, 2008. While the threshold is only for project for which the SCAQMD is the lead agency, in lieu of any other threshold, this will be used to determine GHG emissions significance for this analysis. There is no threshold of significance that has been adopted for construction GHG emissions, so consistent with methods used by the SCAQMD in its draft

guidelines,[1] the one-time construction and vegetation change annual GHG emissions are amortized over a 30-year average project lifespan, combined with the operational emissions and the total compared to the SCAQMD's industrial threshold of 10,000 MT of CO_2e per year.

[1] This approach to one-time construction and vegetation change GHG emissions is based on the GHG Threshold Working Group Meeting No. 13 Minutes from August 26, 2009. Website: http://www.aqmd.gov/ceqa/handbook/GHG/2009/aug26mtg/wkgp13minutes.pdf.

IMPACTS AND MITIGATION

Air pollutant emissions associated with the project would occur over the short term from construction activities, such as fugitive dust from site preparation, and grading, and emissions from equipment exhaust.

CONSTRUCTION IMPACTS

Equipment Exhausts and Related Construction Activities

Construction activities produce combustion emissions from various sources, such as demolition, grading, site preparation, utility engines, and motor vehicles transporting the construction crew. Exhaust emissions from construction activities envisioned on site would vary daily as construction activity levels change. The use of construction equipment on site would result in localized exhaust emissions. The site is expected to be balanced on-site, with little or no off-site transport of soils/dirts. Based on the SCAQMD guidelines, the project is not expected to disturb more than 5 ac on a daily basis. This analysis provides the peak-day construction emissions. Table F lists the tentative project construction schedule. Table G lists the potential construction equipment to be used during project construction.

Table F: Construction Schedule

Phase Number	Phase Name	Phase Start Date	Phase End Date	Number of Days/Week	Number of Days
1	Site Preparation	4/1/2015	4/7/2015	5	5
2	Grading	4/8/2015	4/21/2015	5	10
3	Building Construction	4/22/2015	11/17/2015	5	150
4	Architectural Coating	6/1/2015	11/17/2015	5	122
5	Paving	11/18/2015	12/15/2015	5	20

Source: Project Plans
Note: Site needs minimal prep & grading, assume simple building construction & architectural coatings applied throughout building construction.

Table G: 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	255	0.4
	Tractors/Loaders/ Backhoes	4	8	97	0.37
Grading	Excavators	2	8	162	0.38
	Graders	1	8	174	0.41
	Rubber Tired Dozers	1	8	255	0.4
	Scrapers	2	8	361	0.48
	Tractors/Loaders/ Backhoes	2	8	97	0.37
Building Construction	Cranes	1	7	226	0.29
	Forklifts	3	8	89	0.2
	Generator Sets	1	8	84	0.74
	Tractors/Loaders/ Backhoes	3	7	97	0.37
	Welders	1	8	46	0.45
Paving	Pavers	2	8	125	0.42
	Paving Equipment	2	8	130	0.36
	Rollers	2	8	80	0.38
Architectural Coating	Air Compressors	1	6	78	0.48

Source: CalEEMod Defaults.

The most recent version of the CalEEMod model (Version 2013.2.2) was used to calculate the construction emissions, as shown in Table H. The “Rough Grading” phase includes vegetation removal and site preparation. The emissions rates shown are from the CalEEMod output Tables listed as “Mitigated Construction,” even though the only measures that have been applied to the analysis are the required construction emissions control measures, or standard conditions. They are also the combination of the on- and off-site emissions.

Since no exceedances of any criteria pollutants are expected, no significant impacts would occur for project construction. Standard measures are discussed later in this report. Details of the emission factors and other assumptions are included in Appendix A.

Table H: Short-Term Regional Construction Criteria Pollutant Emissions

Construction Phase	Total Regional Pollutant Emissions, lbs/day								
	VOC	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	CO_2e
Site Preparation	5.3	57	44	0.042	7.2	3.1	3.9	2.8	4,400
Grading	6.9	79	52	0.065	3.6	3.8	1.5	3.5	6,800
Building Construction	6.0	42	49	0.086	3.6	2.3	0.96	2.2	8,200
Architectural Coating	67	2.9	5.6	0.01	0.58	0.23	0.15	0.23	920
Paving	3.2	25	16	0.024	0.17	1.4	0.045	1.3	2,500
Peak Daily	**73**	**79**	**55**	**0.096**	**10**		**6.7**		**9,100**
SCAQMD Thresholds	**75**	**100**	**550**	**150**	**150**		**55**		**No Threshold**
Significant Emissions?	**No**	**No**	**No**	**No**	**No**		**No**		

Source: LSA Associates, Inc., February 2015.
Note: Peak daily emissions are based on assumption that the Building Construction and Architectural Coating phases would overlap.

CO = carbon monoxide
CO_{2e} = carbon dioxide equivalent
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

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.

Construction emissions can vary greatly depending on the level of activity, the specific operations taking place, the equipment being operated, local soils, weather conditions, and other factors. The proposed project will be required to comply with SCAQMD Rules 402 and 403 to control fugitive dust.

Table H lists total construction emissions (i.e., fugitive dust emissions and construction equipment exhausts) that have incorporated a number of feasible control measures that can be reasonably implemented to significantly reduce PM_{10} emissions from construction.

Localized Impact Analysis

The SCAQMD has issued guidance on applying CalEEMod modeling results to LST analyses.[1] Sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to noise and air pollutants. There are existing residential uses approximately 200 ft (60 m) from the project site. Using the distance of 50 m would be considered a conservative analysis. Since the project is not expected to disturb more than 5 ac on a daily basis, using the LST levels for 5 ac is reasonable and adequate for this analysis. Table I shows that the emissions of the pollutants on the peak day of demolition will result in concentrations of pollutants at these nearest campus apartments residences that are all below the SCAQMD thresholds of significance.

Table I: Construction LST Impacts

Emissions Sources	NO_X	CO	PM_{10}	$PM_{2.5}$
On-site Emissions	79	51	10	6.7
LST Thresholds	**317**	**2,430**	**44**	**11**
Significant Emissions?	**No**	**No**	**No**	**No**

Source: LSA Associates, Inc., February 2015.
SRA: Metropolitan Riverside County, 5 acres, 200 foot 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

Architectural Coatings

Architectural coatings contain VOCs that are similar to ROCs and are part of the O_3 precursors. Based on the proposed project, it is estimated that application of the architectural coatings for the proposed peak construction day will result in a combined peak of 73 lbs/day of VOC. Therefore, this VOC emission will not exceed the SCAQMD VOC threshold of 75 lbs/day.

Odors

Heavy-duty equipment in the project area during construction would emit odors. However, the construction activity would cease to occur after individual 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

[1] From the SCAQMD website, www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

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 Riverside County, which is not among the counties that are found to have serpentine and ultramafic rock in their soils. In addition, no serpentine or ultramafic rock has been found in the project vicinity in the past 10 years. Therefore, the potential risk for NOA during project construction is small and less than significant.

Construction Emissions Conclusions

Table H shows that daily regional construction emissions would not exceed the daily thresholds of any criteria pollutant emission thresholds established by the SCAQMD. Table I shows that during construction, there will be no LST impacts. The project's air emissions during construction do not exceed any of the thresholds of significance established by the Air District or other thresholds set forth in CEQA Appendix G. Because these thresholds were established to protect human health, project-specific emissions would not have any significant impact on human health.

LONG-TERM REGIONAL AIR QUALITY IMPACTS

Long-Term Project Operational Emissions

Long-term air pollutant emission impacts are those associated with stationary sources and mobile sources involving any project-related changes. The proposed project would result in area-, energy- and mobile-source emissions. Area sources include architectural coatings, consumer products, hearths, and landscaping. Energy sources include natural gas consumption for heating. Based on trip generation factors included in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (Ninth Edition), which are also provided in the trip generation study prepared for the proposed project (LSA, February 2015), the project’s daily trips were entered in the CalEEMod model. As the project consists of smaller light-industrial buildings in an industrial area, it is expected that truck traffic will be primarily local, thus the CalEEMod trip length of 16.6 miles for work vehicles was used. Long-term operational emissions associated with the proposed project are shown in Tables J and K (localized significance impacts). Table J shows that the peak daily emissions of all criteria pollutants as a result of the proposed project would not exceed the corresponding SCAQMD daily emission thresholds. Therefore, project-related long-term air quality impacts would be less than significant. No mitigation is required.

Table J: Opening Year Regional Operational Emissions

Source	Pollutant Emissions, lbs/day					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area Sources	15	0.00029	0.03	0	0.00011	0.00011
Energy Sources	0.27	2.5	2.1	0.015	0.19	0.19
Mobile Sources	11	45	130	0.27	19	5.6
Total Project Emissions	**26**	**48**	**130**	**0.29**	**19**	**5.8**
SCAQMD Thresholds	**55**	**55**	**550**	**150**	**150**	**55**
Significant?	**No**	**No**	**No**	**No**	**No**	**No**

Source: LSA Associates, Inc., February 2015.

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

Table K: Long-Term Operational LST

Emissions Sources	NO_X	CO	PM_{10}	$PM_{2.5}$
On-site emissions	7.0	15	2.4	0.7
LST Thresholds	**317**	**2,430**	**11**	**3.2**
Significant Emissions?	**No**	**No**	**No**	**No**

Source: LSA Associates, Inc., February 2015.

SRA: Metropolitan Riverside County, 5 acres, 200 foot distance, on-site traffic 5 percent of total

CO = carbon monoxide
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

Localized Impacts Analysis

Table K shows the calculated emissions for the proposed operational activities compared with the appropriate SCAQMD localized impacts thresholds. The localized impacts analysis by design only includes on-site sources; however, the CalEEMod model outputs for operations do not separate on-site and off-site emissions. As shown in Table J the CalEEMod only lists emissions by the categories of Area, Energy, and Mobile. For this LST analysis, it is assumed that all of the Area emissions occur on site, all of the Energy emissions occur off site (at regional power plants), and some portion of the Mobile source emissions occur on site. While some of the mobile source emissions will occur from vehicles driving on site, most of the mobile source emissions calculated by the CalEEMod model would occur while the vehicles are driving off site.

Most on-site vehicle maneuvering would be of short distance. It is unlikely that the average on-site distance driven by vehicles, including trucks, will be 1,000 feet, which is approximately 2 percent of the average trip length. For a conservative analysis, the emissions shown in Table K include five

percent of the mobile emissions added to the area source emissions. Table K shows that the operational on-site emissions rates would not exceed the localized impacts thresholds. Therefore, the proposed operational activity would not result in a locally significant air quality impact.

Greenhouse Gas Emissions

This section evaluates potential significant impacts to 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.

GHG Emissions Background. Emissions estimates for the proposed project are discussed below. 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 GCC 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, nor between any particular proposed mitigation measure and any reduction in climate change impacts.

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 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.[1]
- **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. However, landfill CH_4 can also be a source of energy. In

[1] CEC, 2004. *Water Energy Use in California* (online information sheet) Sacramento, CA, August 24. Website: energy.ca.gov/pier/iaw/industry/water.html (accessed July 24, 2007).

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.

Table L lists the annual GHG emissions by construction phase, with the total GHG emissions for the whole construction process expected to be 660 MT.

Table L: Regional Construction GHG Emissions

Construction Phase	Total Regional Pollutant Emissions, mt/yr			
	CO_2	CH_4	N_2O	CO_2e
Site Preparation	9.8	0.0028	0	9.9
Grading	30	0.0088	0	31
Building Construction	540	0.059	0	550
Architectural Coating	49	0.0039	0	49
Paving	23	0.0064	0	23

Source: LSA Associates, Inc., February 2015.
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
mt/yr = metric tons per year
N_2O = nitrous oxide

Table M: Long-Term Operational Greenhouse Gas Emissions

Source	Pollutant Emissions, MT/year					
	Bio- CO_2	NBio- CO_2	Total CO_2	CH_4	N_2O	CO_2e
Construction emissions amortized over 30 years	0	22	22	0.0027	0	22
Operational Emissions						
Area Sources	0	0.0071	0.0071	0.00002	0	0.0075
Energy Sources	0	2,500	2,500	0.053	0.018	2,500
Mobile Sources	0	3,000	3,000	0.12	0	3,000
Waste Sources	69	0	69	4.1	0	160
Water Usage	20	500	520	2.1	0.051	580
Total Project Emissions	**89**	**6,000**	**6,100**	**6.4**	**0.069**	**6,300**

Source: LSA Associates, Inc., February 2015.
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 = Non-biologically generated CO_2

The GHG emission estimates presented in Table M show the emissions associated with the level of development envisioned by the proposed project. Appendix A includes the CalEEMod output for the

GHG emissions. As shown in Table M, the project will produce 6,300 MT of CO_2e/yr, which is 0.0063 million metric tons of CO_2e per year (MMTCO_2e/yr). For comparison, the existing emissions from the entire SCAG region are estimated to be approximately 176.79 MMTCO_2e/yr, and the existing emissions for the entire State are estimated at approximately 496.95 MMTCO_2e/yr. The GHG emissions shown in Table M are less than the SCAQMD threshold for industrial sources of 10,000 MT of CO_2e/yr; thus, the project would not produce significant emissions of GHGs.

At present, there is a federal ban on chlorofluorocarbons (CFCs); therefore, it is assumed the project would not generate emissions of CFCs. The project may emit a small amount of HFCs from leakage and service of refrigeration and air-conditioning equipment and from disposal at the end of the life of the equipment. However, the details regarding refrigerants to be used at the project site are unknown at this time. PFCs and SF_6 are typically used in industrial applications, none of which would be used on the project site. Therefore, it is not anticipated that the project would contribute significant emissions of these additional GHGs.

LONG-TERM MICROSCALE (CO HOT SPOT) ANALYSIS

Vehicular trips associated with the proposed project would contribute to congestion at intersections and along roadway segments in the project vicinity. Localized air quality impacts would 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, it disperses rapidly with distance from the source. However, under certain extreme meteorological conditions, CO concentrations near a congested roadway or intersection may reach unhealthful levels, affecting local sensitive receptors (residents, schoolchildren, the elderly, and hospital patients, etc.).

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 in the Lake Elsinore station showed a highest recorded 1-hour concentration of 3.1 ppm (State standard is 20 ppm) and a highest 8-hour concentration of 1.6 ppm (State standard is 9 ppm) during the past 3 years (see previously referenced Table E). The highest CO concentrations would normally occur during peak traffic hours; hence, CO impacts calculated under peak traffic conditions represent a worst-case analysis.

Given the relatively low level of CO concentrations in the project area, project-related vehicles are not expected to result in the CO concentrations exceeding the State or federal CO standards. Because no CO hot spot would occur, there would be no project-related impacts on CO concentrations; therefore, 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 the SCAG. The proposed project is an industrial development and is not defined as a regionally significant project under CEQA; therefore, it does not meet SCAG's Intergovernmental Review (IGR) criteria.

Pursuant to the methodology provided in Chapter 12 of the 1993 SCAQMD *CEQA Air Quality Handbook*, consistency with the Basin 2012 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, as demonstrated above; therefore, the project could 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.

The City's General Plan designation for the site is Industrial. To accommodate the proposed uses, the proposed project will not require a General Plan Amendment (GPA). Therefore, the proposed uses are consistent with the General Plan and the regional AQMP. Based on the consistency analysis presented above, the proposed project is consistent with the General Plan and the regional AQMP.

STANDARD CONDITIONS

Construction Operations

The project is required to comply with regional rules that assist in reducing short-term air pollutant emissions. SCAQMD Rule 403 requires that fugitive dust 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, SCAQMD Rule 403 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Applicable dust suppression techniques from Rule 403 are summarized below. Implementation of these dust suppression techniques can reduce the fugitive dust generation (and thus the PM_{10} component). Compliance with these rules would reduce impacts on nearby sensitive receptors. See

http://www.aqmd.gov/rules/reg/reg04/r403.pdf for rule details. As shown in Table H, implementation of Rule 403 measures results in dust emissions below SCAQMD thresholds.

Operations

The proposed project is required to comply with Title 24 of the California Code of Regulations (CCR) established by the CEC regarding energy conservation and green building standards. These measures will result in reduced emissions during the construction and operation phases of the proposed project.

REFERENCES

California Air Resources Board website: http://www.arb.ca.gov.

LSA Associates, Inc. 2015. Traffic Impact Study. February.

South Coast Air Quality Management District. Air Quality Management Plan. 2007.

———. *CEQA Air Quality Handbook.* April 1993.

———. *Final Localized Significance Threshold Methodology.* June 2003.

———. *Final – Methodology to Calculate Particulate Matter* $(PM)_{2.5}$ *and* $PM_{2.5}$ *Significance Thresholds.* October 2006.

Western Regional Climate Center website: http://www.wrcc.dri.edu.

APPENDIX A

CALEEMOD MODEL PRINTOUTS

58 Magnolia Industrial Project

South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	276.00	1000sqft	6.34	276,000.00	0
Other Non-Asphalt Surfaces	1.50	Acre	1.50	65,340.00	0
Parking Lot	6.46	Acre	6.46	281,397.60	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	10			**Operational Year**	2015
Utility Company	Riverside Public Utilities				
CO2 Intensity (lb/MWhr)	1325.65	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Estimated areas from site plan figure.

Construction Phase - Site needs minimal prep & grading, assume simple building construction & architectural coatings applied throughout building construction

Grading -

Vehicle Trips - Assume average truck trip length of 20 miles.

Vechicle Emission Factors - From traffic study.

Vechicle Emission Factors - From traffic study.

Vechicle Emission Factors - From traffic study.

Construction Off-road Equipment Mitigation - Dust control measures as required by SCAQMD Rule 403.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	122.00
tblConstructionPhase	NumDays	300.00	150.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	PhaseEndDate	5/5/2016	11/17/2015
tblConstructionPhase	PhaseStartDate	11/18/2015	6/1/2015
tblProjectCharacteristics	OperationalYear	2014	2015
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MHD	0.02	0.05

tblVehicleEF	MHD	0.02	0.05
tblVehicleEF	MHD	0.02	0.05

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					
2015	72.9220	79.1621	54.1957	0.0965	18.2675	3.8042	21.3575	9.9840	3.4998	12.8269	0.0000	9,089.9556	9,089.9556	1.9497	0.0000	9,130.8987
Total	**72.9220**	**79.1621**	**54.1957**	**0.0965**	**18.2675**	**3.8042**	**21.3575**	**9.9840**	**3.4998**	**12.8269**	**0.0000**	**9,089.9556**	**9,089.9556**	**1.9497**	**0.0000**	**9,130.8987**

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					
2015	72.9220	79.1621	54.1957	0.0965	7.2470	3.8042	10.3371	3.9263	3.4998	6.7692	0.0000	9,089.9556	9,089.9556	1.9497	0.0000	9,130.8987
Total	**72.9220**	**79.1621**	**54.1957**	**0.0965**	**7.2470**	**3.8042**	**10.3371**	**3.9263**	**3.4998**	**6.7692**	**0.0000**	**9,089.9556**	**9,089.9556**	**1.9497**	**0.0000**	**9,130.8987**

	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**	**60.33**	**0.00**	**51.60**	**60.67**	**0.00**	**47.23**	**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	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Energy	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Mobile	10.6016	42.7534	132.7689	0.2702	18.2428	0.7375	18.9803	4.8979	0.6779	5.5758		24,589.1579	24,589.1579	0.9906		24,609.9596
Total	**25.4271**	**45.2216**	**134.8719**	**0.2850**	**18.2428**	**0.9252**	**19.1680**	**4.8979**	**0.8655**	**5.7635**		**27,550.7156**	**27,550.7156**	**1.0475**	**0.0543**	**27,589.5442**

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	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Energy	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Mobile	10.6016	42.7534	132.7689	0.2702	18.2428	0.7375	18.9803	4.8979	0.6779	5.5758		24,589.1579	24,589.1579	0.9906		24,609.9596
Total	**25.4271**	**45.2216**	**134.8719**	**0.2850**	**18.2428**	**0.9252**	**19.1680**	**4.8979**	**0.8655**	**5.7635**		**27,550.7156**	**27,550.7156**	**1.0475**	**0.0543**	**27,589.5442**

	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	4/1/2015	4/7/2015	5	5	
2	Grading	Grading	4/8/2015	4/21/2015	5	10	
3	Building Construction	Building Construction	4/22/2015	11/17/2015	5	150	
4	Architectural Coating	Architectural Coating	6/1/2015	11/17/2015	5	122	
5	Paving	Paving	11/18/2015	12/15/2015	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 25

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 524,673; Non-Residential Outdoor: 174,891 (Architectural Coating –

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	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
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38

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
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	262.00	102.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	52.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2015

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	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412		4,111.7444	4,111.7444	1.2275		4,137.5225

Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**18.0663**	**3.0883**	**21.1545**	**9.9307**	**2.8412**	**12.7719**		**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5225**

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	0.0830	0.1039	1.2894	2.5500e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		221.7657	221.7657	0.0119		222.0162
Total	**0.0830**	**0.1039**	**1.2894**	**2.5500e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**221.7657**	**221.7657**	**0.0119**		**222.0162**

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					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412	0.0000	4,111.7444	4,111.7444	1.2275		4,137.5224
Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**7.0458**	**3.0883**	**10.1341**	**3.8730**	**2.8412**	**6.7142**	**0.0000**	**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5224**

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	0.0830	0.1039	1.2894	2.5500e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		221.7657	221.7657	0.0119		222.0162
Total	**0.0830**	**0.1039**	**1.2894**	**2.5500e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**221.7657**	**221.7657**	**0.0119**		**222.0162**

3.3 Grading - 2015

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					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980		6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**8.6733**	**3.8022**	**12.4755**	**3.5965**	**3.4980**	**7.0945**		**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

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	0.0922	0.1154	1.4326	2.8300e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		246.4063	246.4063	0.0133		246.6847
Total	**0.0922**	**0.1154**	**1.4326**	**2.8300e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**246.4063**	**246.4063**	**0.0133**		**246.6847**

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					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980	0.0000	6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**3.3826**	**3.8022**	**7.1848**	**1.4026**	**3.4980**	**4.9006**	**0.0000**	**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

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	0.0922	0.1154	1.4326	2.8300e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		246.4063	246.4063	0.0133		246.6847
Total	**0.0922**	**0.1154**	**1.4326**	**2.8300e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**246.4063**	**246.4063**	**0.0133**		**246.6847**

3.4 Building Construction - 2015

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	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

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	0.9639	10.0232	11.0571	0.0222	0.6373	0.1733	0.8106	0.1815	0.1594	0.3408		2,250.3509	2,250.3509	0.0177		2,250.7222
Worker	1.2084	1.5121	18.7675	0.0371	2.9285	0.0258	2.9543	0.7767	0.0236	0.8003		3,227.9231	3,227.9231	0.1736		3,231.5695
Total	**2.1723**	**11.5354**	**29.8246**	**0.0594**	**3.5658**	**0.1991**	**3.7649**	**0.9581**	**0.1830**	**1.1411**		**5,478.2740**	**5,478.2740**	**0.1913**		**5,482.2918**

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	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904	0.0000	2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**	**0.0000**	**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

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	0.9639	10.0232	11.0571	0.0222	0.6373	0.1733	0.8106	0.1815	0.1594	0.3408		2,250.3509	2,250.3509	0.0177		2,250.7222
Worker	1.2084	1.5121	18.7675	0.0371	2.9285	0.0258	2.9543	0.7767	0.0236	0.8003		3,227.9231	3,227.9231	0.1736		3,231.5695
Total	**2.1723**	**11.5354**	**29.8246**	**0.0594**	**3.5658**	**0.1991**	**3.7649**	**0.9581**	**0.1830**	**1.1411**		**5,478.2740**	**5,478.2740**	**0.1913**		**5,482.2918**

3.5 Architectural Coating - 2015

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	66.4442					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000

Off-Road	0.4066	2.5703	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209		281.4481	281.4481	0.0367		282.2177
Total	**66.8508**	**2.5703**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**		**281.4481**	**281.4481**	**0.0367**		**282.2177**

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	0.2398	0.3001	3.7248	7.3700e-003	0.5812	5.1200e-003	0.5864	0.1542	4.6900e-003	0.1588		640.6565	640.6565	0.0345		641.3802
Total	**0.2398**	**0.3001**	**3.7248**	**7.3700e-003**	**0.5812**	**5.1200e-003**	**0.5864**	**0.1542**	**4.6900e-003**	**0.1588**		**640.6565**	**640.6565**	**0.0345**		**641.3802**

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	66.4442					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4066	2.5703	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209	0.0000	281.4481	281.4481	0.0367		282.2177
Total	**66.8508**	**2.5703**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**	**0.0000**	**281.4481**	**281.4481**	**0.0367**		**282.2177**

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	0.2398	0.3001	3.7248	7.3700e-003	0.5812	5.1200e-003	0.5864	0.1542	4.6900e-003	0.1588		640.6565	640.6565	0.0345		641.3802
Total	**0.2398**	**0.3001**	**3.7248**	**7.3700e-003**	**0.5812**	**5.1200e-003**	**0.5864**	**0.1542**	**4.6900e-003**	**0.1588**		**640.6565**	**640.6565**	**0.0345**		**641.3802**

3.6 Paving - 2015

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	2.3172	25.1758	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016		2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.8463					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1635**	**25.1758**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**		**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

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	0.0692	0.0866	1.0745	2.1300e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		184.8048	184.8048	9.9400e-003		185.0135
Total	**0.0692**	**0.0866**	**1.0745**	**2.1300e-003**	**0.1677**	**1.4800e-003**	**0.1691**	**0.0445**	**1.3500e-003**	**0.0458**		**184.8048**	**184.8048**	**9.9400e-003**		**185.0135**

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	2.3172	25.1758	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016	0.0000	2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.8463					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1635**	**25.1758**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**	**0.0000**	**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

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	0.0692	0.0866	1.0745	2.1300e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		184.8048	184.8048	9.9400e-003		185.0135
Total	**0.0692**	**0.0866**	**1.0745**	**2.1300e-003**	**0.1677**	**1.4800e-003**	**0.1691**	**0.0445**	**1.3500e-003**	**0.0458**		**184.8048**	**184.8048**	**9.9400e-003**		**185.0135**

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	10.6016	42.7534	132.7689	0.2702	18.2428	0.7375	18.9803	4.8979	0.6779	5.5758		24,589.1579	24,589.1579	0.9906		24,609.9596
Unmitigated	10.6016	42.7534	132.7689	0.2702	18.2428	0.7375	18.9803	4.8979	0.6779	5.5758		24,589.1579	24,589.1579	0.9906		24,609.9596

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	1,923.72	364.32	187.68	6,434,034	6,434,034
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	1,923.72	364.32	187.68	6,434,034	6,434,034

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	16.60	8.40	6.90	59.00	28.00	13.00	92	5	3
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.538700	0.235800	0.040000	0.040000	0.019500	0.019500	0.047600	0.047600	0.001918	0.002517	0.004333	0.000596	0.002079

5.0 Energy Detail

4.4 Fleet Mix

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	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
NaturalGas Unmitigated	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187

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	25172.7	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Other Non-Asphalt Surfaces	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
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		**0.2715**	**2.4679**	**2.0731**	**0.0148**		**0.1876**	**0.1876**		**0.1876**	**0.1876**		**2,961.4956**	**2,961.4956**	**0.0568**	**0.0543**	**2,979.5187**

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					
Other Non-Asphalt Surfaces	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
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
General Light Industry	25.1727	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Total		**0.2715**	**2.4679**	**2.0731**	**0.0148**		**0.1876**	**0.1876**		**0.1876**	**0.1876**		**2,961.4956**	**2,961.4956**	**0.0568**	**0.0543**	**2,979.5187**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Unmitigated	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659

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	2.2209					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.3302					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.9600e-003	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Total	**14.5540**	**2.9000e-004**	**0.0300**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0622**	**0.0622**	**1.8000e-004**		**0.0659**

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	2.2209					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.3302					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.9600e-003	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Total	**14.5540**	**2.9000e-004**	**0.0300**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0622**	**0.0622**	**1.8000e-004**		**0.0659**

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 Vegetation

58 Magnolia Industrial Project

South Coast Air Basin, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	276.00	1000sqft	6.34	276,000.00	0
Other Non-Asphalt Surfaces	1.50	Acre	1.50	65,340.00	0
Parking Lot	6.46	Acre	6.46	281,397.60	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	10			**Operational Year**	2015
Utility Company	Riverside Public Utilities				
CO2 Intensity (lb/MWhr)	1325.65	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Estimated areas from site plan figure.

Construction Phase - Site needs minimal prep & grading, assume simple building construction & architectural coatings applied throughout building construction

Grading -

Vehicle Trips - Assume average truck trip length of 20 miles.

Vechicle Emission Factors - From traffic study.

Vechicle Emission Factors - From traffic study.

Vechicle Emission Factors - From traffic study.

Construction Off-road Equipment Mitigation - Dust control measures as required by SCAQMD Rule 403.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	122.00
tblConstructionPhase	NumDays	300.00	150.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	PhaseEndDate	5/5/2016	11/17/2015
tblConstructionPhase	PhaseStartDate	11/18/2015	6/1/2015
tblProjectCharacteristics	OperationalYear	2014	2015
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MHD	0.02	0.05

tblVehicleEF	MHD	0.02	0.05
tblVehicleEF	MHD	0.02	0.05

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					
2015	73.0521	79.1735	54.5645	0.0936	18.2675	3.8042	21.3575	9.9840	3.4998	12.8269	0.0000	8,831.3258	8,831.3258	1.9497	0.0000	8,872.2689
Total	**73.0521**	**79.1735**	**54.5645**	**0.0936**	**18.2675**	**3.8042**	**21.3575**	**9.9840**	**3.4998**	**12.8269**	**0.0000**	**8,831.3258**	**8,831.3258**	**1.9497**	**0.0000**	**8,872.2689**

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					
2015	73.0521	79.1735	54.5645	0.0936	7.2470	3.8042	10.3371	3.9263	3.4998	6.7692	0.0000	8,831.3258	8,831.3258	1.9497	0.0000	8,872.2689
Total	**73.0521**	**79.1735**	**54.5645**	**0.0936**	**7.2470**	**3.8042**	**10.3371**	**3.9263**	**3.4998**	**6.7692**	**0.0000**	**8,831.3258**	**8,831.3258**	**1.9497**	**0.0000**	**8,872.2689**

	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**	**60.33**	**0.00**	**51.60**	**60.67**	**0.00**	**47.23**	**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	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Energy	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Mobile	10.9818	44.7368	130.0783	0.2583	18.2428	0.7414	18.9842	4.8979	0.6814	5.5794		23,556.5430	23,556.5430	0.9915		23,577.3638
Total	**25.8073**	**47.2050**	**132.1814**	**0.2731**	**18.2428**	**0.9291**	**19.1719**	**4.8979**	**0.8691**	**5.7671**		**26,518.1007**	**26,518.1007**	**1.0484**	**0.0543**	**26,556.9485**

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	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Energy	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Mobile	10.9818	44.7368	130.0783	0.2583	18.2428	0.7414	18.9842	4.8979	0.6814	5.5794		23,556.5430	23,556.5430	0.9915		23,577.3638
Total	**25.8073**	**47.2050**	**132.1814**	**0.2731**	**18.2428**	**0.9291**	**19.1719**	**4.8979**	**0.8691**	**5.7671**		**26,518.1007**	**26,518.1007**	**1.0484**	**0.0543**	**26,556.9485**

	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	4/1/2015	4/7/2015	5	5	
2	Grading	Grading	4/8/2015	4/21/2015	5	10	
3	Building Construction	Building Construction	4/22/2015	11/17/2015	5	150	
4	Architectural Coating	Architectural Coating	6/1/2015	11/17/2015	5	122	
5	Paving	Paving	11/18/2015	12/15/2015	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 25

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 524,673; Non-Residential Outdoor: 174,891 (Architectural Coating –

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	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
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38

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
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	262.00	102.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	52.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2015

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	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412		4,111.7444	4,111.7444	1.2275		4,137.5225

Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**18.0663**	**3.0883**	**21.1545**	**9.9307**	**2.8412**	**12.7719**		**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5225**

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	0.0850	0.1141	1.1926	2.3900e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		208.0159	208.0159	0.0119		208.2664
Total	**0.0850**	**0.1141**	**1.1926**	**2.3900e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**208.0159**	**208.0159**	**0.0119**		**208.2664**

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					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412	0.0000	4,111.7444	4,111.7444	1.2275		4,137.5224
Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**7.0458**	**3.0883**	**10.1341**	**3.8730**	**2.8412**	**6.7142**	**0.0000**	**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5224**

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	0.0850	0.1141	1.1926	2.3900e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		208.0159	208.0159	0.0119		208.2664
Total	**0.0850**	**0.1141**	**1.1926**	**2.3900e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**208.0159**	**208.0159**	**0.0119**		**208.2664**

3.3 Grading - 2015

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					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980		6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**8.6733**	**3.8022**	**12.4755**	**3.5965**	**3.4980**	**7.0945**		**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

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	0.0945	0.1268	1.3251	2.6600e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		231.1287	231.1287	0.0133		231.4071
Total	**0.0945**	**0.1268**	**1.3251**	**2.6600e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**231.1287**	**231.1287**	**0.0133**		**231.4071**

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					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980	0.0000	6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**3.3826**	**3.8022**	**7.1848**	**1.4026**	**3.4980**	**4.9006**	**0.0000**	**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

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	0.0945	0.1268	1.3251	2.6600e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		231.1287	231.1287	0.0133		231.4071
Total	**0.0945**	**0.1268**	**1.3251**	**2.6600e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**231.1287**	**231.1287**	**0.0133**		**231.4071**

3.4 Building Construction - 2015

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	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

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	1.0588	10.2838	13.1143	0.0221	0.6373	0.1754	0.8127	0.1815	0.1613	0.3428		2,231.5794	2,231.5794	0.0182		2,231.9612
Worker	1.2377	1.6614	17.3587	0.0348	2.9285	0.0258	2.9543	0.7767	0.0236	0.8003		3,027.7865	3,027.7865	0.1736		3,031.4329
Total	**2.2965**	**11.9452**	**30.4730**	**0.0569**	**3.5658**	**0.2012**	**3.7670**	**0.9581**	**0.1849**	**1.1431**		**5,259.3659**	**5,259.3659**	**0.1918**		**5,263.3941**

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	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904	0.0000	2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**	**0.0000**	**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

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	1.0588	10.2838	13.1143	0.0221	0.6373	0.1754	0.8127	0.1815	0.1613	0.3428		2,231.5794	2,231.5794	0.0182		2,231.9612
Worker	1.2377	1.6614	17.3587	0.0348	2.9285	0.0258	2.9543	0.7767	0.0236	0.8003		3,027.7865	3,027.7865	0.1736		3,031.4329
Total	**2.2965**	**11.9452**	**30.4730**	**0.0569**	**3.5658**	**0.2012**	**3.7670**	**0.9581**	**0.1849**	**1.1431**		**5,259.3659**	**5,259.3659**	**0.1918**		**5,263.3941**

3.5 Architectural Coating - 2015

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	66.4442					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000

Off-Road	0.4066	2.5703	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209		281.4481	281.4481	0.0367		282.2177
Total	**66.8508**	**2.5703**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**		**281.4481**	**281.4481**	**0.0367**		**282.2177**

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	0.2457	0.3297	3.4452	6.9100e-003	0.5812	5.1200e-003	0.5864	0.1542	4.6900e-003	0.1588		600.9347	600.9347	0.0345		601.6584
Total	**0.2457**	**0.3297**	**3.4452**	**6.9100e-003**	**0.5812**	**5.1200e-003**	**0.5864**	**0.1542**	**4.6900e-003**	**0.1588**		**600.9347**	**600.9347**	**0.0345**		**601.6584**

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	66.4442					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4066	2.5703	1.9018	2.9700e-003		0.2209	0.2209		0.2209	0.2209	0.0000	281.4481	281.4481	0.0367		282.2177
Total	**66.8508**	**2.5703**	**1.9018**	**2.9700e-003**		**0.2209**	**0.2209**		**0.2209**	**0.2209**	**0.0000**	**281.4481**	**281.4481**	**0.0367**		**282.2177**

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	0.2457	0.3297	3.4452	6.9100e-003	0.5812	5.1200e-003	0.5864	0.1542	4.6900e-003	0.1588		600.9347	600.9347	0.0345		601.6584
Total	**0.2457**	**0.3297**	**3.4452**	**6.9100e-003**	**0.5812**	**5.1200e-003**	**0.5864**	**0.1542**	**4.6900e-003**	**0.1588**		**600.9347**	**600.9347**	**0.0345**		**601.6584**

3.6 Paving - 2015

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	2.3172	25.1758	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016		2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.8463					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1635**	**25.1758**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**		**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

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	0.0709	0.0951	0.9938	1.9900e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		173.3466	173.3466	9.9400e-003		173.5553
Total	**0.0709**	**0.0951**	**0.9938**	**1.9900e-003**	**0.1677**	**1.4800e-003**	**0.1691**	**0.0445**	**1.3500e-003**	**0.0458**		**173.3466**	**173.3466**	**9.9400e-003**		**173.5553**

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	2.3172	25.1758	14.9781	0.0223		1.4148	1.4148		1.3016	1.3016	0.0000	2,339.8984	2,339.8984	0.6986		2,354.5681
Paving	0.8463					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1635**	**25.1758**	**14.9781**	**0.0223**		**1.4148**	**1.4148**		**1.3016**	**1.3016**	**0.0000**	**2,339.8984**	**2,339.8984**	**0.6986**		**2,354.5681**

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	0.0709	0.0951	0.9938	1.9900e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		173.3466	173.3466	9.9400e-003		173.5553
Total	**0.0709**	**0.0951**	**0.9938**	**1.9900e-003**	**0.1677**	**1.4800e-003**	**0.1691**	**0.0445**	**1.3500e-003**	**0.0458**		**173.3466**	**173.3466**	**9.9400e-003**		**173.5553**

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	10.9818	44.7368	130.0783	0.2583	18.2428	0.7414	18.9842	4.8979	0.6814	5.5794		23,556.5430	23,556.5430	0.9915		23,577.3638
Unmitigated	10.9818	44.7368	130.0783	0.2583	18.2428	0.7414	18.9842	4.8979	0.6814	5.5794		23,556.5430	23,556.5430	0.9915		23,577.3638

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	1,923.72	364.32	187.68	6,434,034	6,434,034
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	1,923.72	364.32	187.68	6,434,034	6,434,034

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	16.60	8.40	6.90	59.00	28.00	13.00	92	5	3
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.538700	0.235800	0.040000	0.040000	0.019500	0.019500	0.047600	0.047600	0.001918	0.002517	0.004333	0.000596	0.002079

5.0 Energy Detail

4.4 Fleet Mix

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	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
NaturalGas Unmitigated	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187

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	25172.7	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Other Non-Asphalt Surfaces	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
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		**0.2715**	**2.4679**	**2.0731**	**0.0148**		**0.1876**	**0.1876**		**0.1876**	**0.1876**		**2,961.4956**	**2,961.4956**	**0.0568**	**0.0543**	**2,979.5187**

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					
Other Non-Asphalt Surfaces	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
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
General Light Industry	25.1727	0.2715	2.4679	2.0731	0.0148		0.1876	0.1876		0.1876	0.1876		2,961.4956	2,961.4956	0.0568	0.0543	2,979.5187
Total		**0.2715**	**2.4679**	**2.0731**	**0.0148**		**0.1876**	**0.1876**		**0.1876**	**0.1876**		**2,961.4956**	**2,961.4956**	**0.0568**	**0.0543**	**2,979.5187**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Unmitigated	14.5541	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659

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	2.2209					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.3302					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.9600e-003	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Total	**14.5540**	**2.9000e-004**	**0.0300**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0622**	**0.0622**	**1.8000e-004**		**0.0659**

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	2.2209					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.3302					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.9600e-003	2.9000e-004	0.0300	0.0000		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004		0.0622	0.0622	1.8000e-004		0.0659
Total	**14.5540**	**2.9000e-004**	**0.0300**	**0.0000**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**		**0.0622**	**0.0622**	**1.8000e-004**		**0.0659**

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 Vegetation

58 Magnolia Industrial Project

South Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	276.00	1000sqft	6.34	276,000.00	0
Other Non-Asphalt Surfaces	1.50	Acre	1.50	65,340.00	0
Parking Lot	6.46	Acre	6.46	281,397.60	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	10			**Operational Year**	2015
Utility Company	Riverside Public Utilities				
CO2 Intensity (lb/MWhr)	1325.65	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Estimated areas from site plan figure.

Construction Phase - Site needs minimal prep & grading, assume simple building construction & architectural coatings applied throughout building construction

Grading -

Vehicle Trips - Assume average truck trip length of 20 miles.

Vechicle Emission Factors - From traffic study.

Vechicle Emission Factors - From traffic study.

Vechicle Emission Factors - From traffic study.

Construction Off-road Equipment Mitigation - Dust control measures as required by SCAQMD Rule 403.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	122.00
tblConstructionPhase	NumDays	300.00	150.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	PhaseEndDate	5/5/2016	11/17/2015
tblConstructionPhase	PhaseStartDate	11/18/2015	6/1/2015
tblProjectCharacteristics	OperationalYear	2014	2015
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	HHD	0.03	0.05
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDA	0.52	0.54
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT1	0.06	0.24
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LDT2	0.18	0.04
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD1	0.04	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	LHD2	6.6390e-003	0.02
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MDV	0.14	0.04
tblVehicleEF	MHD	0.02	0.05

tblVehicleEF	MHD	0.02	0.05
tblVehicleEF	MHD	0.02	0.05

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					
2015	4.6111	4.1355	4.5593	7.6000e-003	0.3892	0.2285	0.6177	0.1236	0.2145	0.3381	0.0000	657.2438	657.2438	0.0810	0.0000	658.9441
Total	**4.6111**	**4.1355**	**4.5593**	**7.6000e-003**	**0.3892**	**0.2285**	**0.6177**	**0.1236**	**0.2145**	**0.3381**	**0.0000**	**657.2438**	**657.2438**	**0.0810**	**0.0000**	**658.9441**

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					
2015	4.6111	4.1355	4.5593	7.6000e-003	0.3352	0.2285	0.5637	0.0975	0.2145	0.3119	0.0000	657.2435	657.2435	0.0810	0.0000	658.9438
Total	**4.6111**	**4.1355**	**4.5593**	**7.6000e-003**	**0.3352**	**0.2285**	**0.5637**	**0.0975**	**0.2145**	**0.3119**	**0.0000**	**657.2435**	**657.2435**	**0.0810**	**0.0000**	**658.9438**

	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**	**13.88**	**0.00**	**8.74**	**21.13**	**0.00**	**7.72**	**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	tons/yr										MT/yr					
Area	2.6559	4.0000e-005	3.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.0500e-003	7.0500e-003	2.0000e-005	0.0000	7.4800e-003
Energy	0.0495	0.4504	0.3783	2.7000e-003		0.0342	0.0342		0.0342	0.0342	0.0000	2,476.3882	2,476.3882	0.0529	0.0180	2,483.0712
Mobile	1.4395	6.2692	18.0616	0.0359	2.4625	0.1015	2.5640	0.6622	0.0933	0.7555	0.0000	2,965.7555	2,965.7555	0.1234	0.0000	2,968.3474
Waste						0.0000	0.0000		0.0000	0.0000	69.4716	0.0000	69.4716	4.1057	0.0000	155.6904
Water						0.0000	0.0000		0.0000	0.0000	20.2487	499.7235	519.9722	2.0907	0.0514	579.8007
Total	**4.1450**	**6.7196**	**18.4437**	**0.0386**	**2.4625**	**0.1357**	**2.5982**	**0.6622**	**0.1275**	**0.7897**	**89.7204**	**5,941.8742**	**6,031.5946**	**6.3726**	**0.0694**	**6,186.9171**

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	2.6559	4.0000e-005	3.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.0500e-003	7.0500e-003	2.0000e-005	0.0000	7.4800e-003
Energy	0.0495	0.4504	0.3783	2.7000e-003		0.0342	0.0342		0.0342	0.0342	0.0000	2,476.3882	2,476.3882	0.0529	0.0180	2,483.0712
Mobile	1.4395	6.2692	18.0616	0.0359	2.4625	0.1015	2.5640	0.6622	0.0933	0.7555	0.0000	2,965.7555	2,965.7555	0.1234	0.0000	2,968.3474
Waste						0.0000	0.0000		0.0000	0.0000	69.4716	0.0000	69.4716	4.1057	0.0000	155.6904

Water						0.0000	0.0000		0.0000	0.0000	20.2487	499.7235	519.9722	2.0903	0.0513	579.7684
Total	**4.1450**	**6.7196**	**18.4437**	**0.0386**	**2.4625**	**0.1357**	**2.5982**	**0.6622**	**0.1275**	**0.7897**	**89.7204**	**5,941.8742**	**6,031.5946**	**6.3723**	**0.0693**	**6,186.8848**

	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**	**0.01**	**0.12**	**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	4/1/2015	4/7/2015	5	5	
2	Grading	Grading	4/8/2015	4/21/2015	5	10	
3	Building Construction	Building Construction	4/22/2015	11/17/2015	5	150	
4	Architectural Coating	Architectural Coating	6/1/2015	11/17/2015	5	122	
5	Paving	Paving	11/18/2015	12/15/2015	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 25

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 524,673; Non-Residential Outdoor: 174,891 (Architectural Coating

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40

Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	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
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38

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
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	262.00	102.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	52.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2015

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					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0132	0.1422	0.1066	1.0000e-004		7.7200e-003	7.7200e-003		7.1000e-003	7.1000e-003	0.0000	9.3253	9.3253	2.7800e-003	0.0000	9.3837
Total	**0.0132**	**0.1422**	**0.1066**	**1.0000e-004**	**0.0452**	**7.7200e-003**	**0.0529**	**0.0248**	**7.1000e-003**	**0.0319**	**0.0000**	**9.3253**	**9.3253**	**2.7800e-003**	**0.0000**	**9.3837**

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	2.0000e-004	2.9000e-004	3.0500e-003	1.0000e-005	4.9000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.4000e-004	0.0000	0.4791	0.4791	3.0000e-005	0.0000	0.4797
Total	**2.0000e-004**	**2.9000e-004**	**3.0500e-003**	**1.0000e-005**	**4.9000e-004**	**0.0000**	**5.0000e-004**	**1.3000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4791**	**0.4791**	**3.0000e-005**	**0.0000**	**0.4797**

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					0.0176	0.0000	0.0176	9.6800e-003	0.0000	9.6800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0132	0.1422	0.1066	1.0000e-004		7.7200e-003	7.7200e-003		7.1000e-003	7.1000e-003	0.0000	9.3253	9.3253	2.7800e-003	0.0000	9.3837

Total	**0.0132**	**0.1422**	**0.1066**	**1.0000e-004**	**0.0176**	**7.7200e-003**	**0.0253**	**9.6800e-003**	**7.1000e-003**	**0.0168**	**0.0000**	**9.3253**	**9.3253**	**2.7800e-003**	**0.0000**	**9.3837**

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	2.0000e-004	2.9000e-004	3.0500e-003	1.0000e-005	4.9000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.4000e-004	0.0000	0.4791	0.4791	3.0000e-005	0.0000	0.4797
Total	**2.0000e-004**	**2.9000e-004**	**3.0500e-003**	**1.0000e-005**	**4.9000e-004**	**0.0000**	**5.0000e-004**	**1.3000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4791**	**0.4791**	**3.0000e-005**	**0.0000**	**0.4797**

3.3 Grading - 2015

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					0.0434	0.0000	0.0434	0.0180	0.0000	0.0180	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0339	0.3952	0.2542	3.1000e-004		0.0190	0.0190		0.0175	0.0175	0.0000	29.4211	29.4211	8.7800e-003	0.0000	29.6056
Total	**0.0339**	**0.3952**	**0.2542**	**3.1000e-004**	**0.0434**	**0.0190**	**0.0624**	**0.0180**	**0.0175**	**0.0355**	**0.0000**	**29.4211**	**29.4211**	**8.7800e-003**	**0.0000**	**29.6056**

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	4.5000e-004	6.5000e-004	6.7800e-003	1.0000e-005	1.1000e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	1.0647	1.0647	6.0000e-005	0.0000	1.0660
Total	**4.5000e-004**	**6.5000e-004**	**6.7800e-003**	**1.0000e-005**	**1.1000e-003**	**1.0000e-005**	**1.1100e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**1.0647**	**1.0647**	**6.0000e-005**	**0.0000**	**1.0660**

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					0.0169	0.0000	0.0169	7.0100e-003	0.0000	7.0100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0339	0.3952	0.2542	3.1000e-004		0.0190	0.0190		0.0175	0.0175	0.0000	29.4211	29.4211	8.7800e-003	0.0000	29.6055
Total	**0.0339**	**0.3952**	**0.2542**	**3.1000e-004**	**0.0169**	**0.0190**	**0.0359**	**7.0100e-003**	**0.0175**	**0.0245**	**0.0000**	**29.4211**	**29.4211**	**8.7800e-003**	**0.0000**	**29.6055**

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	4.5000e-004	6.5000e-004	6.7800e-003	1.0000e-005	1.1000e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	1.0647	1.0647	6.0000e-005	0.0000	1.0660
Total	**4.5000e-004**	**6.5000e-004**	**6.7800e-003**	**1.0000e-005**	**1.1000e-003**	**1.0000e-005**	**1.1100e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**1.0647**	**1.0647**	**6.0000e-005**	**0.0000**	**1.0660**

3.4 Building Construction - 2015

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	0.2744	2.2523	1.4058	2.0100e-003		0.1588	0.1588		0.1493	0.1493	0.0000	182.9958	182.9958	0.0459	0.0000	183.9599
Total	**0.2744**	**2.2523**	**1.4058**	**2.0100e-003**		**0.1588**	**0.1588**		**0.1493**	**0.1493**	**0.0000**	**182.9958**	**182.9958**	**0.0459**	**0.0000**	**183.9599**

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	0.0771	0.7864	0.9591	1.6600e-003	0.0471	0.0131	0.0601	0.0134	0.0120	0.0254	0.0000	152.5749	152.5749	1.2200e-003	0.0000	152.6004
Worker	0.0876	0.1283	1.3327	2.6500e-003	0.2156	1.9300e-003	0.2175	0.0573	1.7700e-003	0.0590	0.0000	209.2119	209.2119	0.0118	0.0000	209.4600
Total	**0.1647**	**0.9147**	**2.2918**	**4.3100e-003**	**0.2626**	**0.0150**	**0.2776**	**0.0707**	**0.0138**	**0.0845**	**0.0000**	**361.7868**	**361.7868**	**0.0130**	**0.0000**	**362.0605**

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	0.2744	2.2522	1.4058	2.0100e-003		0.1588	0.1588		0.1493	0.1493	0.0000	182.9955	182.9955	0.0459	0.0000	183.9597
Total	**0.2744**	**2.2522**	**1.4058**	**2.0100e-003**		**0.1588**	**0.1588**		**0.1493**	**0.1493**	**0.0000**	**182.9955**	**182.9955**	**0.0459**	**0.0000**	**183.9597**

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	0.0771	0.7864	0.9591	1.6600e-003	0.0471	0.0131	0.0601	0.0134	0.0120	0.0254	0.0000	152.5749	152.5749	1.2200e-003	0.0000	152.6004
Worker	0.0876	0.1283	1.3327	2.6500e-003	0.2156	1.9300e-003	0.2175	0.0573	1.7700e-003	0.0590	0.0000	209.2119	209.2119	0.0118	0.0000	209.4600
Total	**0.1647**	**0.9147**	**2.2918**	**4.3100e-003**	**0.2626**	**0.0150**	**0.2776**	**0.0707**	**0.0138**	**0.0845**	**0.0000**	**361.7868**	**361.7868**	**0.0130**	**0.0000**	**362.0605**

3.5 Architectural Coating - 2015

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	4.0531					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0248	0.1568	0.1160	1.8000e-004		0.0135	0.0135		0.0135	0.0135	0.0000	15.5749	15.5749	2.0300e-003	0.0000	15.6174
Total	**4.0779**	**0.1568**	**0.1160**	**1.8000e-004**		**0.0135**	**0.0135**		**0.0135**	**0.0135**	**0.0000**	**15.5749**	**15.5749**	**2.0300e-003**	**0.0000**	**15.6174**

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	0.0141	0.0207	0.2151	4.3000e-004	0.0348	3.1000e-004	0.0351	9.2400e-003	2.9000e-004	9.5300e-003	0.0000	33.7720	33.7720	1.9100e-003	0.0000	33.8121
Total	**0.0141**	**0.0207**	**0.2151**	**4.3000e-004**	**0.0348**	**3.1000e-004**	**0.0351**	**9.2400e-003**	**2.9000e-004**	**9.5300e-003**	**0.0000**	**33.7720**	**33.7720**	**1.9100e-003**	**0.0000**	**33.8121**

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	4.0531					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Off-Road	0.0248	0.1568	0.1160	1.8000e-004		0.0135	0.0135		0.0135	0.0135	0.0000	15.5748	15.5748	2.0300e-003	0.0000	15.6174
Total	**4.0779**	**0.1568**	**0.1160**	**1.8000e-004**		**0.0135**	**0.0135**		**0.0135**	**0.0135**	**0.0000**	**15.5748**	**15.5748**	**2.0300e-003**	**0.0000**	**15.6174**

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	0.0141	0.0207	0.2151	4.3000e-004	0.0348	3.1000e-004	0.0351	9.2400e-003	2.9000e-004	9.5300e-003	0.0000	33.7720	33.7720	1.9100e-003	0.0000	33.8121
Total	**0.0141**	**0.0207**	**0.2151**	**4.3000e-004**	**0.0348**	**3.1000e-004**	**0.0351**	**9.2400e-003**	**2.9000e-004**	**9.5300e-003**	**0.0000**	**33.7720**	**33.7720**	**1.9100e-003**	**0.0000**	**33.8121**

3.6 Paving - 2015

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	0.0232	0.2518	0.1498	2.2000e-004		0.0142	0.0142		0.0130	0.0130	0.0000	21.2272	21.2272	6.3400e-003	0.0000	21.3603
Paving	8.4600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0316**	**0.2518**	**0.1498**	**2.2000e-004**		**0.0142**	**0.0142**		**0.0130**	**0.0130**	**0.0000**	**21.2272**	**21.2272**	**6.3400e-003**	**0.0000**	**21.3603**

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	6.7000e-004	9.8000e-004	0.0102	2.0000e-005	1.6500e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5970	1.5970	9.0000e-005	0.0000	1.5989
Total	**6.7000e-004**	**9.8000e-004**	**0.0102**	**2.0000e-005**	**1.6500e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5970**	**1.5970**	**9.0000e-005**	**0.0000**	**1.5989**

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	0.0232	0.2518	0.1498	2.2000e-004		0.0142	0.0142		0.0130	0.0130	0.0000	21.2272	21.2272	6.3400e-003	0.0000	21.3603
Paving	8.4600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0316**	**0.2518**	**0.1498**	**2.2000e-004**		**0.0142**	**0.0142**		**0.0130**	**0.0130**	**0.0000**	**21.2272**	**21.2272**	**6.3400e-003**	**0.0000**	**21.3603**

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	6.7000e-004	9.8000e-004	0.0102	2.0000e-005	1.6500e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5970	1.5970	9.0000e-005	0.0000	1.5989
Total	**6.7000e-004**	**9.8000e-004**	**0.0102**	**2.0000e-005**	**1.6500e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5970**	**1.5970**	**9.0000e-005**	**0.0000**	**1.5989**

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	1.4395	6.2692	18.0616	0.0359	2.4625	0.1015	2.5640	0.6622	0.0933	0.7555	0.0000	2,965.7555	2,965.7555	0.1234	0.0000	2,968.3474
Unmitigated	1.4395	6.2692	18.0616	0.0359	2.4625	0.1015	2.5640	0.6622	0.0933	0.7555	0.0000	2,965.7555	2,965.7555	0.1234	0.0000	2,968.3474

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	1,923.72	364.32	187.68	6,434,034	6,434,034
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	1,923.72	364.32	187.68	6,434,034	6,434,034

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-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by

General Light Industry	16.60	8.40	6.90	59.00	28.00	13.00	92	5	3
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.538700	0.235800	0.040000	0.040000	0.019500	0.019500	0.047600	0.047600	0.001918	0.002517	0.004333	0.000596	0.002079

5.0 Energy Detail

4.4 Fleet Mix

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	1,986.0794	1,986.0794	0.0435	8.9900e-003	1,989.7784
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1,986.0794	1,986.0794	0.0435	8.9900e-003	1,989.7784
NaturalGas Mitigated	0.0495	0.4504	0.3783	2.7000e-003		0.0342	0.0342		0.0342	0.0342	0.0000	490.3088	490.3088	9.4000e-003	8.9900e-003	493.2927
NaturalGas Unmitigated	0.0495	0.4504	0.3783	2.7000e-003		0.0342	0.0342		0.0342	0.0342	0.0000	490.3088	490.3088	9.4000e-003	8.9900e-003	493.2927

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	9.18804e+006	0.0495	0.4504	0.3783	2.7000e-003		0.0342	0.0342		0.0342	0.0342	0.0000	490.3088	490.3088	9.4000e-003	8.9900e-003	493.2927
Other Non-Asphalt Surfaces	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
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		**0.0495**	**0.4504**	**0.3783**	**2.7000e-003**		**0.0342**	**0.0342**		**0.0342**	**0.0342**	**0.0000**	**490.3088**	**490.3088**	**9.4000e-003**	**8.9900e-003**	**493.2927**

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	9.18804e+006	0.0495	0.4504	0.3783	2.7000e-003		0.0342	0.0342		0.0342	0.0342	0.0000	490.3088	490.3088	9.4000e-003	8.9900e-003	493.2927
Other Non-Asphalt Surfaces	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
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		**0.0495**	**0.4504**	**0.3783**	**2.7000e-003**		**0.0342**	**0.0342**		**0.0342**	**0.0342**	**0.0000**	**490.3088**	**490.3088**	**9.4000e-003**	**8.9900e-003**	**493.2927**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	3.05532e+006	1,837.1784	0.0402	8.3200e-003	1,840.6001
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000

Parking Lot	247630	148.9010	3.2600e-003	6.7000e-004	149.1784
Total		**1,986.0794**	**0.0435**	**8.9900e-003**	**1,989.7784**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	3.05532e+006	1,837.1784	0.0402	8.3200e-003	1,840.6001
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	247630	148.9010	3.2600e-003	6.7000e-004	149.1784
Total		**1,986.0794**	**0.0435**	**8.9900e-003**	**1,989.7784**

6.0 Area Detail

6.1 Mitigation Measures Area

	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	2.6559	4.0000e-005	3.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.0500e-003	7.0500e-003	2.0000e-005	0.0000	7.4800e-003
Unmitigated	2.6559	4.0000e-005	3.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.0500e-003	7.0500e-003	2.0000e-005	0.0000	7.4800e-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	0.4053					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.2503					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.7000e-004	4.0000e-005	3.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.0500e-003	7.0500e-003	2.0000e-005	0.0000	7.4800e-003
Total	**2.6559**	**4.0000e-005**	**3.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**7.0500e-003**	**7.0500e-003**	**2.0000e-005**	**0.0000**	**7.4800e-003**

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	0.4053					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.2503					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.7000e-004	4.0000e-005	3.7500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.0500e-003	7.0500e-003	2.0000e-005	0.0000	7.4800e-003
Total	**2.6559**	**4.0000e-005**	**3.7500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**7.0500e-003**	**7.0500e-003**	**2.0000e-005**	**0.0000**	**7.4800e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	519.9722	2.0903	0.0513	579.7684
Unmitigated	519.9722	2.0907	0.0514	579.8007

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	63.825 / 0	519.9722	2.0907	0.0514	579.8007
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**519.9722**	**2.0907**	**0.0514**	**579.8007**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			

General Light Industry	63.825 / 0	519.9722	2.0903	0.0513	579.7684
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**519.9722**	**2.0903**	**0.0513**	**579.7684**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	69.4716	4.1057	0.0000	155.6904
Unmitigated	69.4716	4.1057	0.0000	155.6904

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	342.24	69.4716	4.1057	0.0000	155.6904
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000

Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**69.4716**	**4.1057**	**0.0000**	**155.6904**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	342.24	69.4716	4.1057	0.0000	155.6904
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**69.4716**	**4.1057**	**0.0000**	**155.6904**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

APPENDIX C

PHASE II BURROWING OWL SURVEY

December 13, 2016
20895

Brian Bargemann
Investment Building Group
5100 Campus Drive, Suite 300
Newport Beach, California

SUBJECT: ADDENDUM TO THE PHASE II BURROWING OWL REPORT FOR THE IBG MAGNOLIA PROJECT (PARCELS 135-220-021, -023, -025, -027), CITY OF RIVERSIDE, RIVERSIDE COUNTY, CALIFORNIA

Dear Mr. Bargemann,

The purpose of this addendum is to document the results of the site visit conducted at the IBG Magnolia property (Project) located in the city of Riverside, Riverside County, California. The site visit was conducted to identify if habitat conditions have changed since the 2006 Phase II burrowing owl survey and whether or not burrowing owl habitat still exists on the Project.

The site visit was conducted by Chambers Group biologist Saraiah Skidmore on December 12, 2016. The property was fenced in; therefore, the boundary of the Project was walked and binoculars were used to scan the Project and immediate buffer. The areas adjacent to the Project include a commercial development on the southwest, Magnolia Avenue on the west, an open space parcel on the north/northeast, and a concrete lined channel and train tracks on the south/southeast. The following characteristics, observed on the Project and within the Project buffer, include suitable habitat conditions for burrowing owl:

- Open, low-lying ruderal vegetation is present on the Project and on the parcel north of the Project.
- Small mammal burrow activity was observed on the Project.
- A couple of large pieces of old concrete were present on the Project.
- Dirt piles were observed on the parcel north of the Project.
- Slopes along the concrete channel and train tracks are suitable for burrowing owl burrows.

Based on the site visit, conditions on the Project have not changed and the recommendation in the 2006 report is still valid. According to the Riverside County Multiple Species Habitat Conservation Plan, all project sites containing burrows or suitable habitat, regardless of the presence or absence of the owls, will require a pre-construction survey within 30 days prior to ground disturbance, to avoid direct take of burrowing owls (TLMA 2006).

Please contact me at (909) 335-7068 ext. 7330 if you have any questions or concerns regarding this addendum.

Sincerely,

Saraiah Skidmore

Saraiah Skidmore
Senior Biologist / Project Manager
sskidmore@chambersgroupinc.com

November 5, 2015
(20895)

Brian Bargemann
Investment Building Group
5100 Campus Drive, Suite 300
Newport Beach, California

SUBJECT: RESULTS OF THE PHASE II BURROWING OWL SURVEY FOR THE IBG MAGNOLIA PROJECT (PARCELS 135-220-021, -023, -025, -027), CITY OF RIVERSIDE, RIVERSIDE COUNTY, CALIFORNIA

Dear Mr. Bargemann,

The purpose of this letter report is to provide an update for the IBG Magnolia property (Project, Assessor's Parcel Numbers 135-220-021, -023, -025, -027), previously the LA-Magnolia Spectrum property, now owned by Investment Building Group.

2015 REPORT UPDATE

Chambers Group, Inc. (Chambers Group) reviewed current aerial imagery of the Project site on November 3, 2015 (Google 2015). Based on the review of the imagery, conditions on the Project site have not changed since the 2006 survey effort; therefore, no conditions are known to Chambers Group that would change the results and conclusions described below. Although the site was not revisited in person, Chambers Group concurs with the recommendations listed below; and Investment Building Group is prepared to move forward with the recommended surveys prior to conducting construction activities.

2006 SURVEY REPORT

In 2006 Chambers Group was retained by LA-Magnolia Spectrum, LLC to conduct a Phase II burrowing owl (*Athene cunicularia*) survey. The following sections provide background and Project location information and summarize the methods and results of the phase II burrowing owl survey conducted at the Project site in 2006. The survey was conducted to assess the presence of burrowing owls within the Project site and within a 150-meter buffer zone around the Project boundary.

Background

Burrowing owls are considered a California Special Concern species (CSC), protected by the California Department of Fish and Wildlife (CDFW); and burrow sites are protected under the Federal Migratory Bird Treaty Act (MBTA) (16 United States Code 703-712). This species is a ground-dweller that makes its nests in burrows dug by burrowing mammals, primarily ground squirrels, as well as in cement culverts, debris piles, and in openings beneath cement or asphalt pavement. Burrowing owls inhabit arid habitats such as grasslands, prairie, desert scrub habitats, and urban and agricultural areas where low-lying vegetation and friable soils are present. Open fields with adequate foraging habitat are required.

SANTA ANA LOS ANGELES REDLANDS SAN DIEGO EL CENTRO
1200 California Street, Suite 270 | Redlands, California 92374
t | 909.335.7068 f | 909.335.6318 w | www.chambersgroupinc.com

Burrowing owls have high burrow site fidelity, regularly reusing the same burrow from year to year. For this reason, it is difficult to force this species to relocate to a different burrow. These owls tend to remain in the same location throughout the winter as year-round residents after the nesting season. Predators of this species include larger raptor species, foxes, raccoons, snakes, coyotes, and any other animals that can access their burrows. Burrowing owls prey upon insects, rodents, amphibians, and small birds for food. The primary threat to this species is habitat loss.

Site Location And Description

The LA-Magnolia Spectrum property is located southwest of the intersection of Magnolia Avenue and Sterling Avenue in the City of Riverside, Riverside County, California. The property is located in the U.S. Geological Survey (USGS) *Riverside West* 7.5-minute topographic quadrangle, an unsectioned portion of a land grant, Township 3 South, Range 6 West. The 2006 survey described the approximately 16-acre Project site as surrounded on the north, east, and west sides by existing commercial buildings and roads. A railroad existed south of the property with an approximately 3-meter dirt divider between the property and the tracks.

Phase II Burrowing Owl Survey

A Phase II burrowing owl survey was conducted by Chambers Group biologists Shari Norton and Saraiah Skidmore between the hours of 0900 and 1100 on June 2, 2006. Survey methodology followed the *Burrowing Owl Survey Protocol and Mitigation Guidelines* prepared by The California Burrowing Owl Consortium (1993). The survey was conducted by walking over the entire Project site with 15-meter belt transects to achieve 100 percent cover. Additionally, a 150-meter buffer zone was surveyed where potential burrowing owl habitat was present south of the Project. Plant and wildlife species encountered during the field survey were recorded. Vegetative community structure on the Project site was identified. Sign of burrowing owl activity (e.g., whitewash, prey remains, pellets, burrows, scratch marks, or feathers) was noted.

Plant and wildlife species identified during the survey were noted on the field data sheets. Identification of wildlife species was made by direct observation, vocalizations, and evidence of the presence of the species (including scat). Field data sheets and complete lists of plant and wildlife species observed during the survey are included as Attachments 1, 2, and 3, respectively.

Results

The survey site comprised approximately 16 acres of level ground. The nearest freshwater to the Project site is located within 1.0 mile and consists of several canals and channels, including the Arlington and Sierra channels and the Riverside Canal. An old building foundation and debris piles were located in the western portion of the Project site. Temperatures during the time of the survey ranged from 78 to 98 degrees Fahrenheit, with a moderate breeze (0 to 2 miles per hour) and no cloud cover.

Burrowing Owls

No burrowing owls or sign of burrowing owls were observed within the site during the survey; therefore, no further surveys for this species are recommended at this time. Also, the presence of the active red-tailed hawk (*Buteo jamaicensis*) nest site may deter burrowing owls from finding residence in the immediate area.

The County of Riverside (County) may require a preconstruction survey within 30 days prior to construction on the Project site (RCIP 2005). The County should be contacted to determine the need for preconstruction surveys.

Vegetation

The Project site had a cover of ruderal vegetation, with dominant species including non-native herbaceous species such as black mustard (*Brassica nigra*), London rocket (*Sisymbrium irio*), and lamb's quarters (*Chenopodium album*), as well as several non-native grasses including wild oats (*Avena* sp.), foxtail chess (*Bromus madritensis* ssp. *rubens*), and Bermuda grass (*Cynodon dactylon*). Ruderal areas are often a result of disturbance caused by humans. Ruderal areas are typically characterized by heavily compacted or frequently disturbed soils. Plant species occurring in ruderal areas are adapted to survive in these conditions and readily colonize disturbed ground (Sawyer and Keeler-Wolf 1995). Scattered ornamental trees, including Peruvian pepper tree (*Schinus molle*), chinaberry tree (*Melia azedarach*), olive (*Olea europea*), Mexican fan palm (*Washingtonia robusta*), blue gum (*Eucalyptus globulus*), and Mediterranean tamarisk (*Tamarix ramosissima*) were found on the Project site, probably relicts of former residences on the Project site. The full list of plant species detected during the survey is included as Attachment 2.

Other Wildlife

Wildlife species observed and detected on the Project site are typical of the vegetation communities that occur within and around the Project site. One butterfly species, the cabbage white (*Pieris* [*Astrogeia*] *rapae*), was observed within the Project site. Other common butterfly species are also expected to occur on site. Amphibian species were not detected during the survey due to the lack of available water sources on the site; however, one reptile species, western fence lizard (*Sceloporus occidentalis*), was observed during the survey.

Birds were the most abundant wildlife species detected. Bird activity ranged from low to moderate; and a total of nine fairly common species were detected via observation, vocalization, and/or sign during the course of the survey. Bird species observed include Anna's hummingbird (*Calypte anna*), killdeer (*Charadrius vociferous*), and black phoebe (*Sayornis nigricans*). The site also included scat and large owl pellets, which were thought to be from a barn owl (*Tyto alba*), found below the canopy of blue gums. Two red-tailed hawks, one adult and one juvenile, were observed foraging over the Project site and occupied a nest in a blue gum located in the northwestern area of the Project site along Magnolia Avenue.

Two mammal species, desert cottontail (*Sylvilagus audubonii*) and the California ground squirrel (*Spermophilus beecheyi*), were detected during the survey. Additionally, rodent species, such as Botta's pocket gopher (*Thomomys bottae*), would be expected on the Project site. The full list of wildlife species detected during the survey is included as Attachment 3.

RECOMMENDATIONS

Although no burrowing owls were observed within the site and no further surveys for burrowing owls are recommended, the County may require a preconstruction survey within 30 days prior to construction on the Project site (RCIP 2005). The County should be contacted to determine the need for preconstruction surveys.

The presence of the active red-tailed hawk nest observed during the survey may pose seasonal constraints on proposed construction activities within and near the Project site. Construction activities within 500 feet of any raptor nest should be scheduled outside the nesting season, which typically occurs from March 1 through the end of July.

Similarly, to comply with the general provisions of the MBTA, vegetation clearing and tree removal activities should be conducted outside the bird-nesting season, which typically occurs from February 15 through August 31. In the event that vegetation clearing is necessary during the nesting season, a qualified biologist should conduct a preconstruction survey to identify the locations of nests within the areas affected by clearing activities. An exclusionary zone should be established around any active nest. The dimensions of the zone should be determined by a qualified biologist and is dependent upon the species of bird detected. This zone should be clearly marked in the field, and construction or clearing should not be conducted within this zone until the biologist determines that the nest is no longer active.

Please contact me at (909) 335-7068 ext. 7330 if you have any questions or concerns regarding this letter.

Sincerely,

Saraiah Skidmore

Saraiah Skidmore
Senior Biologist / Project Manager
sskidmore@chambersgroupinc.com

ATTACHMENTS:

Attachment 1: Field Data Sheets
Attachment 2: Plant Species Observed
Attachment 3: Wildlife Species Observed

REFERENCES

California Burrowing Owl Consortium
1993 *Burrowing Owl Survey Protocol and Mitigation Guidelines.* April 1993.

Google Earth (Google)
2015 *IBG Magnolia Project Site.* 11 S 454627.39 m 3750493.30 m N. Google Earth. Accessed on November 3, 2015.

Sawyer, J.O., Jr. and T. Keeler-Wolf
1995 *A Manual of California Vegetation*. California Native Plant Society, Sacramento, California.

Riverside County Integrated Project (RCIP)
2005 Final Multiple Species Habitat Conservation Plan (MSHCP). Riverside, California.

U.S. Geological Survey (USGS)
1980 *Redlands West* 7.5-minute Topographic Quadrangle, 1967; photorevised 1980.

ATTACHMENT 1 – FIELD DATA SHEETS

PROJECT: La Magnolia Spectrum (8462) DATE: 6/2/06

SURVEYOR(S): Phase II Burrowing owl survey
S. Norton & S. Skidmore

SPECIES:	NOTES:
Brassica nigra *	Entire project site
Olea europea *	ruderal w/small
Schinus molle *	areas of relict
Washingtonia robusta *	ornamental trees,
Eucalyptus globulus *	ie. pepper, olive,
Bromus madritensis ssp rubens *	chinaberry trees, +
Avena sp *	Eucalyptus
Melia azaradach *	
Tamarix ramossissima *	
Sisymbrium irio *	
Gnaphalium californicum	
Salsola tragus *	
Cynodon dactylon *	
Datura wrighti	
Chenopodium album *	
Convolvulus arvensis *	
Malva parviflora *	
Hordeum murinum *	
* = non-native	

Biological Resources Survey Form

Chambers Group, Inc.

Project Name LA-Magnolia Spectrum **Project #** 8462 **Task** 001 **Billing Group** 01

Location Pierce St & magnolia **Survey Type** _____

Surveyor(s) Sara Skidmore **Date** 6/2/06 **Time (Start)** 9:00 **(End)** 10:39

General Habitat Description of Area Ruderal

Weather (Cloud cover, Estimated wind speed, precipitation) clear / 1.2mph / no

Temperature (In C, taken at 6" above the ground in the shade) **(Start)** 77.7 °F **(End)** 98.2 °F

Time		Wildlife Species
9:05	Ground squirrel	O
"	morning doves	O
"	house sparrows	O
9:30	Red Tailed Hawks foraging	O
9:40	Barn Owl associated w/palm, pellet	Sign
9:51	Black Phoebe	O
9:51	Rock Dove	O
9:55	Cassens Kingbird	O
10:15	Western Fence lizard	O
10:17	Audobons Cottontail	O
	Red tail 1 Adult 1 immature w/nest	D,V
10:30	Killdeer	O
	Swallows	O
	cabbage white butterfly	O

General Comments: NE&W commercial & Roads
S - concrete channel & Railroad track

ATTACHMENT 2 – PLANT SPECIES OBSERVED

PLANT SPECIES LIST
LA-MAGNOLIA SPECTRUM PROJECT SITE

Scientific Name	Common Name
ANGIOSPERMS (DICOTYLEDONS)	
ANACARDIACEAE	**SUMAC OR CASHEW FAMILY**
*Schinus molle**	Peruvian pepper tree
ASTERACEAE	**SUNFLOWER FAMILY**
Gnaphalium californicum	California everlasting
BRASSICACEAE	**MUSTARD FAMILY**
*Brassica nigra**	black mustard
*Sisymbrium irio**	London rocket
CHENOPODIACEAE	**GOOSEFOOT FAMILY**
*Chenopodium album**	lamb's quarters
*Salsola tragus**	Russian thistle
CONVOLVULACEAE	**MORNING-GLORY FAMILY**
*Convolvulus arvensis**	bindweed
MALVACEAE	**MALLOW FAMILY**
*Malva parviflora**	cheeseweed
MELIACEAE	**MAHOGANY FAMILY**
*Melia azedarach**	chinaberry tree
MYRTACEAE	**MYRTLE FAMILY**
*Eucalyptus globulus**	blue gum
OLEACEAE	**OLIVE FAMILY**
*Olea europaea**	olive
SOLANACEAE	**NIGHTSHADE FAMILY**
Datura wrightii	jimson weed
TAMARICACEAE	**TAMARISK FAMILY**
*Tamarix ramosissima**	Mediterranean tamarisk
ANGIOSPERMS (MONOCOTYLEDONS)	
ARECACEAE	**PALM FAMILY**
*Washingtonia robusta**	Mexican fan palm
POACEAE	**GRASS FAMILY**
Avena sp.*	wild oat
Bromus madritensis ssp. *rubens**	foxtail chess
*Cynodon dactylon**	Bermuda grass
*Hordeum murinum**	glaucous foxtail barley

ATTACHMENT 3 – WILDLIFE SPECIES OBSERVED

WILDLIFE SPECIES LIST
LA-MAGNOLIA SPECTRUM PROJECT SITE

Scientific Name	Common Name	Sign
CLASS INSECTA	**INSECTS**	
PIERIDAE	**WHITES & SULPHURS**	
Artogeia rapae	Cabbage white	O
CLASS REPTILIA	**REPTILES**	
PHRYNOSOMATIDAE	**ZEBRA-TAILED, EARLESS, FRINGE-TOED, SPINY, TREE, SIDE-BLOTCHED, AND HORNY LIZARDS**	
Sceloporus occidentalis	western fence lizard	O
CLASS AVES	**BIRDS**	
ACCIPITRIDAE	**HAWKS, KITES, EAGLES**	
Buteo jamaicensis	red-tailed hawk	O,V
CHARADRIIDAE	**PLOVERS**	
Charadrius vociferus	killdeer	O
COLUMBIDAE	**PIGEONS & DOVES**	
Columba livia	rock dove	O
Zenaida macroura	mourning dove	O
TYTONIDAE	**BARN OWLS**	
Tyto alba	barn owl	S
TROCHILIDAE	**HUMMINGBIRDS**	
Calypte anna	Anna's hummingbird	O
TYRANNIDAE	**TYRANT FLYCATCHERS**	
Sayornis nigricans	black phoebe	O
HIRUNDINIDAE	**SWALLOWS**	
PASSERIDAE	**OLD WORLD SPARROWS**	
Passer domesticus	house sparrow	O
LEPORIDAE	**HARES & RABBITS**	
Sylvilagus audubonii	desert cottontail	O
SCIURIDAE	**SQUIRRELS**	
Spermophilus beecheyi	California ground squirrel	O, S
HETEROMYIDAE	**POCKET MICE & KANGAROO RATS**	S
MURIDAE	**MICE, RATS, AND VOLES**	S

APPENDIX D

NOISE IMPACT ANALYSIS

NOISE IMPACT ANALYSIS

58 MAGNOLIA INDUSTRIAL PROJECT

CITY OF RIVERSIDE, CALIFORNIA

LSA

February 2015

NOISE IMPACT ANALYSIS

58 MAGNOLIA INDUSTRIAL PROJECT

CITY OF RIVERSIDE, CALIFORNIA

Prepared for:

Investment Building Group
5100 Campus Drive, Suite 300
Newport Beach, California 92660

Prepared by:

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614
(949) 553-0666

Project No. IBG1501

LSA

February 2015

TABLE OF CONTENTS

INTRODUCTION 1
Project Description 1
Methodology Related to Noise Impact Assessment 1
Characteristics of Sound 4
Measurement of Sound 4
Physiological Effects of Noise 5
Vibration 9
EXISTING CONDITIONS 9
Land Uses in the Project Vicinity 9
Overview of the Existing Noise Environment 9
Thresholds of Significance 10
IMPACTS AND MITIGATION MEASURES 14
Short-Term Construction-Related Impacts 14
Long-Term Vehicular Traffic Noise Impacts 18
Long-Term On-Site Operational Noise Impacts 20
On-Site Operational Noise Impacts 20
Long-Term Vehicular Traffic Vibration Impacts 21
Mitigation Measures 22
Level of Significance after Mitigation 22
REFERENCES 23

FIGURES

Figure 1: Project Location Map 2
Figure 2: Project Site Plan 3

TABLES

Table A: Definitions of Acoustical Terms 6
Table B: Common Sound Levels and Their Noise Sources 7
Table C: Land Use Compatibility for Exterior Community Noise 8
Table D: Existing Traffic Noise Levels 10
Table E: City of Riverside Sound Level Limits (dBA) 12
Table F: Groundborne Vibration and Noise Impact Criteria 13
Table G: Construction Vibration Damage Criteria 14
Table H: RCNM Default Noise Emission Reference Levels and Usage Factors 15
Table I: Vibration Source Amplitudes for Construction Equipment 17
Table J: Existing Traffic Noise Levels With Project 18
Table K: Future Cumulative Traffic Noise Levels Without Project 19
Table L: Future Cumulative Traffic Noise Levels With Project 19

APPENDIX

A: FHWA TRAFFIC NOISE MODEL PRINTOUTS

INTRODUCTION

This noise impact analysis has been prepared to evaluate the potential noise impacts and mitigation measures associated with the proposed 58 Magnolia Industrial Project (project) in the City of Riverside (City), California. This report is intended to satisfy the City's requirement for a project-specific noise impact analysis by examining the impacts of the proposed uses on adjacent noise-sensitive uses, as well as the noise impacts on the proposed uses on the project site, and evaluating the mitigation measures required as part of the project design.

Project Description

The proposed project consists of seven light industrial buildings, averaging about 40,000 square feet (sq. ft.) each, located on the southwest corner of the intersection of Pierce Street and Magnolia Avenue in the City of Riverside in the County of Riverside, California. Figure 1 shows the project location.

The project involves the construction of six smaller buildings totaling 148,700 sq. ft. and one multitenant larger building of 127,300 sq. ft. Figure 2 illustrates the site plan.

The project site is located on the southwest corner of the intersection of Pierce Street and Magnolia Avenue with access provided by five proposed driveways. Three of the proposed driveways would be from Magnolia Avenue and two driveways would be from Pierce Street.

The proposed project is consistent with the current City General Plan designation and will not require a City General Plan Amendment.

Methodology Related to Noise Impact Assessment

Evaluation of noise impacts associated with the proposed project includes the following:

- Determine the short-term construction noise and vibration impacts on off-site noise-sensitive uses
- Determine the long-term traffic noise impacts on off-site noise-sensitive uses
- Determine the long-term traffic vibration impacts on off-site sensitive uses
- Determine the long-term stationary source noise impacts on off-site, noise-sensitive uses
- Determine the required mitigation measures to reduce long-term off-site noise and vibration impacts

LSA

FIGURE 1

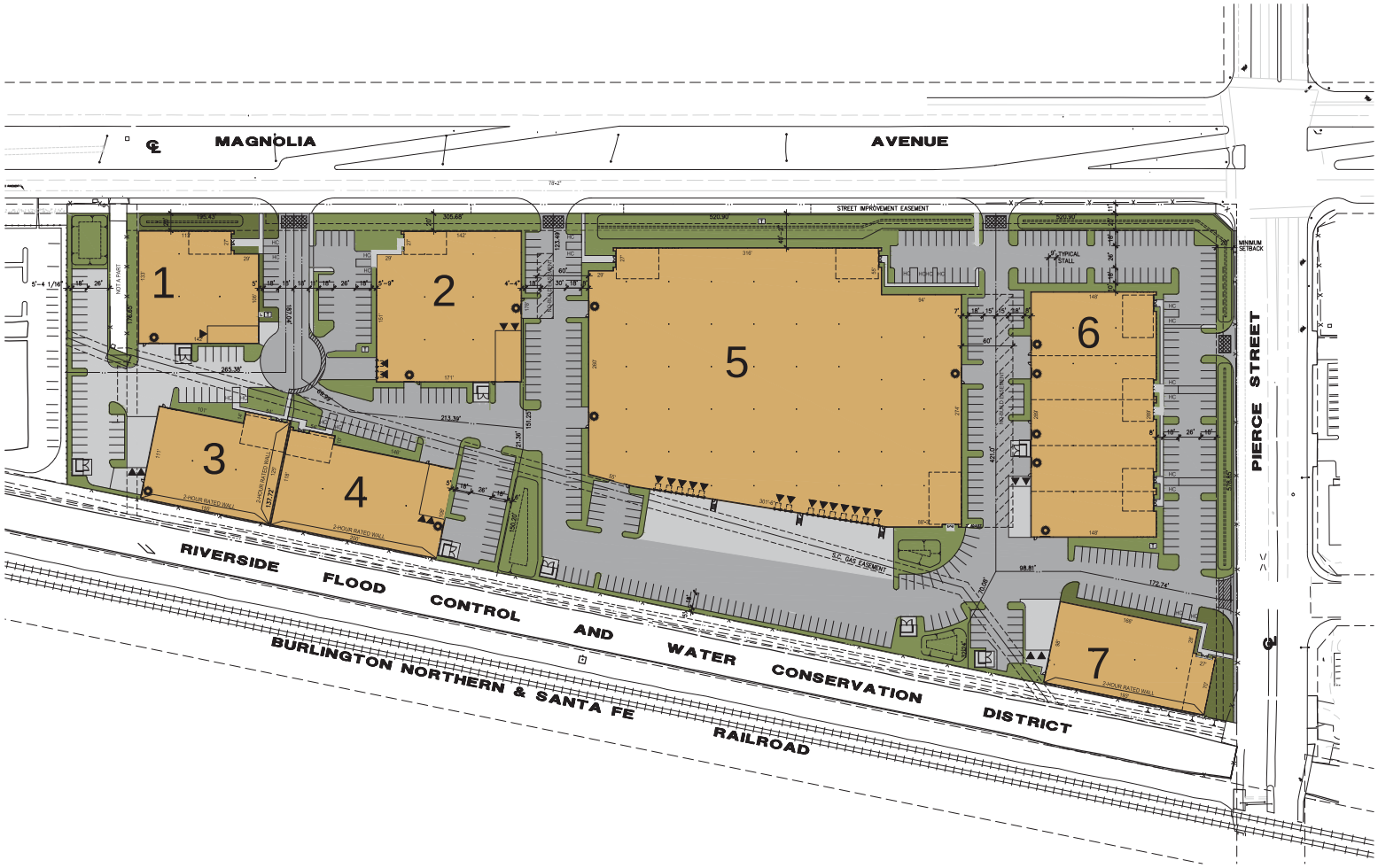
0 1,000 2,000
Feet

58 Magnolia Industrial

SOURCE: ESRI, Bing Imagery, 2010.

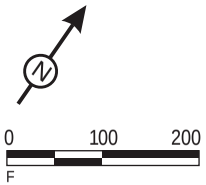
Regional and Project Location

I:\IBG1401\Reports\Traffic\fig1_RegLoc.mxd (11/13/2014)



LSA

FIGURE 2



LEGEND

- INDICATES 12'x14' GRADE LEVEL DOOR
- INDICATES 9'x10' DOCK LEVEL DOOR
- CONCRETE TRASH ENCLOSURE PAINTED TO MATCH BUILDINGS
- ELECTRICAL TRANSFORMER

58 Magnolia Industrial

e ua e a

SOURCE:
I:\IBG1401\Reports\Traffic\fig2_ConceptSitePlan.ai (11/13/14)

Characteristics of Sound

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units (e.g., inches or pounds), decibels (dB) are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 dB are 10 times more intense than 1 dB, 20 dB are 100 times more intense than 1 dB, and 30 dB are 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 A-weighted decibels (dBA) (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dBA for each doubling of distance in a hard site environment. Line source noise (noise in a relatively flat environment with absorptive vegetation) decreases 4.5 dBA for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average level (L_{dn}) based on dBA. CNEL is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for

noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally exchangeable. The City uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater since this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise level of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure (typically more than 8 hours, as defined by the Occupational Safety and Health Administration [OSHA]) to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire body system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dB, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dB, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 to 165 dB will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas.

Table A lists “Definitions of Acoustical Terms,” and Table B shows “Common Sound Levels and Their Noise Sources.” Table C shows “Land Use Compatibility for Exterior Community Noise” from the City *General Plan and Supporting Documents Environmental Impact Report* (EIR) (City of Riverside, certified November 2007).

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1%, 10%, 50%, and 90% of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dB to sound levels occurring in the evening from 7:00 PM to 10:00 PM. and after the addition of 10 dB to sound levels occurring in the night between 10:00 PM and 7:00 AM.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dB to sound levels occurring in the night between 10:00 PM and 7:00 AM.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

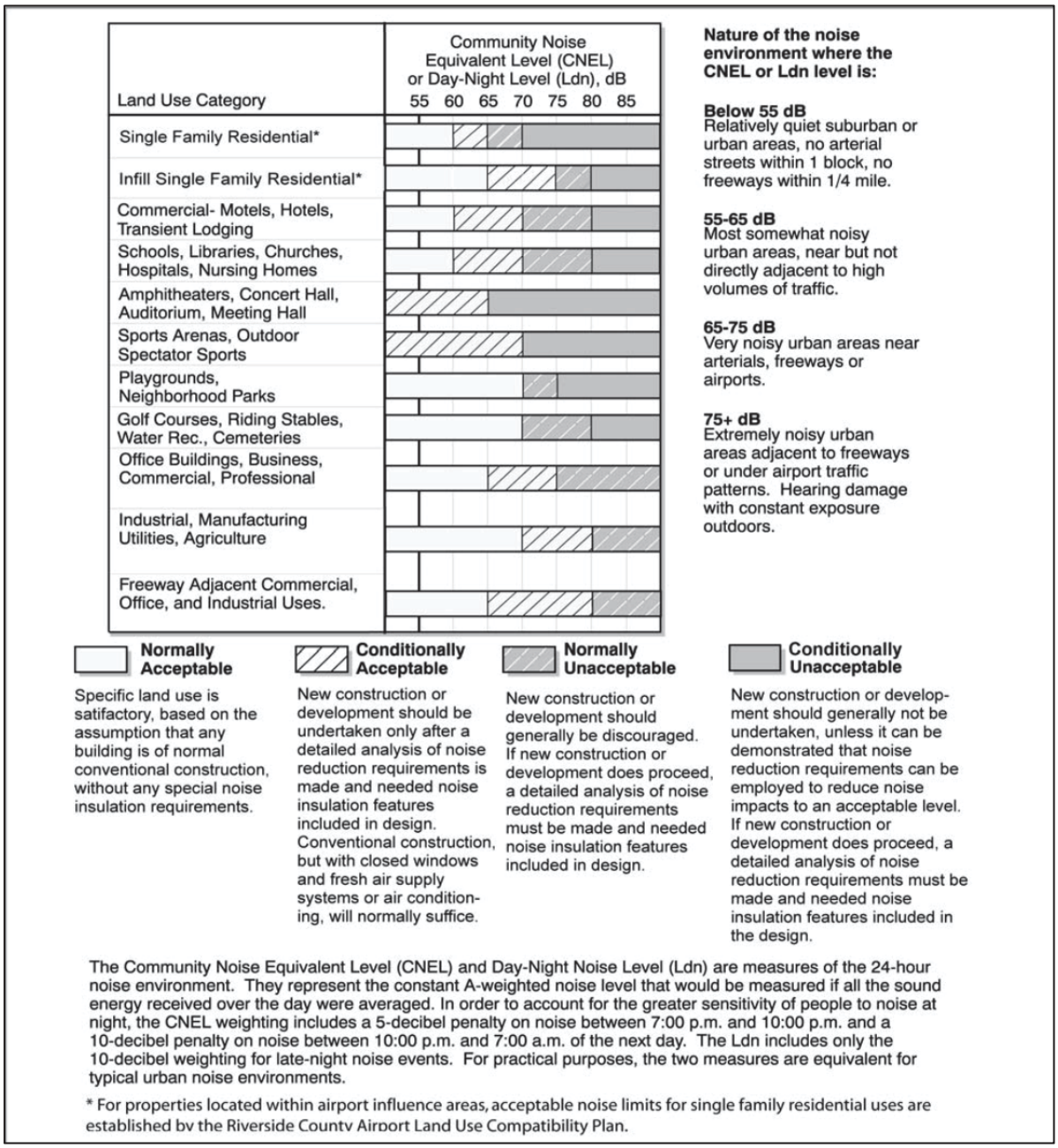
Source: *Handbook of Acoustical Measurements and Noise Control* (1991).

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Evaluation
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle a few feet away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Reference Level
Average Office	60	Quiet	½ as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	$^{1}/_{4}$ as loud
Large Transformer	45	Quiet	
Average Residence Without Stereo Playing	40	Faint	⅛ as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing
	0	Very Faint	

Source: Compiled by LSA Associates, Inc. (2004).

Table C: Land Use Compatibility for Exterior Community Noise



Source: City of Riverside. *General Plan and Supporting Documents Environmental Impact Report* (certified November 2007).

Vibration

Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items on shelves or wall hangings, or a low-frequency rumbling noise. The rumble noise is caused by the vibrating walls, floors, and ceilings radiating sound waves. Groundborne vibration is usually measured in terms of vibration velocity, either the root-mean-square (rms) velocity or peak particle velocity (PPV). Of these two, rms is best for characterizing human response to building vibration, and PPV is used to characterize potential for damage. Ground vibrations from construction activities do not often reach the levels that can damage structures, but they can achieve the audible and tangible ranges in buildings very close to the site. Problems with groundborne vibration from construction sources are usually localized to areas within about 100 feet (ft) from the vibration source.

EXISTING CONDITIONS

Land Uses in the Project Vicinity

Land uses surrounding the project site consist primarily of industrial uses with the nearest residential uses approximately 200 ft to the south of the project boundary. The areas adjacent to the project site include the following uses:

- Riverside Flood Control and Water Conservation District vacant land, Burlington Northern & Santa Fe (BNSF) Railroad Tracks, and residential uses beyond (south)
- Pierce Street and commercial uses beyond (east)
- Magnolia Avenue and industrial uses beyond (south)
- Vacant land and commercial uses beyond (west)

Overview of the Existing Noise Environment

The primary existing noise sources in the project area are transportation facilities. Traffic on Magnolia Avenue, Pierce Street, State Route 91 (SR-91), and other local streets is the dominant source of ambient noise.

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 taken from the traffic study prepared for this project were used to assess the existing traffic noise impacts. Table D 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. The specific assumptions used in developing these noise levels and model printouts are provided in Appendix A.

Table D: Existing Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 CNEL (ft)	Centerline to 65 CNEL (ft)	Centerline to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane
Magnolia Ave west of Project Drwy #1	21,000	61	124	263	68.6
Magnolia Ave between Project Drwy #1 and Pierce St	21,000	61	124	263	68.6
Magnolia Ave east of Pierce St	24,100	66	135	288	69.2
Pierce St north of SR-91 WB Ramps	30,200	62	129	275	69.3
Pierce St between SR-91 EB Ramps and Magnolia Ave	17,800	59	113	236	67.5
Pierce St between Magnolia Ave and Sterling Ave	8,600	< 50	58	120	63.9
Pierce St south of Sterling Ave	7,900	< 50	55	114	63.5

Source: LSA Associates, Inc., February 2015.
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
EB = eastbound
ft = foot/feet
SR-91 = State Route 91
WB = westbound

Table D shows that traffic noise levels along roadway segments in the project vicinity range from moderate (Pierce Street south of Magnolia Avenue) to high (Magnolia Avenue and Pierce Street north of Magnolia Avenue), with the 70 dBA CNEL confined within the roadway right-of-way (ROW) for Pierce Street south of Magnolia Avenue, and extending to 66 ft and 62 ft from the centerline of Magnolia Avenue and Pierce Street north of Magnolia Avenue, respectively. Since the project boundary is approximately 80 ft from the centerline of Magnolia Avenue, it is currently exposed to 69 dBA CNEL as a worst-case scenario. The project site is approximately 50 ft from the centerline of Pierce Street south of Magnolia Avenue; therefore, the impact of traffic noise from Pierce Street at the project boundary would reach 66 dBA CNEL.

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 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 City's Municipal Code and Noise Element of the General Plan.

Based on the standards and thresholds identified earlier, the effects of the proposed project have been categorized as either "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a significant unavoidable impact.

City of Riverside Noise Element. The City in its General Plan 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 dBA 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 this noise impact analysis, multifamily (student housing) uses with outdoor active use areas (such as 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 which exceeds the following:
  - The exterior noise standard of the applicable land use category (Table E), 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 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 (Table E), 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.

Table E: City of Riverside Sound Level Limits (dBA)

Land Use Category	Time Period	Exterior Noise Standard	Interior Noise Standard
Residential	Night (10:00 PM to 7:00 AM) Day (7:00 AM to 10:00 PM)	45 55	35 45
School	7:00 AM to 10:00 PM (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: City of Riverside Municipal Code (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 E and Sections 7.25.010 and 7.30.05 of the City Municipal Code, maximum exterior noise level for residential uses is 75 dBA L_{max} (55 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 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 within the City to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday, 8:00 a.m. to 5:00 p.m. on Saturdays, and are prohibited on Sundays and federal holidays.

Vibration. Based on the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment* (2006) and depending on the building category of the nearest buildings adjacent to the project site, the potential construction vibration damage criteria vary.

Both the FTA in its *Transit Noise and Vibration Impact Assessment* (2006) and the Federal Railroad Administration (FRA) in *its High-Speed Ground Transportation Noise and Vibration Impact Assessment* (2005) included groundborne vibration and noise impact criteria guidance, as shown in Table F.

Table F: Groundborne Vibration and Noise Impact Criteria

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 micro inch/sec)		Groundborne Noise Impact Levels (dB re 20 micropascals)	
	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]	B[4]	B[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 (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 groundborne noise.
dB = decibels
dBA = A-weighted decibels
HVAC = heating, ventilation, and air-conditioning
inch/sec = inches per second
VdB = vibration velocity decibels

The criteria presented in Table 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. Table 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 to identify problem locations that must be addressed during final design (FTA 2006).

Tables F (criteria in terms of vibration velocity decibels [VdB]) and G (criteria in terms of inches per second [inch/sec] and VdB) are 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 inch/sec) (FTA 2006) is considered safe and would not result in any construction vibration damage. For a nonengineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 inch/sec).

Table G: Construction Vibration Damage Criteria

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

Source: Federal Transit Administration, May 2006.
[1] RMS VdB re 1 micro-inch/second.
inch/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

IMPACTS AND MITIGATION MEASURES

Short-Term Construction-Related Impacts

Short-term noise impacts would be associated with grading and erecting of buildings on site during construction of the proposed project. Construction-related short-term noise levels would be higher than existing ambient noise levels in the project area today, but would no longer occur 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 site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single-event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to a maximum of 87 dBA L_{max}), the effect on longer term (hourly or daily) ambient noise levels would be small. Therefore, short-term construction-related impacts associated with worker commute and equipment transport to the project site would 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 completed in discrete steps, each of which has its own mix of equipment, and consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site, and therefore, 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. Table H lists typical construction noise levels (L_{max}) included in the FHWA *Highway Construction Noise Handbook* (2006) that are based on a distance of 50 ft between the equipment and a noise receptor. Typical noise levels range up to 86 dBA L_{max} at 50 ft 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, draglines, 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.

Table H: 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)	No. 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
Rivet 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
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

Table H: 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)	No. of Actual Data Samples (Count)
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: Federal Highway Administration, *Highway Construction Noise Handbook* (2006).
dBA = A-weighted decibels
ft = foot/feet
HP = horsepower
kVA = kilovolt-ampere
L_{max} = maximum instantaneous noise level
N/A = Not Applicable
RCNM = Roadway Construction Noise Model
VMS = variable-message sign

Construction Noise. 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. Based on the information in Table H, the maximum noise level generated by each scraper 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 from the bulldozer. Each doubling of the sound sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of construction would be 86 dBA L_{max} at a distance of 50 ft from the active construction area. Land uses adjacent to the project site include residential and streets. The nearest noise-sensitive residential uses are approximately 200 ft to the north, which would result in 12 dBA of noise reduction from distance divergence alone. Construction on the project site would not expose noise-sensitive uses in the project vicinity to noise levels exceeding 74 dBA L_{max}, and the impact associated with earthmoving equipment is considered less than significant. In addition, train noise associated with the BNSF Railroad tracks between the project site and the adjacent residences would contribute intermittent maximum noise levels that are higher than 74 dBA L_{max}. The proposed project would also be required to comply with the construction hours specified in the City's Noise Ordinance to ensure that noise impacts from earthmoving equipment would be reduced.

Construction Vibration. 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. Construction on the project site would result in the exposure of persons to excessive groundborne vibration or groundborne noise levels. Groundborne vibration during construction activity is temporary and would cease to occur after project construction is completed.

The proposed project would require the use of excavators, scrapers, and graders, as well as a bulldozer and other construction equipment. As shown in Table I, a large bulldozer would generate approximately 0.089 PPV (inch/sec) when measured at 25 ft, while a loaded truck would generate

Table I: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 Ft		Reference Lv at 50 Ft (VdB)
	PPV (inch/sec)	L_V (VdB)	
Pile Driver (Impact), Typical	0.644	104	98
Pile Driver (Sonic), Typical	0.170	93	87
Vibratory Roller	0.210	94	88
Hoe Ram	0.089	87	81
Large Bulldozer	**0.089**	**87**	**81**
Caisson Drilling	0.089	87	81
Loaded Trucks	**0.076**	**86**	**80**
Jackhammer	**0.035**	**79**	**73**
Small Bulldozer	0.003	58	52

Sources: Federal Transit Administration (2006), except Hanson (2001) for vibratory rollers.
Note: Equipment and associated source vibration levels that are expected to be used on the project site are shown in **bold**.
ft = foot/feet
L_V = velocity in decibels
VdB = velocity decibels
inch/sec = inches per second
PPV = peak particle velocity

0.076 PPV (inch/sec) at 25 ft. Table I also shows that caisson drilling and a jackhammer would generate approximately 0.035 to 0.089 PPV (inch/sec) when measured at 25 ft.

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 groundborne vibration problems at some distance from the source. Factors, e.g., 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.

Regarding the potential for building damage, Table I shows that vibration levels from construction equipment and activities, including bulldozers, drilling, trucks, and jackhammers, would be less than 0.1 inch/sec at 25 ft from the project site and lower than the PPV of 0.2 inch/sec vibration damage criteria at the nearest sensitive uses for nonengineered timber and masonry buildings (FTA 2006). For new residential buildings, the vibration damage potential threshold recommended by the California Department of Transportation (Caltrans) is 1 inch/sec from transient sources, such as pile driving and blasting. Caltrans also states that it takes at least 0.9 inch/sec of PPV for the human response to be strongly perceptible, or 0.25 inch/sec to be distinctly perceptible (Caltrans 1992). The nearest residences are approximately 200 ft to the south, and no commercial or industrial buildings are within 100 ft of the project construction area. None of the predicted vibration levels (all below 0.1 inch/sec) for sensitive uses in the vicinity of the project site would reach either of these two threshold levels. Thus, no significant vibration impacts are anticipated, and no mitigation is required.

Similarly, regarding human perception of vibration, bulldozers, and other heavy-tracked construction equipment generate approximately 92 VdB of groundborne vibration when measured at 50 ft, based on the FTA *Transit Noise and Vibration Impact Assessment* (2006). Based on the Caltrans 1992 *Transportation-Related Earthborne Vibrations, Technical Advisory*, the vibration level at 100 ft is approximately 6 VdB lower than the vibration level at 50 ft. Vibration at 200 ft from the source is more than 6 VdB lower than the vibration level at 100 ft, or more than 12 VdB lower than the

vibration level at 50 ft. Therefore, receptors at 200 ft from the construction activity may be exposed to groundborne vibration up to 80 VdB. Therefore, the nearest residential uses are approximately 200 ft to the south of the project site, and would not be exposed to vibration levels exceeding 80 VdB. This range of groundborne vibration levels would not exceed the 80 VdB threshold for residences due to infrequent events but would not result in any potential vibration damage impacts at the nearest residences in the project site vicinity. No mitigation measures are required.

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 obtained from the project's traffic study were used to assess the potential traffic noise impacts along the street segments in the project vicinity.

Tables J, K, and L provide the traffic noise levels for the Existing Plus Project, Future Cumulative Without Project, and Future Cumulative With Project traffic noise scenarios, respectively. 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. The specific assumptions used in developing these noise levels and model printouts are provided in Appendix A.

Table J: Existing Traffic Noise Levels With Project

Roadway Segment	ADT	Center-line to 70 CNEL (ft)	Center-line to 65 CNEL (ft)	Center-line to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane	Increase CNEL (dBA) 50 Ft from Centerline of Outermost Lane
Magnolia Ave west of Project Drwy #1	21,600	62	126	268	68.7	0.1
Magnolia Ave between Project Drwy #1 and Pierce St	23,000	65	131	279	69.0	0.4
Magnolia Ave east of Pierce St	25,700	69	141	301	69.5	0.3
Pierce St north of SR-91 WB Ramps	30,300	62	129	276	69.4	0.1
Pierce St between SR-91 EB Ramps and Magnolia Ave	19,000	61	118	247	67.8	0.3
Pierce St between Magnolia Ave and Sterling Ave	10,000	< 50	64	133	64.5	0.6
Pierce St south of Sterling Ave	8,000	< 50	56	115	63.6	0.1

Source: LSA Associates, Inc., February 2015.
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
dBA = A-weighted decibels
EB = eastbound
ft = foot/feet
S-91 = State Route 91
WB = westbound

Table K: Future Cumulative Traffic Noise Levels Without Project

Roadway Segment	ADT	Centerline to 70 CNEL (ft)	Centerline to 65 CNEL (ft)	Centerline to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane
Magnolia Ave west of Project Drwy #1	21,600	62	126	268	68.7
Magnolia Ave between Project Drwy #1 and Pierce St	21,600	62	126	268	68.7
Magnolia Ave east of Pierce St	24,600	67	137	292	69.3
Pierce St north of SR-91 WB Ramps	30,600	62	130	278	69.4
Pierce St between SR-91 EB Ramps and Magnolia Ave	18,200	59	115	240	67.6
Pierce St between Magnolia Ave and Sterling Ave	9,000	< 50	60	124	64.1
Pierce St south of Sterling Ave	8,300	< 50	57	118	63.7

Source: LSA Associates, Inc., February 2015.
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
dBA = A-weighted decibels
EB = eastbound
ft = foot/feet
S-91 = State Route 91
WB = westbound

Table L: Future Cumulative Traffic Noise Levels With Project

Roadway Segment	ADT	Center-line to 70 CNEL (ft)	Center-line to 65 CNEL (ft)	Center-line to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane	Increase CNEL (dBA) 50 Ft from Centerline of Outermost Lane
Magnolia Ave west of Project Drwy #1	22,100	63	128	272	68.8	0.1
Magnolia Ave between Project Drwy #1 and Pierce St	23,500	65	133	283	69.1	0.4
Magnolia Ave east of Pierce St	26,100	70	143	304	69.5	0.2
Pierce St north of SR-91 WB Ramps	30,700	63	130	278	69.4	0.0
Pierce St between SR-91 EB Ramps and Magnolia Ave	19,400	61	119	250	67.9	0.3
Pierce St between Magnolia Ave and Sterling Ave	10,400	< 50	65	136	64.7	0.6
Pierce St south of Sterling Ave	8,400	< 50	57	119	63.8	0.1

Source: LSA Associates, Inc., February 2015.
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
dBA = A-weighted decibels
EB = eastbound
ft = foot/feet
S-91 = State Route 91
WB = westbound

Tables J and L show, in the Existing Plus Project and Future Cumulative With Project scenarios, traffic noise levels would increase up to 0.6 dBA over their corresponding without project levels. This range of traffic noise level increases is small and not discernible to the human ear in an outdoor environment. No project-related traffic noise impacts on off-site land uses would occur and no mitigation measures would be required.

For on-site proposed land uses, the 70 dBA and 65 dBA CNEL along Magnolia Avenue would extend to 65 ft and 133 ft from the roadway centerline, respectively. The 70 dBA CNEL from Pierce Street would continue to be confined to within the roadway ROW. The proposed on-site industrial uses are not considered noise-sensitive, and would be exposed to traffic noise levels below the City's acceptable noise level of 70 dBA CNEL for industrial uses, from both Magnolia Avenue and Pierce Street. Mitigation measures would not be required.

Long-Term On-Site Operational Noise Impacts

Potential long-term noise impacts would be associated with stationary sources. These activities are potential point sources of noise that could affect on-site residences. Since there are no commercial or industrial uses that would produce high noise levels, no significant stationary source noise impacts would occur and no mitigation measures are required.

On-Site Operational Noise Impacts

Potential long-term noise impacts would be associated with on-site stationary sources. These activities are potential point sources of noise that could affect off-site, noise-sensitive receptors (e.g., residences to the south). On-site, noise-producing activities include slow-moving trucks on the driveways, loading/unloading activities at the docks, and slow-moving vehicles, doors slamming, vehicle engines starting, and people conversing in the parking lots.

As noise spreads from a source, it loses energy; thus, the farther the noise receiver is from the noise source, the lower the perceived noise level by the receiver. Geometric spreading causes the sound level to attenuate, or be reduced, resulting in a 6 dBA reduction in the noise level for each doubling of distance from a single-point source of noise, such as a car door slam, to the noise-sensitive receptor of concern.

Slow-Moving Trucks on Driveways. Large trucks entering and leaving the project site at low speeds on the driveways would result in a maximum noise level of 75 dBA L_{max} at 50 ft. This noise level is used for this analysis. The closest residences to the south of the project site are approximately 215 ft from the driveway along the south side of Building 5 and would be potentially exposed to truck passby noise intermittently reaching 62 dBA L_{max}. These existing residences are within 100 ft of the BNSF Railroad tracks and would be exposed to maximum train passby noise ranging from 70 to 90 dBA L_{max}, which is higher than from the truck passby noise along the project's southern driveway. Depending on the number of trucks driving by on the southern project driveway and the times they would occur (during daytime, evening, or nighttime hours), the effects to the 24-hour weighted average CNEL would vary. However, it is not expected that, by the slow-moving trucks on the southern driveway alone, the CNEL level would reach or exceed those levels resulting from train on

BNSF railroad tracks. No significant operational noise impacts would occur and no mitigation measure is required for residences to the south.

Although these residences would not be exposed to truck passby noise on the southern driveway, it is recommended that a sound wall with a minimum height of 8 ft be constructed along the south side of the project boundary between Buildings 4 and 7.

Loading/Unloading Activities at Docks. Trucks at the on-site dock loading/unloading areas would result in a maximum noise level similar to noise readings from loading and unloading activities for other industrial projects, which generates a noise level of 75 dBA L_{max} at 50 ft. Based on the site plan, there are dock doors located on the south side of Buildings 1, 2, 5, and 6, on the west and east sides of Buildings 3, 4, and 7, with these dock doors facing outward away from the building. The closest residences to the south of the project site are approximately 400 ft from the nearest loading areas facing south on Building 5, and would be potentially exposed to truck loading/unloading noise intermittently reaching 57 dBA L_{max}. Loading dock at Buildings 1, 2, and 6 would be partially blocked by Buildings 3, 4, and 7 to the south. Loading dock at Buildings 3, 4, and 7 are facing north and activity inside the loading dock would be blocked by the building itself.

Although a typical truck unloading process takes an average of 10 to 15 minutes, this maximum noise level occurs in a much shorter period of time (i.e., in only a few minutes). It is not expected that truck loading/unloading activities would result in this maximum noise level lasting more than 5 minutes in any hour when it occurs. Depending on the number of trucks on the loading docks with loading/ unloading operations and the times they would occur (during daytime, evening, or nighttime hours), the effects to the 24-hour weighted average CNEL would vary. However, it is not expected that, by the loading/unloading operations on the loading docks alone, the CNEL level would reach or exceed those levels resulting from train on the BNSF railroad tracks. It is recommended that a sound wall with a minimum height of 8 ft be constructed along the south side of the project boundary between Buildings 4 and 7, from trash enclosure to trash enclosure within Building 5 property line.

Parking Lot Activity Noise. The representative parking lot activities, such as door slamming, engine starting, and slow-moving vehicles would generate approximately 60 to 70 dBA L_{max} at 50 ft. The closest off-site residences to the south that are approximately 215 ft away from the parking lot and driveway would be exposed to noises from the project's parking areas ranging from 47 to 57 dBA L_{max} from the nearest parking lot activities. With the implementation of the 8 ft high sound barrier along the project's southern boundary between Buildings 4 and 7, no significant parking lot activity noise would occur for these residences.

Long-Term Vehicular Traffic Vibration Impacts

Operations of the proposed project would not involve any vibration sources that would cause exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. Vehicles with rubber tires on roadway segments surrounding the project site would not generate any significant groundborne vibration that would exceed the 65 VdB perception threshold for such uses. No significant groundborne vibration impacts would occur. No mitigation is required.

Mitigation Measures

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 of 7:00 a.m. to 7:00 p.m. Monday through Friday, 8:00 a.m. to 5:00 p.m. on Saturdays, and are prohibited on Sundays and federal holidays.
- During all project site 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.

Traffic Noise Impacts. No mitigation measures are required.

On-Site Operational Noise Impacts. The following mitigation measure is required:

- Construct a noise barrier along the southern project boundary, between Buildings 4 and 7, or from trash enclosure to trash enclosure within Building 5 property line, with a minimum height of 8 feet.

On-Site Operational Vibration Impacts. No mitigation measures are required.

Level of Significance after Mitigation

Implementation of these mitigation measures for construction impacts and operational noise impacts would result in a less than significant impact for all potential noise impacts associated with the proposed project.

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APPENDIX A

FHWA TRAFFIC NOISE MODEL PRINTOUTS

TABLE Existing-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Rialto Avenue between Muscott Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 7100 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.89

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	63.7	129.4	275.0

TABLE Existing-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Rialto Avenue and Belleview Street
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1100 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.14

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-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Belleview Avenue and W Congress Street
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 720 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.30

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-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: W Congress Street east of Muscott Street
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 170 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 43.03

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-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street/Walnut Street between W Congress Street and Artesian Street
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 700 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.18

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-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Artesian Street and Pico Avenue
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 900 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 50.27

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: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Pico Avenue and Grape Street
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1000 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 50.73

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: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Grape Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.52

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-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Mount Vernon Avenue between Rialto Avenue and Walnut Street
NOTES: Mary's Mercy Center - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10700 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.98

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	56.7	113.2	239.5

TABLE Existing with Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Rialto Avenue between Muscott Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 7300 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.8	131.8	280.1

TABLE Existing with Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Rialto Avenue and Belleview Street
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1400 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 52.19

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-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Belleview Avenue and W Congress Street
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1100 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.14

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-04

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: W Congress Street east of Muscott Street
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 530 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 47.97

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-05

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street/Walnut Street between W Congress Street and Artesian Street
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 700 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 49.18

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-06

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Artesian Street and Pico Avenue
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.52

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: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Pico Avenue and Grape Street
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1500 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.49

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: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Grape Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1600 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.77

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-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Mount Vernon Avenue between Rialto Avenue and Walnut Street
NOTES: Mary's Mercy Center - Existing with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10800 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.02

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	57.0	113.9	240.9

TABLE 2017 Cumulative w/o Project-01

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Rialto Avenue between Muscott Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9000 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.92

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	73.2	150.9	321.8

TABLE 2017 Cumulative w/o Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Rialto Avenue and Belleview Street
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1300 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.86

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-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Belleview Avenue and W Congress Street
NOTES: Mary's Mercy Center - 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	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.92

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-04

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: W Congress Street east of Muscott Street
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 180 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 43.28

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-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street/Walnut Street between W Congress Street and Artesian Street
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 740 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 49.42

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2017 Cumulative w/o Project-06

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Artesian Street and Pico Avenue
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 950 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 50.50

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: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Pico Avenue and Grape Street
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1100 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.14

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: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Grape Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1400 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 52.19

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-09

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Mount Vernon Avenue between Rialto Avenue and Walnut Street
NOTES: Mary's Mercy Center - 2017 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 13100 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.86

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	63.5	128.8	273.7

TABLE 2017 Cumulative with Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Rialto Avenue between Muscott Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9100 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.97

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	73.7	152.0	324.1

TABLE 2017 Cumulative with Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Rialto Avenue and Belleview Street
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1600 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 52.77

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-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Belleview Avenue and W Congress Street
NOTES: Mary's Mercy Center - 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	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.52

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-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: W Congress Street east of Muscott Street
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 540 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 48.05

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-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street/Walnut Street between W Congress Street and Artesian Street
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 740 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.42

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2017 Cumulative with Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Artesian Street and Pico Avenue
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1300 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 51.86

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-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Pico Avenue and Grape Street
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1600 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.77

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-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Grape Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1800 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.28

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-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Mount Vernon Avenue between Rialto Avenue and Walnut Street
NOTES: Mary's Mercy Center - 2017 Cumulative with Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 13300 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.93

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.0	130.1	276.5

TABLE 2035 Cumulative w/o Project-01

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Rialto Avenue between Muscott Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10000 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.38

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	78.0	161.6	345.1

TABLE 2035 Cumulative w/o Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Rialto Avenue and Belleview Street
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1600 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 52.77

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative w/o Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Belleview Avenue and W Congress Street
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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) = 51.52

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative w/o Project-04

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: W Congress Street east of Muscott Street
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 250 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 44.71

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative w/o Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street/Walnut Street between W Congress Street and Artesian Street
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 51.52

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative w/o Project-06

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Artesian Street and Pico Avenue
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1500 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.49

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative w/o Project-07

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Pico Avenue and Grape Street
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1600 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.77

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative w/o Project-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Grape Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1800 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.28

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative w/o Project-09

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Mount Vernon Avenue between Rialto Avenue and Walnut Street
NOTES: Mary's Mercy Center - 2035 Cumulative w/o Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14600 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.33

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	67.6	138.2	294.1

TABLE 2035 Cumulative with Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Rialto Avenue between Muscott Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10100 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.42

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	78.4	162.7	347.4

TABLE 2035 Cumulative with Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Rialto Avenue and Belleview Street
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2000 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.74

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative with Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street between Belleview Avenue and W Congress Street
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1600 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.77

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative with Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: W Congress Street east of Muscott Street
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 610 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 48.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative with Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Muscott Street/Walnut Street between W Congress Street and Artesian Street
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 51.52

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative with Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Artesian Street and Pico Avenue
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1800 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.28

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative with Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Pico Avenue and Grape Street
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2000 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.74

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative with Project-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Walnut Street between Grape Street and Mount Vernon Avenue
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2200 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 54.15

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Cumulative with Project-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 10/08/2015
ROADWAY SEGMENT: Mount Vernon Avenue between Rialto Avenue and Walnut Street
NOTES: Mary's Mercy Center - 2035 Cumulative with Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14700 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.36

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	67.8	138.8	295.4

APPENDIX E

TRAFFIC IMPACT ANALYSIS

TRAFFIC STUDY

58 MAGNOLIA INDUSTRIAL PROJECT

CITY OF RIVERSIDE

RIVERSIDE COUNTY, CALIFORNIA

LSA

a uary 12 2015

TRAFFIC STUDY

58 MAGNOLIA INDUSTRIAL PROJECT
CITY OF RIVERSIDE
RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

Investment Building Group
5100 Campus Drive, Suite 300
Newport Beach, California 92660

Prepared by:

LSA Associates, Inc.
1500 Iowa Avenue, Suite 200
Riverside, California 92507
(951) 781-9310

LSA Project No. IBG1401

LSA

a uary 12 2015

TABLE OF CONTENTS

INTRODUCTION 1

PROJECT DESCRIPTION 1

LEVEL OF SERVICE DEFINITIONS AND PROCEDURES 4

ANALYSIS METHODOLOGY 5
- Study Area Determination 5

TRAFFIC VOLUMES WITHOUT PROJECT SCENARIOS 6
- Existing Traffic Volumes 6
- Project Completion (2015) without Project Traffic Volumes 6
- Cumulative (2015) without Project Traffic Volumes 6

PROJECT TRAFFIC 12
- Project Trip Generation, Distribution, and Assignment 12

TRAFFIC VOLUMES PLUS PROJECT SCENARIOS 12

EXISTING LEVELS OF SERVICE 12

EXISTING PLUS PROJECT LEVELS OF SERVICE 12

OPENING YEAR LEVELS OF SERVICE 26
- Project Completion (2015) Without Project Levels of Service 26
- Project Completion (2015) Plus Project Levels of Service 26
- Cumulative (2015) Without Project Levels of Service 26
- Cumulative (2015) Plus Project Levels of Service 26

SUMMARY 29

APPENDICES

A: SIGNED SCOPE OF WORK
B: TRAFFIC COUNTS
C: VOLUME DEVELOPMENT WORKSHEETS
D: LEVEL OF SERVICE WORKSHEETS

FIGURES AND TABLES

FIGURES

Figure 1: Regional and Project Location 2
Figure 2: Conceptual Site Plan 3
Figure 3: Study Intersections 7
Figure 4: Existing Peak Hour Traffic Volumes 8
Figure 5: Project Completion (2015) Without Project Peak Hour Traffic Volumes 9
Figure 6: Cumulative Project Locations 10
Figure 7: Cumulative Project Trips 13
Figure 8: Cumulative Without Project A.M. and P.M. Peak Hour Traffic Volumes 14
Figure 9: Project Trip Distribution (Passenger Vehicles) 16
Figure 10: Project Trip Distribution (Trucks) 17
Figure 11: Project Trip Assignment (Passenger Vehicles) 18
Figure 12: Project Trip Assignment (Trucks) 19
Figure 13: Total Project Trip Assignment (PCEs) 20
Figure 14: Existing Plus Project Peak Hour Traffic Volumes 21
Figure 15: Project Completion (2015) Plus Project Peak Hour Traffic Volumes 22
Figure 16: Cumulative (2015) Plus Project Peak Hour Traffic Volumes 23
Figure 17: Existing Plus Project Intersection Geometrics and Stop Control 24

TABLES

Table A: Level of Service Definitions 4
Table B: Level of Service Criteria for Unsignalized and Signalized Intersections 4
Table C: Cumulative Projects Trip Generation 11
Table D: Project Trip Generation 15
Table E: Existing Intersection Levels of Service 25
Table F: Project Completion (2015) Intersection Levels of Service 27
Table G: Cumulative (2015) Intersection Levels of Service 28

INTRODUCTION

This traffic study has been prepared to assess potential circulation impacts associated with the development of the proposed 58 Magnolia Industrial Project to be located on the southwest corner of the intersection of Pierce Street and Magnolia Avenue in the City of Riverside, Riverside County. The project consists of six General Light Industrial Warehouse Buildings totaling 276,000 square feet. Figure 1 illustrates the regional and project location.

This report is intended to satisfy the requirements established by the City of Riverside "Traffic Impact Analysis Preparation Guide," dated August 2012, as well as the requirements for the disclosure of potential impacts and mitigation measures per the California Environmental Quality Act (CEQA). The scope of work for this traffic study, including trip generation, trip distribution, study area, and analysis methodologies have been approved by City staff via the Scoping Agreement process. A copy of the Scoping Agreement is included in Appendix A.

This study examines traffic operations in the vicinity of the proposed project under the following six scenarios:

- Existing conditions;
- Existing Plus Project conditions;
- Project Completion (2015) Without Project conditions;
- Project Completion (2015) Plus Project conditions;
- Cumulative (2015) Without Project conditions; and
- Cumulative (2015) Plus Project conditions.

Traffic conditions were examined for the weekday a.m. and p.m. peak hour conditions. 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 the one hour of highest traffic volumes occurring between 4:00 and 6:00 p.m.

PROJECT DESCRIPTION

As previously noted, the project consists of six General Industrial Warehouse Buildings totaling 276,000 square feet. The project site is located on the southwest corner of the intersection of Pierce Street and Magnolia Avenue. Access to the project site is provided by five proposed driveways. As part of the proposed project, a left-turn lane is proposed on Magnolia Avenue. The left-turn lane would encroach into the existing median and provide access to the project site via the westerly project driveway located on Magnolia Avenue. This driveway will be designed to prohibit left-turn egress movements from the project site while allowing right-in/right-out movements and left-turn ingress movements into the project site. Two additional driveways on Magnolia Avenue are proposed as right-in/right out only. In addition, two project driveways are proposed on Pierce Street. The northerly driveway will be right-in/right-out only and will align with the existing shopping center driveway across the street. The southerly driveway is proposed as a full-access driveway and will align with Sterling Avenue. The project opening year is 2015.

Figure 2 illustrates a conceptual site plan of the proposed project.

LSA

FIGURE 1

N

0 1,000 2,000

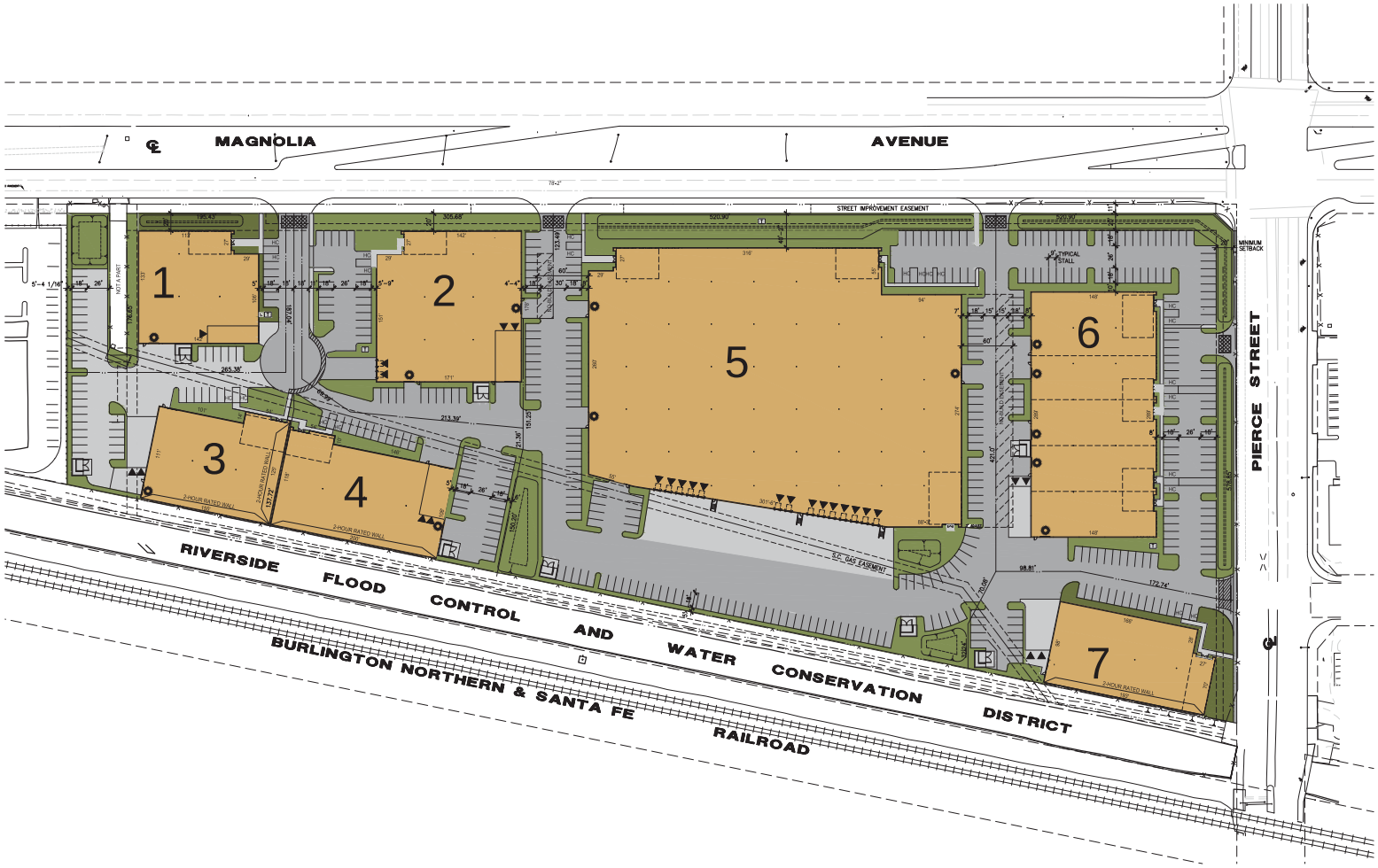
Feet

SOURCE: ESRI, Bing Imagery, 2010.

58 Magnolia Industrial Traffic Study

Regional and Project Location

I:\IBG1401\Reports\Traffic\fig1_RegLoc.mxd (11/13/2014)



LSA

FIGURE 2

LEGEND

- INDICATES 12'x14' GRADE LEVEL DOOR
- INDICATES 9'x10' DOCK LEVEL DOOR
- CONCRETE TRASH ENCLOSURE PAINTED TO MATCH BUILDINGS
- ELECTRICAL TRANSFORMER

0 100 200
FEET

58 Magnolia Industrial
ra i tud

once t al ite lan

SOURCE:
I:\IBG1401\Reports\Traffic\fig2_ConceptSitePlan.ai (11/13/14)

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*. The Manual establishes levels of service A through F as shown in Table A.

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 shows the level of service criteria for unsignalized and signalized intersections.

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	≤ 10	≤ 10

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.)
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

Consistent with City traffic study guidelines, the 2010 *Highway Capacity Manual* (HCM 2010) 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.

The study area intersections fall under the jurisdiction of the City of Riverside and Caltrans. 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 LOS D (E or F) per Policy CCM-2.3, which strives to maintain LOS D or better on Arterial Streets wherever possible. Since the proposed project does not require a General Plan Amendment, a significant project impact occurs when the proposed project reduces the peak hour LOS to below D in this analysis. Caltrans considers acceptable level of service to be between C and D for all intersections under its jurisdiction; therefore, all signalized intersections under Caltrans jurisdiction must operate with a weighted average delay of 45 seconds or less. Signalized study intersections under the jurisdiction of Caltrans operating at delays of more than 45 seconds are required to be mitigated to acceptable standards.

ANALYSIS METHODOLOGY

Study Area Determination

The study area was approved by City staff via the City's scoping agreement process. A copy of the Scoping Agreement is included in Appendix A. Study intersections include those locations where project traffic has the potential to cause a significant impact. The study area includes the following eight intersections:

1. Project Driveway 1/Magnolia Avenue;
2. Project Driveway 2/Magnolia Avenue;
3. Project Driveway 3/Magnolia Avenue;
4. Pierce Street/State Route 91 (SR-91) Westbound Ramps;
5. Pierce Street/SR-91 Eastbound Ramps;
6. Pierce Street/Magnolia Avenue;
7. Pierce Street/Project Driveway 4; and

8. Pierce Street/Project Driveway 5-Sterling Avenue.

Figure 3 illustrates the locations of all analysis intersections.

TRAFFIC VOLUMES WITHOUT PROJECT SCENARIOS

Existing Traffic Volumes

For all intersections, traffic conditions are based on a.m. and p.m. peak hour intersection turn movement counts collected by National Data and Surveying Services in November 2014, with the exception of the intersection of Pierce Street/Magnolia Avenue due to construction activity. Vehicle classification counts were conducted for study intersections located on the intersections of Pierce Street/SR-91 Westbound Ramps and Pierce Street/SR-91 Eastbound Ramps. Passenger Car Equivalents (PCEs) volumes for study area locations with classification counts were computed using a PCE factor of 1.5 for 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for trucks with four or more axles. Count sheets are contained in Appendix B.

Because of construction activity on Magnolia Avenue, current travel patterns within the study area differ from those of a typical weekday peak hour. Therefore, existing traffic counts at the intersection of Pierce Street/Magnolia Avenue were adjusted using counts collected by Counts Unlimited in November 2012. As approved by the City via the City's scoping agreement process, where the 2012 turn movements are greater than the 2014 turn movements (at the intersection of Pierce Street/ Magnolia Avenue) a 1.5 percent per annum growth rate was applied to the 2012 movements. The resulting adjusted volumes were accordingly added to the adjacent study intersections and used for analysis.

Detailed volume development worksheets are included in Appendix C. The existing a.m. and p.m. peak hour traffic volumes for the study intersections are illustrated in Figure 4.

Project Completion (2015) without Project Traffic Volumes

As approved during the City's scoping agreement process, traffic volumes for project completion (2015) conditions were developed by applying a 1.5 percent per annum growth rate for one year (2014 to 2015) to the existing without project traffic volumes. Detailed volume development worksheets are included in Appendix C. Figure 5 illustrates project completion without project a.m. and p.m. peak hour traffic volumes.

Cumulative (2015) without Project Traffic Volumes

Cumulative projects are included in the cumulative conditions analysis. Information concerning cumulative projects in the vicinity of the proposed project was obtained from the City. Figure 6 illustrates the cumulative project locations.

The trip generation for the cumulative projects was developed using rates from the Institute of Transportation Engineers (ITE) *Trip Generation*, 9th Edition. As shown in Table C, the cumulative projects are expected to generate 9,181 net daily trips, with 491 net trips in the a.m. peak hour, and 632 net trips in the p.m. peak hour.

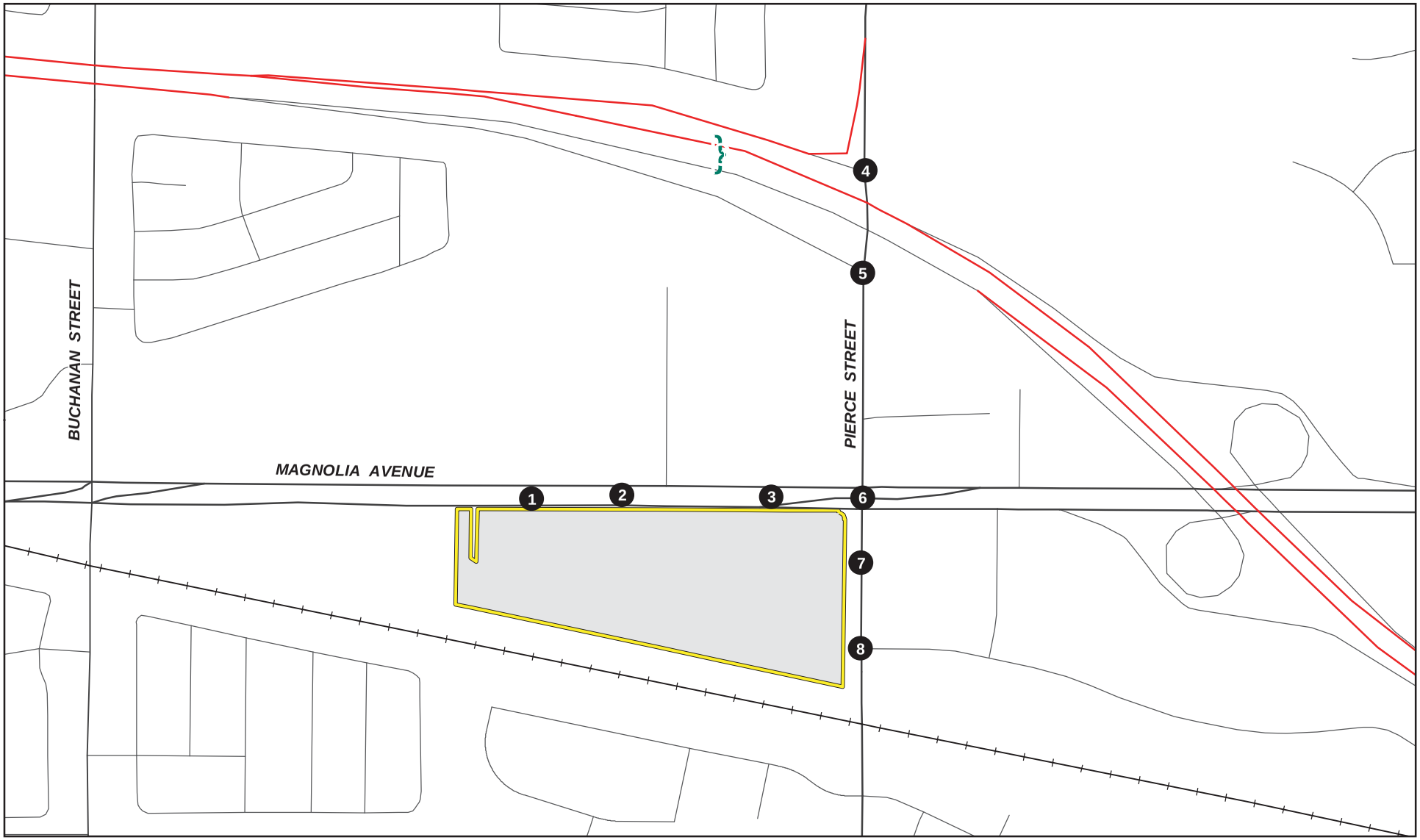


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FIGURE 3

Project Boundary

1 Study Intersection

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Feet

58 Magnolia Industrial
Traffic Study

Source: Thomas Bros. 2009.

Study Intersections

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Future Intersection	*Future Intersection*	*Future Intersection*	691/701 ↲ 685/770 ↓ 88/80 ↳ ↱ 72/37 ← 50/22 ↰ 55/24	747/797 ↓ 661/772 ↳ 164/150 ↲ 1191/874 →
1 Project Dwy 1/Magnolia Ave	2 Project Dwy 2/Magnolia Ave	3 Project Dwy 3/Magnolia Ave	139/140 ↰ 1666/1424 → 48/87 ↱	4 Pierce St/SR-91 WB Ramps
				5 Pierce St/SR-91 EB Ramps
268/192 ↲ 285/266 ↓ 298/451 ↳ ↱ 426/236 ← 747/673 ↰ 218/151	469/436 ↓ 2/4 ↳ ↱ 2/16 ↰ 1/1	411/401 ↓ 53/27 ↳ ↱ 19/53 ↰ 4/22		
364/331 ↳ 510/800 → 26/49 ↲ ↰ 75/53 ↑ 387/263 ↱ 184/95	1/0 ↰ 676/410 ↑ 3/2 ↱	668/351 → 27/15 ↱		
6 Pierce St/Magnolia Ave	7 Pierce St/Project Dwy 4	8 Pierce St./Project Dwy 5 - Sterling Ave.		

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FIGURE

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58 Magnolia Industrial
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Future Intersection	*Future Intersection*	*Future Intersection*	701/712 ↲ 695/782 ↓ 89/81 ↳ ↱ 73/38 ← 51/22 ↰ 56/24	758/809 ↓ 671/784 ↳ 166/152 ↲ 1209/887 ↑
1 Project Dwy 1/Magnolia Ave	2 Project Dwy 2/Magnolia Ave	3 Project Dwy 3/Magnolia Ave	141/142 ↰ ↑ 1691/1445 ↱ 49/88	4 Pierce St/SR-91 WB Ramps
272/195 ↲ 289/270 ↓ 302/458 ↳ ↱ 432/240 ← 758/683 ↰ 221/153	476/443 ↓ 2/4 ↳ ↱ 2/16 ↰ 1/1	417/407 ↓ 54/27 ↳ ↱ 19/54 ↰ 4/22		5 Pierce St/SR-91 EB Ramps
369/336 ↰ 518/812 → 26/50 ↲ 76/54 ↰ 393/267 ↑ 187/96 ↱	1/0 ↰ 686/416 ↑ 3/2 ↱	678/356 → 27/15 ↱		
6 Pierce St/Magnolia Ave	7 Pierce St/Project Dwy 4	8 Pierce St./Project Dwy 5 - Sterling Ave.		

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FIGURE 5

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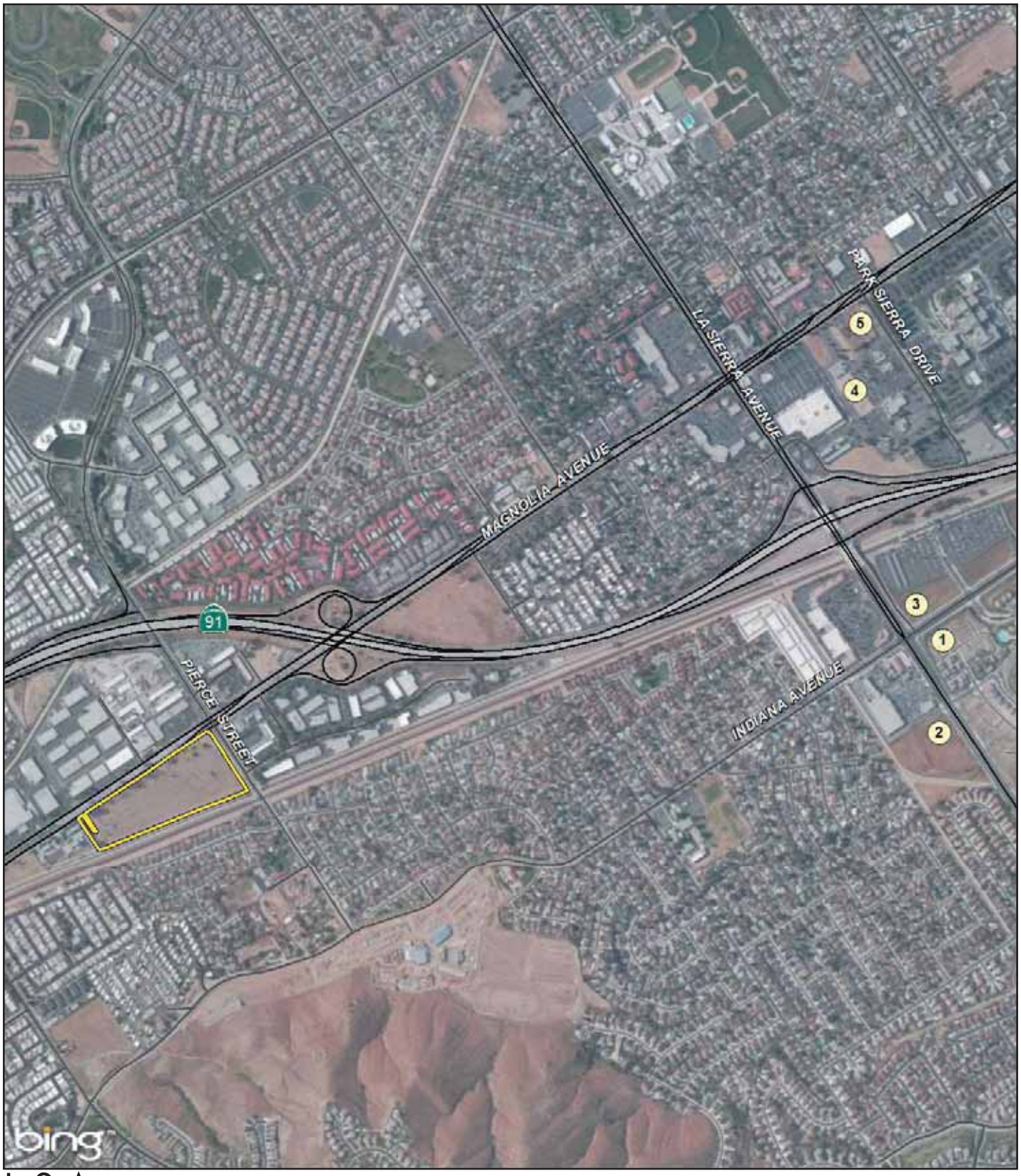

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FIGURE 6

Project Boundary

Cumulative Project

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SOURCE: ESRI, Bing Imagery, 2010.

58 Magnolia Industrial Traffic Study

Cumulative Project Locations

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Table C - Cumulative Projects Trip Generation

Project Number	Project Land Use	Location	Units	Rate	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
1	Single-Family Residential	Southeast corner of the intersection of La Sierra Avenue and Indiana Avenue.	163 D.U.	Trips/Unit[1]	0.19	0.56	0.75	0.63	0.37	1.00	9.52
				Trip Generation	**31**	**92**	**123**	**103**	**60**	**163**	**1,552**
2	Gas Station	Westerly side of La Sierra Avenue, southerly of Indiana Avenue and northerly of Liverpool Lane.	16 FS	Trips/Unit[2]	6.04	5.80	11.84	7.07	6.79	13.86	152.84
				Trip Generation	97	93	190	113	109	222	2,445
				Pass By Trips[3]	(60)	(58)	(118)	(63)	(61)	(124)	(242)
				Net Trip Generation	**37**	**35**	**72**	**50**	**48**	**98**	**2,203**
3	Apartments	Northerly side of Indiana Avenue, Easterly of La Sierra Avenue and Adjacent to La Sierra Metrolink Station.	187 D.U.	Trips/Unit[4]	0.10	0.41	0.51	0.40	0.22	0.62	6.65
				Trip Generation	**19**	**76**	**95**	**75**	**41**	**116**	**1,244**
4	Fitness Facility	3742 Park Sierra Avenue.	45.0 TSF	Trips/Unit[5]	0.71	0.71	1.41	2.01	1.52	3.53	32.93
				Trip Generation	**32**	**32**	**64**	**91**	**68**	**159**	**1,482**
5	Fast-Food Restaurant with Drive-Through	Southwest corner of the intersection of Magnolia Avenue and Park Sierra Avenue.	5.9 TSF	Trips/Unit[6]	23.16	22.26	45.42	16.98	15.67	32.65	496.12
				Trip Generation	137	131	268	100	92	192	2,927
				Pass By Trips[7]	(67)	(64)	(131)	(50)	(46)	(96)	(227)
				Net Trip Generation	**70**	**67**	**137**	**50**	**46**	**96**	**2,700**
				Total	**189**	**302**	**491**	**369**	**263**	**632**	**9,181**

D.U. = Dwelling Units; TSF=Thousand Square-feet; FS=Fueling Stations

[1] Rates based on Land Use 210 "Single-Family Detached Housing" from *ITE Trip Generation (9th Ed.)*

[2] Rates based on Land Use 946 "Gasoline/Service Station with Convenience Market and Car Wash" from *ITE Trip Generation (9th Ed.)*

[3] Pass-by rates are based on Land Use 945 - "Gasoline/Service Station with Convenience Market" from the *ITE Trip Generation Handbook*, 2nd Edition. A pass-by rate of 62% was used for the a.m. peak hour and 56% for the p.m. peak hour. Inbound and outbound pass-by splits are based on the a.m. and p.m. peak hour trip generation. No daily pass-by rates are provided in the ITE Trip Generation Manual. Therefore, the sum of a.m. and p.m. peak hour pass-by trips was applied to the daily trip generation as a conservative approach.

[4] Rates based on Land Use 220 "Apartment" from *ITE Trip Generation (9th Ed.)*

[5] Rates based on Land Use 492"Health/Fitness Club" from *ITE Trip Generation (9th Ed.)*

[6] Rates based on Land Use 934- "Fast-Food Restaurant with Drive-Through Window" from *ITE Trip Generation (9th Ed.)*

[7] Pass-by rates are based on Land Use 934- "Fast-Food Restaurant with Drive- Through Window" from the *ITE Trip Generation Handbook*, 2nd Edition. A pass-by rate of 49% was used for the a.m. peak hour and 50% for the p.m. peak hour. Inbound and outbound pass-by splits are based on the a.m. and p.m. peak hour trip generation. No daily pass-by rates are provided in the ITE Trip Generation Manual. Therefore, the sum of a.m. and p.m. peak hour pass-by trips was applied to the daily trip generation as a conservative approach.

Figure 7 illustrates the total cumulative project volumes at study intersections. Figure 8 illustrates cumulative without project a.m. and p.m. peak hour traffic volumes.

PROJECT TRAFFIC

Project Trip Generation, Distribution, and Assignment

Trip generation for the proposed project was developed using rates from the ITE *Trip Generation* (9th Edition) for Land Use 110 General Light Industrial. The vehicle splits for cars and trucks were based on General Light Industrial splits from the *Fontana Truck Trip Generation Study*, August 2003. Truck trips were converted to PCEs based on San Bernardino Associated Governments (SANBAG) PCE factors of 1.5 for 2-axle, 2.0 for 3-axle, and 3.0 for 4-axle trucks. Table D summarizes the a.m. and p.m. peak hour and daily project trip generation and shows that the project is expected to generate 2,442 daily total PCE trips, with 322 total PCE trips occurring the a.m. peak hour and 338 total PCE trips occurring during the p.m. peak hour.

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 trip distributions were approved by City staff via the City's scoping agreement process. Figures 9 and 10 illustrate the trip distribution patterns for project passenger vehicles and truck traffic, respectively. 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 passenger vehicles and truck PCE traffic volumes at the study area intersections during the a.m. and p.m. peak hours. Figure 13 illustrates the total project traffic volumes in PCEs at the study area intersections during the a.m. and p.m. peak hours.

TRAFFIC VOLUMES PLUS PROJECT SCENARIOS

Existing, project completion (2015), and cumulative (2015) plus project traffic volumes were developed by adding project traffic to the corresponding without project scenarios. Figures 14, 15, and 16 illustrate the existing, project completion (2015), and cumulative (2015) plus project a.m. and p.m. peak hour traffic volumes respectively.

EXISTING LEVELS OF SERVICE

Figure 17 illustrates the existing intersection geometrics and stop control. An intersection level of service analysis was conducted for existing conditions. Table E summarizes the results of this analysis and shows all intersections are currently operating at satisfactory levels of service. Level of service calculation worksheets are contained in Appendix D.

EXISTING PLUS PROJECT LEVELS OF SERVICE

Analysis of the existing plus project scenario is required by City guidelines and for CEQA compliance to identify direct project impacts if the project were to be built and in operation today. This scenario eliminates the effects of ambient growth and other cumulative projects and deals specifically with project impacts.

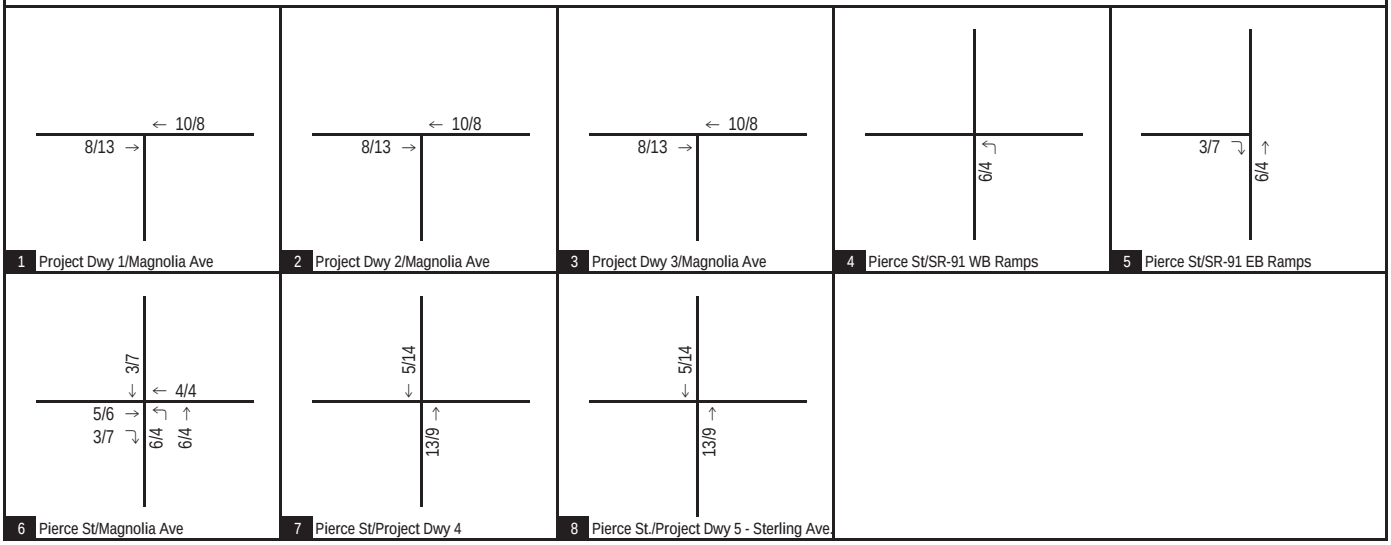

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FIGURE

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R:\IBG1401\z30- Cumulative Project Trips (1/9/2015)

Future Intersection	*Future Intersection*	*Future Intersection*	701/712 ↲ 695/782 ↓ 89/81 ↳ ↱ 73/38 ← 51/22 ↰ 56/24 ↰ 147/146 ↱ 1691/1445 ↑ 49/88 ↱	758/809 ↓ 671/784 ↳ 169/159 ↲ 1215/891 ↑
1 Project Dwy 1/Magnolia Ave	2 Project Dwy 2/Magnolia Ave	3 Project Dwy 3/Magnolia Ave	4 Pierce St/SR-91 WB Ramps	5 Pierce St/SR-91 EB Ramps
272/195 ↲ 292/277 ↓ 302/458 ↳ ↱ 432/240 ← 762/687 ↰ 221/153 ↰ 369/336 ↳ 523/818 → 29/57 ↲ ↰ 82/58 ↑ 399/271 ↱ 187/96	481/457 ↓ 2/4 ↳ ↱ 2/16 ↰ 1/1 ↰ 1/0 ↑ 699/425 ↱ 3/2	422/421 ↓ 54/27 ↳ ↱ 19/54 ↰ 4/22 ↰ 691/365 ↑ 27/15 ↱		
6 Pierce St/Magnolia Ave	7 Pierce St/Project Dwy 4	8 Pierce St./Project Dwy 5 - Sterling Ave.		

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FIGURE 8

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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
General Light Industrial[1]	276.0 TSF							
Trips/Unit (Cars)		0.636	0.087	0.723	0.095	0.667	0.762	5.478
Trips/Unit (2-Axle Trucks)		0.065	0.009	0.074	0.009	0.069	0.078	0.558
Trips/Unit (3-Axle Trucks)		0.032	0.004	0.036	0.005	0.033	0.038	0.272
Trips/Unit (4+ Axle Trucks)		0.077	0.010	0.087	0.011	0.081	0.092	0.662
Trips/Unit (Total)		0.810	0.110	0.920	0.120	0.850	0.970	6.970
Trip Generation (Cars)		176	24	200	26	184	210	1,512
Trip Generation (2-Axle Trucks)		18	2	20	2	20	22	154
Trip Generation (3-Axle Trucks)		9	1	10	1	9	10	75
Trip Generation (4+ Axle Trucks)		21	3	24	3	22	25	183
Trip Generation (Total)		224	30	254	32	235	267	1,924
Trip Generation (Cars)		176	24	200	26	184	210	1,512
PCE Trip Generation (2-Axle Trucks)		27	3	30	3	30	33	231
PCE Trip Generation (3-Axle Trucks)		18	2	20	2	18	20	150
PCE Trip Generation (4+ Axle Trucks)		63	9	72	9	66	75	549
PCE Trip Generation (Total)		**284**	**38**	**322**	**40**	**298**	**338**	**2,442**

TSF = thousand square-feet

1 Total a.m. peak hour, p.m. peak hour and daily rates from Institute of Transportation Engineers (ITE) Trip Generation (9th Edition) rates for Land Use 110 - "General Light Industrial." Trip generation rates converted to car and truck trips using vehicle mix and enter/exit splits for Light Industrial from Fontana Truck Trip Generation Study dated March 13, 2003. Truck trips were converted to PCEs based on the SANBAG truck PCE factors. PCE volumes for were computed using a PCE factor of 1.5 for 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for trucks with 4 or more axles.

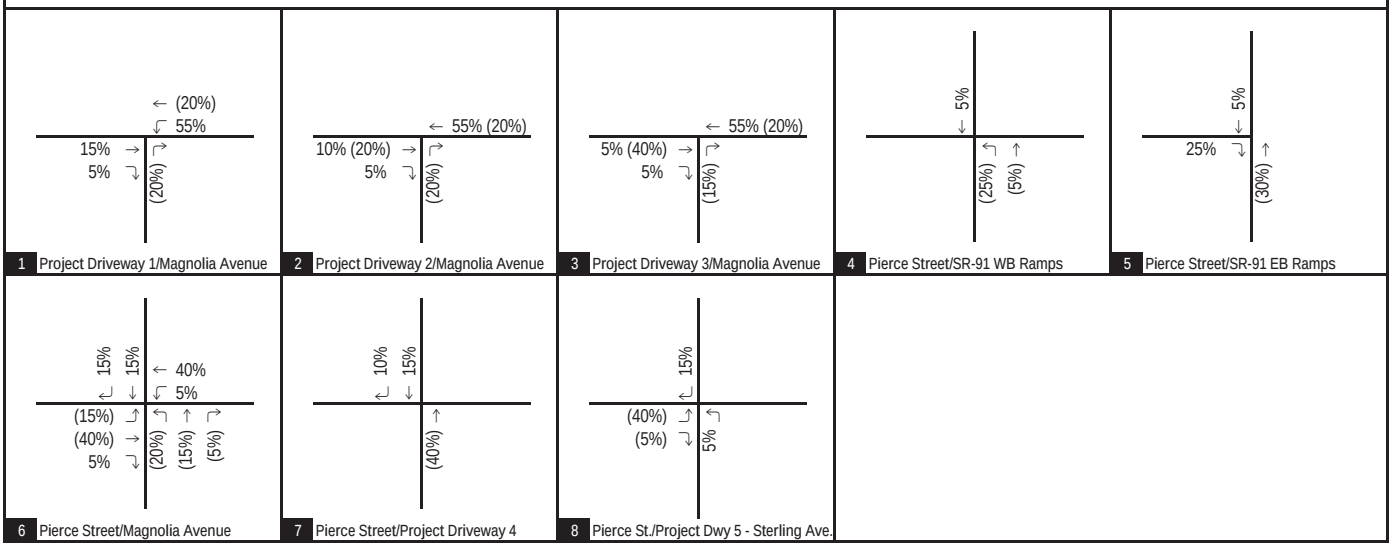

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FIGURE

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R:\IBG1401\z30-Dist Cars (1/9/2015)

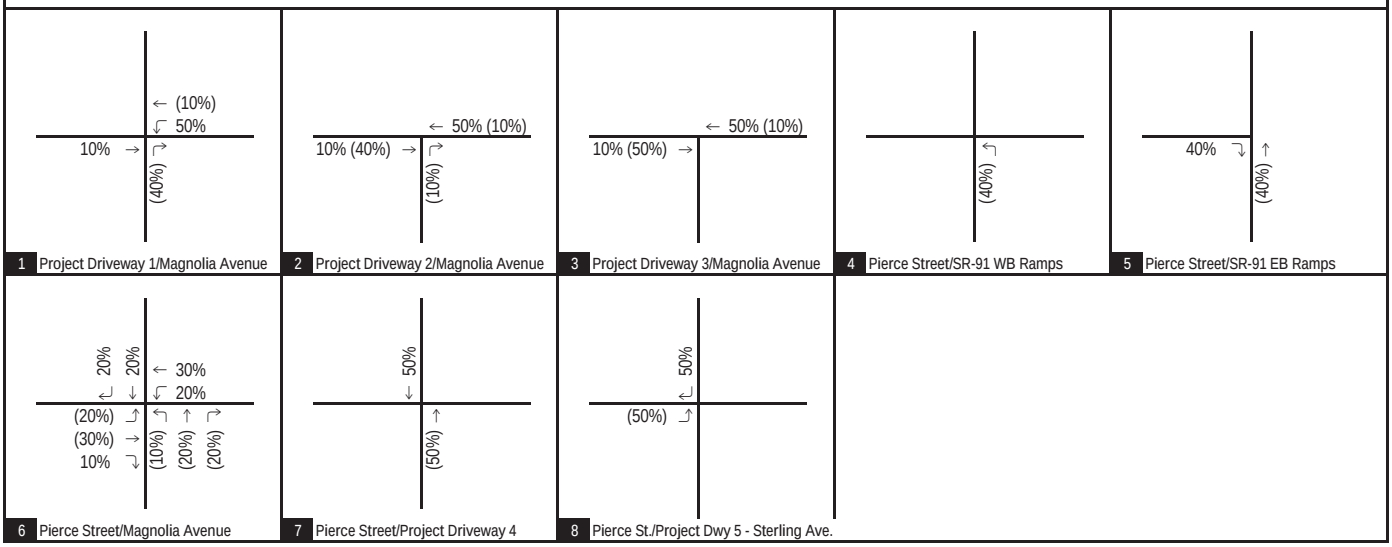

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FIGURE 10

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R:\IBG1401\z30-Dist Trucks (1/9/2015)

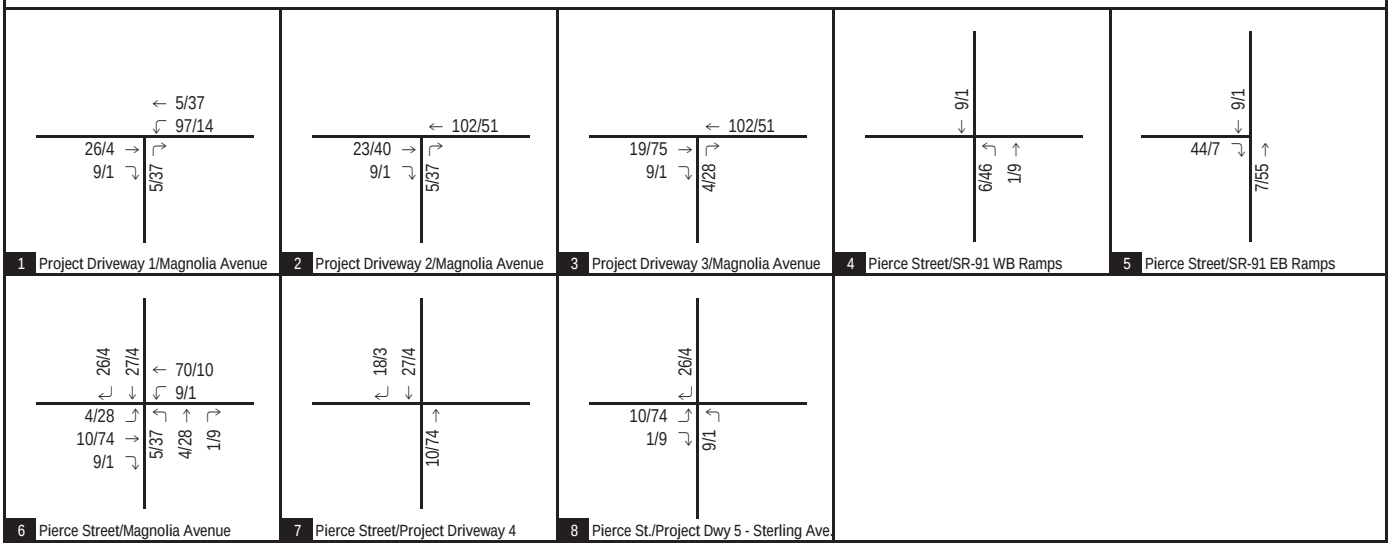

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FIGURE 11

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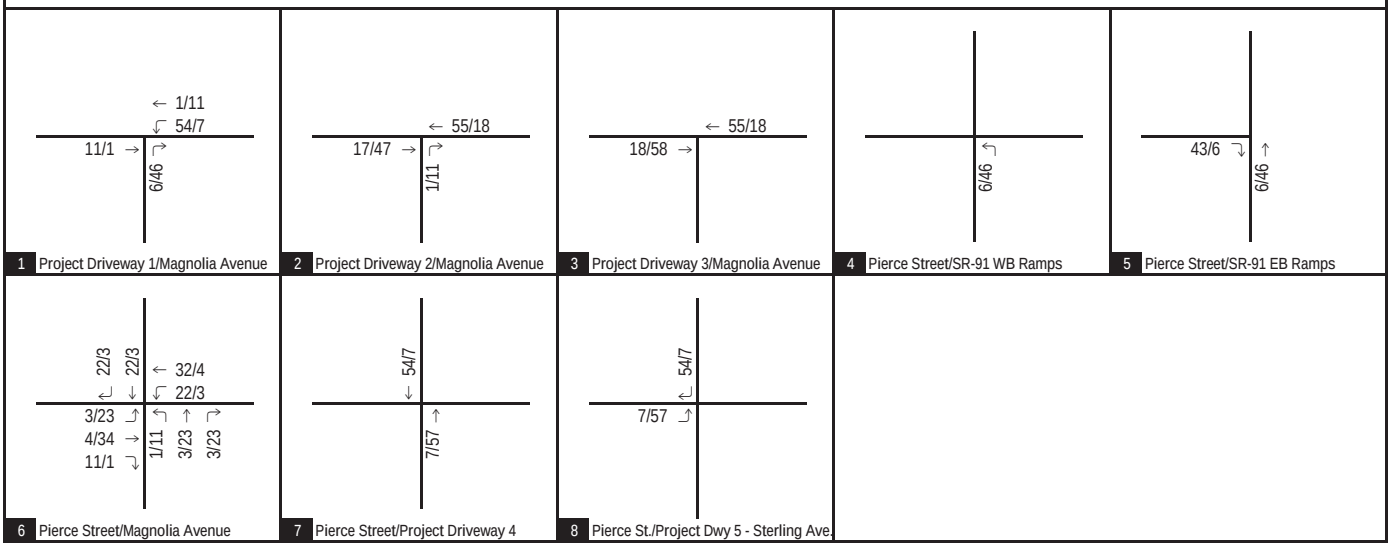

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FIGURE 12

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R:\IBG1401\z30- Project Trips_Trucks (1/9/2015)

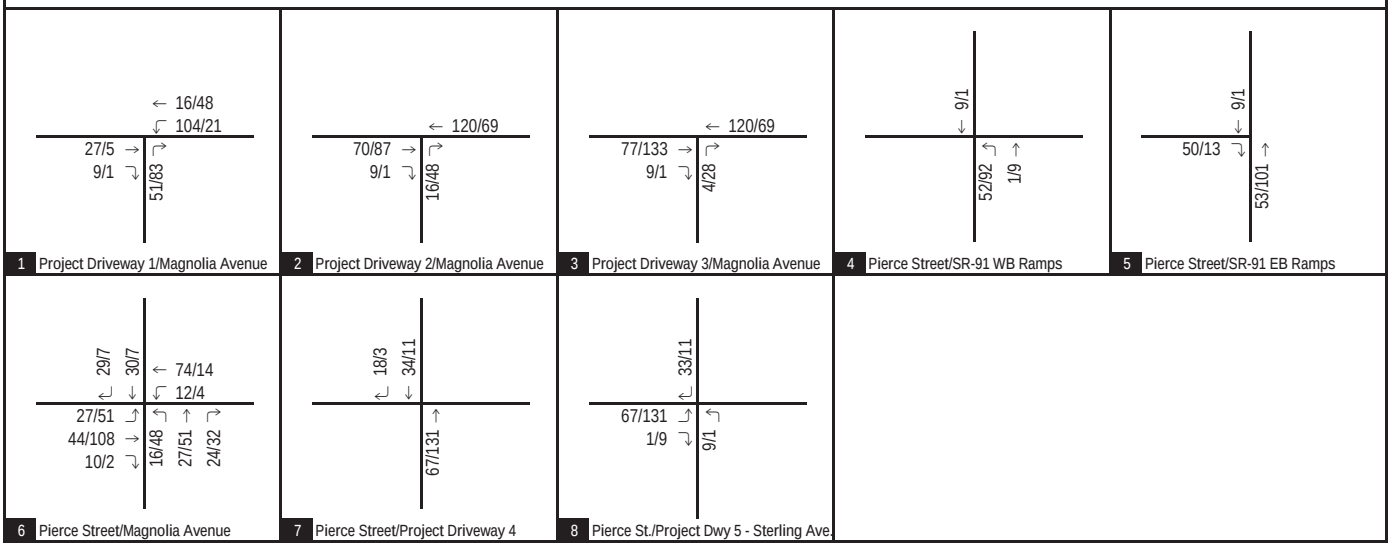

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FIGURE 1

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R:\IBG1401\z30- Project Trips_Total PCE (1/9/2015)

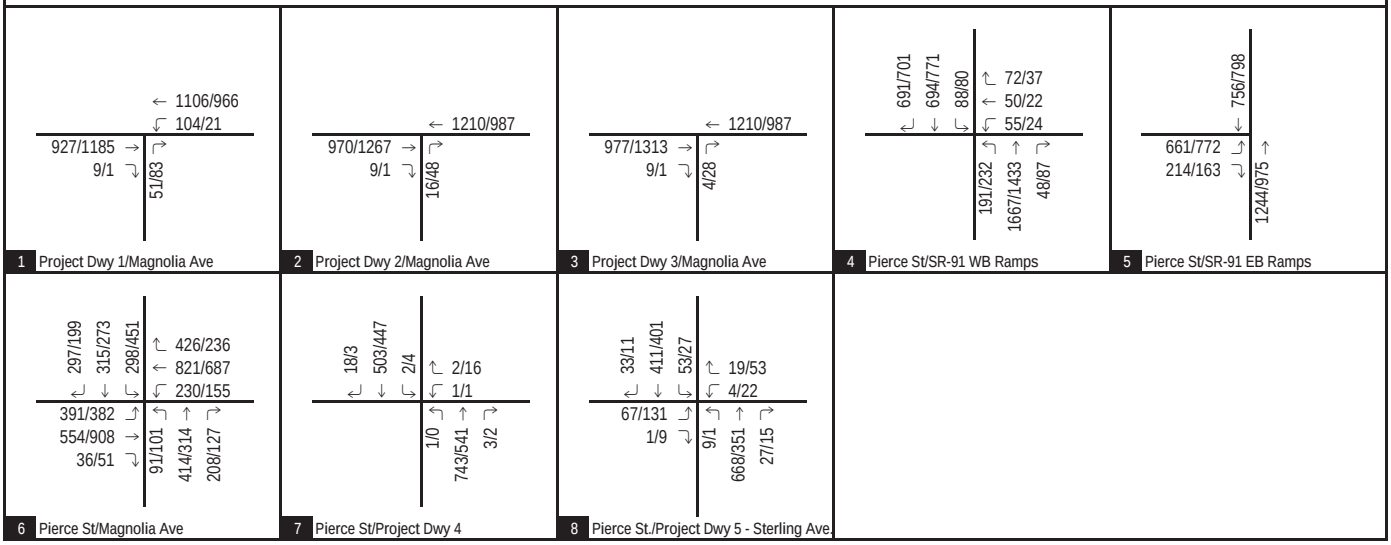

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FIGURE 1

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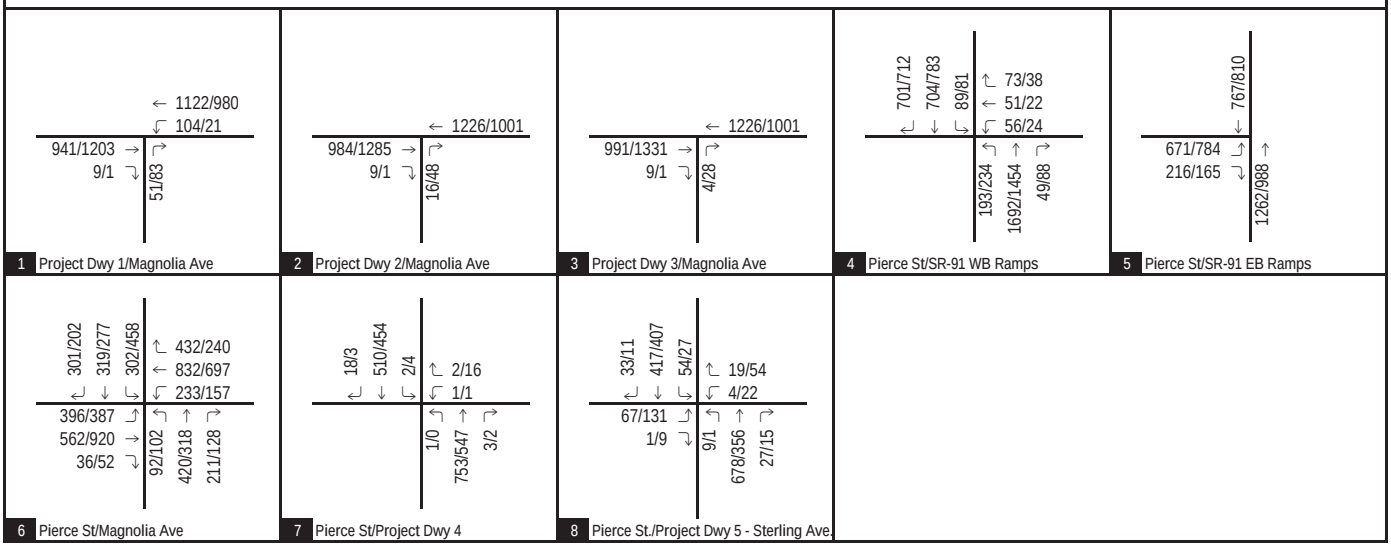

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FIGURE 15

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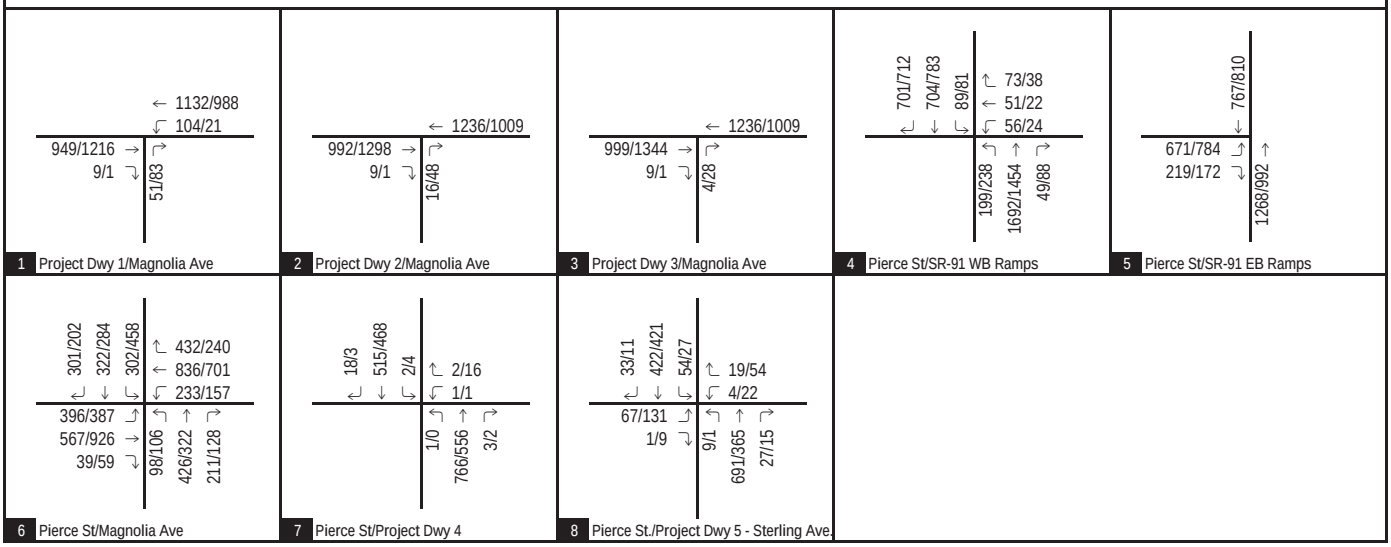

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FIGURE 1

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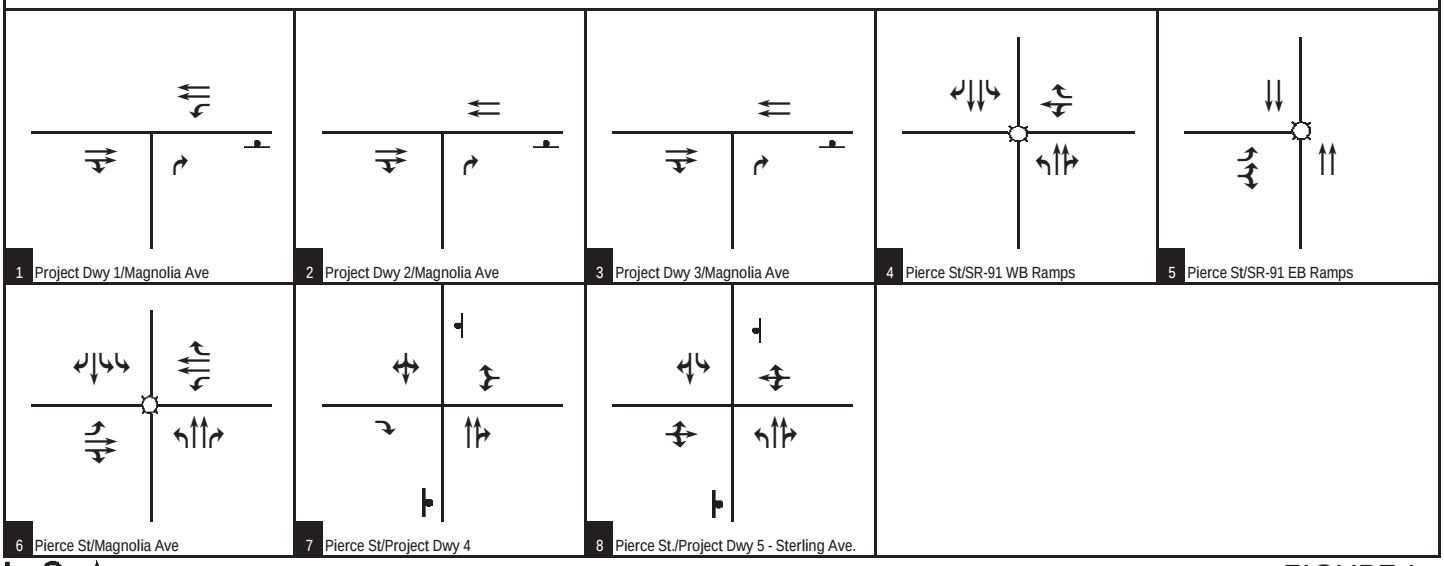

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Table E - Existing Intersection Levels of Service

Intersection	Control	Without Project				Plus Project			
		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 . Project Driveway 1/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.3	B	14.7	B
2 . Project Driveway 2/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.0	B	14.5	B
3 . Project Driveway 3/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		11.9	B	14.4	B
4 . Pierce Street/SR-91 WB Ramps	Signal	10.2	B	9.7	A	13.0	B	10.5	B
5 . Pierce Street/SR-91 EB Ramps	Signal	17.1	B	13.5	B	17.9	B	15.5	B
6 . Pierce Street/Magnolia Avenue	Signal	37.3	D	31.3	C	43.7	D	35.3	D
7 . Pierce Street/Project Driveway 4	TWSC	13.6	B	10.2	B	17.6	C	10.8	B
8 . Pierce St./Project Dwy 5 - Sterling Ave.	TWSC	13.1	B	12.1	B	26.3	D	21.3	C

Notes:

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

Existing plus project traffic volumes were developed using the approach discussed in the Traffic Volumes Plus Project Scenarios section. An intersection level of service analysis was conducted for existing plus project conditions to determine current intersection performance. Previously referenced Table E summarizes the results of this analysis and shows that all intersections are projected to operate at satisfactory levels of service. Level of service calculation worksheets are contained in Appendix D.

OPENING YEAR LEVELS OF SERVICE

Project Completion (2015) Without Project Levels of Service

Project completion (2015) without project traffic volumes were developed using the approach discussed in the Traffic Volumes Without Project Scenarios section. An intersection level of service analysis was conducted for project completion (2015) without project conditions. Table F summarizes the results of this analysis and shows all intersections are projected to operate at satisfactory levels of service. Level of service calculation worksheets are contained in Appendix D.

Project Completion (2015) Plus Project Levels of Service

Project completion (2015) plus project traffic volumes were developed using the approach discussed in the Traffic Volumes Plus Project Scenarios section. An intersection level of service analysis was conducted for project completion (2015) plus project conditions. Table F summarizes the results of this analysis and shows all intersections are projected to operate at satisfactory levels of service. Level of service calculation worksheets are contained in Appendix D.

Cumulative (2015) Without Project Levels of Service

Cumulative (2015) without project traffic volumes were developed using the approach discussed in the Traffic Volumes Without Project Scenarios section. An intersection level of service analysis was conducted for cumulative (2015) without project conditions to determine projected intersection performance. Table G summarizes the results of this analysis and shows all intersections are projected to operate at satisfactory levels of service. Level of service calculation worksheets are contained in Appendix D.

Cumulative (2015) Plus Project Levels of Service

Cumulative (2015) plus project traffic volumes were developed using the approach discussed in the Traffic Volumes Plus Project Scenarios section. An intersection level of service analysis was conducted for cumulative (2015) plus project conditions. Table G summarizes the results of this analysis and shows all intersections are projected to operate at satisfactory levels of service. Level of service calculation worksheets are contained in Appendix D.

Table F - Project Completion (2015) Intersection Levels of Service

Intersection	Control	Without Project				Plus Project			
		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 . Project Driveway 1/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.3	B	14.9	B
2 . Project Driveway 2/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.1	B	14.6	B
3 . Project Driveway 3/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.0	B	14.5	B
4 . Pierce Street/SR-91 WB Ramps	Signal	13.7	B	9.8	A	13.7	B	10.6	B
5 . Pierce Street/SR-91 EB Ramps	Signal	17.4	B	13.6	B	18.2	B	15.7	B
6 . Pierce Street/Magnolia Avenue	Signal	41.6	D	34.2	C	46.5	D	36.3	D
7 . Pierce Street/Project Driveway 4	TWSC	13.7	B	10.3	B	18.0	C	10.8	B
8 . Pierce St./Project Dwy 5 - Sterling Ave.	TWSC	13.2	B	12.2	B	27.0	D	21.7	C

Notes:

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 G - Cumulative (2015) Intersection Levels of Service

Intersection	Control	Without Project				Plus Project			
		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 . Project Driveway 1/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.4	B	15.0	B
2 . Project Driveway 2/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.1	B	14.8	B
3 . Project Driveway 3/Magnolia Avenue	TWSC	*Future Intersection*		*Future Intersection*		12.0	B	14.6	B
4 . Pierce Street/SR-91 WB Ramps	Signal	15.3	B	9.8	A	16.0	B	10.8	B
5 . Pierce Street/SR-91 EB Ramps	Signal	17.4	B	15.6	B	18.3	B	15.8	B
6 . Pierce Street/Magnolia Avenue	Signal	42.9	D	34.5	C	46.7	D	36.8	D
7 . Pierce Street/Project Driveway 4	TWSC	13.8	B	10.1	B	18.2	C	10.9	B
8 . Pierce St./Project Dwy 5 - Sterling Ave.	TWSC	13.3	B	12.3	B	27.6	D	22.6	C

Notes:

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

SUMMARY

Construction of the proposed 58 Magnolia Industrial Project would not create a significant impact at any of the study area intersections. As shown in previously referenced Table D, the project would generate 2,442 daily PCE trips, with 322 PCE trips occurring during the a.m. peak hour and 338 PCE trips occurring in the p.m. peak hour. Additionally, under existing, project completion, and cumulative conditions, all intersections operate at satisfactory LOS D or better during the a.m. and p.m. peak hours.

APPENDIX A:

SIGNED SCOPE OF WORK

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 December 2014.

Case No. 58 Magnolia Industrial
Related Cases -
SP No.
EIR No.
GPA No.
CZ No.
Project Name: 58 Magnolia Industrial
Project Location: Southwest corner of the Intersection of Pierce Street/Magnolia Avenue
Project Description: 6 General Industrial Warehouse Buildings totaling 276,000 square feet

	Consultant	Developer
Name:	LSA Associates	Michele Hackbart (Investment Building Group)
Address:	1500 Iowa Avenue	5100 Campus Drive, Suite 300
	Riverside, CA 92507	Newport Beach, CA 92660
Telephone:	951-781-9310	949-263-1111 Ext. 210

A. Trip Generation Source: ITE *Trip Generation Manual,* most recent edition (9th Edition)

Existing Land Use: Vacant
Proposed Land Use: General Industrial
Existing Zoning: BMP
Proposed Zoning: BMP
Total Daily Trips: 2,442 PCE (see attached Trip Gen)

	In	Out	Total
AM Trips	284 PCE	38 PCE	322 PCE
PM Trips	40 PCE	298 PCE	338 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 5 % S 5 % E 45 % W 45 %
(See attached exhibit for detailed assignment)

C. Background Traffic

Project Completion Year: 2015 Annual Ambient Growth Rate: 1.5 %
Other area projects to be included: See Attached Table

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. Project Driveway 1/Magnolia Avenue
2. Project Driveway 2/Magnolia Avenue
3. Project Driveway 3/Magnolia Avenue
4. Pierce Street/SR-91 WB Ramps
5. Pierce Street/SR-91 EB Ramps
6. Pierce Street/Magnolia Avenue
7. Pierce Street/Project Driveway 4
8. Pierce St./Project Dwy 5 - Sterling Ave.

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)

SPECIAL ADJUSTED COUNTS INCLUDED TO ACCT. FOR MAGNOLIA GRADE SEP. CONSTRUCTION

Recommended by:

Joe Urzua — 01/05/2015

Consultant's Representative — Date

Scoping Agreement Submitted on — Date

Scoping Agreement Resubmitted on — Date

Approved Scoping Agreement:

1/5/15

City of Riverside — Date
Traffic Engineering Division

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
Warehousing[1]	276.0 TSF							
Trips/Unit (Cars)		0.636	0.087	0.723	0.095	0.667	0.762	5.478
Trips/Unit (2-Axle Trucks)		0.065	0.009	0.074	0.009	0.069	0.078	0.558
Trips/Unit (3-Axle Trucks)		0.032	0.004	0.036	0.005	0.033	0.038	0.272
Trips/Unit (4+ Axle Trucks)		0.077	0.010	0.087	0.011	0.081	0.092	0.662
Trips/Unit (Total)		0.810	0.110	0.920	0.120	0.850	0.970	6.970
Trip Generation (Cars)		176	24	200	26	184	210	1,512
Trip Generation (2-Axle Trucks)		18	2	20	2	20	22	154
Trip Generation (3-Axle Trucks)		9	1	10	1	9	10	75
Trip Generation (4+ Axle Trucks)		21	3	24	3	22	25	183
Trip Generation (Total)		224	30	254	32	235	267	1,924
Trip Generation (Cars)		176	24	200	26	184	210	1,512
PCE Trip Generation (2-Axle Trucks)		27	3	30	3	30	33	231
PCE Trip Generation (3-Axle Trucks)		18	2	20	2	18	20	150
PCE Trip Generation (4+ Axle Trucks)		63	9	72	9	66	75	549
PCE Trip Generation (Total)		284	38	322	40	298	338	2,442

TSF = thousand square-feet

1 Total a.m. peak hour, p.m. peak hour and daily rates from Institute of Transportation Engineers (ITE) Trip Generation (9th Edition) rates for Land Use 110 - "General Light Industrial." Trip generation rates converted to car and truck trips using vehicle mix and enter/exit splits for Light Industrial from Fontana Truck Trip Generation Study dated March 13, 2003. Truck trips were converted to PCEs based on the SANBAG truck PCE factors. PCE volumes for were computed using a PCE factor of 1.5 for 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for trucks with 4 or more axles.

Table B - Existing Count Adjustment

	AM Peak Hour					PM Peak Hour				
	2014 Counts	2012 Counts	Difference (2014-2012)	Adjusted Growth	Proposed Adjusted Count[1]	2014 Counts	2012 Counts	Difference (2014-2012)	Adjusted Growth	Proposed Adjusted Count[1]
6 Pierce Street/Magnolia Avenue										
NBL	75	72	3	0	75	53	42	11	0	53
NBT	387	312	75	0	387	263	195	68	0	263
NBR	184	76	108	0	184	95	86	9	0	95
SBL	298	278	20	0	298	451	397	54	0	451
SBT	285	224	61	0	285	266	255	11	0	266
SBR	268	247	21	0	268	192	65	127	0	192
EBL[2]	142	353	-211	11	364	212	321	-109	10	331
EBT	435	495	-60	15	510	800	715	85	0	800
EBR	26	25	1	0	26	33	48	-15	1	49
WBL	218	200	18	0	218	151	102	49	0	151
WBT	657	725	-68	22	747	633	653	-20	20	673
WBR	426	275	151	0	426	236	223	13	0	236
North Leg										
Approach	851	749	102	0	851	909	717	192	0	909
Departure	955	940	15	364	1,177	711	739	-28	331	830
Total	1,806	1,689	117	364	2,028	1,620	1,456	164	331	1,739
South Leg										
Approach	646	460	186	0	646	411	323	88	0	411
Departure	529	449	80	0	529	450	405	45	49	466
Total	1,175	909	266	0	1,175	861	728	133	49	877
East Leg										
Approach	1,301	1,200	101	747	1,391	1,020	978	42	673	1,060
Departure	917	849	68	510	992	1,346	1,198	148	0	1,346
Total	2,218	2,049	169	1,257	2,383	2,366	2,176	190	673	2,406
West Leg										
Approach	603	873	-270	873	899	1,045	1,084	-39	380	1,180
Departure	1,000	1,044	-44	747	1,090	878	760	118	673	918
Total	1,603	1,917	-314	1,620	1,989	1,923	1,844	79	1,053	2,098
Total Approaches										
Approach	3,401	3,282	119	1,620	3,787	3,385	3,102	283	1,053	3,560
Departure	3,401	3,282	119	1,620	3,787	3,385	3,102	283	1,053	3,560
Total	6,802	6,564	238	3,240	7,574	6,770	6,204	566	2,105	7,119

Notes:

[1] At locations where the 2012 turn movements are greater than the 2014 turn movements, a 1.5% per annum growth rate will be applied to the 2012 movements. The resulting volumes "proposed adjusted counts" will be used for analysis.

[2] During the a.m. and p.m. peak hours, eastbound left-turn volumes were adjusted using a 1.5% per annumum growth rate.. The difference between the "proposed adjusted counts" and the 2012 will be applied to the 91 eastbound/westbound ramps located on Pierce Street. In the a.m. peak hour, 222 vehicles (364-142) will be added to the northbound through volumes at the 91 ramps. In the p.m. peak hour, 119 vehicles (331-212) will be added the northbound through volume at the 91 ramps.

Table C - Proposed Cumulative Projects

Map No.	Project (Case #)	Land Use	Location	Units
1	P10-0577/P10-0671 P10-0672/P10-0798	Residential	S/E corner at intersection of La Sierra and Indiana Av	163 D.U.
2	P13-0165/P13-0166 P13-0167/P13-0168	Gas Station	Westerly side of La Sierra Av southerly of Indiana Ave northerly of Liverpool Ln	16 Fueling Stations
3	P13-0324/P13-0325 P13-0326/P13-0327	Residential	Northerly side of Indiana Ave Easterly of La Sierra Ave Adjacent to La Sierra Metrolink station	187 D.U.
4	P13-0912/P13-0913	Fitness Facility	3742 Park Sierra Av	45.0 TSF
5	P14-0026/P14-0027	Fast-Food Restaurant with Drive-Through Window	S/W corner at intersection of Magnolia and Park Sierra Av	5.2 TSF

LSA

FIGURE 1

N

0 1,000 2,000

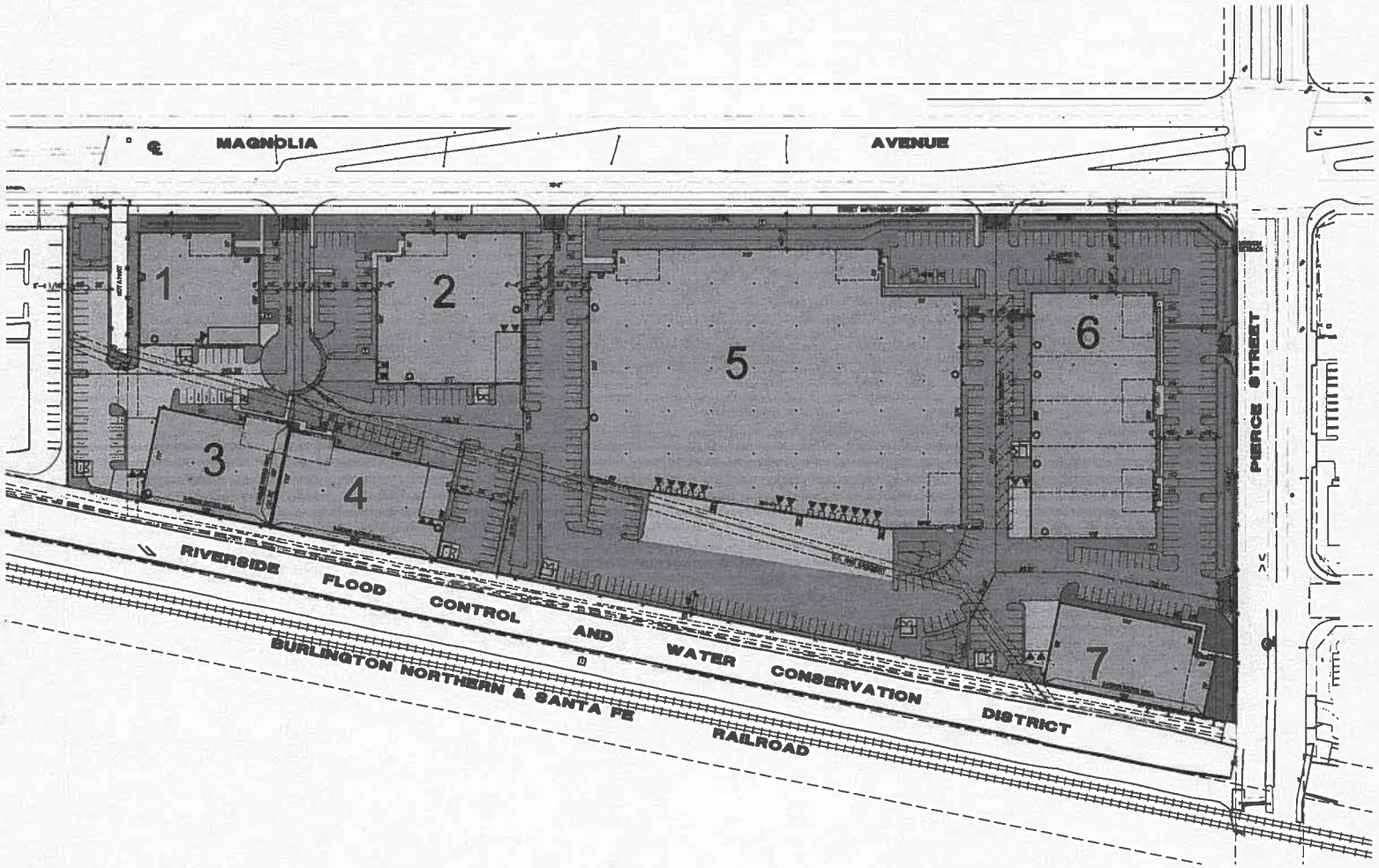
FEET

SOURCE: ESRI, Bing Imagery, 2010.

I:\IBG1401\Reports\Traffic\fig1_RegLoc.mxd (11/13/2014)

58 Magnolia Industrial Traffic Study

Regional and Project Location



LSA

FIGURE 2

LEGEND

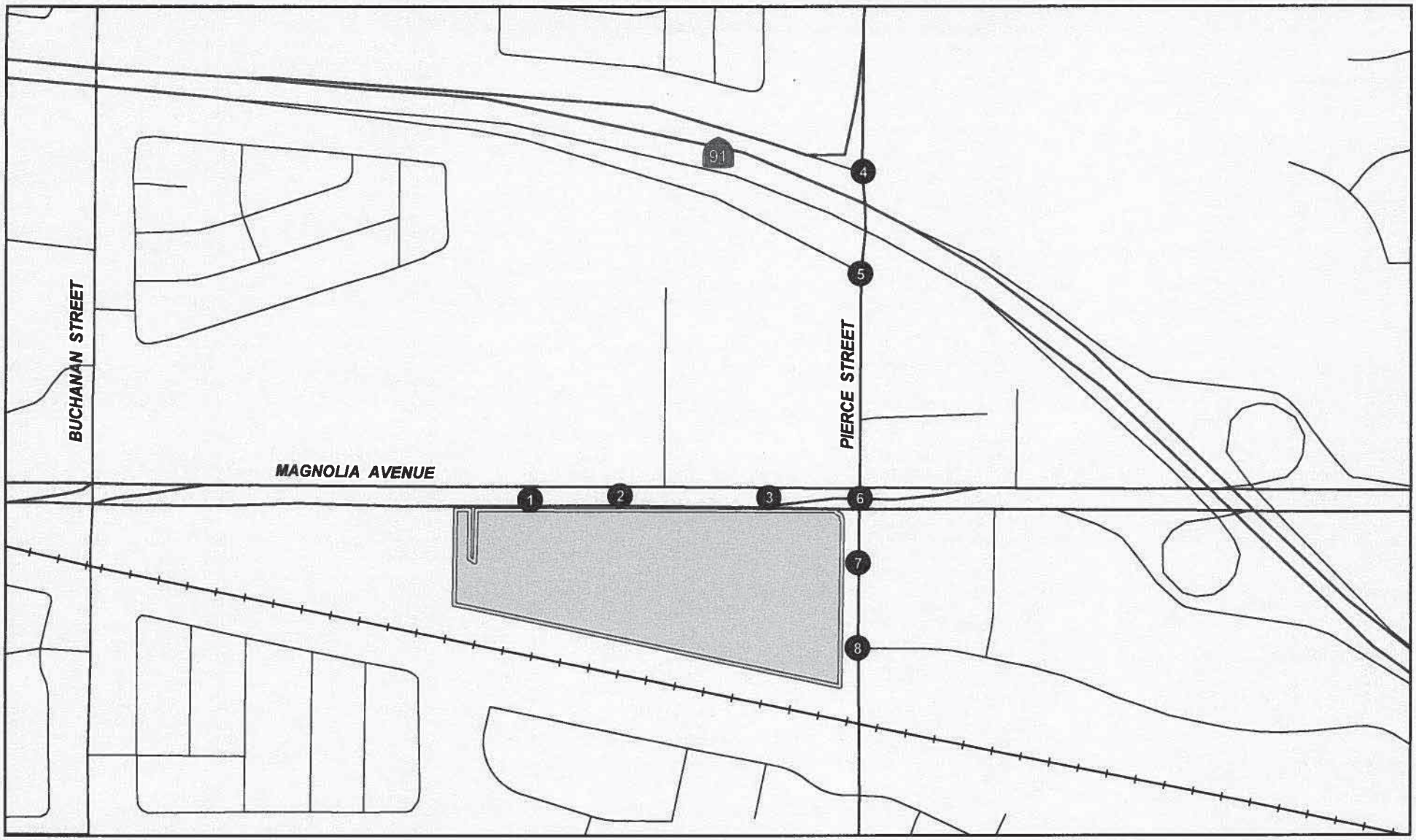
- INDICATES 12'x14' GRADE LEVEL DOOR
- INDICATES 9'x10' DOCK LEVEL DOOR
- CONCRETE TRASH ENCLOSURE PAINTED TO MATCH BUILDINGS
- ELECTRICAL TRANSFORMER

0 100 200
FEET

58 Magnolia Industrial Traffic Study

Conceptual Site Plan

SOURCE:
I:\IBG1401\Reports\Traffic\fig2_ConceptSitePlan.ai (11/13/14)



LSA

FIGURE 3

Project Boundary

1 Study Intersection

0 250 500

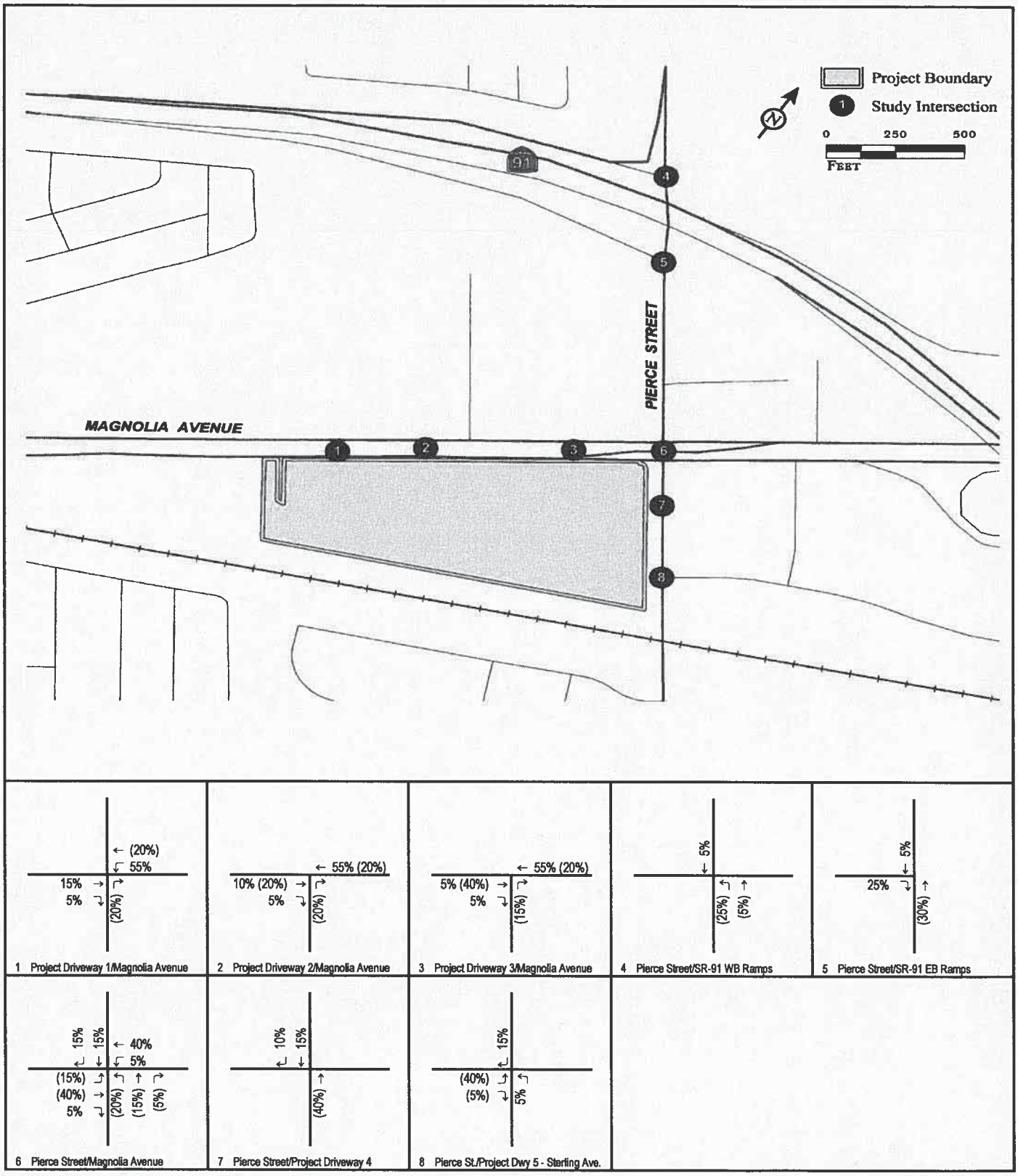
FEET

Source: Thomas Bros. 2009.

58 Magnolia Industrial
Traffic Study

Study Intersections

I:\IBG1401\Reports\Traffic\fig3_StudyIntersections.mxd (11/13/2014)



LSA

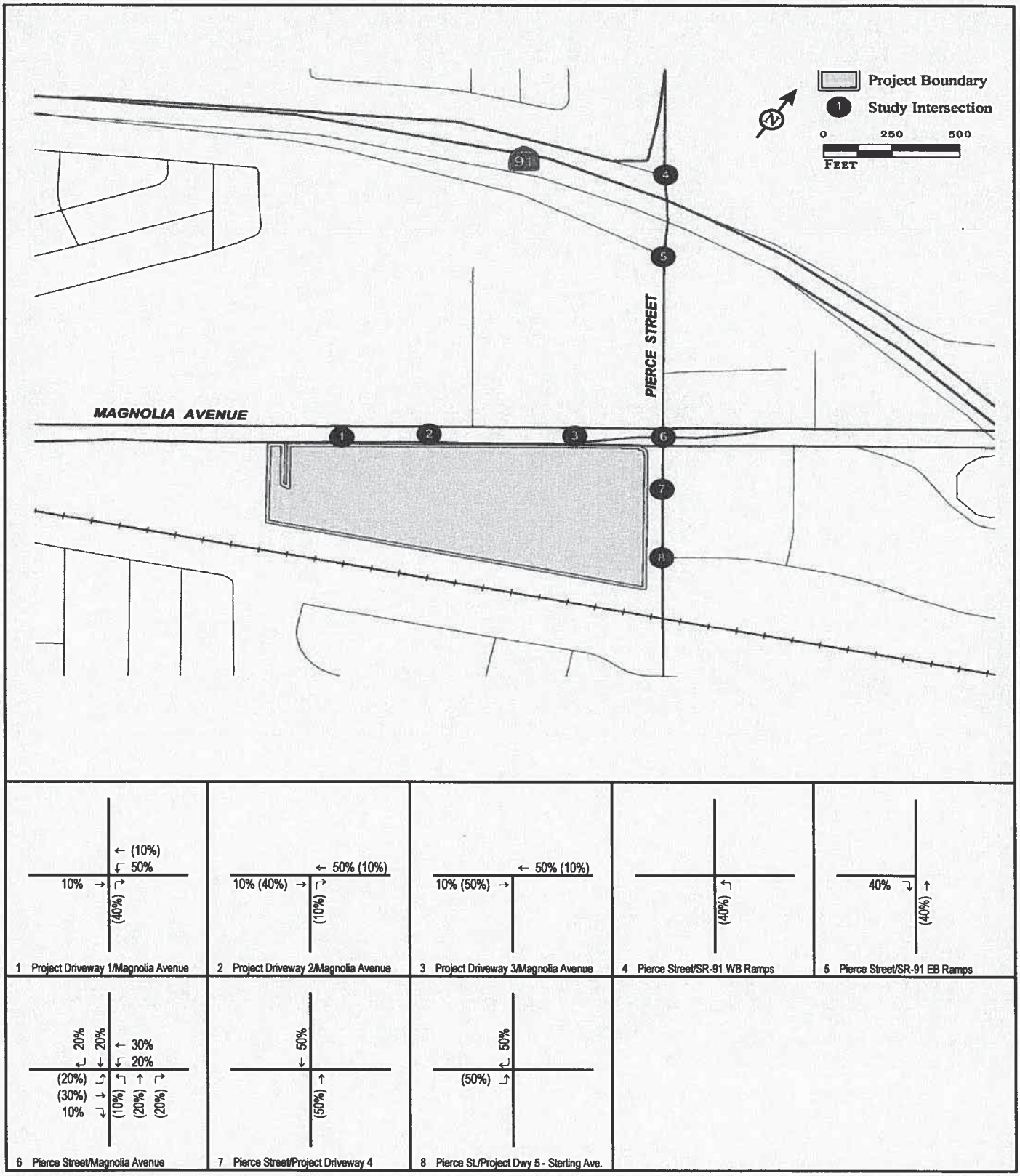
FIGURE 4

XX%(YY%) Inbound%(Outbound%) Trip Distribution

58 Magnolia Industrial
Traffic Study

Project Trip Distribution (Passenger Vehicles)

R:\IBG1401\Scope\z30-Dist Cars (11/19/2014)



LSA

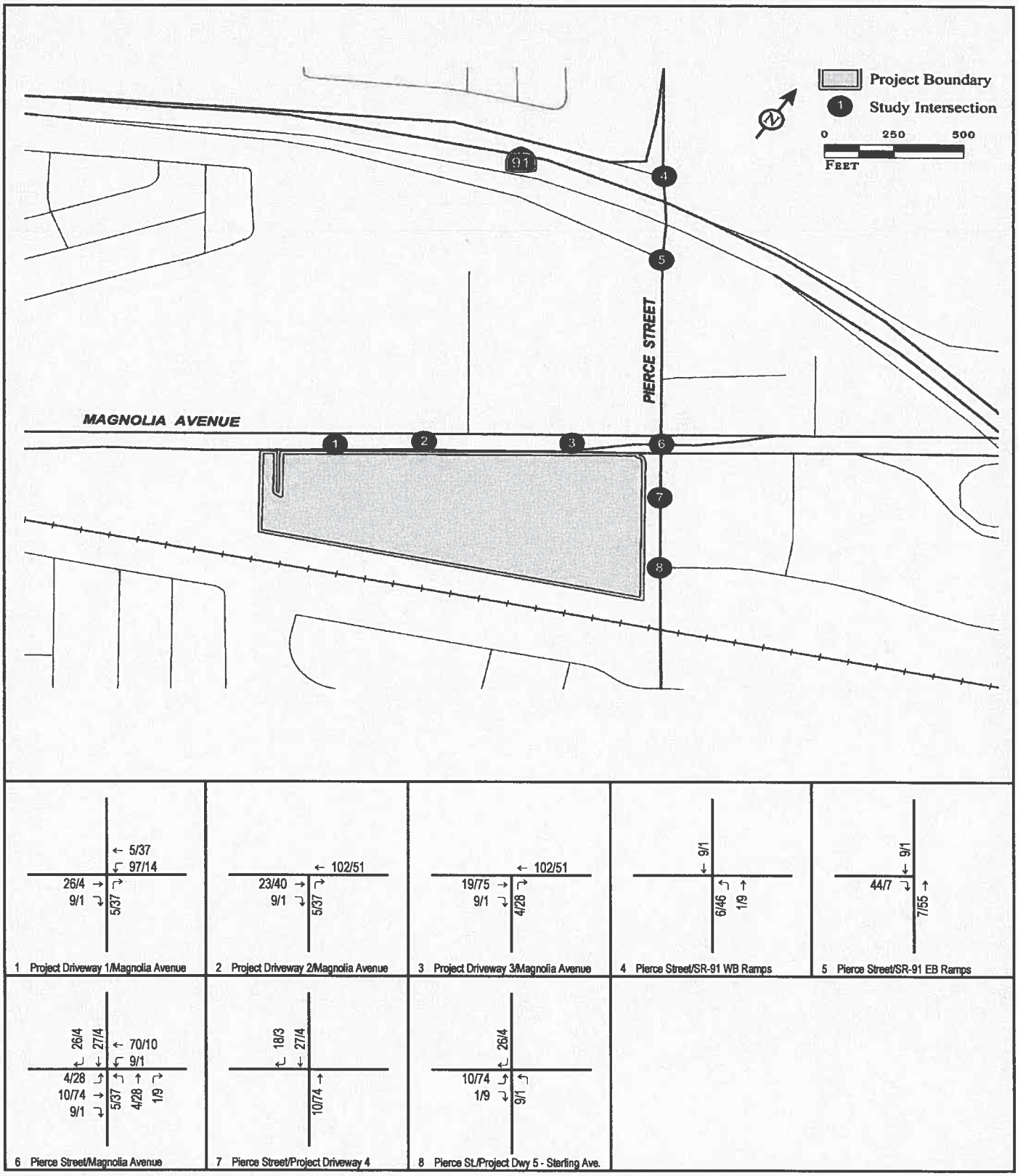
FIGURE 5

XX%(YY%) Inbound%(Outbound%) Trip Distribution

58 Magnolia Industrial
Traffic Study

Project Trip Distribution (Trucks)

R:\IBG1401\Scope\z30-Dist Trucks (11/19/2014)



LSA

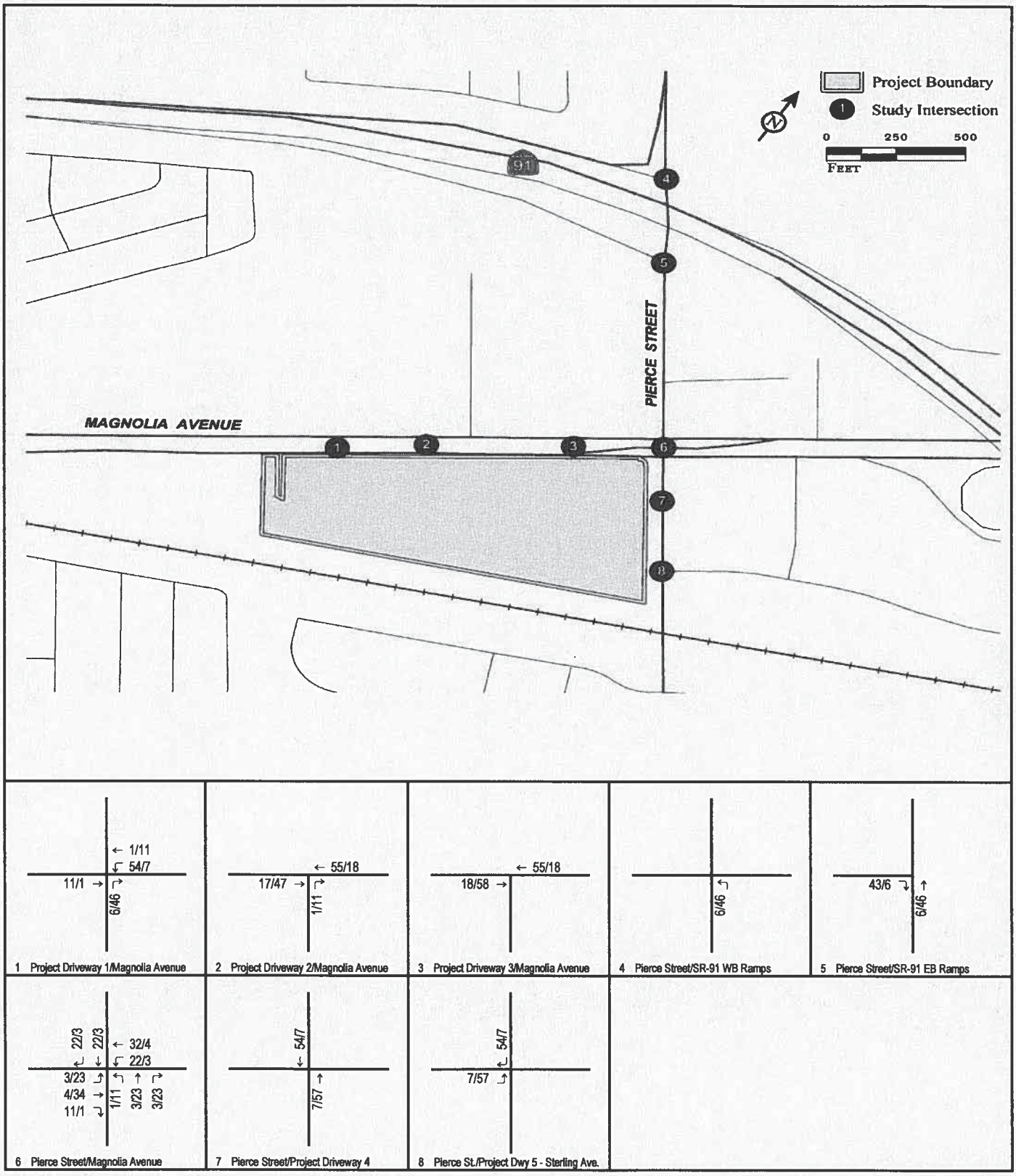
FIGURE 6

XX/YY AM/PM Peak Hour Trips

58 Magnolia Industrial
Traffic Study

Project Trip Assignment (Passenger Vehicles)

R:\IBG1401\Scope\z30- Project Trips_PV (11/19/2014)



LSA

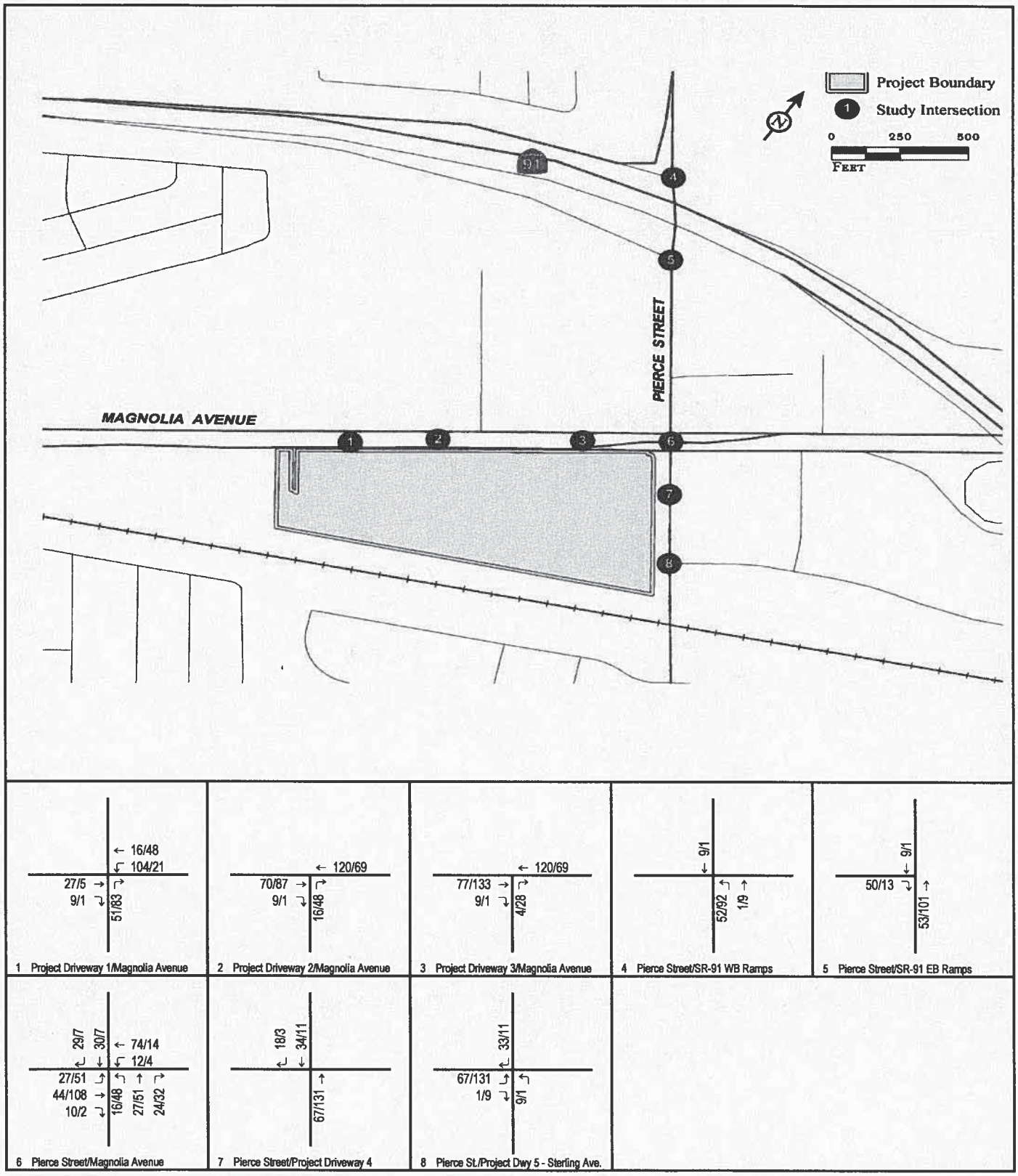
FIGURE 7

XX/YY AM/PM Peak Hour PCE Trips

58 Magnolia Industrial
Traffic Study

Project Trip Assignment (Trucks)

R:\IBG1401\Scope\z30- Project Trips_Trucks (11/19/2014)



LSA

FIGURE 8

XX/YY AM/PM Peak Hour PCE Trips

58 Magnolia Industrial
Traffic Study

Total Project Trip Assignment

R:\IBG1401\Scope\z30- Project Trips_Total PCE (11/19/2014)

APPENDIX B:

TRAFFIC COUNTS

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Pierce St and SR-91 WB Ramps , Riverside

Date: 11/18/2014

Day: Tuesday

Project #: 14-6204-001

City: Riverside

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Peak Hour Summary

Southbound Approach (Pierce St)

	Lanes 1	2	1		
AM	681	673	88	1500	AM
NOON	0	0	0	0	NOON
PM	697	765	80	1328	PM

Eastbound Approach (SR-91 WB Ramps)

Lanes	AM	NOON	PM
	869	0	856
0	0	0	0
0	0	0	0
0	0	0	0

Westbound Approach

AM	NOON	PM	Lanes
72	0	37	1
50	0	22	0.5
55	0	23	0.5
134	0	166	

Northbound Approach

AM	728	138	1428	46	AM
NOON	0	0	0	0	NOON
PM	788	137	1291	86	PM
		1	2	0	Lanes

CONTROL: Signalized

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

Total Ins & Outs

	North Leg		
	1442	1500	AM
	0	0	NOON
	1542	1328	PM

West Leg	AM	NOON	PM
	869	0	856
	0	0	0

East Leg	AM	NOON	PM
	177	0	82
	134	0	166

	South Leg	
AM	728	1612
NOON	0	0
PM	788	1514

Total Volume Per Leg

North Leg	
2942	AM
0	NOON
2870	PM

West Leg	AM	NOON	PM
	869	0	856

East Leg	AM	NOON	PM
	311	0	248

	South Leg
AM	2340
NOON	0
PM	2302

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Pierce St and SR-91 EB Ramps , Riverside

Date: 11/18/2014

Day: Tuesday

Project #: 14-6204-002

City: Riverside

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Peak Hour Summary

Southbound Approach (Pierce St)

	Lanes 0	2	0		
AM	0	735	0	1612	AM
NOON	0	0	0	0	NOON
PM	0	791	0	1510	PM

Eastbound Approach (SR-91 EB Ramps)

Lanes	AM	NOON	PM
	0	0	0
1.5	653	0	763
0	0	0	0
0.5	158	0	147

Westbound Approach

AM	NOON	PM	Lanes
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	

Northbound Approach

	0	2	0	Lanes
AM	893	0	959	0	AM
NOON	0	0	0	0	NOON
PM	938	0	747	0	PM

CONTROL: Signalized

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

Total Ins & Outs

	North Leg		
	735	1612	AM
	0	0	NOON
	791	1510	PM

West Leg AM	NOON	PM	East Leg AM	NOON	PM
0	0	0	0	0	0
811	0	910	0	0	0

	South Leg	
AM	893	959
NOON	0	0
PM	938	747

Total Volume Per Leg

North Leg	
2347	AM
0	NOON
2301	PM

West Leg AM	NOON	PM	East Leg AM	NOON	PM
811	0	910	0	0	0

	South Leg
AM	1852
NOON	0
PM	1685

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Pierce St and Magnolia Ave , Riverside

Date: 11/18/2014

Day: Tuesday

Project #: 14-6204-003

City: Riverside

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Peak Hour Summary

Southbound Approach (Pierce St)

Lanes	1	1	2		
AM	268	285	298	955	AM
NOON	0	0	0	0	NOON
PM	192	266	451	711	PM

Eastbound Approach (Magnolia Ave)

Lanes	AM	NOON	PM
	1000	0	878
1	142	0	212
2	435	0	800
0	26	0	33

Westbound Approach

Lanes	AM	NOON	PM
1	426	0	236
2	657	0	633
1	218	0	151
	917	0	1346

Northbound Approach

Lanes	1	2	1		
AM	529	75	387	184	AM
NOON	0	0	0	0	NOON
PM	450	53	263	95	PM

CONTROL

Signalized

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

Total Ins & Outs

	North Leg		
	851	955	AM
	0	0	NOON
	909	711	PM

West Leg			East Leg		
AM	NOON	PM			
1000	0	878	1301	0	1020
603	0	1045	917	0	1346
			AM	NOON	PM

	South Leg	
AM	529	646
NOON	0	0
PM	450	411

Total Volume Per Leg

	North Leg
	1806 AM
	0 NOON
	1620 PM

West Leg			East Leg		
AM	NOON	PM			
1603	0	1923	2218	0	2366
			AM	NOON	PM

	South Leg
AM	1175
NOON	0
PM	861

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Pierce St and Dwy (South of Magnolia & North of Sterling Ave) , Riverside

Date: 11/18/2014

Day: Tuesday

Project #: 14-6204-004

City: Riverside

AM Peak Hour	700 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Peak Hour Summary

Southbound Approach (Pierce St)

	Lanes 0	1	0		
AM	0	469	2	678	AM
NOON	0	0	0	0	NOON
PM	0	420	4	426	PM

Eastbound Approach (Dwy (South of Magnolia & North of Sterling Ave))

Lanes	AM	NOON	PM
	1	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Westbound Approach

	AM	NOON	PM	Lanes
	2	0	16	0
	0	0	0	1
	1	0	1	0
	5	0	6	

CONTROL: No Control

Northbound Approach

AM	470	1	676	3	AM
NOON	0	0	0	0	NOON
PM	421	0	410	2	PM
		0	2	0	Lanes

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

Total Ins & Outs

	North Leg		
	471	678	AM
	0	0	NOON
	424	426	PM

West Leg AM	NOON	PM	East Leg AM	NOON	PM
1	0	0	3	0	17
0	0	0	5	0	6

	South Leg	
AM	470	680
NOON	0	0
PM	421	412

Total Volume Per Leg

	North Leg
AM	1149
NOON	0
PM	850

West Leg AM	NOON	PM	East Leg AM	NOON	PM
1	0	0	8	0	23

	South Leg
AM	1150
NOON	0
PM	833

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Pierce St and Sterling Ave , Riverside

Date: 11/18/2014

Day: Tuesday

Project #: 14-6204-005

City: Riverside

AM Peak Hour	700 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Peak Hour Summary

Southbound Approach (Pierce St)

	Lanes 0	1	0		
AM	0	411	53	687	AM
NOON	0	0	0	0	NOON
PM	0	385	27	404	PM

Eastbound Approach (Sterling Ave)

Lanes	AM	NOON	PM
	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Westbound Approach

Lanes	AM	NOON	PM
0	19	0	53
1	0	0	0
0	4	0	22
	80	0	42

CONTROL

1 Way Stop WB

Northbound Approach

AM	415	0	668	27
NOON	0	0	0	0
PM	407	0	351	15
Lanes		0	2	0

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

Total Ins & Outs

	North Leg		
	464	687	AM
	0	0	NOON
	412	404	PM

West Leg AM	NOON	PM	East Leg AM	NOON	PM
0	0	0	23	0	75
0	0	0	80	0	42

	South Leg	
AM	415	695
NOON	0	0
PM	407	366

Total Volume Per Leg

	North Leg
AM	1151
NOON	0
PM	816

West Leg AM	NOON	PM	East Leg AM	NOON	PM
0	0	0	103	0	117

	South Leg
AM	1110
NOON	0
PM	773

APPENDIX C:

VOLUME DEVELOPMENT WORKSHEETS

Table C-1 - Existing Peak Hour Volumes (Vehicle 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	
4 Pierce Street/SR-91 WB Ramps												
NBL	136	2	0	0	3	139	134	1	2	0	6	140
NBT	1,403	22	1	2	41	1,444	1,269	20	0	2	36	1,305
NBR	43	3	0	0	5	48	85	1	0	0	2	87
SBL	88	0	0	0	0	88	80	0	0	0	0	80
SBT	657	12	2	2	28	685	757	6	2	0	13	770
SBR	669	7	4	1	22	691	690	6	1	0	11	701
EBL	0	0	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0	0	0
WBL	55	0	0	0	0	55	22	0	1	0	2	24
WBT	50	0	0	0	0	50	22	0	0	0	0	22
WBR	72	0	0	0	0	72	37	0	0	0	0	37
North Leg												
Approach	1,414	19	6	3	50	1,464	1,527	12	3	0	24	1,551
Departure	1,475	22	1	2	41	1,516	1,306	20	0	2	36	1,342
Total	2,889	41	7	5	91	2,980	2,833	32	3	2	60	2,893
South Leg												
Approach	1,582	27	1	2	49	1,631	1,488	22	2	2	43	1,532
Departure	712	12	2	2	28	740	779	6	3	0	15	794
Total	2,294	39	3	4	77	2,371	2,267	28	5	2	58	2,326
East Leg												
Approach	177	0	0	0	0	177	81	0	1	0	2	83
Departure	131	3	0	0	5	136	165	1	0	0	2	167
Total	308	3	0	0	5	313	246	1	1	0	4	250
West Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	855	9	4	1	25	880	846	7	3	0	17	863
Total	855	9	4	1	25	880	846	7	3	0	17	863
Total Approaches												
Approach	3,173	46	7	5	98	3,272	3,096	34	6	2	69	3,166
Departure	3,173	46	7	5	98	3,272	3,096	34	6	2	69	3,166
Total	6,346	92	14	10	196	6,544	6,192	68	12	4	138	6,332

Table C-1 - Existing Peak Hour Volumes (Vehicle 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	
5 Pierce Street/SR-91 EB Ramps												
NBL	0	0	0	0	0	0	0	0	0	0	0	0
NBT	942	16	0	1	27	969	733	13	1	0	22	755
NBR	0	0	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0	0	0
SBT	719	12	2	2	28	747	782	6	3	0	15	797
SBR	0	0	0	0	0	0	0	0	0	0	0	0
EBL	641	10	1	1	20	661	752	9	0	2	20	772
EBT	0	0	0	0	0	0	0	0	0	0	0	0
EBR	153	2	1	2	11	164	145	1	0	1	5	150
WBL	0	0	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0	0	0
North Leg												
Approach	719	12	2	2	28	747	782	6	3	0	15	797
Departure	1,583	26	1	2	47	1,630	1,485	22	1	2	41	1,527
Total	2,302	38	3	4	75	2,377	2,267	28	4	2	56	2,324
South Leg												
Approach	942	16	0	1	27	969	733	13	1	0	22	755
Departure	872	14	3	4	39	911	927	7	3	1	20	947
Total	1,814	30	3	5	66	1,880	1,660	20	4	1	41	1,702
East Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
West Leg												
Approach	794	12	2	3	31	825	897	10	0	3	24	922
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	794	12	2	3	31	825	897	10	0	3	24	922
Total Approaches												
Approach	2,455	40	4	6	86	2,541	2,412	29	4	3	61	2,474
Departure	2,455	40	4	6	86	2,541	2,412	29	4	3	61	2,474
Total	4,910	80	8	12	172	5,082	4,824	58	8	6	121	4,948

58 Magnolia Industrial

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
1 Project Driveway 1/Magnolia Avenue										
NBL	0		0	0	0	0		0	0	0
NBT	0		0	0	0	0		0	0	0
NBR	0		0	51	51	0		0	83	83
SBL	0		0	0	0	0		0	0	0
SBT	0		0	0	0	0		0	0	0
SBR	0		0	0	0	0		0	0	0
EBL	0		0	0	0	0		0	0	0
EBT	603	297	900	27	927	1,045	135	1,180	5	1,185
EBR	0		0	9	9	0		0	1	1
WBL	0		0	104	104	0		0	21	21
WBT	1,000	90	1,090	16	1,106	878	40	918	48	966
WBR	0		0	0	0	0		0	0	0
North Leg										
Approach	0		0	0	0	0		0	0	0
Departure	0		0	0	0	0		0	0	0
Total	0		0	0	0	0		0	0	0
South Leg										
Approach	0		0	51	51	0		0	83	83
Departure	0		0	113	113	0		0	22	22
Total	0		0	164	164	0		0	105	105
East Leg										
Approach	1,000		1,090	120	1,210	878		918	69	987
Departure	603		900	78	978	1,045		1,180	88	1,268
Total	1,603		1,990	198	2,188	1,923		2,098	157	2,255
West Leg										
Approach	603		900	36	936	1,045		1,180	6	1,186
Departure	1,000		1,090	16	1,106	878		918	48	966
Total	1,603		1,990	52	2,042	1,923		2,098	54	2,152
Total Approaches										
Approach	1,603		1,990	207	2,197	1,923		2,098	158	2,256
Departure	1,603		1,990	207	2,197	1,923		2,098	158	2,256
Total	3,206		3,980	414	4,394	3,846		4,196	316	4,512

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
2 Project Driveway 2/Magnolia Avenue										
NBL	0		0	0	0	0		0	0	0
NBT	0		0	0	0	0		0	0	0
NBR	0		0	16	16	0		0	48	48
SBL	0		0	0	0	0		0	0	0
SBT	0		0	0	0	0		0	0	0
SBR	0		0	0	0	0		0	0	0
EBL	0		0	0	0	0		0	0	0
EBT	603	297	900	70	970	1,045	135	1,180	87	1,267
EBR	0		0	9	9	0		0	1	1
WBL	0		0	0	0	0		0	0	0
WBT	1,000	90	1,090	120	1,210	878	40	918	69	987
WBR	0		0	0	0	0		0	0	0
North Leg										
Approach	0		0	0	0	0		0	0	0
Departure	0		0	0	0	0		0	0	0
Total	0		0	0	0	0		0	0	0
South Leg										
Approach	0		0	16	16	0		0	48	48
Departure	0		0	9	9	0		0	1	1
Total	0		0	25	25	0		0	49	49
East Leg										
Approach	1,000		1,090	120	1,210	878		918	69	987
Departure	603		900	86	986	1,045		1,180	135	1,315
Total	1,603		1,990	206	2,196	1,923		2,098	204	2,302
West Leg										
Approach	603		900	79	979	1,045		1,180	88	1,268
Departure	1,000		1,090	120	1,210	878		918	69	987
Total	1,603		1,990	199	2,189	1,923		2,098	157	2,255
Total Approaches										
Approach	1,603		1,990	215	2,205	1,923		2,098	205	2,303
Departure	1,603		1,990	215	2,205	1,923		2,098	205	2,303
Total	3,206		3,980	430	4,410	3,846		4,196	410	4,606

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
3 Project Driveway 3/Magnolia Avenue										
NBL	0		0	0	0	0		0	0	0
NBT	0		0	0	0	0		0	0	0
NBR	0		0	4	4	0		0	28	28
SBL	0		0	0	0	0		0	0	0
SBT	0		0	0	0	0		0	0	0
SBR	0		0	0	0	0		0	0	0
EBL	0		0	0	0	0		0	0	0
EBT	603	297	900	77	977	1,045	135	1,180	133	1,313
EBR	0		0	9	9	0		0	1	1
WBL	0		0	0	0	0		0	0	0
WBT	1,000	90	1,090	120	1,210	878	40	918	69	987
WBR	0		0	0	0	0		0	0	0
North Leg										
Approach	0		0	0	0	0		0	0	0
Departure	0		0	0	0	0		0	0	0
Total	0		0	0	0	0		0	0	0
South Leg										
Approach	0		0	4	4	0		0	28	28
Departure	0		0	9	9	0		0	1	1
Total	0		0	13	13	0		0	29	29
East Leg										
Approach	1,000		1,090	120	1,210	878		918	69	987
Departure	603		900	81	981	1,045		1,180	161	1,341
Total	1,603		1,990	201	2,191	1,923		2,098	230	2,328
West Leg										
Approach	603		900	86	986	1,045		1,180	134	1,314
Departure	1,000		1,090	120	1,210	878		918	69	987
Total	1,603		1,990	206	2,196	1,923		2,098	203	2,301
Total Approaches										
Approach	1,603		1,990	210	2,200	1,923		2,098	231	2,329
Departure	1,603		1,990	210	2,200	1,923		2,098	231	2,329
Total	3,206		3,980	420	4,400	3,846		4,196	462	4,658

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
4 Pierce Street/SR-91 WB Ramps										
NBL	139		139	52	191	140		140	92	232
NBT	1,444	222	1,666	1	1,667	1,305	119	1,424	9	1,433
NBR	48		48	0	48	87		87	0	87
SBL	88		88	0	88	80		80	0	80
SBT	685	0	685	9	694	770	0	770	1	771
SBR	691		691	0	691	701		701	0	701
EBL	0		0	0	0	0		0	0	0
EBT	0		0	0	0	0		0	0	0
EBR	0		0	0	0	0		0	0	0
WBL	55		55	0	55	24		24	0	24
WBT	50		50	0	50	22		22	0	22
WBR	72		72	0	72	37		37	0	37
North Leg										
Approach	1,464		1,464	9	1,473	1,551		1,551	1	1,552
Departure	1,516		1,738	1	1,739	1,342		1,461	9	1,470
Total	2,980		3,202	10	3,212	2,893		3,012	10	3,022
South Leg										
Approach	1,631		1,853	53	1,906	1,532		1,651	101	1,752
Departure	740		740	9	749	794		794	1	795
Total	2,371		2,593	62	2,655	2,326		2,445	102	2,547
East Leg										
Approach	177		177	0	177	83		83	0	83
Departure	136		136	0	136	167		167	0	167
Total	313		313	0	313	250		250	0	250
West Leg										
Approach	0		0	0	0	0		0	0	0
Departure	880		880	52	932	863		863	92	955
Total	880		880	52	932	863		863	92	955
Total Approaches										
Approach	3,272		3,494	62	3,556	3,166		3,285	102	3,387
Departure	3,272		3,494	62	3,556	3,166		3,285	102	3,387
Total	6,544		6,988	124	7,112	6,332		6,570	204	6,774

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
5 Pierce Street/SR-91 EB Ramps										
NBL	0		0	0	0	0		0	0	0
NBT	969	222	1,191	53	1,244	755	119	874	101	975
NBR	0		0	0	0	0		0	0	0
SBL	0		0	0	0	0		0	0	0
SBT	747	0	747	9	756	797	0	797	1	798
SBR	0		0	0	0	0		0	0	0
EBL	661		661	0	661	772		772	0	772
EBT	0		0	0	0	0		0	0	0
EBR	164		164	50	214	150		150	13	163
WBL	0		0	0	0	0		0	0	0
WBT	0		0	0	0	0		0	0	0
WBR	0		0	0	0	0		0	0	0
North Leg										
Approach	747		747	9	756	797		797	1	798
Departure	1,630		1,852	53	1,905	1,527		1,646	101	1,747
Total	2,377		2,599	62	2,661	2,324		2,443	102	2,545
South Leg										
Approach	969		1,191	53	1,244	755		874	101	975
Departure	911		911	59	970	947		947	14	961
Total	1,880		2,102	112	2,214	1,702		1,821	115	1,936
East Leg										
Approach	0		0	0	0	0		0	0	0
Departure	0		0	0	0	0		0	0	0
Total	0		0	0	0	0		0	0	0
West Leg										
Approach	825		825	50	875	922		922	13	935
Departure	0		0	0	0	0		0	0	0
Total	825		825	50	875	922		922	13	935
Total Approaches										
Approach	2,541		2,763	112	2,875	2,474		2,593	115	2,708
Departure	2,541		2,763	112	2,875	2,474		2,593	115	2,708
Total	5,082		5,526	224	5,750	4,948		5,186	230	5,416

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
6 Pierce Street/Magnolia Avenue										
NBL	75	0	75	16	91	53	0	53	48	101
NBT	387	0	387	27	414	263	0	263	51	314
NBR	184	0	184	24	208	95	0	95	32	127
SBL	298	0	298	0	298	451	0	451	0	451
SBT	285	0	285	30	315	266	0	266	7	273
SBR	268	0	268	29	297	192	0	192	7	199
EBL	142	222	364	27	391	212	119	331	51	382
EBT	435	75	510	44	554	800	0	800	108	908
EBR	26	0	26	10	36	33	16	49	2	51
WBL	218	0	218	12	230	151	0	151	4	155
WBT	657	90	747	74	821	633	40	673	14	687
WBR	426	0	426	0	426	236	0	236	0	236
North Leg										
Approach	851	0	851	59	910	909	0	909	14	923
Departure	955	222	1,177	54	1,231	711	119	830	102	932
Total	1,806	222	2,028	113	2,141	1,620	119	1,739	116	1,855
South Leg										
Approach	646	0	646	67	713	411	0	411	131	542
Departure	529	0	529	52	581	450	16	466	13	479
Total	1,175	0	1,175	119	1,294	861	16	877	144	1,021
East Leg										
Approach	1,301	90	1,391	86	1,477	1,020	40	1,060	18	1,078
Departure	917	75	992	68	1,060	1,346	0	1,346	140	1,486
Total	2,218	165	2,383	154	2,537	2,366	40	2,406	158	2,564
West Leg										
Approach	603	297	900	81	981	1,045	135	1,180	161	1,341
Departure	1,000	90	1,090	119	1,209	878	40	918	69	987
Total	1,603	387	1,990	200	2,190	1,923	175	2,098	230	2,328
Total Approaches										
Approach	3,401	387	3,788	293	4,081	3,385	175	3,560	324	3,884
Departure	3,401	387	3,788	293	4,081	3,385	175	3,560	324	3,884
Total	6,802	774	7,576	586	8,162	6,770	350	7,120	648	7,768

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
7 Pierce Street/Project Driveway 4										
NBL	1		1	0	1	0		0	0	0
NBT	676		676	67	743	410		410	131	541
NBR	3		3	0	3	2		2	0	2
SBL	2		2	0	2	4		4	0	4
SBT	469	0	469	34	503	420	16	436	11	447
SBR	0		0	18	18	0		0	3	3
EBL	0		0	0	0	0		0	0	0
EBT	0		0	0	0	0		0	0	0
EBR	0		0	0	0	0		0	0	0
WBL	1		1	0	1	1		1	0	1
WBT	0		0	0	0	0		0	0	0
WBR	2		2	0	2	16		16	0	16
North Leg										
Approach	471		471	52	523	424		440	14	454
Departure	678		678	67	745	426		426	131	557
Total	1,149		1,149	119	1,268	850		866	145	1,011
South Leg										
Approach	680		680	67	747	412		412	131	543
Departure	470		470	34	504	421		437	11	448
Total	1,150		1,150	101	1,251	833		849	142	991
East Leg										
Approach	3		3	0	3	17		17	0	17
Departure	5		5	0	5	6		6	0	6
Total	8		8	0	8	23		23	0	23
West Leg										
Approach	0		0	0	0	0		0	0	0
Departure	1		1	18	19	0		0	3	3
Total	1		1	18	19	0		0	3	3
Total Approaches										
Approach	1,154		1,154	119	1,273	853		869	145	1,014
Departure	1,154		1,154	119	1,273	853		869	145	1,014
Total	2,308		2,308	238	2,546	1,706		1,738	290	2,028

Table C-2 - Existing Peak Hour PCE Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume	Existing PCE Volume	Volume Adj. Due to Constuction	Adjusted PCE Volume	Project Trips	With Project PCE Volume
8 Pierce St./Project Dwy 5 - Sterling Ave.										
NBL	0		0	9	9	0		0	1	1
NBT	668		668	0	668	351		351	0	351
NBR	27		27	0	27	15		15	0	15
SBL	53		53	0	53	27		27	0	27
SBT	411	0	411	0	411	385	16	401	0	401
SBR	0		0	33	33	0		0	11	11
EBL	0		0	67	67	0		0	131	131
EBT	0		0	0	0	0		0	0	0
EBR	0		0	1	1	0		0	9	9
WBL	4		4	0	4	22		22	0	22
WBT	0		0	0	0	0		0	0	0
WBR	19		19	0	19	53		53	0	53
North Leg										
Approach	464		464	33	497	412		428	11	439
Departure	687		687	67	754	404		404	131	535
Total	1,151		1,151	100	1,251	816		832	142	974
South Leg										
Approach	695		695	9	704	366		366	1	367
Departure	415		415	1	416	407		423	9	432
Total	1,110		1,110	10	1,120	773		789	10	799
East Leg										
Approach	23		23	0	23	75		75	0	75
Departure	80		80	0	80	42		42	0	42
Total	103		103	0	103	117		117	0	117
West Leg										
Approach	0		0	68	68	0		0	140	140
Departure	0		0	42	42	0		0	12	12
Total	0		0	110	110	0		0	152	152
Total Approaches										
Approach	1,182		1,182	110	1,292	853		869	152	1,021
Departure	1,182		1,182	110	1,292	853		869	152	1,021
Total	2,364		2,364	220	2,584	1,706		1,738	304	2,042

58 Magnolia Industrial

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
1 Project Driveway 1/Magnolia Avenue										
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	51	51	0	0	0	83	83
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	900	14	914	27	941	1,180	18	1,198	5	1,203
EBR	0	0	0	9	9	0	0	0	1	1
WBL	0	0	0	104	104	0	0	0	21	21
WBT	1,090	16	1,106	16	1,122	918	14	932	48	980
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	51	51	0	0	0	83	83
Departure	0	0	0	113	113	0	0	0	22	22
Total	0	0	0	164	164	0	0	0	105	105
East Leg										
Approach	1,090	16	1,106	120	1,226	918	14	932	69	1,001
Departure	900	14	914	78	992	1,180	18	1,198	88	1,286
Total	1,990	30	2,020	198	2,218	2,098	32	2,130	157	2,287
West Leg										
Approach	900	14	914	36	950	1,180	18	1,198	6	1,204
Departure	1,090	16	1,106	16	1,122	918	14	932	48	980
Total	1,990	30	2,020	52	2,072	2,098	32	2,130	54	2,184
Total Approaches										
Approach	1,990	30	2,020	207	2,227	2,098	32	2,130	158	2,288
Departure	1,990	30	2,020	207	2,227	2,098	32	2,130	158	2,288
Total	3,980	60	4,040	414	4,454	4,196	64	4,260	316	4,576

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
2 Project Driveway 2/Magnolia Avenue										
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	16	16	0	0	0	48	48
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	900	14	914	70	984	1,180	18	1,198	87	1,285
EBR	0	0	0	9	9	0	0	0	1	1
WBL	0	0	0	0	0	0	0	0	0	0
WBT	1,090	16	1,106	120	1,226	918	14	932	69	1,001
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	16	16	0	0	0	48	48
Departure	0	0	0	9	9	0	0	0	1	1
Total	0	0	0	25	25	0	0	0	49	49
East Leg										
Approach	1,090	16	1,106	120	1,226	918	14	932	69	1,001
Departure	900	14	914	86	1,000	1,180	18	1,198	135	1,333
Total	1,990	30	2,020	206	2,226	2,098	32	2,130	204	2,334
West Leg										
Approach	900	14	914	79	993	1,180	18	1,198	88	1,286
Departure	1,090	16	1,106	120	1,226	918	14	932	69	1,001
Total	1,990	30	2,020	199	2,219	2,098	32	2,130	157	2,287
Total Approaches										
Approach	1,990	30	2,020	215	2,235	2,098	32	2,130	205	2,335
Departure	1,990	30	2,020	215	2,235	2,098	32	2,130	205	2,335
Total	3,980	60	4,040	430	4,470	4,196	64	4,260	410	4,670

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
3 Project Driveway 3/Magnolia Avenue										
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	4	4	0	0	0	28	28
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	900	14	914	77	991	1,180	18	1,198	133	1,331
EBR	0	0	0	9	9	0	0	0	1	1
WBL	0	0	0	0	0	0	0	0	0	0
WBT	1,090	16	1,106	120	1,226	918	14	932	69	1,001
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	4	4	0	0	0	28	28
Departure	0	0	0	9	9	0	0	0	1	1
Total	0	0	0	13	13	0	0	0	29	29
East Leg										
Approach	1,090	16	1,106	120	1,226	918	14	932	69	1,001
Departure	900	14	914	81	995	1,180	18	1,198	161	1,359
Total	1,990	30	2,020	201	2,221	2,098	32	2,130	230	2,360
West Leg										
Approach	900	14	914	86	1,000	1,180	18	1,198	134	1,332
Departure	1,090	16	1,106	120	1,226	918	14	932	69	1,001
Total	1,990	30	2,020	206	2,226	2,098	32	2,130	203	2,333
Total Approaches										
Approach	1,990	30	2,020	210	2,230	2,098	32	2,130	231	2,361
Departure	1,990	30	2,020	210	2,230	2,098	32	2,130	231	2,361
Total	3,980	60	4,040	420	4,460	4,196	64	4,260	462	4,722

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
4 Pierce Street/SR-91 WB Ramps										
NBL	139	2	141	52	193	140	2	142	92	234
NBT	1,666	25	1,691	1	1,692	1,424	21	1,445	9	1,454
NBR	48	1	49	0	49	87	1	88	0	88
SBL	88	1	89	0	89	80	1	81	0	81
SBT	685	10	695	9	704	770	12	782	1	783
SBR	691	10	701	0	701	701	11	712	0	712
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	55	1	56	0	56	24	0	24	0	24
WBT	50	1	51	0	51	22	0	22	0	22
WBR	72	1	73	0	73	37	1	38	0	38
North Leg										
Approach	1,464	21	1,485	9	1,494	1,551	24	1,575	1	1,576
Departure	1,738	26	1,764	1	1,765	1,461	22	1,483	9	1,492
Total	3,202	47	3,249	10	3,259	3,012	46	3,058	10	3,068
South Leg										
Approach	1,853	28	1,881	53	1,934	1,651	24	1,675	101	1,776
Departure	740	11	751	9	760	794	12	806	1	807
Total	2,593	39	2,632	62	2,694	2,445	36	2,481	102	2,583
East Leg										
Approach	177	3	180	0	180	83	1	84	0	84
Departure	136	2	138	0	138	167	2	169	0	169
Total	313	5	318	0	318	250	3	253	0	253
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	880	13	893	52	945	863	13	876	92	968
Total	880	13	893	52	945	863	13	876	92	968
Total Approaches										
Approach	3,494	52	3,546	62	3,608	3,285	49	3,334	102	3,436
Departure	3,494	52	3,546	62	3,608	3,285	49	3,334	102	3,436
Total	6,988	104	7,092	124	7,216	6,570	98	6,668	204	6,872

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
5 Pierce Street/SR-91 EB Ramps										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	1,191	18	1,209	53	1,262	874	13	887	101	988
NBR	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0
SBT	747	11	758	9	767	797	12	809	1	810
SBR	0	0	0	0	0	0	0	0	0	0
EBL	661	10	671	0	671	772	12	784	0	784
EBT	0	0	0	0	0	0	0	0	0	0
EBR	164	2	166	50	216	150	2	152	13	165
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	747	11	758	9	767	797	12	809	1	810
Departure	1,852	28	1,880	53	1,933	1,646	25	1,671	101	1,772
Total	2,599	39	2,638	62	2,700	2,443	37	2,480	102	2,582
South Leg										
Approach	1,191	18	1,209	53	1,262	874	13	887	101	988
Departure	911	13	924	59	983	947	14	961	14	975
Total	2,102	31	2,133	112	2,245	1,821	27	1,848	115	1,963
East 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
West Leg										
Approach	825	12	837	50	887	922	14	936	13	949
Departure	0	0	0	0	0	0	0	0	0	0
Total	825	12	837	50	887	922	14	936	13	949
Total Approaches										
Approach	2,763	41	2,804	112	2,916	2,593	39	2,632	115	2,747
Departure	2,763	41	2,804	112	2,916	2,593	39	2,632	115	2,747
Total	5,526	82	5,608	224	5,832	5,186	78	5,264	230	5,494

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
6 Pierce Street/Magnolia Avenue										
NBL	75	1	76	16	92	53	1	54	48	102
NBT	387	6	393	27	420	263	4	267	51	318
NBR	184	3	187	24	211	95	1	96	32	128
SBL	298	4	302	0	302	451	7	458	0	458
SBT	285	4	289	30	319	266	4	270	7	277
SBR	268	4	272	29	301	192	3	195	7	202
EBL	364	5	369	27	396	331	5	336	51	387
EBT	510	8	518	44	562	800	12	812	108	920
EBR	26	0	26	10	36	49	1	50	2	52
WBL	218	3	221	12	233	151	2	153	4	157
WBT	747	11	758	74	832	673	10	683	14	697
WBR	426	6	432	0	432	236	4	240	0	240
North Leg										
Approach	851	12	863	59	922	909	14	923	14	937
Departure	1,177	17	1,194	54	1,248	830	13	843	102	945
Total	2,028	29	2,057	113	2,170	1,739	27	1,766	116	1,882
South Leg										
Approach	646	10	656	67	723	411	6	417	131	548
Departure	529	7	536	52	588	466	7	473	13	486
Total	1,175	17	1,192	119	1,311	877	13	890	144	1,034
East Leg										
Approach	1,391	20	1,411	86	1,497	1,060	16	1,076	18	1,094
Departure	992	15	1,007	68	1,075	1,346	20	1,366	140	1,506
Total	2,383	35	2,418	154	2,572	2,406	36	2,442	158	2,600
West Leg										
Approach	900	13	913	81	994	1,180	18	1,198	161	1,359
Departure	1,090	16	1,106	119	1,225	918	14	932	69	1,001
Total	1,990	29	2,019	200	2,219	2,098	32	2,130	230	2,360
Total Approaches										
Approach	3,788	55	3,843	293	4,136	3,560	54	3,614	324	3,938
Departure	3,788	55	3,843	293	4,136	3,560	54	3,614	324	3,938
Total	7,576	110	7,686	586	8,272	7,120	108	7,228	648	7,876

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
7 Pierce Street/Project Driveway 4										
NBL	1	0	1	0	1	0	0	0	0	0
NBT	676	10	686	67	753	410	6	416	131	547
NBR	3	0	3	0	3	2	0	2	0	2
SBL	2	0	2	0	2	4	0	4	0	4
SBT	469	7	476	34	510	436	7	443	11	454
SBR	0	0	0	18	18	0	0	0	3	3
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	1	0	1	0	1	1	0	1	0	1
WBT	0	0	0	0	0	0	0	0	0	0
WBR	2	0	2	0	2	16	0	16	0	16
North Leg										
Approach	471	7	478	52	530	440	7	447	14	461
Departure	678	10	688	67	755	426	6	432	131	563
Total	1,149	17	1,166	119	1,285	866	13	879	145	1,024
South Leg										
Approach	680	10	690	67	757	412	6	418	131	549
Departure	470	7	477	34	511	437	7	444	11	455
Total	1,150	17	1,167	101	1,268	849	13	862	142	1,004
East Leg										
Approach	3	0	3	0	3	17	0	17	0	17
Departure	5	0	5	0	5	6	0	6	0	6
Total	8	0	8	0	8	23	0	23	0	23
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	1	0	1	18	19	0	0	0	3	3
Total	1	0	1	18	19	0	0	0	3	3
Total Approaches										
Approach	1,154	17	1,171	119	1,290	869	13	882	145	1,027
Departure	1,154	17	1,171	119	1,290	869	13	882	145	1,027
Total	2,308	34	2,342	238	2,580	1,738	26	1,764	290	2,054

Table C-3- Project Completion Peak Hour PCE Volume Summary

	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project	Adjusted PCE Volume	Ambient Growth	Project Completion W/O Project	Project PCE Trips	Project Completion W/ Project
8 Pierce St./Project Dwy 5 - Sterling Ave.										
NBL	0	0	0	9	9	0	0	0	1	1
NBT	668	10	678	0	678	351	5	356	0	356
NBR	27	0	27	0	27	15	0	15	0	15
SBL	53	1	54	0	54	27	0	27	0	27
SBT	411	6	417	0	417	401	6	407	0	407
SBR	0	0	0	33	33	0	0	0	11	11
EBL	0	0	0	67	67	0	0	0	131	131
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	1	1	0	0	0	9	9
WBL	4	0	4	0	4	22	0	22	0	22
WBT	0	0	0	0	0	0	0	0	0	0
WBR	19	0	19	0	19	53	1	54	0	54
North Leg										
Approach	464	7	471	33	504	428	6	434	11	445
Departure	687	10	697	67	764	404	6	410	131	541
Total	1,151	17	1,168	100	1,268	832	12	844	142	986
South Leg										
Approach	695	10	705	9	714	366	5	371	1	372
Departure	415	6	421	1	422	423	6	429	9	438
Total	1,110	16	1,126	10	1,136	789	11	800	10	810
East Leg										
Approach	23	0	23	0	23	75	1	76	0	76
Departure	80	1	81	0	81	42	0	42	0	42
Total	103	1	104	0	104	117	1	118	0	118
West Leg										
Approach	0	0	0	68	68	0	0	0	140	140
Departure	0	0	0	42	42	0	0	0	12	12
Total	0	0	0	110	110	0	0	0	152	152
Total Approaches										
Approach	1,182	17	1,199	110	1,309	869	12	881	152	1,033
Departure	1,182	17	1,199	110	1,309	869	12	881	152	1,033
Total	2,364	34	2,398	220	2,618	1,738	24	1,762	304	2,066

58 Magnolia Industrial

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
1 Project Driveway 1/Magnolia Avenue										
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	51	51	0	0	0	83	83
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	914	8	922	27	949	1,198	13	1,211	5	1,216
EBR	0	0	0	9	9	0	0	0	1	1
WBL	0	0	0	104	104	0	0	0	21	21
WBT	1,106	10	1,116	16	1,132	932	8	940	48	988
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	51	51	0	0	0	83	83
Departure	0	0	0	113	113	0	0	0	22	22
Total	0	0	0	164	164	0	0	0	105	105
East Leg										
Approach	1,106	10	1,116	120	1,236	932	8	940	69	1,009
Departure	914	8	922	78	1,000	1,198	13	1,211	88	1,299
Total	2,020	18	2,038	198	2,236	2,130	21	2,151	157	2,308
West Leg										
Approach	914	8	922	36	958	1,198	13	1,211	6	1,217
Departure	1,106	10	1,116	16	1,132	932	8	940	48	988
Total	2,020	18	2,038	52	2,090	2,130	21	2,151	54	2,205
Total Approaches										
Approach	2,020	18	2,038	207	2,245	2,130	21	2,151	158	2,309
Departure	2,020	18	2,038	207	2,245	2,130	21	2,151	158	2,309
Total	4,040	36	4,076	414	4,490	4,260	42	4,302	316	4,618

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
2 Project Driveway 2/Magnolia Avenue										
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	16	16	0	0	0	48	48
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	914	8	922	70	992	1,198	13	1,211	87	1,298
EBR	0	0	0	9	9	0	0	0	1	1
WBL	0	0	0	0	0	0	0	0	0	0
WBT	1,106	10	1,116	120	1,236	932	8	940	69	1,009
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	16	16	0	0	0	48	48
Departure	0	0	0	9	9	0	0	0	1	1
Total	0	0	0	25	25	0	0	0	49	49
East Leg										
Approach	1,106	10	1,116	120	1,236	932	8	940	69	1,009
Departure	914	8	922	86	1,008	1,198	13	1,211	135	1,346
Total	2,020	18	2,038	206	2,244	2,130	21	2,151	204	2,355
West Leg										
Approach	914	8	922	79	1,001	1,198	13	1,211	88	1,299
Departure	1,106	10	1,116	120	1,236	932	8	940	69	1,009
Total	2,020	18	2,038	199	2,237	2,130	21	2,151	157	2,308
Total Approaches										
Approach	2,020	18	2,038	215	2,253	2,130	21	2,151	205	2,356
Departure	2,020	18	2,038	215	2,253	2,130	21	2,151	205	2,356
Total	4,040	36	4,076	430	4,506	4,260	42	4,302	410	4,712

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
3 Project Driveway 3/Magnolia Avenue										
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	4	4	0	0	0	28	28
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	914	8	922	77	999	1,198	13	1,211	133	1,344
EBR	0	0	0	9	9	0	0	0	1	1
WBL	0	0	0	0	0	0	0	0	0	0
WBT	1,106	10	1,116	120	1,236	932	8	940	69	1,009
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	4	4	0	0	0	28	28
Departure	0	0	0	9	9	0	0	0	1	1
Total	0	0	0	13	13	0	0	0	29	29
East Leg										
Approach	1,106	10	1,116	120	1,236	932	8	940	69	1,009
Departure	914	8	922	81	1,003	1,198	13	1,211	161	1,372
Total	2,020	18	2,038	201	2,239	2,130	21	2,151	230	2,381
West Leg										
Approach	914	8	922	86	1,008	1,198	13	1,211	134	1,345
Departure	1,106	10	1,116	120	1,236	932	8	940	69	1,009
Total	2,020	18	2,038	206	2,244	2,130	21	2,151	203	2,354
Total Approaches										
Approach	2,020	18	2,038	210	2,248	2,130	21	2,151	231	2,382
Departure	2,020	18	2,038	210	2,248	2,130	21	2,151	231	2,382
Total	4,040	36	4,076	420	4,496	4,260	42	4,302	462	4,764

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
4 Pierce Street/SR-91 WB Ramps										
NBL	141	6	147	52	199	142	4	146	92	238
NBT	1,691	0	1,691	1	1,692	1,445	0	1,445	9	1,454
NBR	49	0	49	0	49	88	0	88	0	88
SBL	89	0	89	0	89	81	0	81	0	81
SBT	695	0	695	9	704	782	0	782	1	783
SBR	701	0	701	0	701	712	0	712	0	712
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	56	0	56	0	56	24	0	24	0	24
WBT	51	0	51	0	51	22	0	22	0	22
WBR	73	0	73	0	73	38	0	38	0	38
North Leg										
Approach	1,485	0	1,485	9	1,494	1,575	0	1,575	1	1,576
Departure	1,764	0	1,764	1	1,765	1,483	0	1,483	9	1,492
Total	3,249	0	3,249	10	3,259	3,058	0	3,058	10	3,068
South Leg										
Approach	1,881	6	1,887	53	1,940	1,675	4	1,679	101	1,780
Departure	751	0	751	9	760	806	0	806	1	807
Total	2,632	6	2,638	62	2,700	2,481	4	2,485	102	2,587
East Leg										
Approach	180	0	180	0	180	84	0	84	0	84
Departure	138	0	138	0	138	169	0	169	0	169
Total	318	0	318	0	318	253	0	253	0	253
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	893	6	899	52	951	876	4	880	92	972
Total	893	6	899	52	951	876	4	880	92	972
Total Approaches										
Approach	3,546	6	3,552	62	3,614	3,334	4	3,338	102	3,440
Departure	3,546	6	3,552	62	3,614	3,334	4	3,338	102	3,440
Total	7,092	12	7,104	124	7,228	6,668	8	6,676	204	6,880

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
5 Pierce Street/SR-91 EB Ramps										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	1,209	6	1,215	53	1,268	887	4	891	101	992
NBR	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0
SBT	758	0	758	9	767	809	0	809	1	810
SBR	0	0	0	0	0	0	0	0	0	0
EBL	671	0	671	0	671	784	0	784	0	784
EBT	0	0	0	0	0	0	0	0	0	0
EBR	166	3	169	50	219	152	7	159	13	172
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	758	0	758	9	767	809	0	809	1	810
Departure	1,880	6	1,886	53	1,939	1,671	4	1,675	101	1,776
Total	2,638	6	2,644	62	2,706	2,480	4	2,484	102	2,586
South Leg										
Approach	1,209	6	1,215	53	1,268	887	4	891	101	992
Departure	924	3	927	59	986	961	7	968	14	982
Total	2,133	9	2,142	112	2,254	1,848	11	1,859	115	1,974
East 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
West Leg										
Approach	837	3	840	50	890	936	7	943	13	956
Departure	0	0	0	0	0	0	0	0	0	0
Total	837	3	840	50	890	936	7	943	13	956
Total Approaches										
Approach	2,804	9	2,813	112	2,925	2,632	11	2,643	115	2,758
Departure	2,804	9	2,813	112	2,925	2,632	11	2,643	115	2,758
Total	5,608	18	5,626	224	5,850	5,264	22	5,286	230	5,516

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
6 Pierce Street/Magnolia Avenue										
NBL	76	6	82	16	98	54	4	58	48	106
NBT	393	6	399	27	426	267	4	271	51	322
NBR	187	0	187	24	211	96	0	96	32	128
SBL	302	0	302	0	302	458	0	458	0	458
SBT	289	3	292	30	322	270	7	277	7	284
SBR	272	0	272	29	301	195	0	195	7	202
EBL	369	0	369	27	396	336	0	336	51	387
EBT	518	5	523	44	567	812	6	818	108	926
EBR	26	3	29	10	39	50	7	57	2	59
WBL	221	0	221	12	233	153	0	153	4	157
WBT	758	4	762	74	836	683	4	687	14	701
WBR	432	0	432	0	432	240	0	240	0	240
North Leg										
Approach	863	3	866	59	925	923	7	930	14	944
Departure	1,194	6	1,200	54	1,254	843	4	847	102	949
Total	2,057	9	2,066	113	2,179	1,766	11	1,777	116	1,893
South Leg										
Approach	656	12	668	67	735	417	8	425	131	556
Departure	536	6	542	52	594	473	14	487	13	500
Total	1,192	18	1,210	119	1,329	890	22	912	144	1,056
East Leg										
Approach	1,411	4	1,415	86	1,501	1,076	4	1,080	18	1,098
Departure	1,007	5	1,012	68	1,080	1,366	6	1,372	140	1,512
Total	2,418	9	2,427	154	2,581	2,442	10	2,452	158	2,610
West Leg										
Approach	913	8	921	81	1,002	1,198	13	1,211	161	1,372
Departure	1,106	10	1,116	119	1,235	932	8	940	69	1,009
Total	2,019	18	2,037	200	2,237	2,130	21	2,151	230	2,381
Total Approaches										
Approach	3,843	27	3,870	293	4,163	3,614	32	3,646	324	3,970
Departure	3,843	27	3,870	293	4,163	3,614	32	3,646	324	3,970
Total	7,686	54	7,740	586	8,326	7,228	64	7,292	648	7,940

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
7 Pierce Street/Project Driveway 4										
NBL	1	0	1	0	1	0	0	0	0	0
NBT	686	13	699	67	766	416	9	425	131	556
NBR	3	0	3	0	3	2	0	2	0	2
SBL	2	0	2	0	2	4	0	4	0	4
SBT	476	5	481	34	515	443	14	457	11	468
SBR	0	0	0	18	18	0	0	0	3	3
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	1	0	1	0	1	1	0	1	0	1
WBT	0	0	0	0	0	0	0	0	0	0
WBR	2	0	2	0	2	16	0	16	0	16
North Leg										
Approach	478	5	483	52	535	447	14	461	14	475
Departure	688	13	701	67	768	432	9	441	131	572
Total	1,166	18	1,184	119	1,303	879	23	902	145	1,047
South Leg										
Approach	690	13	703	67	770	418	9	427	131	558
Departure	477	5	482	34	516	444	14	458	11	469
Total	1,167	18	1,185	101	1,286	862	23	885	142	1,027
East Leg										
Approach	3	0	3	0	3	17	0	17	0	17
Departure	5	0	5	0	5	6	0	6	0	6
Total	8	0	8	0	8	23	0	23	0	23
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	1	0	1	18	19	0	0	0	3	3
Total	1	0	1	18	19	0	0	0	3	3
Total Approaches										
Approach	1,171	18	1,189	119	1,308	882	23	905	145	1,050
Departure	1,171	18	1,189	119	1,308	882	23	905	145	1,050
Total	2,342	36	2,378	238	2,616	1,764	46	1,810	290	2,100

Table C-4- Cumulative Conditions Peak Hour PCE Volume Summary

	Project Completion W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project	Existing (+) Ambient W/O Project	Cumulative Projects	Cumulative W/O Project	Project Trips	Cumulative W/ Project
8 Pierce St./Project Dwy 5 - Sterling Ave.										
NBL	0	0	0	9	9	0	0	0	1	1
NBT	678	13	691	0	691	356	9	365	0	365
NBR	27	0	27	0	27	15	0	15	0	15
SBL	54	0	54	0	54	27	0	27	0	27
SBT	417	5	422	0	422	407	14	421	0	421
SBR	0	0	0	33	33	0	0	0	11	11
EBL	0	0	0	67	67	0	0	0	131	131
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	1	1	0	0	0	9	9
WBL	4	0	4	0	4	22	0	22	0	22
WBT	0	0	0	0	0	0	0	0	0	0
WBR	19	0	19	0	19	54	0	54	0	54
North Leg										
Approach	471	5	476	33	509	434	14	448	11	459
Departure	697	13	710	67	777	410	9	419	131	550
Total	1,168	18	1,186	100	1,286	844	23	867	142	1,009
South Leg										
Approach	705	13	718	9	727	371	9	380	1	381
Departure	421	5	426	1	427	429	14	443	9	452
Total	1,126	18	1,144	10	1,154	800	23	823	10	833
East Leg										
Approach	23	0	23	0	23	76	0	76	0	76
Departure	81	0	81	0	81	42	0	42	0	42
Total	104	0	104	0	104	118	0	118	0	118
West Leg										
Approach	0	0	0	68	68	0	0	0	140	140
Departure	0	0	0	42	42	0	0	0	12	12
Total	0	0	0	110	110	0	0	0	152	152
Total Approaches										
Approach	1,199	18	1,217	110	1,327	881	23	904	152	1,056
Departure	1,199	18	1,217	110	1,327	881	23	904	152	1,056
Total	2,398	36	2,434	220	2,654	1,762	46	1,808	304	2,112

APPENDIX D:

LEVEL OF SERVICE WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	55	50	72	139	1666	48	88	685	691
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				61	56	80	154	1851	53	98	761	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				89	81	148	191	2440	70	140	2356	1054
Arrive On Green				0.09	0.09	0.09	0.14	0.91	0.91	0.08	0.65	0.00
Sat Flow, veh/h				965	886	1615	1810	3585	102	1810	3610	1615
Grp Volume(v), veh/h				117	0	80	154	928	976	98	761	0
Grp Sat Flow(s),veh/h/ln				1852	0	1615	1810	1805	1882	1810	1805	1615
Q Serve(g_s), s				4.9	0.0	3.8	6.6	12.3	12.7	4.2	7.4	0.0
Cycle Q Clear(g_c), s				4.9	0.0	3.8	6.6	12.3	12.7	4.2	7.4	0.0
Prop In Lane				0.52		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h				170	0	148	191	1229	1281	140	2356	1054
V/C Ratio(X)				0.69	0.00	0.54	0.81	0.76	0.76	0.70	0.32	0.00
Avail Cap(c_a), veh/h				370	0	323	294	1229	1281	158	2356	1054
HCM Platoon Ratio				1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.61	0.61	0.61	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.2	0.0	34.7	33.6	1.8	1.8	36.0	6.1	0.0
Incr Delay (d2), s/veh				4.9	0.0	3.0	5.7	2.7	2.7	11.0	0.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.7	0.0	1.8	3.6	6.1	6.8	2.5	3.7	0.0
LnGrp Delay(d),s/veh				40.1	0.0	37.7	39.2	4.5	4.5	47.0	6.5	0.0
LnGrp LOS				D		D	D	A	A	D	A	
Approach Vol, veh/h					197			2058			859	
Approach Delay, s/veh					39.1			7.1			11.1	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	10.2	58.4			12.5	56.2		11.3
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			13.0	39.0		16.0
Max Q Clear Time (g_c+I1), s	6.2	14.7			8.6	9.4		6.9
Green Ext Time (p_c), s	0.0	23.9			0.1	23.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	10.2
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	661	164	0	1191	747	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	474	495	0	1369	859	0
Adj No. of Lanes	1	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	607	542	0	2037	2037	0
Arrive On Green	0.34	0.34	0.00	0.75	0.56	0.00
Sat Flow, veh/h	1810	1615	0	3800	3800	0
Grp Volume(v), veh/h	474	495	0	1369	859	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	18.9	23.5	0.0	15.3	10.9	0.0
Cycle Q Clear(g_c), s	18.9	23.5	0.0	15.3	10.9	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	607	542	0	2037	2037	0
V/C Ratio(X)	0.78	0.91	0.00	0.67	0.42	0.00
Avail Cap(c_a), veh/h	656	585	0	2037	2037	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.61	0.94	0.00
Uniform Delay (d), s/veh	23.9	25.5	0.0	6.3	10.0	0.0
Incr Delay (d2), s/veh	5.6	18.1	0.0	1.1	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.3	13.2	0.0	7.7	5.5	0.0
LnGrp Delay(d),s/veh	29.5	43.5	0.0	7.4	10.6	0.0
LnGrp LOS	C	D		A	B	
Approach Vol, veh/h	969			1369	859	
Approach Delay, s/veh	36.7			7.4	10.6	
Approach LOS	D			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		49.1		30.9		49.1		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		43.0		29.0		43.0		
Max Q Clear Time (g_c+I1), s		17.3		25.5		12.9		
Green Ext Time (p_c), s		18.8		1.4		21.1		

Intersection Summary	
HCM 2010 Ctrl Delay	17.1
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	364	510	26	218	747	426	75	387	184	298	285	268
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	383	537	27	229	786	448	79	407	194	314	300	282
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	422	1309	66	273	1054	472	131	548	245	432	384	327
Arrive On Green	0.23	0.37	0.37	0.15	0.29	0.29	0.07	0.15	0.15	0.04	0.07	0.07
Sat Flow, veh/h	1810	3498	176	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	383	277	287	229	786	448	79	407	194	314	300	282
Grp Sat Flow(s),veh/h/ln	1810	1805	1869	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	16.5	9.1	9.1	9.8	15.8	14.9	3.4	8.6	6.5	7.1	12.4	13.8
Cycle Q Clear(g_c), s	16.5	9.1	9.1	9.8	15.8	14.9	3.4	8.6	6.5	7.1	12.4	13.8
Prop In Lane	1.00		0.09	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	422	676	700	273	1054	472	131	548	245	432	384	327
V/C Ratio(X)	0.91	0.41	0.41	0.84	0.75	0.95	0.60	0.74	0.79	0.73	0.78	0.86
Avail Cap(c_a), veh/h	452	676	700	407	1054	472	158	722	323	432	404	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	29.8	18.5	18.5	33.0	25.6	13.0	36.0	32.4	16.2	37.1	35.6	36.2
Incr Delay (d2), s/veh	21.0	1.8	1.8	9.4	4.8	30.7	4.4	2.9	9.5	5.6	8.4	17.8
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	10.7	4.8	5.1	5.6	8.6	10.6	1.8	4.5	3.5	3.8	7.5	7.8
LnGrp Delay(d),s/veh	50.8	20.3	20.3	42.5	30.4	43.7	40.4	35.4	25.7	42.6	44.0	54.0
LnGrp LOS	D	C	C	D	C	D	D	D	C	D	D	D
Approach Vol, veh/h		947			1463			680			896	
Approach Delay, s/veh		32.6			36.4			33.2			46.7	
Approach LOS		C			D			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	16.1	33.9	9.8	20.2	22.7	27.4	13.8	16.1
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	18.0	22.0	7.0	17.0	20.0	20.0	8.0	16.0
Max Q Clear Time (g_c+I1), s	11.8	11.1	5.4	15.8	18.5	17.8	9.1	10.6
Green Ext Time (p_c), s	0.3	7.0	0.0	0.3	0.2	1.8	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	37.3
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	2	676	3	2	469
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	2	835	4	2	579

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1420	419	0	0	838	0
Stage 1	836	-	-	-	-	-
Stage 2	584	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	140	589	-	-	805	-
Stage 1	391	-	-	-	-	-
Stage 2	561	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	139	589	-	-	805	-
Mov Cap-2 Maneuver	271	-	-	-	-	-
Stage 1	391	-	-	-	-	-
Stage 2	559	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	423	805	-
HCM Lane V/C Ratio	-	-	0.009	0.003	-
HCM Control Delay (s)	-	-	13.6	9.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	19	668	27	53	411
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	145	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	5	23	825	33	65	507

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1479	429	0	0	858	0
Stage 1	841	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	129	580	-	-	791	-
Stage 1	388	-	-	-	-	-
Stage 2	530	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	118	580	-	-	791	-
Mov Cap-2 Maneuver	250	-	-	-	-	-
Stage 1	388	-	-	-	-	-
Stage 2	486	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	472	791	-
HCM Lane V/C Ratio	-	-	0.06	0.083	-
HCM Control Delay (s)	-	-	13.1	10	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0.3	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	24	22	37	140	1424	87	80	770	701
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				27	24	41	156	1582	97	89	856	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				75	66	123	473	1945	119	382	1850	828
Arrive On Green				0.08	0.08	0.08	0.52	1.00	1.00	0.21	0.51	0.00
Sat Flow, veh/h				980	871	1615	1810	3457	211	1810	3610	1615
Grp Volume(v), veh/h				51	0	41	156	822	857	89	856	0
Grp Sat Flow(s),veh/h/ln				1851	0	1615	1810	1805	1863	1810	1805	1615
Q Serve(g_s), s				2.1	0.0	1.9	4.0	0.0	0.0	3.3	12.1	0.0
Cycle Q Clear(g_c), s				2.1	0.0	1.9	4.0	0.0	0.0	3.3	12.1	0.0
Prop In Lane				0.53		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h				141	0	123	473	1015	1048	382	1850	828
V/C Ratio(X)				0.36	0.00	0.33	0.33	0.81	0.82	0.23	0.46	0.00
Avail Cap(c_a), veh/h				370	0	323	473	1015	1048	382	1850	828
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.69	0.69	0.69	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.1	0.0	35.0	15.1	0.0	0.0	26.2	12.5	0.0
Incr Delay (d2), s/veh				1.6	0.0	1.6	0.3	4.9	5.0	0.3	0.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.9	1.9	1.4	1.5	1.7	6.2	0.0
LnGrp Delay(d),s/veh				36.7	0.0	36.6	15.3	4.9	5.0	26.5	13.3	0.0
LnGrp LOS				D		D	B	A	A	C	B	
Approach Vol, veh/h					92			1835			945	
Approach Delay, s/veh					36.6			5.9			14.5	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	20.9	49.0			24.9	45.0		10.1
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			11.0	41.0		16.0
Max Q Clear Time (g_c+I1), s	5.3	2.0			6.0	14.1		4.1
Green Ext Time (p_c), s	0.1	17.6			0.3	6.2		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	9.7
HCM 2010 LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	772	150	0	874	797	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	1048	0	0	1005	916	0
Adj No. of Lanes	2	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1229	548	0	2023	2023	0
Arrive On Green	0.34	0.00	0.00	1.00	0.56	0.00
Sat Flow, veh/h	3619	1615	0	3800	3800	0
Grp Volume(v), veh/h	1048	0	0	1005	916	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	21.5	0.0	0.0	0.0	12.0	0.0
Cycle Q Clear(g_c), s	21.5	0.0	0.0	0.0	12.0	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1229	548	0	2023	2023	0
V/C Ratio(X)	0.85	0.00	0.00	0.50	0.45	0.00
Avail Cap(c_a), veh/h	1629	727	0	2023	2023	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.72	0.94	0.00
Uniform Delay (d), s/veh	24.6	0.0	0.0	0.0	10.4	0.0
Incr Delay (d2), s/veh	3.6	0.0	0.0	0.6	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.4	0.0	0.0	0.2	6.0	0.0
LnGrp Delay(d),s/veh	28.1	0.0	0.0	0.6	11.0	0.0
LnGrp LOS	C			A	B	
Approach Vol, veh/h	1048			1005	916	
Approach Delay, s/veh	28.1			0.6	11.0	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.8		31.2		48.8		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		36.0		36.0		36.0		
Max Q Clear Time (g_c+I1), s		2.0		23.5		14.0		
Green Ext Time (p_c), s		19.1		3.6		14.5		

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	331	800	49	151	673	236	53	263	95	451	266	192
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	348	842	52	159	708	248	56	277	100	475	280	202
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	541	1479	91	196	857	384	113	410	184	527	383	325
Arrive On Green	0.30	0.43	0.43	0.11	0.24	0.24	0.06	0.11	0.11	0.25	0.34	0.34
Sat Flow, veh/h	1810	3454	213	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	348	440	454	159	708	248	56	277	100	475	280	202
Grp Sat Flow(s),veh/h/ln	1810	1805	1862	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	13.4	14.7	14.7	6.9	14.9	11.1	2.4	5.9	3.6	10.5	10.4	4.2
Cycle Q Clear(g_c), s	13.4	14.7	14.7	6.9	14.9	11.1	2.4	5.9	3.6	10.5	10.4	4.2
Prop In Lane	1.00		0.11	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	541	773	797	196	857	384	113	410	184	527	383	325
V/C Ratio(X)	0.64	0.57	0.57	0.81	0.83	0.65	0.50	0.67	0.54	0.90	0.73	0.62
Avail Cap(c_a), veh/h	541	773	797	226	857	384	158	722	323	527	499	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.87	0.87
Uniform Delay (d), s/veh	24.3	17.3	17.3	34.9	28.9	27.5	36.3	34.0	19.6	29.4	24.6	6.0
Incr Delay (d2), s/veh	2.6	3.0	2.9	17.6	8.9	8.2	3.4	1.9	2.5	16.7	3.4	1.7
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	7.1	8.0	8.2	4.4	8.4	5.8	1.3	3.0	1.7	6.3	5.7	1.9
LnGrp Delay(d),s/veh	27.0	20.3	20.2	52.5	37.9	35.6	39.7	36.0	22.1	46.1	28.0	7.7
LnGrp LOS	C	C	C	D	D	D	D	D	C	D	C	A
Approach Vol, veh/h		1242			1115			433			957	
Approach Delay, s/veh		22.2			39.4			33.2			32.7	
Approach LOS		C			D			C			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	12.7	38.2	9.0	20.1	27.9	23.0	16.0	13.1
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	26.0	7.0	21.0	17.0	19.0	12.0	16.0
Max Q Clear Time (g_c+I1), s	8.9	16.7	4.4	12.4	15.4	16.9	12.5	7.9
Green Ext Time (p_c), s	0.0	4.3	0.0	2.8	0.5	1.1	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	31.3
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	16	410	2	4	436
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	20	506	2	5	538

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1055	254	0	0	509	0
Stage 1	507	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	238	752	-	-	1066	-
Stage 1	576	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	236	752	-	-	1066	-
Mov Cap-2 Maneuver	371	-	-	-	-	-
Stage 1	576	-	-	-	-	-
Stage 2	579	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	709	1066	-
HCM Lane V/C Ratio	-	-	0.03	0.005	-
HCM Control Delay (s)	-	-	10.2	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	22	53	351	15	27	401
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	145	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	27	65	433	19	33	495

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1005	226	0	0	452	0
Stage 1	443	-	-	-	-	-
Stage 2	562	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	255	783	-	-	1119	-
Stage 1	620	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	247	783	-	-	1119	-
Mov Cap-2 Maneuver	380	-	-	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	558	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.1	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	597	1119	-
HCM Lane V/C Ratio	-	-	0.155	0.03	-
HCM Control Delay (s)	-	-	12.1	8.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	927	9	104	1106	0	51
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	927	9	104	1106	0	51

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	936	0	1693	468
Stage 1	-	-	-	-	932	-
Stage 2	-	-	-	-	761	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	740	-	86	547
Stage 1	-	-	-	-	348	-
Stage 2	-	-	-	-	427	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	740	-	55	547
Mov Cap-2 Maneuver	-	-	-	-	55	-
Stage 1	-	-	-	-	348	-
Stage 2	-	-	-	-	271	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	547	-	-	740	-
HCM Lane V/C Ratio	0.093	-	-	0.141	-
HCM Control Delay (s)	12.3	-	-	10.7	1.6
HCM Lane LOS	B	-	-	B	A
HCM 95th %tile Q(veh)	0.3	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	970	9	0	1210	0	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	970	9	0	1210	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	979	0	1580	490
Stage 1	-	-	-	-	975	-
Stage 2	-	-	-	-	605	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	713	-	102	529
Stage 1	-	-	-	-	331	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	713	-	102	529
Mov Cap-2 Maneuver	-	-	-	-	102	-
Stage 1	-	-	-	-	331	-
Stage 2	-	-	-	-	513	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	529	-	-	713	-
HCM Lane V/C Ratio	0.03	-	-	-	-
HCM Control Delay (s)	12	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	977	9	0	1210	0	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	977	9	0	1210	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	986	0	1587	493
Stage 1	-	-	-	-	982	-
Stage 2	-	-	-	-	605	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	709	-	101	527
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	709	-	101	527
Mov Cap-2 Maneuver	-	-	-	-	101	-
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	513	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	527	-	-	709	-
HCM Lane V/C Ratio	0.008	-	-	-	-
HCM Control Delay (s)	11.9	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	55	50	72	191	1667	48	88	694	691
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				61	56	80	212	1852	53	98	771	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				89	81	148	490	2016	57	354	1760	787
Arrive On Green				0.09	0.09	0.09	0.54	1.00	1.00	0.20	0.49	0.00
Sat Flow, veh/h				965	886	1615	1810	3585	102	1810	3610	1615
Grp Volume(v), veh/h				117	0	80	212	928	977	98	771	0
Grp Sat Flow(s),veh/h/ln				1852	0	1615	1810	1805	1882	1810	1805	1615
Q Serve(g_s), s				4.9	0.0	3.8	5.6	0.0	0.0	3.7	11.1	0.0
Cycle Q Clear(g_c), s				4.9	0.0	3.8	5.6	0.0	0.0	3.7	11.1	0.0
Prop In Lane				0.52		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h				170	0	148	490	1015	1059	354	1760	787
V/C Ratio(X)				0.69	0.00	0.54	0.43	0.91	0.92	0.28	0.44	0.00
Avail Cap(c_a), veh/h				370	0	323	490	1015	1059	354	1760	787
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.56	0.56	0.56	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.2	0.0	34.7	14.7	0.0	0.0	27.4	13.4	0.0
Incr Delay (d2), s/veh				4.9	0.0	3.0	0.3	8.7	9.1	0.4	0.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.7	0.0	1.8	2.8	2.5	2.7	1.9	5.7	0.0
LnGrp Delay(d),s/veh				40.1	0.0	37.7	15.0	8.7	9.1	27.8	14.2	0.0
LnGrp LOS				D		D	B	A	A	C	B	
Approach Vol, veh/h					197			2117			869	
Approach Delay, s/veh					39.1			9.5			15.7	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	19.7	49.0			25.7	43.0		11.3
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			13.0	39.0		16.0
Max Q Clear Time (g_c+I1), s	5.7	2.0			7.6	13.1		6.9
Green Ext Time (p_c), s	0.1	22.2			0.4	5.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.0
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	661	214	0	1244	756	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	503	521	0	1430	869	0
Adj No. of Lanes	1	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	635	567	0	1981	1981	0
Arrive On Green	0.35	0.35	0.00	0.73	0.55	0.00
Sat Flow, veh/h	1810	1615	0	3800	3800	0
Grp Volume(v), veh/h	503	521	0	1430	869	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	20.0	24.7	0.0	18.1	11.4	0.0
Cycle Q Clear(g_c), s	20.0	24.7	0.0	18.1	11.4	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	635	567	0	1981	1981	0
V/C Ratio(X)	0.79	0.92	0.00	0.72	0.44	0.00
Avail Cap(c_a), veh/h	679	606	0	1981	1981	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.55	0.94	0.00
Uniform Delay (d), s/veh	23.3	24.9	0.0	7.3	10.7	0.0
Incr Delay (d2), s/veh	6.0	18.6	0.0	1.3	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	13.9	0.0	9.1	5.9	0.0
LnGrp Delay(d),s/veh	29.3	43.4	0.0	8.6	11.4	0.0
LnGrp LOS	C	D		A	B	
Approach Vol, veh/h	1024			1430	869	
Approach Delay, s/veh	36.5			8.6	11.4	
Approach LOS	D			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		47.9		32.1		47.9		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		42.0		30.0		42.0		
Max Q Clear Time (g_c+I1), s		20.1		26.7		13.4		
Green Ext Time (p_c), s		17.0		1.4		20.9		

Intersection Summary	
HCM 2010 Ctrl Delay	17.9
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	391	554	36	230	821	426	91	414	208	298	315	297
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	412	583	38	242	864	448	96	436	219	314	332	313
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	476	1264	82	286	948	424	140	575	257	405	375	319
Arrive On Green	0.26	0.37	0.37	0.16	0.26	0.26	0.08	0.16	0.16	0.19	0.33	0.33
Sat Flow, veh/h	1810	3441	224	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	412	305	316	242	864	448	96	436	219	314	332	313
Grp Sat Flow(s),veh/h/ln	1810	1805	1860	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	17.4	10.3	10.3	10.4	18.6	21.0	4.1	9.2	7.3	6.8	13.2	8.4
Cycle Q Clear(g_c), s	17.4	10.3	10.3	10.4	18.6	21.0	4.1	9.2	7.3	6.8	13.2	8.4
Prop In Lane	1.00		0.12	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	476	663	683	286	948	424	140	575	257	405	375	319
V/C Ratio(X)	0.87	0.46	0.46	0.85	0.91	1.06	0.69	0.76	0.85	0.78	0.89	0.98
Avail Cap(c_a), veh/h	476	663	683	407	948	424	158	722	323	405	404	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	28.1	19.3	19.3	32.7	28.6	29.5	36.0	32.2	15.7	31.3	26.0	8.0
Incr Delay (d2), s/veh	15.4	2.3	2.2	10.8	14.4	59.5	10.1	3.6	16.0	8.4	17.9	40.2
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	10.7	5.5	5.7	6.0	11.1	16.3	2.4	4.9	4.4	3.7	8.8	7.1
LnGrp Delay(d),s/veh	43.5	21.6	21.5	43.5	43.0	89.0	46.1	35.8	31.7	39.7	43.9	48.2
LnGrp LOS	D	C	C	D	D	F	D	D	C	D	D	D
Approach Vol, veh/h		1033			1554			751			959	
Approach Delay, s/veh		30.3			56.3			35.9			43.9	
Approach LOS		C			E			D			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	16.7	33.4	10.2	19.8	25.0	25.0	13.2	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	18.0	22.0	7.0	17.0	19.0	21.0	8.0	16.0
Max Q Clear Time (g_c+I1), s	12.4	12.3	6.1	15.2	19.4	23.0	8.8	11.2
Green Ext Time (p_c), s	0.3	3.5	0.0	0.6	0.0	0.0	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	43.7
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	1	0	2	1	743	3	2	503	18
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	-	-	0	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	1	0	2	1	743	3	2	503	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	890	1264	512	1263	1272	373	521	0	0	746	0	0
Stage 1	516	516	-	747	747	-	-	-	-	-	-	-
Stage 2	374	748	-	516	525	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	253	171	566	138	169	630	1056	-	-	871	-	-
Stage 1	546	538	-	376	423	-	-	-	-	-	-	-
Stage 2	624	423	-	546	533	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	251	170	566	138	168	630	1056	-	-	871	-	-
Mov Cap-2 Maneuver	251	170	-	138	168	-	-	-	-	-	-	-
Stage 1	545	536	-	376	423	-	-	-	-	-	-	-
Stage 2	621	423	-	544	531	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	17.6	0	0
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1056	-	-	-	288	871	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.01	0.002	-	-
HCM Control Delay (s)	8.4	-	-	0	17.6	9.1	0	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	67	0	1	4	0	19	9	668	27	53	411	33
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	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	67	0	1	4	0	19	9	668	27	53	411	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	886	1247	428	1234	1250	348	444	0	0	695	0	0
Stage 1	534	534	-	700	700	-	-	-	-	-	-	-
Stage 2	352	713	-	534	550	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	254	175	631	145	174	654	1127	-	-	910	-	-
Stage 1	534	528	-	401	444	-	-	-	-	-	-	-
Stage 2	643	438	-	534	519	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	234	163	631	137	163	654	1127	-	-	910	-	-
Mov Cap-2 Maneuver	234	163	-	137	163	-	-	-	-	-	-	-
Stage 1	530	497	-	398	440	-	-	-	-	-	-	-
Stage 2	619	435	-	502	489	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26.3	14.7	0.1	1
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1127	-	-	236	395	910	-	-
HCM Lane V/C Ratio	0.008	-	-	0.288	0.058	0.058	-	-
HCM Control Delay (s)	8.2	-	-	26.3	14.7	9.2	-	-
HCM Lane LOS	A	-	-	D	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.2	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1185	1	21	966	0	83
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1185	1	21	966	0	83

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1186	0	1711	593
Stage 1	-	-	-	-	1186	-
Stage 2	-	-	-	-	525	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	596	-	83	454
Stage 1	-	-	-	-	256	-
Stage 2	-	-	-	-	564	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	596	-	77	454
Mov Cap-2 Maneuver	-	-	-	-	77	-
Stage 1	-	-	-	-	256	-
Stage 2	-	-	-	-	521	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	14.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	454	-	-	596	-
HCM Lane V/C Ratio	0.183	-	-	0.035	-
HCM Control Delay (s)	14.7	-	-	11.3	0.4
HCM Lane LOS	B	-	-	B	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1267	1	0	987	0	48
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1267	1	0	987	0	48

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1268	0	1762	634
Stage 1	-	-	-	-	1268	-
Stage 2	-	-	-	-	494	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	555	-	77	427
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	584	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	555	-	77	427
Mov Cap-2 Maneuver	-	-	-	-	77	-
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	584	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	427	-	-	555	-
HCM Lane V/C Ratio	0.112	-	-	-	-
HCM Control Delay (s)	14.5	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1313	1	0	987	0	28
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1313	1	0	987	0	28

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1314	0	1808	657
Stage 1	-	-	-	-	1314	-
Stage 2	-	-	-	-	494	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	533	-	72	412
Stage 1	-	-	-	-	219	-
Stage 2	-	-	-	-	584	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	533	-	72	412
Mov Cap-2 Maneuver	-	-	-	-	72	-
Stage 1	-	-	-	-	219	-
Stage 2	-	-	-	-	584	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	412	-	-	533	-
HCM Lane V/C Ratio	0.068	-	-	-	-
HCM Control Delay (s)	14.4	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	24	22	37	232	1433	87	80	771	701
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				27	24	41	258	1592	97	89	857	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				75	66	123	586	1945	118	382	1624	727
Arrive On Green				0.08	0.08	0.08	0.65	1.00	1.00	0.21	0.45	0.00
Sat Flow, veh/h				980	871	1615	1810	3458	210	1810	3610	1615
Grp Volume(v), veh/h				51	0	41	258	827	862	89	857	0
Grp Sat Flow(s),veh/h/ln				1851	0	1615	1810	1805	1863	1810	1805	1615
Q Serve(g_s), s				2.1	0.0	1.9	5.6	0.0	0.0	3.3	13.7	0.0
Cycle Q Clear(g_c), s				2.1	0.0	1.9	5.6	0.0	0.0	3.3	13.7	0.0
Prop In Lane				0.53		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h				141	0	123	586	1015	1048	382	1625	727
V/C Ratio(X)				0.36	0.00	0.33	0.44	0.81	0.82	0.23	0.53	0.00
Avail Cap(c_a), veh/h				370	0	323	586	1015	1048	382	1625	727
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.65	0.65	0.65	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.1	0.0	35.0	10.5	0.0	0.0	26.2	15.9	0.0
Incr Delay (d2), s/veh				1.6	0.0	1.6	0.3	4.8	4.9	0.3	1.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.9	2.8	1.4	1.4	1.7	7.1	0.0
LnGrp Delay(d),s/veh				36.7	0.0	36.6	10.9	4.8	4.9	26.5	17.1	0.0
LnGrp LOS				D		D	B	A	A	C	B	
Approach Vol, veh/h					92			1947			946	
Approach Delay, s/veh					36.6			5.6			18.0	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	20.9	49.0			29.9	40.0		10.1
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			16.0	36.0		16.0
Max Q Clear Time (g_c+I1), s	5.3	2.0			7.6	15.7		4.1
Green Ext Time (p_c), s	0.2	17.8			0.7	5.6		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.5
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	772	163	0	975	798	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	1062	0	0	1121	917	0
Adj No. of Lanes	2	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1238	552	0	2014	2014	0
Arrive On Green	0.34	0.00	0.00	0.74	0.56	0.00
Sat Flow, veh/h	3619	1615	0	3800	3800	0
Grp Volume(v), veh/h	1062	0	0	1121	917	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	21.9	0.0	0.0	10.9	12.0	0.0
Cycle Q Clear(g_c), s	21.9	0.0	0.0	10.9	12.0	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1238	552	0	2014	2014	0
V/C Ratio(X)	0.86	0.00	0.00	0.56	0.46	0.00
Avail Cap(c_a), veh/h	1583	707	0	2014	2014	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.66	0.92	0.00
Uniform Delay (d), s/veh	24.5	0.0	0.0	6.0	10.5	0.0
Incr Delay (d2), s/veh	4.0	0.0	0.0	0.7	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.6	0.0	0.0	5.4	6.2	0.0
LnGrp Delay(d),s/veh	28.5	0.0	0.0	6.7	11.2	0.0
LnGrp LOS	C			A	B	
Approach Vol, veh/h	1062			1121	917	
Approach Delay, s/veh	28.5			6.7	11.2	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.6		31.4		48.6		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		37.0		35.0		37.0		
Max Q Clear Time (g_c+I1), s		12.9		23.9		14.0		
Green Ext Time (p_c), s		16.4		3.5		15.8		

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	382	908	51	155	687	236	101	314	127	451	273	199
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	402	956	54	163	723	248	106	331	134	475	287	209
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	552	1457	82	200	812	363	143	469	210	492	363	308
Arrive On Green	0.30	0.42	0.42	0.11	0.22	0.22	0.08	0.13	0.13	0.23	0.32	0.32
Sat Flow, veh/h	1810	3474	196	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	402	497	513	163	723	248	106	331	134	475	287	209
Grp Sat Flow(s),veh/h/ln	1810	1805	1865	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	15.9	17.6	17.6	7.0	15.5	11.2	4.6	7.0	4.8	10.7	11.0	4.5
Cycle Q Clear(g_c), s	15.9	17.6	17.6	7.0	15.5	11.2	4.6	7.0	4.8	10.7	11.0	4.5
Prop In Lane	1.00		0.11	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	552	757	782	200	812	363	143	469	210	492	363	308
V/C Ratio(X)	0.73	0.66	0.66	0.82	0.89	0.68	0.74	0.71	0.64	0.97	0.79	0.68
Avail Cap(c_a), veh/h	552	757	782	226	812	363	158	722	323	492	475	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.87	0.87
Uniform Delay (d), s/veh	24.8	18.6	18.6	34.8	30.0	28.4	36.0	33.3	19.0	30.5	25.8	6.3
Incr Delay (d2), s/veh	4.8	4.4	4.3	18.3	14.0	10.0	15.2	2.0	3.2	29.3	5.8	2.6
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	8.7	9.6	9.9	4.5	9.3	6.0	2.9	3.6	2.3	7.2	6.3	2.2
LnGrp Delay(d),s/veh	29.7	23.0	22.9	53.1	44.0	38.3	51.2	35.3	22.2	59.7	31.6	8.8
LnGrp LOS	C	C	C	D	D	D	D	D	C	E	C	A
Approach Vol, veh/h		1412			1134			571			971	
Approach Delay, s/veh		24.9			44.1			35.2			40.5	
Approach LOS		C			D			D			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	12.8	37.5	10.3	19.3	28.4	22.0	15.2	14.4
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	27.0	7.0	20.0	19.0	18.0	11.0	16.0
Max Q Clear Time (g_c+I1), s	19.0	19.6	6.6	13.0	17.9	17.5	12.7	9.0
Green Ext Time (p_c), s	0.0	4.2	0.0	2.3	0.2	0.3	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	35.3
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	1	0	16	0	541	2	4	447	3
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	-	-	0	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	1	0	16	0	541	2	4	447	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	728	1000	449	999	1000	272	450	0	0	543	0	0
Stage 1	457	457	-	542	542	-	-	-	-	-	-	-
Stage 2	271	543	-	457	458	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	328	245	614	212	245	732	1121	-	-	1036	-	-
Stage 1	587	571	-	497	523	-	-	-	-	-	-	-
Stage 2	717	523	-	587	570	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	320	244	614	211	244	732	1121	-	-	1036	-	-
Mov Cap-2 Maneuver	320	244	-	211	244	-	-	-	-	-	-	-
Stage 1	587	568	-	497	523	-	-	-	-	-	-	-
Stage 2	701	523	-	584	567	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	10.8	0	0.1
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1121	-	-	-	639	1036	-	-
HCM Lane V/C Ratio	-	-	-	-	0.027	0.004	-	-
HCM Control Delay (s)	0	-	-	0	10.8	8.5	0	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	131	0	9	22	0	53	1	351	15	27	401	11
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	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	131	0	9	22	0	53	1	351	15	27	401	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	639	829	407	826	827	183	412	0	0	366	0	0
Stage 1	461	461	-	361	361	-	-	-	-	-	-	-
Stage 2	178	368	-	465	466	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	378	308	648	280	309	834	1158	-	-	1204	-	-
Stage 1	584	569	-	636	629	-	-	-	-	-	-	-
Stage 2	812	625	-	581	566	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	348	301	648	271	302	834	1158	-	-	1204	-	-
Mov Cap-2 Maneuver	348	301	-	271	302	-	-	-	-	-	-	-
Stage 1	583	556	-	635	628	-	-	-	-	-	-	-
Stage 2	760	624	-	560	553	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.3	13.1	0	0.5
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1158	-	-	359	518	1204	-	-
HCM Lane V/C Ratio	0.001	-	-	0.39	0.145	0.022	-	-
HCM Control Delay (s)	8.1	-	-	21.3	13.1	8.1	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.8	0.5	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	56	51	73	141	1691	49	89	695	701
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				62	57	81	157	1879	54	99	772	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				90	82	150	420	2016	58	352	1895	848
Arrive On Green				0.09	0.09	0.09	0.46	1.00	1.00	0.19	0.52	0.00
Sat Flow, veh/h				965	887	1615	1810	3584	103	1810	3610	1615
Grp Volume(v), veh/h				119	0	81	157	942	991	99	772	0
Grp Sat Flow(s),veh/h/ln				1852	0	1615	1810	1805	1882	1810	1805	1615
Q Serve(g_s), s				5.0	0.0	3.8	4.5	0.0	0.0	3.7	10.3	0.0
Cycle Q Clear(g_c), s				5.0	0.0	3.8	4.5	0.0	0.0	3.7	10.3	0.0
Prop In Lane				0.52		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h				172	0	150	420	1015	1059	352	1895	848
V/C Ratio(X)				0.69	0.00	0.54	0.37	0.93	0.94	0.28	0.41	0.00
Avail Cap(c_a), veh/h				370	0	323	420	1015	1059	352	1895	848
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.60	0.60	0.60	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.2	0.0	34.6	17.7	0.0	0.0	27.5	11.5	0.0
Incr Delay (d2), s/veh				4.9	0.0	3.0	0.3	10.3	10.8	0.4	0.7	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.8	0.0	1.8	2.2	2.9	3.2	1.9	5.3	0.0
LnGrp Delay(d),s/veh				40.0	0.0	37.6	18.0	10.3	10.8	27.9	12.1	0.0
LnGrp LOS				D		D	B	B	B	C	B	
Approach Vol, veh/h					200			2090			871	
Approach Delay, s/veh					39.1			11.1			13.9	
Approach LOS					D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	19.6	49.0			22.6	46.0		11.4
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			10.0	42.0		16.0
Max Q Clear Time (g_c+I1), s	5.7	2.0			6.5	12.3		7.0
Green Ext Time (p_c), s	0.1	22.8			0.2	5.5		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.7
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	671	166	0	1209	758	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	481	502	0	1390	871	0
Adj No. of Lanes	1	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	613	547	0	2025	2025	0
Arrive On Green	0.34	0.34	0.00	0.75	0.56	0.00
Sat Flow, veh/h	1810	1615	0	3800	3800	0
Grp Volume(v), veh/h	481	502	0	1390	871	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	19.1	23.9	0.0	16.0	11.2	0.0
Cycle Q Clear(g_c), s	19.1	23.9	0.0	16.0	11.2	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	613	547	0	2025	2025	0
V/C Ratio(X)	0.78	0.92	0.00	0.69	0.43	0.00
Avail Cap(c_a), veh/h	656	585	0	2025	2025	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.59	0.95	0.00
Uniform Delay (d), s/veh	23.8	25.4	0.0	6.5	10.2	0.0
Incr Delay (d2), s/veh	5.8	18.8	0.0	1.1	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.5	13.5	0.0	8.0	5.7	0.0
LnGrp Delay(d),s/veh	29.7	44.1	0.0	7.6	10.8	0.0
LnGrp LOS	C	D		A	B	
Approach Vol, veh/h	983			1390	871	
Approach Delay, s/veh	37.0			7.6	10.8	
Approach LOS	D			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.9		31.1		48.9		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		43.0		29.0		43.0		
Max Q Clear Time (g_c+I1), s		18.0		25.9		13.2		
Green Ext Time (p_c), s		18.6		1.3		21.3		

Intersection Summary	
HCM 2010 Ctrl Delay	17.4
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	369	518	26	221	758	432	76	393	187	302	289	272
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	388	545	27	233	798	455	80	414	197	318	304	286
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	502	1354	67	277	948	424	132	554	248	374	356	302
Arrive On Green	0.28	0.39	0.39	0.15	0.26	0.26	0.07	0.15	0.15	0.18	0.31	0.31
Sat Flow, veh/h	1810	3501	173	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	388	281	291	233	798	455	80	414	197	318	304	286
Grp Sat Flow(s),veh/h/ln	1810	1805	1869	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	15.8	9.0	9.1	10.0	16.7	21.0	3.4	8.8	6.6	7.0	12.0	7.4
Cycle Q Clear(g_c), s	15.8	9.0	9.1	10.0	16.7	21.0	3.4	8.8	6.6	7.0	12.0	7.4
Prop In Lane	1.00		0.09	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	502	698	723	277	948	424	132	554	248	374	356	302
V/C Ratio(X)	0.77	0.40	0.40	0.84	0.84	1.07	0.61	0.75	0.79	0.85	0.85	0.95
Avail Cap(c_a), veh/h	502	698	723	407	948	424	158	722	323	374	404	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	26.6	17.8	17.8	32.9	27.9	29.5	36.0	32.4	16.0	32.3	26.5	7.8
Incr Delay (d2), s/veh	7.3	1.7	1.7	9.9	9.0	64.7	4.6	3.1	9.9	15.6	13.7	30.9
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	8.9	4.8	4.9	5.7	9.5	16.9	1.9	4.6	3.6	4.2	7.5	5.7
LnGrp Delay(d),s/veh	33.9	19.5	19.5	42.8	36.9	94.2	40.6	35.5	25.9	47.9	40.2	38.7
LnGrp LOS	C	B	B	D	D	F	D	D	C	D	D	D
Approach Vol, veh/h		960			1486			691			908	
Approach Delay, s/veh		25.3			55.4			33.3			42.4	
Approach LOS		C			E			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	16.3	34.9	9.8	19.0	26.2	25.0	12.5	16.3
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	18.0	22.0	7.0	17.0	19.0	21.0	8.0	16.0
Max Q Clear Time (g_c+I1), s	12.0	11.1	5.4	14.0	17.8	23.0	9.0	10.8
Green Ext Time (p_c), s	0.3	3.4	0.0	1.0	0.3	0.0	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	41.6
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	2	686	3	2	476
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	2	847	4	2	588

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1442	425	0	0	851	0
Stage 1	849	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	136	583	-	-	796	-
Stage 1	385	-	-	-	-	-
Stage 2	556	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	135	583	-	-	796	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	385	-	-	-	-	-
Stage 2	554	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	417	796	-
HCM Lane V/C Ratio	-	-	0.009	0.003	-
HCM Control Delay (s)	-	-	13.7	9.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	19	678	27	54	417
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	145	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	5	23	837	33	67	515

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1502	435	0	0	870	0
Stage 1	854	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	125	575	-	-	783	-
Stage 1	382	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	114	575	-	-	783	-
Mov Cap-2 Maneuver	245	-	-	-	-	-
Stage 1	382	-	-	-	-	-
Stage 2	479	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	466	783	-
HCM Lane V/C Ratio	-	-	0.061	0.085	-
HCM Control Delay (s)	-	-	13.2	10	-
HCM Lane LOS	-	-	B	B	-
HCM 95th %tile Q(veh)	-	-	0.2	0.3	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	24	22	38	142	1445	88	81	782	712
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				27	24	42	158	1606	98	90	869	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				75	67	123	450	1945	118	382	1895	848
Arrive On Green				0.08	0.08	0.08	0.50	1.00	1.00	0.21	0.52	0.00
Sat Flow, veh/h				980	871	1615	1810	3458	210	1810	3610	1615
Grp Volume(v), veh/h				51	0	42	158	834	870	90	869	0
Grp Sat Flow(s),veh/h/ln				1851	0	1615	1810	1805	1863	1810	1805	1615
Q Serve(g_s), s				2.1	0.0	2.0	4.3	0.0	0.0	3.3	12.0	0.0
Cycle Q Clear(g_c), s				2.1	0.0	2.0	4.3	0.0	0.0	3.3	12.0	0.0
Prop In Lane				0.53		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h				141	0	123	450	1015	1048	382	1895	848
V/C Ratio(X)				0.36	0.00	0.34	0.35	0.82	0.83	0.24	0.46	0.00
Avail Cap(c_a), veh/h				370	0	323	450	1015	1048	382	1895	848
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.68	0.68	0.68	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.1	0.0	35.0	16.2	0.0	0.0	26.2	11.9	0.0
Incr Delay (d2), s/veh				1.5	0.0	1.6	0.3	5.2	5.4	0.3	0.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.9	2.1	1.5	1.6	1.7	6.1	0.0
LnGrp Delay(d),s/veh				36.6	0.0	36.6	16.5	5.2	5.4	26.5	12.7	0.0
LnGrp LOS				D		D	B	A	A	C	B	
Approach Vol, veh/h					93			1862			959	
Approach Delay, s/veh					36.6			6.2			14.0	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	20.9	49.0			23.9	46.0		10.1
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			10.0	42.0		16.0
Max Q Clear Time (g_c+I1), s	5.3	2.0			6.3	14.0		4.1
Green Ext Time (p_c), s	0.1	18.1			0.2	6.3		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	9.8
HCM 2010 LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	784	152	0	887	809	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	1064	0	0	1020	930	0
Adj No. of Lanes	2	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1245	555	0	2008	2008	0
Arrive On Green	0.34	0.00	0.00	1.00	0.56	0.00
Sat Flow, veh/h	3619	1615	0	3800	3800	0
Grp Volume(v), veh/h	1064	0	0	1020	930	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	21.9	0.0	0.0	0.0	12.3	0.0
Cycle Q Clear(g_c), s	21.9	0.0	0.0	0.0	12.3	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1245	555	0	2008	2008	0
V/C Ratio(X)	0.85	0.00	0.00	0.51	0.46	0.00
Avail Cap(c_a), veh/h	1629	727	0	2008	2008	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.70	0.94	0.00
Uniform Delay (d), s/veh	24.4	0.0	0.0	0.0	10.6	0.0
Incr Delay (d2), s/veh	3.7	0.0	0.0	0.6	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.4	0.0	0.0	0.2	6.3	0.0
LnGrp Delay(d),s/veh	28.1	0.0	0.0	0.6	11.3	0.0
LnGrp LOS	C			A	B	
Approach Vol, veh/h	1064			1020	930	
Approach Delay, s/veh	28.1			0.6	11.3	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.5		31.5		48.5		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		36.0		36.0		36.0		
Max Q Clear Time (g_c+I1), s		2.0		23.9		14.3		
Green Ext Time (p_c), s		19.5		3.7		14.6		

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	336	812	50	153	683	240	54	267	96	458	270	195
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	354	855	53	161	719	253	57	281	101	482	284	205
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	539	1122	70	380	857	384	114	415	186	527	384	326
Arrive On Green	0.30	0.32	0.32	0.21	0.24	0.24	0.06	0.11	0.11	0.25	0.34	0.34
Sat Flow, veh/h	1810	3453	214	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	354	447	461	161	719	253	57	281	101	482	284	205
Grp Sat Flow(s),veh/h/ln	1810	1805	1862	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	13.7	17.8	17.8	6.2	15.2	11.3	2.4	6.0	4.7	10.7	10.6	4.3
Cycle Q Clear(g_c), s	13.7	17.8	17.8	6.2	15.2	11.3	2.4	6.0	4.7	10.7	10.6	4.3
Prop In Lane	1.00		0.11	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	539	587	605	380	857	384	114	415	186	527	384	326
V/C Ratio(X)	0.66	0.76	0.76	0.42	0.84	0.66	0.50	0.68	0.54	0.92	0.74	0.63
Avail Cap(c_a), veh/h	539	587	605	380	857	384	158	722	323	527	499	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.86	0.86
Uniform Delay (d), s/veh	24.5	24.2	24.2	27.4	29.0	27.6	36.3	34.0	33.4	29.5	24.6	6.0
Incr Delay (d2), s/veh	2.9	9.0	8.8	0.7	9.6	8.6	3.4	1.9	2.5	18.5	3.6	1.7
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	7.2	10.3	10.6	3.2	8.6	6.0	1.3	3.1	2.2	6.5	5.9	2.0
LnGrp Delay(d),s/veh	27.4	33.3	33.0	28.1	38.7	36.2	39.7	35.9	35.9	48.0	28.3	7.7
LnGrp LOS	C	C	C	C	D	D	D	D	D	D	C	A
Approach Vol, veh/h		1262			1133			439			971	
Approach Delay, s/veh		31.5			36.6			36.4			33.7	
Approach LOS		C			D			D			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	20.8	30.0	9.0	20.2	27.8	23.0	16.0	13.2
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	16.8	26.0	7.0	21.0	17.0	19.0	12.0	16.0
Max Q Clear Time (g_c+I1), s	8.2	19.8	4.4	12.6	15.7	17.2	12.7	8.0
Green Ext Time (p_c), s	0.4	2.8	0.0	2.8	0.3	1.0	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	34.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	16	416	2	4	443
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	20	514	2	5	547

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1072	258	0	0	516	0
Stage 1	515	-	-	-	-	-
Stage 2	557	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	232	747	-	-	1060	-
Stage 1	570	-	-	-	-	-
Stage 2	578	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	230	747	-	-	1060	-
Mov Cap-2 Maneuver	366	-	-	-	-	-
Stage 1	570	-	-	-	-	-
Stage 2	574	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	704	1060	-
HCM Lane V/C Ratio	-	-	0.03	0.005	-
HCM Control Delay (s)	-	-	10.3	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	22	54	356	15	27	407
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	145	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	27	67	440	19	33	502

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1018	229	0	0	458	0
Stage 1	449	-	-	-	-	-
Stage 2	569	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	251	780	-	-	1114	-
Stage 1	616	-	-	-	-	-
Stage 2	570	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	244	780	-	-	1114	-
Mov Cap-2 Maneuver	377	-	-	-	-	-
Stage 1	616	-	-	-	-	-
Stage 2	553	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.2	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	596	1114	-
HCM Lane V/C Ratio	-	-	0.157	0.03	-
HCM Control Delay (s)	-	-	12.2	8.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	0.1	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	941	9	104	1122	0	51
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	941	9	104	1122	0	51

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	950	0	1715	475
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	769	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	731	-	83	541
Stage 1	-	-	-	-	343	-
Stage 2	-	-	-	-	423	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	731	-	52	541
Mov Cap-2 Maneuver	-	-	-	-	52	-
Stage 1	-	-	-	-	343	-
Stage 2	-	-	-	-	263	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	541	-	-	731	-
HCM Lane V/C Ratio	0.094	-	-	0.142	-
HCM Control Delay (s)	12.3	-	-	10.7	1.7
HCM Lane LOS	B	-	-	B	A
HCM 95th %tile Q(veh)	0.3	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	984	9	0	1226	0	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	984	9	0	1226	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	993	0	1602	497
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	704	-	98	524
Stage 1	-	-	-	-	325	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	704	-	98	524
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	325	-
Stage 2	-	-	-	-	509	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	524	-	-	704	-
HCM Lane V/C Ratio	0.031	-	-	-	-
HCM Control Delay (s)	12.1	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	991	9	0	1226	0	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	991	9	0	1226	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1000	0	1609	500
Stage 1	-	-	-	-	996	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	700	-	97	522
Stage 1	-	-	-	-	323	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	700	-	97	522
Mov Cap-2 Maneuver	-	-	-	-	97	-
Stage 1	-	-	-	-	323	-
Stage 2	-	-	-	-	509	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	522	-	-	700	-
HCM Lane V/C Ratio	0.008	-	-	-	-
HCM Control Delay (s)	12	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	56	51	73	193	1692	49	89	704	701
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				62	57	81	214	1880	54	99	782	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				90	82	150	488	2016	58	352	1760	787
Arrive On Green				0.09	0.09	0.09	0.54	1.00	1.00	0.19	0.49	0.00
Sat Flow, veh/h				965	887	1615	1810	3584	102	1810	3610	1615
Grp Volume(v), veh/h				119	0	81	214	942	992	99	782	0
Grp Sat Flow(s),veh/h/ln				1852	0	1615	1810	1805	1882	1810	1805	1615
Q Serve(g_s), s				5.0	0.0	3.8	5.7	0.0	0.0	3.7	11.3	0.0
Cycle Q Clear(g_c), s				5.0	0.0	3.8	5.7	0.0	0.0	3.7	11.3	0.0
Prop In Lane				0.52		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h				172	0	150	488	1015	1059	352	1760	787
V/C Ratio(X)				0.69	0.00	0.54	0.44	0.93	0.94	0.28	0.44	0.00
Avail Cap(c_a), veh/h				370	0	323	488	1015	1059	352	1760	787
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.55	0.55	0.55	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.2	0.0	34.6	14.8	0.0	0.0	27.5	13.4	0.0
Incr Delay (d2), s/veh				4.9	0.0	3.0	0.3	9.7	10.2	0.4	0.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.8	0.0	1.8	2.8	2.7	3.0	1.9	5.8	0.0
LnGrp Delay(d),s/veh				40.0	0.0	37.6	15.1	9.7	10.2	27.9	14.2	0.0
LnGrp LOS				D		D	B	A	B	C	B	
Approach Vol, veh/h					200			2148			881	
Approach Delay, s/veh					39.1			10.5			15.8	
Approach LOS					D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	19.6	49.0			25.6	43.0		11.4
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			13.0	39.0		16.0
Max Q Clear Time (g_c+I1), s	5.7	2.0			7.7	13.3		7.0
Green Ext Time (p_c), s	0.1	22.9			0.4	5.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.7
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	671	216	0	1262	767	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	510	528	0	1451	882	0
Adj No. of Lanes	1	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	641	572	0	1970	1970	0
Arrive On Green	0.35	0.35	0.00	0.73	0.55	0.00
Sat Flow, veh/h	1810	1615	0	3800	3800	0
Grp Volume(v), veh/h	510	528	0	1451	882	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	20.3	25.1	0.0	19.0	11.8	0.0
Cycle Q Clear(g_c), s	20.3	25.1	0.0	19.0	11.8	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	641	572	0	1970	1970	0
V/C Ratio(X)	0.80	0.92	0.00	0.74	0.45	0.00
Avail Cap(c_a), veh/h	679	606	0	1970	1970	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.54	0.94	0.00
Uniform Delay (d), s/veh	23.2	24.8	0.0	7.6	10.9	0.0
Incr Delay (d2), s/veh	6.2	19.3	0.0	1.4	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	14.2	0.0	9.5	5.9	0.0
LnGrp Delay(d),s/veh	29.5	44.1	0.0	8.9	11.6	0.0
LnGrp LOS	C	D		A	B	
Approach Vol, veh/h	1038			1451	882	
Approach Delay, s/veh	36.9			8.9	11.6	
Approach LOS	D			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		47.7		32.3		47.7		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		42.0		30.0		42.0		
Max Q Clear Time (g_c+I1), s		21.0		27.1		13.8		
Green Ext Time (p_c), s		16.7		1.3		21.0		

Intersection Summary	
HCM 2010 Ctrl Delay	18.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	396	562	36	233	832	432	92	420	211	302	319	301
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	417	592	38	245	876	455	97	442	222	318	336	317
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	472	947	61	449	948	424	140	620	277	369	379	322
Arrive On Green	0.26	0.28	0.28	0.25	0.26	0.26	0.08	0.17	0.17	0.18	0.33	0.33
Sat Flow, veh/h	1810	3445	221	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	417	310	320	245	876	455	97	442	222	318	336	317
Grp Sat Flow(s),veh/h/ln	1810	1805	1861	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	17.7	12.0	12.1	9.4	18.9	21.0	4.2	9.2	10.6	7.0	13.4	8.6
Cycle Q Clear(g_c), s	17.7	12.0	12.1	9.4	18.9	21.0	4.2	9.2	10.6	7.0	13.4	8.6
Prop In Lane	1.00		0.12	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	472	496	512	449	948	424	140	620	277	369	379	322
V/C Ratio(X)	0.88	0.62	0.63	0.55	0.92	1.07	0.69	0.71	0.80	0.86	0.89	0.98
Avail Cap(c_a), veh/h	472	496	512	449	948	424	158	722	323	369	404	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	28.4	25.4	25.4	26.2	28.7	29.5	36.0	31.3	31.8	32.4	25.8	8.0
Incr Delay (d2), s/veh	17.8	5.8	5.7	1.4	15.8	64.7	10.6	2.8	11.7	16.8	18.1	40.7
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	11.1	6.7	6.9	4.9	11.5	16.9	2.5	4.8	5.6	4.2	8.9	7.4
LnGrp Delay(d),s/veh	46.2	31.2	31.1	27.5	44.6	94.2	46.6	34.0	43.5	49.2	43.9	48.7
LnGrp LOS	D	C	C	C	D	F	D	C	D	D	D	D
Approach Vol, veh/h		1047			1576			761			971	
Approach Delay, s/veh		37.1			56.2			38.4			47.2	
Approach LOS		D			E			D			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	23.8	26.0	10.2	20.0	24.8	25.0	12.4	17.7
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	19.8	22.0	7.0	17.0	19.0	21.0	8.0	16.0
Max Q Clear Time (g_c+I1), s	11.4	14.1	6.2	15.4	19.7	23.0	9.0	12.6
Green Ext Time (p_c), s	1.3	2.2	0.0	0.6	0.0	0.0	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	46.5
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	1	0	2	1	753	3	2	510	18
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	-	-	0	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	1	0	2	1	753	3	2	510	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	902	1281	519	1280	1289	378	528	0	0	756	0	0
Stage 1	523	523	-	757	757	-	-	-	-	-	-	-
Stage 2	379	758	-	523	532	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	248	167	561	134	165	625	1049	-	-	864	-	-
Stage 1	541	534	-	370	419	-	-	-	-	-	-	-
Stage 2	620	418	-	541	529	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	246	166	561	134	164	625	1049	-	-	864	-	-
Mov Cap-2 Maneuver	246	166	-	134	164	-	-	-	-	-	-	-
Stage 1	540	532	-	370	419	-	-	-	-	-	-	-
Stage 2	617	418	-	539	527	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	18	0	0
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1049	-	-	-	281	864	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.011	0.002	-	-
HCM Control Delay (s)	8.4	-	-	0	18	9.2	0	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	67	0	1	4	0	19	9	678	27	54	417	33
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	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	67	0	1	4	0	19	9	678	27	54	417	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	899	1265	434	1252	1268	353	450	0	0	705	0	0
Stage 1	542	542	-	710	710	-	-	-	-	-	-	-
Stage 2	357	723	-	542	558	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	249	171	626	140	170	649	1121	-	-	902	-	-
Stage 1	528	523	-	395	440	-	-	-	-	-	-	-
Stage 2	639	434	-	528	515	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	229	159	626	133	159	649	1121	-	-	902	-	-
Mov Cap-2 Maneuver	229	159	-	133	159	-	-	-	-	-	-	-
Stage 1	524	492	-	392	436	-	-	-	-	-	-	-
Stage 2	615	431	-	496	484	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27	14.9	0.1	1
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1121	-	-	231	388	902	-	-
HCM Lane V/C Ratio	0.008	-	-	0.294	0.059	0.06	-	-
HCM Control Delay (s)	8.2	-	-	27	14.9	9.2	-	-
HCM Lane LOS	A	-	-	D	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.2	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1203	1	21	980	0	83
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1203	1	21	980	0	83

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1204	0	1736	602
Stage 1	-	-	-	-	1204	-
Stage 2	-	-	-	-	532	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	587	-	80	448
Stage 1	-	-	-	-	251	-
Stage 2	-	-	-	-	559	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	587	-	74	448
Mov Cap-2 Maneuver	-	-	-	-	74	-
Stage 1	-	-	-	-	251	-
Stage 2	-	-	-	-	515	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	448	-	-	587	-
HCM Lane V/C Ratio	0.185	-	-	0.036	-
HCM Control Delay (s)	14.9	-	-	11.4	0.4
HCM Lane LOS	B	-	-	B	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1285	1	0	1001	0	48
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1285	1	0	1001	0	48

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1286	0	1787	643
Stage 1	-	-	-	-	1286	-
Stage 2	-	-	-	-	501	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	546	-	74	421
Stage 1	-	-	-	-	227	-
Stage 2	-	-	-	-	580	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	546	-	74	421
Mov Cap-2 Maneuver	-	-	-	-	74	-
Stage 1	-	-	-	-	227	-
Stage 2	-	-	-	-	580	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	421	-	-	546	-
HCM Lane V/C Ratio	0.114	-	-	-	-
HCM Control Delay (s)	14.6	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1331	1	0	1001	0	28
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1331	1	0	1001	0	28

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1332	0	1833	666
Stage 1	-	-	-	-	1332	-
Stage 2	-	-	-	-	501	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	525	-	69	407
Stage 1	-	-	-	-	215	-
Stage 2	-	-	-	-	580	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	525	-	69	407
Mov Cap-2 Maneuver	-	-	-	-	69	-
Stage 1	-	-	-	-	215	-
Stage 2	-	-	-	-	580	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	407	-	-	525	-
HCM Lane V/C Ratio	0.069	-	-	-	-
HCM Control Delay (s)	14.5	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	24	22	38	234	1454	88	81	783	712
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				27	24	42	260	1616	98	90	870	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				75	67	123	563	1946	117	382	1670	747
Arrive On Green				0.08	0.08	0.08	0.62	1.00	1.00	0.21	0.46	0.00
Sat Flow, veh/h				980	871	1615	1810	3460	209	1810	3610	1615
Grp Volume(v), veh/h				51	0	42	260	839	875	90	870	0
Grp Sat Flow(s),veh/h/ln				1851	0	1615	1810	1805	1863	1810	1805	1615
Q Serve(g_s), s				2.1	0.0	2.0	6.1	0.0	0.0	3.3	13.7	0.0
Cycle Q Clear(g_c), s				2.1	0.0	2.0	6.1	0.0	0.0	3.3	13.7	0.0
Prop In Lane				0.53		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h				141	0	123	563	1015	1048	382	1670	747
V/C Ratio(X)				0.36	0.00	0.34	0.46	0.83	0.84	0.24	0.52	0.00
Avail Cap(c_a), veh/h				370	0	323	563	1015	1048	382	1670	747
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.64	0.64	0.64	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.1	0.0	35.0	11.6	0.0	0.0	26.2	15.2	0.0
Incr Delay (d2), s/veh				1.5	0.0	1.6	0.4	5.1	5.2	0.3	1.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.9	2.9	1.4	1.5	1.7	7.0	0.0
LnGrp Delay(d),s/veh				36.6	0.0	36.6	11.9	5.1	5.2	26.5	16.4	0.0
LnGrp LOS				D		D	B	A	A	C	B	
Approach Vol, veh/h					93			1974			960	
Approach Delay, s/veh					36.6			6.0			17.3	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	20.9	49.0			28.9	41.0		10.1
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			15.0	37.0		16.0
Max Q Clear Time (g_c+I1), s	5.3	2.0			8.1	15.7		4.1
Green Ext Time (p_c), s	0.2	18.3			0.6	5.8		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.6
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	784	165	0	988	810	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	1078	0	0	1136	931	0
Adj No. of Lanes	2	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1253	559	0	1999	1999	0
Arrive On Green	0.35	0.00	0.00	0.74	0.55	0.00
Sat Flow, veh/h	3619	1615	0	3800	3800	0
Grp Volume(v), veh/h	1078	0	0	1136	931	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	22.2	0.0	0.0	11.4	12.4	0.0
Cycle Q Clear(g_c), s	22.2	0.0	0.0	11.4	12.4	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1253	559	0	1999	1999	0
V/C Ratio(X)	0.86	0.00	0.00	0.57	0.47	0.00
Avail Cap(c_a), veh/h	1583	707	0	1999	1999	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.65	0.92	0.00
Uniform Delay (d), s/veh	24.4	0.0	0.0	6.2	10.7	0.0
Incr Delay (d2), s/veh	4.2	0.0	0.0	0.8	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.8	0.0	0.0	5.7	6.3	0.0
LnGrp Delay(d),s/veh	28.5	0.0	0.0	7.0	11.5	0.0
LnGrp LOS	C			A	B	
Approach Vol, veh/h	1078			1136	931	
Approach Delay, s/veh	28.5			7.0	11.5	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.3		31.7		48.3		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		37.0		35.0		37.0		
Max Q Clear Time (g_c+I1), s		13.4		24.2		14.4		
Green Ext Time (p_c), s		16.4		3.5		15.9		

Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	387	920	52	157	697	240	102	318	128	458	277	202
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	407	968	55	165	734	253	107	335	135	482	292	213
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	554	1414	80	202	767	343	144	474	212	527	383	326
Arrive On Green	0.31	0.41	0.41	0.11	0.21	0.21	0.08	0.13	0.13	0.25	0.34	0.34
Sat Flow, veh/h	1810	3473	197	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	407	503	520	165	734	253	107	335	135	482	292	213
Grp Sat Flow(s),veh/h/ln	1810	1805	1865	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	16.1	18.3	18.3	7.1	16.1	11.7	4.6	7.1	4.8	10.7	11.0	4.4
Cycle Q Clear(g_c), s	16.1	18.3	18.3	7.1	16.1	11.7	4.6	7.1	4.8	10.7	11.0	4.4
Prop In Lane	1.00		0.11	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	554	735	759	202	767	343	144	474	212	527	383	326
V/C Ratio(X)	0.73	0.68	0.68	0.82	0.96	0.74	0.74	0.71	0.64	0.92	0.76	0.65
Avail Cap(c_a), veh/h	554	735	759	226	767	343	158	722	323	527	499	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.86	0.86
Uniform Delay (d), s/veh	24.8	19.5	19.5	34.7	31.1	29.4	36.0	33.3	18.9	29.5	24.8	5.8
Incr Delay (d2), s/veh	5.0	5.1	5.0	18.6	23.5	13.2	15.8	2.0	3.2	18.5	4.3	1.9
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	8.8	10.1	10.4	4.6	10.5	6.5	2.9	3.7	2.3	6.5	6.1	2.1
LnGrp Delay(d),s/veh	29.9	24.6	24.5	53.4	54.7	42.6	51.8	35.2	22.0	48.0	29.1	7.8
LnGrp LOS	C	C	C	D	D	D	D	D	C	D	C	A
Approach Vol, veh/h		1430			1152			577			987	
Approach Delay, s/veh		26.1			51.8			35.2			33.7	
Approach LOS		C			D			D			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	12.9	36.6	10.4	20.1	28.5	21.0	16.0	14.5
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	26.0	7.0	21.0	19.0	17.0	12.0	16.0
Max Q Clear Time (g_c+I1), s	19.1	20.3	6.6	13.0	18.1	18.1	12.7	9.1
Green Ext Time (p_c), s	0.0	3.5	0.0	2.7	0.2	0.0	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	36.3
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	1	0	16	0	547	2	4	454	3
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	-	-	0	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	1	0	16	0	547	2	4	454	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	738	1013	456	1012	1013	275	457	0	0	549	0	0
Stage 1	464	464	-	548	548	-	-	-	-	-	-	-
Stage 2	274	549	-	464	465	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	323	241	609	208	241	729	1114	-	-	1031	-	-
Stage 1	582	567	-	493	520	-	-	-	-	-	-	-
Stage 2	714	520	-	582	566	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	315	240	609	207	240	729	1114	-	-	1031	-	-
Mov Cap-2 Maneuver	315	240	-	207	240	-	-	-	-	-	-	-
Stage 1	582	564	-	493	520	-	-	-	-	-	-	-
Stage 2	698	520	-	579	563	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	10.8	0	0.1
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1114	-	-	-	635	1031	-	-
HCM Lane V/C Ratio	-	-	-	-	0.027	0.004	-	-
HCM Control Delay (s)	0	-	-	0	10.8	8.5	0	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	131	0	9	22	0	54	1	356	15	27	407	11
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	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	131	0	9	22	0	54	1	356	15	27	407	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	647	840	413	837	838	186	418	0	0	371	0	0
Stage 1	467	467	-	366	366	-	-	-	-	-	-	-
Stage 2	180	373	-	471	472	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	373	304	643	275	305	831	1152	-	-	1199	-	-
Stage 1	580	565	-	631	626	-	-	-	-	-	-	-
Stage 2	810	622	-	577	562	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	343	297	643	266	298	831	1152	-	-	1199	-	-
Mov Cap-2 Maneuver	343	297	-	266	298	-	-	-	-	-	-	-
Stage 1	579	552	-	630	625	-	-	-	-	-	-	-
Stage 2	757	621	-	556	549	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.7	13.2	0	0.5
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1152	-	-	354	515	1199	-	-
HCM Lane V/C Ratio	0.001	-	-	0.395	0.148	0.023	-	-
HCM Control Delay (s)	8.1	-	-	21.7	13.2	8.1	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.8	0.5	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	56	51	73	147	1691	49	89	695	701
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				62	57	81	163	1879	54	99	772	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				90	82	150	200	2400	69	158	2334	1044
Arrive On Green				0.09	0.09	0.09	0.11	0.67	0.67	0.09	0.65	0.00
Sat Flow, veh/h				965	887	1615	1810	3584	103	1810	3610	1615
Grp Volume(v), veh/h				119	0	81	163	942	991	99	772	0
Grp Sat Flow(s),veh/h/ln				1852	0	1615	1810	1805	1882	1810	1805	1615
Q Serve(g_s), s				5.0	0.0	3.8	7.0	28.8	29.4	4.2	7.7	0.0
Cycle Q Clear(g_c), s				5.0	0.0	3.8	7.0	28.8	29.4	4.2	7.7	0.0
Prop In Lane				0.52		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h				172	0	150	200	1208	1260	158	2334	1044
V/C Ratio(X)				0.69	0.00	0.54	0.82	0.78	0.79	0.63	0.33	0.00
Avail Cap(c_a), veh/h				370	0	323	226	1208	1260	158	2334	1044
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.59	0.59	0.59	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.2	0.0	34.6	34.8	9.1	9.2	35.2	6.4	0.0
Incr Delay (d2), s/veh				4.9	0.0	3.0	11.6	3.0	3.0	7.5	0.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.8	0.0	1.8	4.2	15.1	15.9	2.4	3.9	0.0
LnGrp Delay(d),s/veh				40.0	0.0	37.6	46.4	12.2	12.3	42.7	6.7	0.0
LnGrp LOS				D		D	D	B	B	D	A	
Approach Vol, veh/h					200			2096			871	
Approach Delay, s/veh					39.1			14.9			10.8	
Approach LOS					D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	11.0	57.6			12.8	55.7		11.4
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			10.0	42.0		16.0
Max Q Clear Time (g_c+I1), s	6.2	31.4			9.0	9.7		7.0
Green Ext Time (p_c), s	0.0	12.1			0.0	25.5		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	671	169	0	1215	758	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	482	503	0	1397	871	0
Adj No. of Lanes	1	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	614	548	0	2023	2023	0
Arrive On Green	0.34	0.34	0.00	0.75	0.56	0.00
Sat Flow, veh/h	1810	1615	0	3800	3800	0
Grp Volume(v), veh/h	482	503	0	1397	871	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	19.2	23.9	0.0	16.2	11.2	0.0
Cycle Q Clear(g_c), s	19.2	23.9	0.0	16.2	11.2	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	614	548	0	2023	2023	0
V/C Ratio(X)	0.78	0.92	0.00	0.69	0.43	0.00
Avail Cap(c_a), veh/h	656	585	0	2023	2023	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.58	0.94	0.00
Uniform Delay (d), s/veh	23.8	25.3	0.0	6.5	10.2	0.0
Incr Delay (d2), s/veh	5.9	18.9	0.0	1.1	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.5	13.5	0.0	8.1	5.7	0.0
LnGrp Delay(d),s/veh	29.7	44.2	0.0	7.7	10.8	0.0
LnGrp LOS	C	D		A	B	
Approach Vol, veh/h	985			1397	871	
Approach Delay, s/veh	37.1			7.7	10.8	
Approach LOS	D			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.8		31.2		48.8		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		43.0		29.0		43.0		
Max Q Clear Time (g_c+I1), s		18.2		25.9		13.2		
Green Ext Time (p_c), s		18.5		1.3		21.3		

Intersection Summary	
HCM 2010 Ctrl Delay	17.4
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	369	523	29	221	762	432	82	399	187	302	292	272
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	388	551	31	233	802	455	86	420	197	318	307	286
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	495	956	54	473	948	424	135	575	257	367	359	305
Arrive On Green	0.27	0.28	0.28	0.26	0.26	0.26	0.07	0.16	0.16	0.17	0.32	0.32
Sat Flow, veh/h	1810	3475	195	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	388	286	296	233	802	455	86	420	197	318	307	286
Grp Sat Flow(s),veh/h/ln	1810	1805	1866	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	15.9	10.9	10.9	8.7	16.9	21.0	3.7	8.9	9.3	7.0	12.1	7.4
Cycle Q Clear(g_c), s	15.9	10.9	10.9	8.7	16.9	21.0	3.7	8.9	9.3	7.0	12.1	7.4
Prop In Lane	1.00		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	495	496	513	473	948	424	135	575	257	367	359	305
V/C Ratio(X)	0.78	0.58	0.58	0.49	0.85	1.07	0.64	0.73	0.77	0.87	0.85	0.94
Avail Cap(c_a), veh/h	495	496	513	473	948	424	158	722	323	367	404	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	26.9	25.0	25.0	25.1	28.0	29.5	36.0	32.0	32.2	32.5	26.3	7.8
Incr Delay (d2), s/veh	8.0	4.8	4.7	0.8	9.2	64.7	6.4	2.9	8.2	17.8	13.8	29.0
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	9.0	6.1	6.3	4.4	9.6	16.9	2.1	4.7	4.8	4.3	7.6	5.6
LnGrp Delay(d),s/veh	34.9	29.8	29.7	25.8	37.2	94.2	42.4	34.9	40.5	50.3	40.1	36.8
LnGrp LOS	C	C	C	C	D	F	D	C	D	D	D	D
Approach Vol, veh/h		970			1490			703			911	
Approach Delay, s/veh		31.8			52.8			37.3			42.6	
Approach LOS		C			D			D			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	24.9	26.0	10.0	19.1	25.9	25.0	12.4	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	18.0	22.0	7.0	17.0	19.0	21.0	8.0	16.0
Max Q Clear Time (g_c+I1), s	10.7	12.9	5.7	14.1	17.9	23.0	9.0	11.3
Green Ext Time (p_c), s	1.2	2.2	0.0	1.0	0.3	0.0	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	42.9
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	2	699	3	2	481
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	2	863	4	2	594

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1464	433	0	0	867	0
Stage 1	865	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	132	576	-	-	785	-
Stage 1	377	-	-	-	-	-
Stage 2	553	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	131	576	-	-	785	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	377	-	-	-	-	-
Stage 2	551	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	411	785	-
HCM Lane V/C Ratio	-	-	0.009	0.003	-
HCM Control Delay (s)	-	-	13.8	9.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	19	691	27	54	422
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	145	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	5	23	853	33	67	521

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1524	443	0	0	886	0
Stage 1	870	-	-	-	-	-
Stage 2	654	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	121	568	-	-	773	-
Stage 1	375	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	111	568	-	-	773	-
Mov Cap-2 Maneuver	241	-	-	-	-	-
Stage 1	375	-	-	-	-	-
Stage 2	476	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.3	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	460	773	-
HCM Lane V/C Ratio	-	-	0.062	0.086	-
HCM Control Delay (s)	-	-	13.3	10.1	-
HCM Lane LOS	-	-	B	B	-
HCM 95th %tile Q(veh)	-	-	0.2	0.3	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	24	22	38	146	1445	88	81	782	712
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				27	24	42	162	1606	98	90	869	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				75	67	123	450	1945	118	382	1895	848
Arrive On Green				0.08	0.08	0.08	0.50	1.00	1.00	0.21	0.52	0.00
Sat Flow, veh/h				980	871	1615	1810	3458	210	1810	3610	1615
Grp Volume(v), veh/h				51	0	42	162	834	870	90	869	0
Grp Sat Flow(s),veh/h/ln				1851	0	1615	1810	1805	1863	1810	1805	1615
Q Serve(g_s), s				2.1	0.0	2.0	4.4	0.0	0.0	3.3	12.0	0.0
Cycle Q Clear(g_c), s				2.1	0.0	2.0	4.4	0.0	0.0	3.3	12.0	0.0
Prop In Lane				0.53		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h				141	0	123	450	1015	1048	382	1895	848
V/C Ratio(X)				0.36	0.00	0.34	0.36	0.82	0.83	0.24	0.46	0.00
Avail Cap(c_a), veh/h				370	0	323	450	1015	1048	382	1895	848
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.68	0.68	0.68	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.1	0.0	35.0	16.2	0.0	0.0	26.2	11.9	0.0
Incr Delay (d2), s/veh				1.5	0.0	1.6	0.3	5.2	5.3	0.3	0.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.9	2.2	1.5	1.6	1.7	6.1	0.0
LnGrp Delay(d),s/veh				36.6	0.0	36.6	16.5	5.2	5.3	26.5	12.7	0.0
LnGrp LOS				D		D	B	A	A	C	B	
Approach Vol, veh/h					93			1866			959	
Approach Delay, s/veh					36.6			6.2			14.0	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	20.9	49.0			23.9	46.0		10.1
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			10.0	42.0		16.0
Max Q Clear Time (g_c+I1), s	5.3	2.0			6.4	14.0		4.1
Green Ext Time (p_c), s	0.1	18.1			0.2	6.3		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	9.8
HCM 2010 LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	784	159	0	891	809	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	1072	0	0	1024	930	0
Adj No. of Lanes	2	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1257	561	0	1995	1995	0
Arrive On Green	0.35	0.00	0.00	0.74	0.55	0.00
Sat Flow, veh/h	3619	1615	0	3800	3800	0
Grp Volume(v), veh/h	1072	0	0	1024	930	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	22.0	0.0	0.0	9.7	12.4	0.0
Cycle Q Clear(g_c), s	22.0	0.0	0.0	9.7	12.4	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1257	561	0	1995	1995	0
V/C Ratio(X)	0.85	0.00	0.00	0.51	0.47	0.00
Avail Cap(c_a), veh/h	1674	747	0	1995	1995	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.70	0.94	0.00
Uniform Delay (d), s/veh	24.2	0.0	0.0	6.0	10.8	0.0
Incr Delay (d2), s/veh	3.4	0.0	0.0	0.7	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	0.0	0.0	4.8	6.3	0.0
LnGrp Delay(d),s/veh	27.7	0.0	0.0	6.7	11.5	0.0
LnGrp LOS	C			A	B	
Approach Vol, veh/h	1072			1024	930	
Approach Delay, s/veh	27.7			6.7	11.5	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.2		31.8		48.2		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		35.0		37.0		35.0		
Max Q Clear Time (g_c+I1), s		11.7		24.0		14.4		
Green Ext Time (p_c), s		15.4		3.8		14.1		

Intersection Summary	
HCM 2010 Ctrl Delay	15.6
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	336	818	57	153	687	240	58	271	96	458	277	195
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	354	861	60	161	723	253	61	285	101	482	292	205
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	536	1113	78	378	857	384	118	419	187	527	382	325
Arrive On Green	0.30	0.32	0.32	0.21	0.24	0.24	0.06	0.12	0.12	0.25	0.34	0.34
Sat Flow, veh/h	1810	3424	239	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	354	454	467	161	723	253	61	285	101	482	292	205
Grp Sat Flow(s),veh/h/ln	1810	1805	1858	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	13.7	18.1	18.1	6.2	15.3	11.3	2.6	6.1	4.7	10.7	11.0	4.3
Cycle Q Clear(g_c), s	13.7	18.1	18.1	6.2	15.3	11.3	2.6	6.1	4.7	10.7	11.0	4.3
Prop In Lane	1.00		0.13	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	536	587	604	378	857	384	118	419	187	527	382	325
V/C Ratio(X)	0.66	0.77	0.77	0.43	0.84	0.66	0.52	0.68	0.54	0.92	0.76	0.63
Avail Cap(c_a), veh/h	536	587	604	378	857	384	158	722	323	527	499	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.85	0.85
Uniform Delay (d), s/veh	24.6	24.3	24.3	27.5	29.1	27.6	36.2	33.9	33.3	29.5	24.9	6.1
Incr Delay (d2), s/veh	3.0	9.6	9.3	0.8	9.9	8.6	3.5	1.9	2.4	18.5	4.4	1.7
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	7.2	10.5	10.8	3.2	8.8	6.0	1.4	3.1	2.2	6.5	6.1	2.1
LnGrp Delay(d),s/veh	27.6	33.9	33.7	28.2	39.0	36.2	39.7	35.9	35.7	47.9	29.3	7.8
LnGrp LOS	C	C	C	C	D	D	D	D	D	D	C	A
Approach Vol, veh/h		1275			1137			447			979	
Approach Delay, s/veh		32.1			36.8			36.4			34.0	
Approach LOS		C			D			D			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	20.7	30.0	9.2	20.1	27.7	23.0	16.0	13.3
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	26.0	7.0	21.0	17.0	19.0	12.0	16.0
Max Q Clear Time (g_c+I1), s	8.2	20.1	4.6	13.0	15.7	17.3	12.7	8.1
Green Ext Time (p_c), s	0.4	2.7	0.0	2.7	0.3	1.0	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	34.5
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	16	425	2	4	457
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	20	525	2	5	564

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1100	264	0	0	527	0
Stage 1	526	-	-	-	-	-
Stage 2	574	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	223	741	-	-	1050	-
Stage 1	563	-	-	-	-	-
Stage 2	567	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	221	741	-	-	1050	-
Mov Cap-2 Maneuver	563	-	-	-	-	-
Stage 1	563	-	-	-	-	-
Stage 2	563	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	727	1050	-
HCM Lane V/C Ratio	-	-	0.029	0.005	-
HCM Control Delay (s)	-	-	10.1	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	22	54	365	15	27	421
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	145	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	27	67	451	19	33	520

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1046	235	0	0	469	0
Stage 1	460	-	-	-	-	-
Stage 2	586	-	-	-	-	-
Critical Hdwy	6.6	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	241	773	-	-	1103	-
Stage 1	608	-	-	-	-	-
Stage 2	560	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	234	773	-	-	1103	-
Mov Cap-2 Maneuver	368	-	-	-	-	-
Stage 1	608	-	-	-	-	-
Stage 2	543	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.3	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	586	1103	-
HCM Lane V/C Ratio	-	-	0.16	0.03	-
HCM Control Delay (s)	-	-	12.3	8.4	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	0.1	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	949	9	104	1132	0	51
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	949	9	104	1132	0	51

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	958	0	1728	479
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	774	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	726	-	81	538
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	421	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	726	-	50	538
Mov Cap-2 Maneuver	-	-	-	-	50	-
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	258	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	12.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	538	-	-	726	-
HCM Lane V/C Ratio	0.095	-	-	0.143	-
HCM Control Delay (s)	12.4	-	-	10.8	1.8
HCM Lane LOS	B	-	-	B	A
HCM 95th %tile Q(veh)	0.3	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	992	9	0	1236	0	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	992	9	0	1236	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1001	0	1615	501
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	618	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	700	-	97	521
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	506	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	700	-	97	521
Mov Cap-2 Maneuver	-	-	-	-	97	-
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	506	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	521	-	-	700	-
HCM Lane V/C Ratio	0.031	-	-	-	-
HCM Control Delay (s)	12.1	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	999	9	0	1236	0	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	999	9	0	1236	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1008	0	1622	504
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	618	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	695	-	95	518
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	506	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	695	-	95	518
Mov Cap-2 Maneuver	-	-	-	-	95	-
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	506	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	518	-	-	695	-
HCM Lane V/C Ratio	0.008	-	-	-	-
HCM Control Delay (s)	12	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	56	51	73	199	1692	49	89	704	701
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				62	57	81	221	1880	54	99	782	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				90	82	150	488	2400	69	158	1760	787
Arrive On Green				0.09	0.09	0.09	0.27	0.67	0.67	0.09	0.49	0.00
Sat Flow, veh/h				965	887	1615	1810	3584	102	1810	3610	1615
Grp Volume(v), veh/h				119	0	81	221	942	992	99	782	0
Grp Sat Flow(s),veh/h/ln				1852	0	1615	1810	1805	1882	1810	1805	1615
Q Serve(g_s), s				5.0	0.0	3.8	8.1	28.9	29.5	4.2	11.3	0.0
Cycle Q Clear(g_c), s				5.0	0.0	3.8	8.1	28.9	29.5	4.2	11.3	0.0
Prop In Lane				0.52		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h				172	0	150	488	1208	1260	158	1760	787
V/C Ratio(X)				0.69	0.00	0.54	0.45	0.78	0.79	0.63	0.44	0.00
Avail Cap(c_a), veh/h				370	0	323	488	1208	1260	158	1760	787
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.54	0.54	0.54	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.2	0.0	34.6	24.3	9.1	9.2	35.2	13.4	0.0
Incr Delay (d2), s/veh				4.9	0.0	3.0	0.4	2.8	2.8	7.5	0.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.8	0.0	1.8	4.1	15.1	15.9	2.4	5.8	0.0
LnGrp Delay(d),s/veh				40.0	0.0	37.6	24.7	11.9	12.0	42.7	14.2	0.0
LnGrp LOS				D		D	C	B	B	D	B	
Approach Vol, veh/h					200			2155			881	
Approach Delay, s/veh					39.1			13.3			17.4	
Approach LOS					D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	11.0	57.6			25.6	43.0		11.4
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			13.0	39.0		16.0
Max Q Clear Time (g_c+I1), s	6.2	31.5			10.1	13.3		7.0
Green Ext Time (p_c), s	0.0	10.7			2.6	5.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	16.0
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	671	219	0	1268	767	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	512	530	0	1457	882	0
Adj No. of Lanes	1	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	643	574	0	1966	1966	0
Arrive On Green	0.36	0.36	0.00	0.72	0.54	0.00
Sat Flow, veh/h	1810	1615	0	3800	3800	0
Grp Volume(v), veh/h	512	530	0	1457	882	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	20.4	25.2	0.0	19.2	11.8	0.0
Cycle Q Clear(g_c), s	20.4	25.2	0.0	19.2	11.8	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	643	574	0	1966	1966	0
V/C Ratio(X)	0.80	0.92	0.00	0.74	0.45	0.00
Avail Cap(c_a), veh/h	679	606	0	1966	1966	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.53	0.94	0.00
Uniform Delay (d), s/veh	23.2	24.7	0.0	7.7	11.0	0.0
Incr Delay (d2), s/veh	6.3	19.5	0.0	1.4	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	14.3	0.0	9.6	5.9	0.0
LnGrp Delay(d),s/veh	29.5	44.2	0.0	9.0	11.7	0.0
LnGrp LOS	C	D		A	B	
Approach Vol, veh/h	1042			1457	882	
Approach Delay, s/veh	37.0			9.0	11.7	
Approach LOS	D			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		47.6		32.4		47.6		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		42.0		30.0		42.0		
Max Q Clear Time (g_c+I1), s		21.2		27.2		13.8		
Green Ext Time (p_c), s		16.5		1.2		21.1		

Intersection Summary	
HCM 2010 Ctrl Delay	18.3
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	396	567	39	233	836	432	98	426	211	302	322	301
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	417	597	41	245	880	455	103	448	222	318	339	317
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	468	943	65	445	948	424	142	620	278	375	380	323
Arrive On Green	0.26	0.28	0.28	0.25	0.26	0.26	0.08	0.17	0.17	0.18	0.33	0.33
Sat Flow, veh/h	1810	3428	235	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	417	314	324	245	880	455	103	448	222	318	339	317
Grp Sat Flow(s),veh/h/ln	1810	1805	1859	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	17.8	12.2	12.2	9.4	19.0	21.0	4.4	9.4	10.6	7.0	13.5	8.6
Cycle Q Clear(g_c), s	17.8	12.2	12.2	9.4	19.0	21.0	4.4	9.4	10.6	7.0	13.5	8.6
Prop In Lane	1.00		0.13	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	468	496	511	445	948	424	142	620	278	375	380	323
V/C Ratio(X)	0.89	0.63	0.63	0.55	0.93	1.07	0.72	0.72	0.80	0.85	0.89	0.98
Avail Cap(c_a), veh/h	468	496	511	445	948	424	158	722	323	375	404	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	28.6	25.5	25.5	26.3	28.8	29.5	36.0	31.3	31.8	32.2	25.8	8.1
Incr Delay (d2), s/veh	18.8	6.0	5.9	1.4	16.4	64.7	13.5	3.0	11.7	14.9	18.8	39.9
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	11.3	6.9	7.1	4.9	11.6	16.9	2.8	4.9	5.6	4.2	9.1	7.3
LnGrp Delay(d),s/veh	47.4	31.5	31.4	27.7	45.1	94.2	49.5	34.3	43.5	47.1	44.6	48.0
LnGrp LOS	D	C	C	C	D	F	D	C	D	D	D	D
Approach Vol, veh/h		1055			1580			773			974	
Approach Delay, s/veh		37.7			56.6			39.0			46.5	
Approach LOS		D			E			D			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	23.7	26.0	10.3	20.0	24.7	25.0	12.6	17.8
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	19.0	22.0	7.0	17.0	19.0	21.0	8.0	16.0
Max Q Clear Time (g_c+I1), s	11.4	14.2	6.4	15.5	19.8	23.0	9.0	12.6
Green Ext Time (p_c), s	1.3	2.2	0.0	0.5	0.0	0.0	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	46.7
HCM 2010 LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	1	0	2	1	766	3	2	515	18
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	-	-	0	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	1	0	2	1	766	3	2	515	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	913	1299	524	1298	1307	385	533	0	0	769	0	0
Stage 1	528	528	-	770	770	-	-	-	-	-	-	-
Stage 2	385	771	-	528	537	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	244	163	557	130	161	619	1045	-	-	854	-	-
Stage 1	538	531	-	364	413	-	-	-	-	-	-	-
Stage 2	615	413	-	538	526	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	242	162	557	130	160	619	1045	-	-	854	-	-
Mov Cap-2 Maneuver	242	162	-	130	160	-	-	-	-	-	-	-
Stage 1	537	529	-	364	413	-	-	-	-	-	-	-
Stage 2	612	413	-	536	524	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	18.2	0	0
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1045	-	-	-	275	854	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.011	0.002	-	-
HCM Control Delay (s)	8.4	-	-	0	18.2	9.2	0	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	67	0	1	4	0	19	9	691	27	54	422	33
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	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	67	0	1	4	0	19	9	691	27	54	422	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	911	1283	439	1270	1286	359	455	0	0	718	0	0
Stage 1	547	547	-	723	723	-	-	-	-	-	-	-
Stage 2	364	736	-	547	563	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	244	167	622	136	166	643	1116	-	-	892	-	-
Stage 1	525	521	-	388	434	-	-	-	-	-	-	-
Stage 2	633	428	-	525	512	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	224	156	622	129	155	643	1116	-	-	892	-	-
Mov Cap-2 Maneuver	224	156	-	129	155	-	-	-	-	-	-	-
Stage 1	521	489	-	385	431	-	-	-	-	-	-	-
Stage 2	609	425	-	492	481	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.6	15.1	0.1	1
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1116	-	-	226	380	892	-	-
HCM Lane V/C Ratio	0.008	-	-	0.301	0.061	0.061	-	-
HCM Control Delay (s)	8.3	-	-	27.6	15.1	9.3	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.2	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1216	1	21	988	0	83
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1216	1	21	988	0	83

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1217	0	1753	609
Stage 1	-	-	-	-	1217	-
Stage 2	-	-	-	-	536	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	580	-	78	443
Stage 1	-	-	-	-	247	-
Stage 2	-	-	-	-	556	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	580	-	72	443
Mov Cap-2 Maneuver	-	-	-	-	72	-
Stage 1	-	-	-	-	247	-
Stage 2	-	-	-	-	512	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	443	-	-	580	-
HCM Lane V/C Ratio	0.187	-	-	0.036	-
HCM Control Delay (s)	15	-	-	11.4	0.4
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1298	1	0	1009	0	48
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1298	1	0	1009	0	48

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1299	0	1804	650
Stage 1	-	-	-	-	1299	-
Stage 2	-	-	-	-	505	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	540	-	72	417
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	540	-	72	417
Mov Cap-2 Maneuver	-	-	-	-	72	-
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	577	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	417	-	-	540	-
HCM Lane V/C Ratio	0.115	-	-	-	-
HCM Control Delay (s)	14.8	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1344	1	0	1009	0	28
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1344	1	0	1009	0	28

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1345	0	1850	673
Stage 1	-	-	-	-	1345	-
Stage 2	-	-	-	-	505	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	519	-	67	402
Stage 1	-	-	-	-	211	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	519	-	67	402
Mov Cap-2 Maneuver	-	-	-	-	67	-
Stage 1	-	-	-	-	211	-
Stage 2	-	-	-	-	577	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	402	-	-	519	-
HCM Lane V/C Ratio	0.07	-	-	-	-
HCM Control Delay (s)	14.6	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	24	22	38	238	1454	88	81	783	712
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				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
Parking Bus, Adj				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
Adj Flow Rate, veh/h				27	24	42	264	1616	98	90	870	0
Adj No. of Lanes				0	1	1	1	2	0	1	2	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				75	67	123	298	1946	117	382	2198	983
Arrive On Green				0.08	0.08	0.08	0.33	1.00	1.00	0.21	0.61	0.00
Sat Flow, veh/h				980	871	1615	1810	3460	209	1810	3610	1615
Grp Volume(v), veh/h				51	0	42	264	839	875	90	870	0
Grp Sat Flow(s),veh/h/ln				1851	0	1615	1810	1805	1863	1810	1805	1615
Q Serve(g_s), s				2.1	0.0	2.0	11.1	0.0	0.0	3.3	9.9	0.0
Cycle Q Clear(g_c), s				2.1	0.0	2.0	11.1	0.0	0.0	3.3	9.9	0.0
Prop In Lane				0.53		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h				141	0	123	298	1015	1048	382	2198	983
V/C Ratio(X)				0.36	0.00	0.34	0.89	0.83	0.84	0.24	0.40	0.00
Avail Cap(c_a), veh/h				370	0	323	339	1015	1048	382	2198	983
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.64	0.64	0.64	1.00	1.00	0.00
Uniform Delay (d), s/veh				35.1	0.0	35.0	26.1	0.0	0.0	26.2	8.1	0.0
Incr Delay (d2), s/veh				1.5	0.0	1.6	15.1	5.0	5.2	0.3	0.5	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.9	6.7	1.4	1.5	1.7	5.0	0.0
LnGrp Delay(d),s/veh				36.6	0.0	36.6	41.2	5.0	5.2	26.5	8.6	0.0
LnGrp LOS				D		D	D	A	A	C	A	
Approach Vol, veh/h					93			1978			960	
Approach Delay, s/veh					36.6			9.9			10.3	
Approach LOS					D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	20.9	49.0			17.2	52.7		10.1
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	45.0			15.0	37.0		16.0
Max Q Clear Time (g_c+I1), s	5.3	2.0			13.1	11.9		4.1
Green Ext Time (p_c), s	0.1	18.3			0.2	6.4		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.8
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	784	172	0	992	810	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	0
Adj Flow Rate, veh/h	1086	0	0	1140	931	0
Adj No. of Lanes	2	1	0	2	2	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1260	562	0	1992	1992	0
Arrive On Green	0.35	0.00	0.00	0.73	0.55	0.00
Sat Flow, veh/h	3619	1615	0	3800	3800	0
Grp Volume(v), veh/h	1086	0	0	1140	931	0
Grp Sat Flow(s),veh/h/ln	1810	1615	0	1805	1805	0
Q Serve(g_s), s	22.4	0.0	0.0	11.6	12.5	0.0
Cycle Q Clear(g_c), s	22.4	0.0	0.0	11.6	12.5	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1260	562	0	1992	1992	0
V/C Ratio(X)	0.86	0.00	0.00	0.57	0.47	0.00
Avail Cap(c_a), veh/h	1583	707	0	1992	1992	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.65	0.91	0.00
Uniform Delay (d), s/veh	24.3	0.0	0.0	6.3	10.8	0.0
Incr Delay (d2), s/veh	4.2	0.0	0.0	0.8	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.9	0.0	0.0	5.7	6.4	0.0
LnGrp Delay(d),s/veh	28.5	0.0	0.0	7.1	11.5	0.0
LnGrp LOS	C			A	B	
Approach Vol, veh/h	1086			1140	931	
Approach Delay, s/veh	28.5			7.1	11.5	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		48.1		31.9		48.1		
Change Period (Y+Rc), s		4.0		4.0		4.0		
Max Green Setting (Gmax), s		37.0		35.0		37.0		
Max Q Clear Time (g_c+I1), s		13.6		24.4		14.5		
Green Ext Time (p_c), s		16.3		3.5		15.9		

Intersection Summary	
HCM 2010 Ctrl Delay	15.8
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	387	926	59	157	701	240	106	322	128	458	284	202
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	407	975	62	165	738	253	112	339	135	482	299	213
Adj No. of Lanes	1	2	0	1	2	1	1	2	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	552	1400	89	202	767	343	145	478	214	527	384	326
Arrive On Green	0.31	0.41	0.41	0.11	0.21	0.21	0.08	0.13	0.13	0.25	0.34	0.34
Sat Flow, veh/h	1810	3447	219	1810	3610	1615	1810	3610	1615	3510	1900	1615
Grp Volume(v), veh/h	407	511	526	165	738	253	112	339	135	482	299	213
Grp Sat Flow(s),veh/h/ln	1810	1805	1861	1810	1805	1615	1810	1805	1615	1755	1900	1615
Q Serve(g_s), s	16.1	18.7	18.7	7.1	16.2	11.7	4.9	7.2	4.8	10.7	11.3	4.4
Cycle Q Clear(g_c), s	16.1	18.7	18.7	7.1	16.2	11.7	4.9	7.2	4.8	10.7	11.3	4.4
Prop In Lane	1.00		0.12	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	552	733	756	202	767	343	145	478	214	527	384	326
V/C Ratio(X)	0.74	0.70	0.70	0.82	0.96	0.74	0.77	0.71	0.63	0.92	0.78	0.65
Avail Cap(c_a), veh/h	552	733	756	226	767	343	158	722	323	527	499	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.86	0.86
Uniform Delay (d), s/veh	24.9	19.7	19.7	34.7	31.2	29.4	36.1	33.2	18.8	29.5	24.9	5.8
Incr Delay (d2), s/veh	5.1	5.4	5.3	18.6	24.5	13.2	19.1	2.0	3.1	18.5	5.0	1.9
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	8.8	10.3	10.6	4.6	10.6	6.5	3.2	3.7	2.3	6.5	6.3	2.1
LnGrp Delay(d),s/veh	30.1	25.1	24.9	53.4	55.6	42.6	55.2	35.2	21.9	48.0	29.9	7.8
LnGrp LOS	C	C	C	D	E	D	E	D	C	D	C	A
Approach Vol, veh/h		1444			1156			586			994	
Approach Delay, s/veh		26.4			52.5			35.9			33.9	
Approach LOS		C			D			D			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	12.9	36.5	10.4	20.2	28.4	21.0	16.0	14.6
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	26.0	7.0	21.0	19.0	17.0	12.0	16.0
Max Q Clear Time (g_c+I1), s	9.1	20.7	6.9	13.3	18.1	18.2	12.7	9.2
Green Ext Time (p_c), s	0.0	3.3	0.0	2.7	0.2	0.0	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	36.8
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	1	0	16	0	556	2	4	468	3
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	-	-	0	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	1	0	16	0	556	2	4	468	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	756	1036	470	1035	1036	279	471	0	0	558	0	0
Stage 1	478	478	-	557	557	-	-	-	-	-	-	-
Stage 2	278	558	-	478	479	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	314	233	598	200	233	724	1101	-	-	1023	-	-
Stage 1	572	559	-	487	515	-	-	-	-	-	-	-
Stage 2	711	515	-	572	558	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	306	232	598	199	232	724	1101	-	-	1023	-	-
Mov Cap-2 Maneuver	306	232	-	199	232	-	-	-	-	-	-	-
Stage 1	572	556	-	487	515	-	-	-	-	-	-	-
Stage 2	695	515	-	569	555	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	10.9	0	0.1
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1101	-	-	-	627	1023	-	-
HCM Lane V/C Ratio	-	-	-	-	0.027	0.004	-	-
HCM Control Delay (s)	0	-	-	0	10.9	8.5	0	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	131	0	9	22	0	54	1	365	15	27	421	11
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	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	131	0	9	22	0	54	1	365	15	27	421	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	666	863	427	860	861	190	432	0	0	380	0	0
Stage 1	481	481	-	375	375	-	-	-	-	-	-	-
Stage 2	185	382	-	485	486	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	362	295	632	265	295	826	1138	-	-	1190	-	-
Stage 1	570	557	-	624	621	-	-	-	-	-	-	-
Stage 2	805	616	-	567	554	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	332	288	632	257	288	826	1138	-	-	1190	-	-
Mov Cap-2 Maneuver	332	288	-	257	288	-	-	-	-	-	-	-
Stage 1	569	544	-	623	620	-	-	-	-	-	-	-
Stage 2	752	615	-	546	541	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.6	13.4	0	0.5
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1138	-	-	342	503	1190	-	-
HCM Lane V/C Ratio	0.001	-	-	0.409	0.151	0.023	-	-
HCM Control Delay (s)	8.2	-	-	22.6	13.4	8.1	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.9	0.5	0.1	-	-

APPENDIX F

PRELIMINARY WATER QUALITY MANAGEMENT PLAN

PROJECT SPECIFIC PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

FOR:
IBG MAGNOLIA CENTER
PIERCE STREET AND MAGNOLIA AVENUE
RIVERSIDE, CA 92503
APNs: 135-220-021, -023, -025, -027, and -030

PREPARED FOR:
INVESTMENT BUILDING GROUP
5100 CAMPUS DRIVE, SUITE #300
NEWPORT BEACH, CA 92660
PHONE: (949) 263-1111
CONTACT: BRIAN BARGEMANN

JULY 11, 2013 r1
OCTOBER 1, 2015 r2
JANUARY 8, 2016 r3

JOB NO. 2609E

PREPARED BY:
THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
PHONE: (714) 521-4811
FAX: (714) 521-4173
CONTACT: VICKY LI (vicky@thieneseng.com)

PROJECT SPECIFIC PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

FOR

“IBG MAGNOLIA CENTER”

PREPARED BY VICKY LI
UNDER THE SUPERVISION OF

HAIDOOK AGHAIAN DATE
R.C.E. 43293
EXP. 03/31/2016

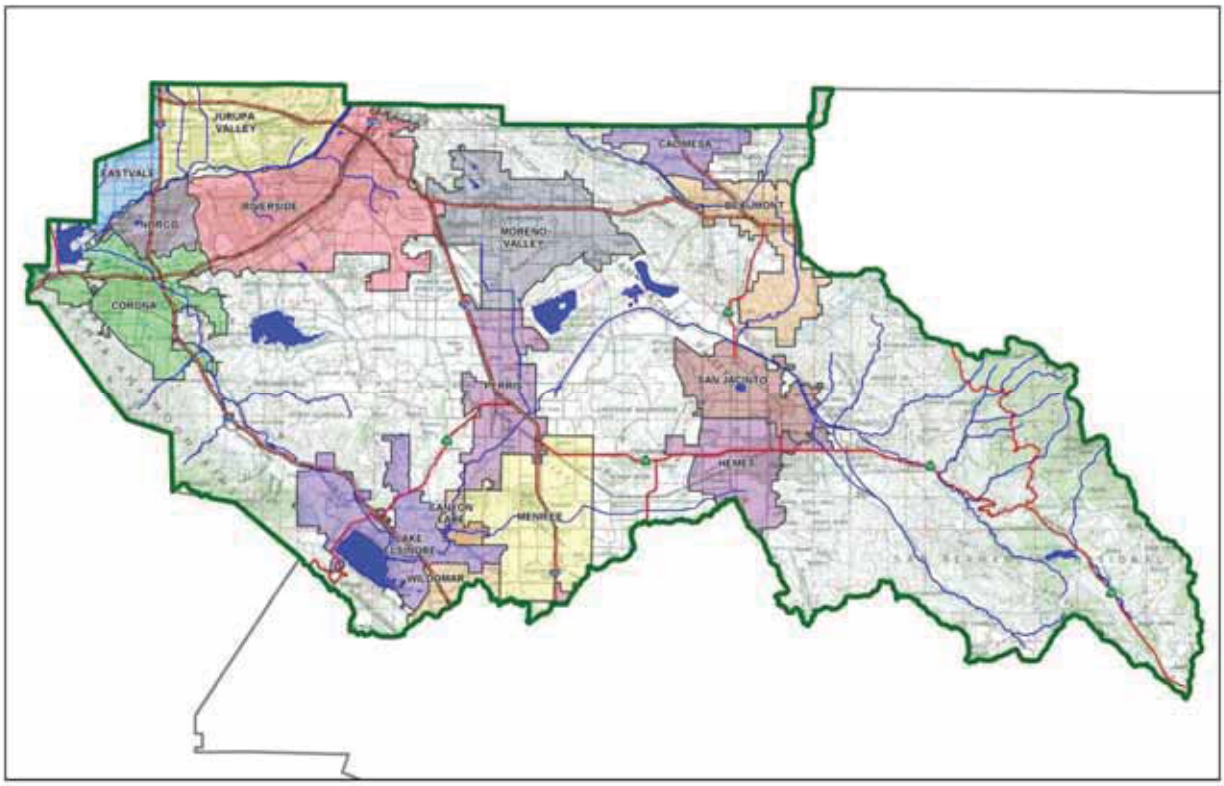
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: IBG Magnolia Center

Development No: P13-0529

Design Review/Case No: P13-0530



Contact Information:

Prepared for:
Investment Building Group
5100 Campus Drive, Suite #300
Newport Beach, CA 92660
(949) 263-1111
Contact: Brian Bargemann

Prepared by:
Thienes Engineering, Inc.
14349 Firestone Boulevard
La Mirada, CA 90638
(714) 521-4811
Contact: Vicky Li (vicky@thieneseng.com)
Job No. 2609e

☒ **Preliminary**
☐ **Final**

Original Date Prepared: July 11, 2013

Revision Date(s): October 1, 2015 r2
January 8, 2016 r3

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for **Investment Building Group** by **Thienes Engineering, Inc.** for the **IBG Magnolia Center** project.

This WQMP is intended to comply with the requirements of the **City of Riverside** for **Design Review of Seven New Industrial Buildings, Planning Case No. P13-0530**, 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 **14.12.315**).

"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
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. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Haidook I. Aghaian	Senior Civil Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 5

A.1 Maps and Site Plans 6
A.2 Receiving Waters 6
A.3 Additional Permits/Approvals required for the Project: 6

Section B: Optimize Site Utilization (LID Principles) 7

Section C: Delineate Drainage Management Areas (DMAs) 8

Section D: Implement LID BMPs 11

D.1 Infiltration Applicability 11
D.2 Harvest and Use Assessment 12
D.3 Bioretention and Biotreatment Assessment 13
D.4 Feasibility Assessment Summaries 13
D.5 LID BMP Sizing 14

Section E: Alternative Compliance (LID Waiver Program) 15

Section F: Hydromodification 16

F.1 Hydrologic Conditions of Concern (HCOC) Analysis 16
F.2 HCOC Mitigation 17

Section G: Source Control BMPs 18

Section H: Construction Plan Checklist 20

Section I: Operation, Maintenance and Funding 21

List of Tables

Table A.1 Identification of Receiving Waters 6
Table A.2 Other Applicable Permits 6
Table C.1 DMA Classifications 8
Table C.2 Type 'A', Self-Treating Areas 8
Table C.3 Type 'B', Self-Retaining Areas 9
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas 9
Table C.5 Type 'D', Areas Draining to BMPs 10
Table D.1 Infiltration Feasibility 11
Table D.2 LID Prioritization Summary Matrix 13
Table D.3 DCV Calculations for LID BMPs 14
Table F.1 Hydrologic Conditions of Concern Summary 16
Table G.1 Permanent and Operational Source Control Measures 18
Table H.1 Construction Plan Cross-reference 20

List of Appendices

Appendix 1: Maps and Site Plans 22
Appendix 2: Construction Plans 23
Appendix 3: Soils Information 24
Appendix 4: Historical Site Conditions 25
Appendix 5: LID Infeasibility 26
Appendix 6: BMP Design Details 27
Appendix 7: Hydromodification 28
Appendix 8: Source Control 29
Appendix 9: O&M 30
Appendix 10: Educational Materials 31

Section A: Project and Site Information

The proposed project site encompasses approximately 14.35 acres. Improvements to the site include the construction of seven office type buildings. There will be landscaping adjacent to Magnolia Avenue and Pierce Street. The remainder of the site will be paved for vehicle parking.

PROJECT INFORMATION	
Type of Project:	Light Industrial
Planning Area:	n/a
Community Name:	n/a
Development Name:	IBG Magnolia Center
PROJECT LOCATION	
Latitude & Longitude (DMS): 33.893111, -117.4932	
Project Watershed and Sub-Watershed: Santa Ana River & Temescal Creek	
APN(s): 135-220-021, -023, -025, -027, and -030	
Map Book and Page No.: Assessor's Map BK. 135 PG. 22	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Light Industrial
Proposed or Potential SIC Code(s)	1541
Area of Impervious Project Footprint (SF)	527,661 (12.11 ac)
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	527,661 (12.11 ac)
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	Geotech Report Available
What is the Water Quality Design Storm Depth for the project?	0.62

A.1 Maps and Site Plans

Appendix 1 includes a map of the local vicinity and existing site. In addition, WQMP Site Plan, located in Appendix 1, includes 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

A.2 Receiving Waters

In order of upstream to downstream, the receiving waters that the project site is tributary to are as follows. A map of the receiving waters is included 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
Temescal Creek, Reach 1	pH	N/A	Not classified as a RARE waterbody.
Santa Ana River, Reach 3	Metals and Pathogens	AGR, GWR, REC1, REC2, WARM, WILD, RARE	8.1 Miles

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 Conditional Use Permit	☒ Y	☐ N
City of Riverside Design Review	☒ Y	☐ N
City of Riverside Building Permit	☒ Y	☐ N
City of Riverside Grading Permit	☒ Y	☐ N
City of Riverside Construction Permit	☒ Y	☐ N

Section B: Optimize Site Utilization (LID Principles)

Site Optimization

Does the project identify and preserve existing drainage patterns? If so, how? If not, why?

- *Excessive grading has been minimized.*
- *There are no creeks, wetlands, or riparian habitats nearby.*
- *Existing drainage patterns flow from east to west. Proposed condition drainage patterns mimic pre-development conditions.*

Does the project identify and protect existing vegetation? If so, how? If not, why?

- *Not applicable, the entire site was previously disturbed (mass-graded).*
- *Not applicable, there are no sensitive areas.*
- *No applicable, there are no existing trees or vegetation to preserve.*

Does the project identify and preserve natural infiltration capacity? If so, how? If not, why?

- *Stormwater BMPs are located in areas of permeable soil to promote infiltration where applicable.*

Does the project identify and minimize impervious area? If so, how? If not, why?

- *Impervious area on the site has been minimized to County/City standards.*
- *Due to the nature of the project site, substitution of pavement for landscaping is not feasible. Landscaping has been provided wherever applicable and to the maximum extent practicable. There is no proposed overflow parking.*
- *The entire DCV will be handled by infiltration and biofiltration facilities. Permeable pavement is not needed to meet the DCV.*

Does the project identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

- *Roof runoff is directed to the infiltration and biofiltration facilities for treatment.*
- *Stormwater BMPs are located throughout the site to detain and retain runoff at various locations.*
- *The site is not on a hillside.*
- *All stormwater runoff will either sheet flow, be piped, or utilize curb-cuts into infiltration and biofiltration facilities.*

Section C: Delineate Drainage Management Areas (DMAs)

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	Area (Acres)	DMA Type
1-A	Roofs	9,150	0.21	Type D
1-B	Ornamental Landscaping	10,735	0.25	Type D
1-C	Concrete or Asphalt	21,497	0.49	Type D
2-A	Roofs	17,365	0.40	Type D
2-B	Ornamental Landscaping	8,570	0.20	Type D
2-C	Concrete or Asphalt	21,981	0.50	Type D
3-A	Roofs	33,850	0.78	Type D
3-B	Ornamental Landscaping	7,455	0.17	Type D
3-C	Concrete or Asphalt	26,213	0.60	Type D
4-A	Roofs	0	0.00	Type D
4-B	Ornamental Landscaping	5,035	0.12	Type D
4-C	Concrete or Asphalt	3,677	0.08	Type D
5-A	Roofs	78,300	1.80	Type D
5-B	Ornamental Landscaping	21,210	0.49	Type D
5-C	Concrete or Asphalt	22,458	0.52	Type D
6-A	Roofs	60,340	1.39	Type D
6-B	Ornamental Landscaping	13,630	0.31	Type D
6-C	Concrete or Asphalt	80,668	1.85	Type D
7-A	Roofs	14,130	0.32	Type D
7-B	Ornamental Landscaping	6,675	0.15	Type D
7-C	Concrete or Asphalt	9,687	0.22	Type D
8-A	Roofs	48,525	1.11	Type D
8-B	Ornamental Landscaping	13,545	0.31	Type D
8-C	Concrete or Asphalt	38,118	0.88	Type D
9-A	Roofs	13,105	0.30	Type D
9-B	Ornamental Landscaping	10,750	0.25	Type D
9-C	Concrete or Asphalt	28,597	0.65	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	n/a	n/a	n/a
n/a	n/a	n/a	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	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	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) [A]	Post-project surface type	Runoff factor [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
1-A	BIO#01 (Biofiltration with Underdrain)
1-B	BIO#01 (Biofiltration with Underdrain)
1-C	BIO#01 (Biofiltration with Underdrain)
2-A	BIO#02 (Biofiltration with Underdrain)
2-B	BIO#02 (Biofiltration with Underdrain)
2-C	BIO#02 (Biofiltration with Underdrain)
3-A	BIO#03 (Bioretention w/o underdrain)
3-B	BIO#03 (Bioretention w/o underdrain)
3-C	BIO#03 (Bioretention w/o underdrain)
4-A	BIO#04 (Bioretention w/o underdrain)
4-B	BIO#04 (Bioretention w/o underdrain)
4-C	BIO#04 (Bioretention w/o underdrain)
5-A	BIO#05 (Biofiltration with Underdrain)
5-B	BIO#05 (Biofiltration with Underdrain)
5-C	BIO#05 (Biofiltration with Underdrain)
6-A	BIO#06 (Bioretention w/o underdrain)
6-B	BIO#06 (Bioretention w/o underdrain)
6-C	BIO#06 (Bioretention w/o underdrain)
7-A	BIO#07 (Biofiltration with Underdrain)
7-B	BIO#07 (Biofiltration with Underdrain)
7-C	BIO#07 (Biofiltration with Underdrain)
8-A	BIO#08 (equalized with BIO#09) (Biofiltration with Underdrain)
8-B	BIO#08 (equalized with BIO#09) (Biofiltration with Underdrain)
8-C	BIO#08 (equalized with BIO#09) (Biofiltration with Underdrain)
9-A	BIO#09 (equalized with BIO#08) (Biofiltration with Underdrain)
9-B	BIO#09 (equalized with BIO#08) (Biofiltration with Underdrain)
9-C	BIO#09 (equalized with BIO#08) (Biofiltration with Underdrain)

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

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

Geotechnical Report

A Geotechnical Report is required by the **City of Riverside** to confirm present and past site characteristics that may affect the use of Infiltration BMPs, in Appendix 3.

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 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: **1, 2, 5, 7, 8, and 9**		
...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:		

D.2 Harvest and Use Assessment

The following conditions apply*:*

☐ 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 City or Riverside).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. (Harvest and Use BMPs are still encouraged, but are not be required as the Design Capture Volume will be infiltrated or evapotranspired.)

☒ The Design Capture Volume is partially address using Infiltration BMPs. Harvest and Use assessment must be completed to determine feasibility.

Irrigation Use Feasibility

Step 1: Total Area of Irrigated Landscape: 2.25 acres

Type of Landscaping (Conservation Design or Active Turf): Conservation Design

Step 2: Total Area of Impervious Surfaces: 12.11 acres

Step 3: The project EIATIA factor: 0.89 (interpolated value)

Step 4: Minimum required irrigated area: 10.78 acres

Step 5:

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
10.78 acres	2.25 acres

Toilet Use Feasibility

Step 1: Projected Number of Daily Toilet Users: 385 (estimated using # of parking stalls available)

Project Type: Industrial

Step 2: Total Area of Impervious Surfaces: 12.11 acres

Step 3: The project TUTIA factor: 177 (interpolated value)

Step 4: Minimum number of toilet users: 2,143

Step 5:

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
2,143	385

Other Non-Potable Use Feasibility

Step 1: Average Daily Demand: N/A

Step 2: Total Area of Impervious Surfaces: N/A

Step 3: The project factor: N/A

Step 4: Minimum required use: N/A

Step 5:

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
N/A	N/A

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.

For the project, the following applies:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5.

D.4 Feasibility Assessment Summaries

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	
1-A	☐	☐	☐	☒	☐
1-B	☐	☐	☐	☒	☐
1-C	☐	☐	☐	☒	☐
2-A	☐	☐	☐	☒	☐
2-B	☐	☐	☐	☒	☐
2-C	☐	☐	☐	☒	☐
3-A	☐	☐	☒	☐	☐
3-B	☐	☐	☒	☐	☐
3-C	☐	☐	☒	☐	☐
4-A	☐	☐	☒	☐	☐
4-B	☐	☐	☒	☐	☐
4-C	☐	☐	☒	☐	☐
5-A	☐	☐	☐	☒	☐
5-B	☐	☐	☐	☒	☐
5-C	☐	☐	☐	☒	☐
6-A	☐	☐	☒	☐	☐
6-B	☐	☐	☒	☐	☐
6-C	☐	☐	☒	☐	☐
7-A	☐	☐	☐	☒	☐
7-B	☐	☐	☐	☒	☐
7-C	☐	☐	☐	☒	☐
8-A	☐	☐	☐	☒	☐
8-B	☐	☐	☐	☒	☐
8-C	☐	☐	☐	☒	☐
9-A	☐	☐	☐	☒	☐
9-B	☐	☐	☐	☒	☐
9-C	☐	☐	☐	☒	☐

D.5 LID BMP Sizing

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious 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)*
	[A]		[B]	[C]	[A] x [C]			
1-A	9,150	Roofs	*1.00*	*0.89*	*8,161.8*	*0.62*	*421.7*	*8,017*
1-B	10,735	Ornamental Landscaping	*0.10*	*0.11*	*1,185.8*	*0.62*	*61.3*	
1-C	21,497	Concrete or Asphalt	*1.00*	*0.89*	*19,175.3*	*0.62*	*990.7*	
2-A	17,365	Roofs	*1.00*	*0.89*	*15,489.6*	*0.62*	*800.3*	*4,582*
2-B	8,570	Ornamental Landscaping	*0.10*	*0.11*	*946.6*	*0.62*	*48.9*	
2-C	21,981	Concrete or Asphalt	*1.00*	*0.89*	*19,607.1*	*0.62*	*1013.0*	
3-A	33,850	Roofs	*1.00*	*0.89*	*30,194.2*	*0.62*	*1560.0*	*2,826*
3-B	7,455	Ornamental Landscaping	*0.10*	*0.11*	*823.5*	*0.62*	*42.5*	
3-C	26,213	Concrete or Asphalt	*1.00*	*0.89*	*23,382.0*	*0.62*	*1208.1*	
4-A	0	Roofs	*1.00*	*0.89*	*0.0*	*0.62*	*0*	*2,248*
4-B	5,035	Ornamental Landscaping	*0.10*	*0.11*	*556.2*	*0.62*	*28.7*	
4-C	3,677	Concrete or Asphalt	*1.00*	*0.89*	*3,279.9*	*0.62*	*169.5*	
5-A	78,300	Roofs	*1.00*	*0.89*	*69,843.6*	*0.62*	*3608.6*	*14,700*
5-B	21,210	Ornamental Landscaping	*0.10*	*0.11*	*2,342.8*	*0.62*	*121.0*	
5-C	22,458	Concrete or Asphalt	*1.00*	*0.89*	*20,032.5*	*0.62*	*1035.0*	
6-A	60,340	Roofs	*1.00*	*0.89*	*53,823.3*	*0.62*	*2780.9*	*6,716*
6-B	13,630	Ornamental Landscaping	*0.10*	*0.11*	*1,505.5*	*0.62*	*77.8*	
6-C	80,668	Concrete or Asphalt	*1.00*	*0.89*	*71,955.9*	*0.62*	*3717.7*	
7-A	14,130	Roofs	*1.00*	*0.89*	*12,604.0*	*0.62*	*651.2*	*3,454*
7-B	6,675	Ornamental Landscaping	*0.10*	*0.11*	*737.3*	*0.62*	*38.1*	
7-C	9,687	Concrete or Asphalt	*1.00*	*0.89*	*8,640.8*	*0.62*	*446.4*	
8-A	48,525	Roofs	*1.00*	*0.89*	*43,284.3*	*0.62*	*2236.4*	*7,239*
8-B	13,545	Ornamental Landscaping	*0.10*	*0.11*	*1,496.2*	*0.62*	*77.3*	
8-C	38,118	Concrete or Asphalt	*1.00*	*0.89*	*34,001.3*	*0.62*	*1756.7*	
9-A	13,105	Roofs	*1.00*	*0.89*	*11,689.7*	*0.62*	*604.0*	
9-B	10,750	Ornamental Landscaping	*0.10*	*0.11*	*1,187.4*	*0.62*	*61.3*	
9-C	28,597	Concrete or Asphalt	*1.00*	*0.89*	*25,508.5*	*0.62*	*1317.9*	
	625,266				*481,455*	0.62	24,875.0	49,782

[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

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 City of Riverside). For the project, the following applies:

☒ 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 City of Riverside 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.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

The project does not create a Hydrologic Condition of Concern, meeting the criteria for HCOC Exemption as shown below:

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The City of Riverside 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

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 City of Riverside

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

Results in Table F.1 below and 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 (Prado Dam and Santa Ana River) 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 Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

The adequate sump that applies to the project site is Prado Dam and the Santa Ana River (see map in Appendix 7 of this WQMP report).

F.2 HCOC Mitigation

As an alternative to the HCOC Exemption Criteria above, HCOC criteria is considered mitigated if the project meets one of the following conditions, as indicated:

☐ 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 City of Riverside 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.

☒ d. None of the above.

Section G: Source Control BMPs

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
A. On-site storm drain inlets	• Mark all inlets with the words "Only Rain Down the Strom 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 CASQA fact sheet SC-44 fro "Drainage System Maintenance" • Include the following lease agreements: "Tenant shall not allow anyone to discharge anything to storm drain 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	• Interior floor drains and elevator shaft sump pups will be plumbed to sanitary sewer.	• Inspect and maintain drains to prevent blockages and overflow.
D2. Landscape / Outdoor Pesticide Use	• Landscape plans will 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. • Pest-resistant plans will be used adjacent to hardscape. • The landscape plans will consider plants appropriate to the site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	• Maintain landscaping using minimum or no pesticides. • See "Landscape and Gardening" brochure by RCFlood. • Provide IPM information to new owners, lessees and operators.
G. Refuse Areas	• Site refuse will be handled by contractor on a weekly basis. • Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	• An adequate number of receptacles will be provided. Receptacles are to be inspected daily and repairs or replacements to leaky receptacles will be completed immediately. Receptacles are to remain covered with not in use. Dumping of liquid or hazardous wastes is prohibited. A "no hazardous materials" sign will be posted. Spills will be cleaned immediately upon discovery. Spill control materials will be available onsite. See CASQA fact sheet SC-34 for "Waste Handling and Disposal."
H. Industrial processes	• All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.	• See CASQA fact sheet SC-10 for "Non-Stormwater Discharges"
M. Loading Docks	• Spills will be cleaned up immediately and disposed of properly.	• Move loaded and unloaded items indoors as soon as possible. • See CASQA fact sheet SC-30 for "Outdoor Loading and Unloading"

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
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.

Section H: Construction Plan Checklist

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	Latitude	Longitude
BIO#01	Biofiltration with Underdrain	TBD	33.894689	-117.491150
BIO#02	Biofiltration with Underdrain	TBD	33.894034	-117.490458
BIO#03	Bioretention without Underdrain	TBD	33.893366	-117.491343
BIO#04	Bioretention without Underdrain	TBD	33.893112	-117.491209
BIO#05	Biofiltration with Underdrain	TBD	33.894114	-117.492171
BIO#06	Bioretention without Underdrain	TBD	33.892715	-117.492338
BIO#07	Biofiltration with Underdrain	TBD	33.893388	-117.493496
BIO#08	Biofiltration with Underdrain	TBD	33.893023	-117.494103
BIO#09	Biofiltration with Underdrain	TBD	33.892626	-117.494655

Section I: Operation, Maintenance and Funding

As required by the City of Riverside, the following Operation, Maintenance and Funding details are provided as summarized:

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.
3. An outline of general maintenance requirements for the Stormwater BMPs 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.
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.

See Appendix 9 for a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on site, and an agreement assigning responsibility for maintenance and providing for inspections and certification.

Maintenance Mechanism: Covenant and Agreement
Establishing Notification Process And Responsibility For
Water Quality Management Plan Implementation And Maintenance

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☒ Y ☐ N

Operation and Maintenance Plan and Maintenance Mechanism are included in Appendix 9. Educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP are included in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

"VICINITY MAP"

FOR

IBG MAGNOLIA CENTER

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

"RECEIVING WATERS MAP"

FOR

IBG MAGNOLIA CENTER

FLOW

MAGNOLIA AVENUE

PIERCE STREET

ARLINGTON CHANNEL

PARCEL 1
BUILDING 1
DMA #09 1.20 AC

PARCEL 2
BUILDING 2
DMA #07 0.70 AC

PARCEL 3
BUILDING 3

PARCEL 4
BUILDING 4
DMA #08 2.30 AC

PARCEL 5
BUILDING 5
DMA #05 2.80 AC
DMA #06 3.55 AC

PARCEL 6
BUILDING 6
DMA #01 0.95 AC
DMA #02 1.10 AC
DMA #03 1.55 AC
DMA #04 0.20 AC

PARCEL 7
BUILDING 7

LEGEND

1. ABOVEGROUND LOADING DOCK
2. DEPRESSED LOADING DOCK
3. BIORETENTION/BIOFILTRATION BASIN
4. STORM DRAIN CATCH BASIN STENCIL: "ONLY RAIN DOWN THE DRAIN"
5. TRASH STORAGE AREAS
6. SUMP PUMP
7. SUMP PUMP DISCHARGE POINT
8. STORM DRAIN
9. CATCH BASIN
10. NOT USED

NOTES:

RD ROOF DRAIN
BOUNDARY
DRAINAGE AREAS
FLOW LINE
LANDSCAPE

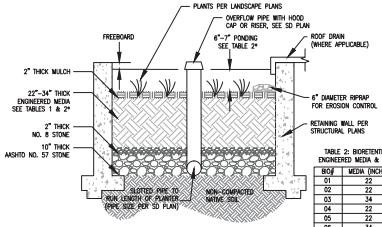


TABLE 1: MINERAL COMPONENT RANGE REQUIREMENTS (BY VOLUME)

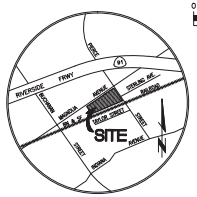
PERCENT RANGE	COMPONENT
70–80	SAND
15–20	SILT
5–10	CLAY

TABLE 2: BIORETENTION/BIOFILTRATION ENGINEERED MEDIA & PONDING SPECIFICS

BIO#	MEDIA (INCHES)	PONDING (FT)
01	22	0.5
02	22	0.5
03	34	0.5
04	22	0.5
05	22	0.5
06	34	0.6
07	22	0.5
08	34	0.5
09	34	0.5

TYPICAL BIOFILTRATION DETAIL

N.T.S.



VICINITY MAP

N.T.S.

0 20 40 80 120

SCALE:1"=40'

Last Updated 1/8/16
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CITY OF RIVERSIDE

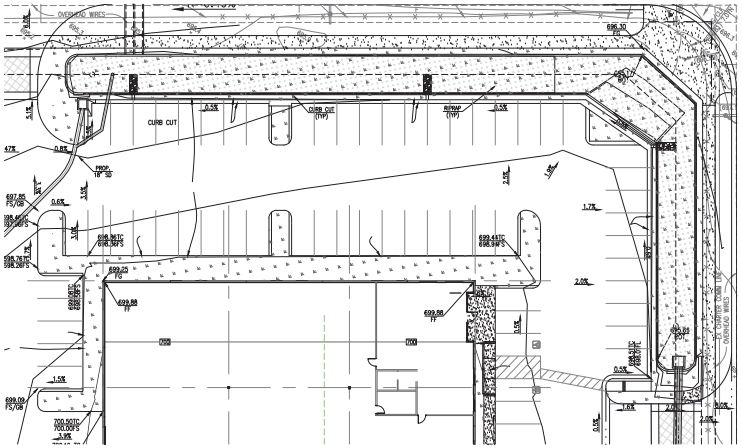
WQMP SITE MAP
IBQ MAGNOLIA CENTER

PIERCE STREET
AND
MAGNOLIA AVENUE

PREPARED BY:

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH(714)521-4811 FAX(714)521-4173

2609E/ 1 OF 2 SHEETS



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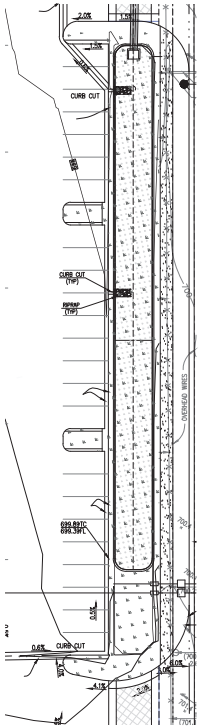

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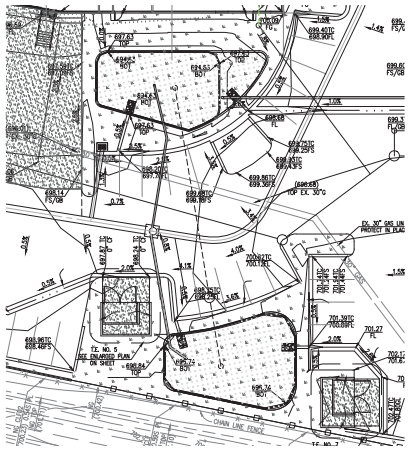

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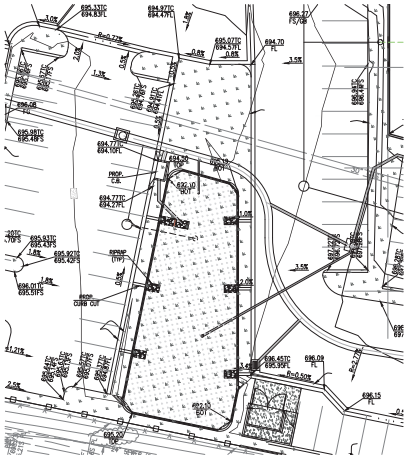

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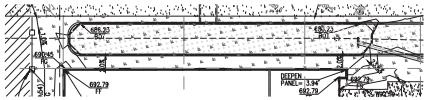

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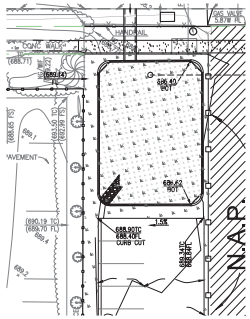

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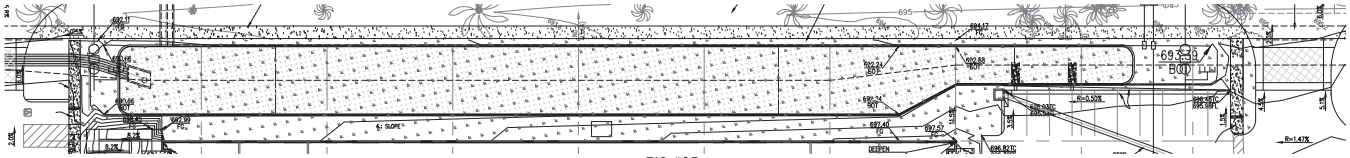

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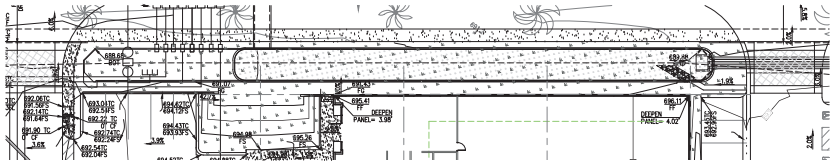

BIO #07

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SCALE:1"=20'

Last Updated 1/8/16
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CITY OF RIVERSIDE

WQMP SITE MAP
IBQ MAGNOLIA CENTER

PIERCE STREET
AND
MAGNOLIA AVENUE

PREPARED BY:

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH(714)521-4811 FAX(714)521-4173

2609E/ 2 OF 2 SHEETS

Appendix 2: Construction Plans

Grading and Drainage Plans (TO BE INCLUDED WITH FINAL WQMP)

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

John R. Byerly
INCORPORATED

May 4, 2015

Investment Building Group
5100 Campus Drive, Suite 300
Newport Beach, California 92660

Rpt. No.: 2953
File No.: S-13620

Attention: Brian Bargemann

Project: Proposed Business Center, Assessor's Parcel Nos. 135-220-21, 135-220-23, 135-220-25, 135-220-27, and 135-220-30, Southwest Corner of Magnolia Avenue and Pierce Street, Riverside, California

Subject: Percolation Testing for Storm Water Disposal

References:

(a) Soils Investigation, Magnolia Business Center and Regional Concentrate Reduction Facilities, Southwest Corner of Magnolia Avenue and Pierce Street, Riverside, California, John R. Byerly, Inc., File No.: S-12643, Rpt. No. 4964, December 1, 2008

(b) Design Handbook for Low Impact Development, Best Management Practices, Riverside County Flood Control and Water Conservation District, Revised September 2011

(c) e-mail re: IBG Magnolia Center – Required Test Locations, Cesar Raymundo, Thienes Engineering, Inc., March 11, 2015 with attached Infiltration Test Location Exhibit

(d) Update of Soils Investigation Report, Proposed Business Center, Assessor's Parcel Nos. 135-220-21, 135-220-23, 135-220-25, 135-220-27, and 135-220-30, Southwest Corner of Magnolia Avenue and Pierce Street, Riverside, California, John R. Byerly, Inc., File No.: S-13620, Rpt. No. 2958, May 4, 2015

Gentlemen:

Improvement of the subject property will require the disposal of storm water runoff within the site. We understand that the disposal of the storm water runoff will be accomplished by the use of infiltration basins. In a telephone conversation on March 12, 2015 with Rick Dalton, Principal with RMDalton Corporation, we were informed that six percolation tests as depicted in Reference (c) are required at this time. We were also informed that if the percolation rates

determined by the six tests are not acceptable, additional percolation testing would not be needed. If the six percolation test results are considered favorable, we understand that five additional percolation tests would be needed as shown in Reference (c). During April of 2014, an investigation of the percolation characteristics of the soils that will underlie the proposed infiltration basins was conducted by this firm. The purpose of our investigation was to assist in the determination of a suitable infiltration rate for design of the infiltration system for this project.

PROJECT DESCRIPTION

For the preparation of this report, we reviewed the referenced infiltration test location exhibit provided by Thienes Engineering, Inc. The referenced infiltration test location exhibit identifies eleven percolation test locations in which eight infiltration basins will be constructed. However, we understand that six percolation tests as depicted in Reference (c) are required at this time. We note that the bottom of the infiltration basins will range from 5 to 9 feet below the presently existing grade.

REVIEW OF PREVIOUS GEOTECHNICAL REPORT

A soils investigation was performed for the then-proposed Magnolia Business Center and Regional Concentrate Reduction Facilities by our firm as described in Reference (a). The subsurface explorations consisted of 32 test borings drilled with a truck-mounted flight-auger to a maximum depth of 51.5 feet below the existing ground surface. Test borings were placed in the vicinity of the areas proposed for infiltration basins. Laboratory testing included maximum density, consolidation, expansion index, gradation, sand equivalent, and chemical tests. This report presented grading and foundation design recommendations. Recommendations were also provided for the design of asphalt concrete pavement design for the improvement areas.

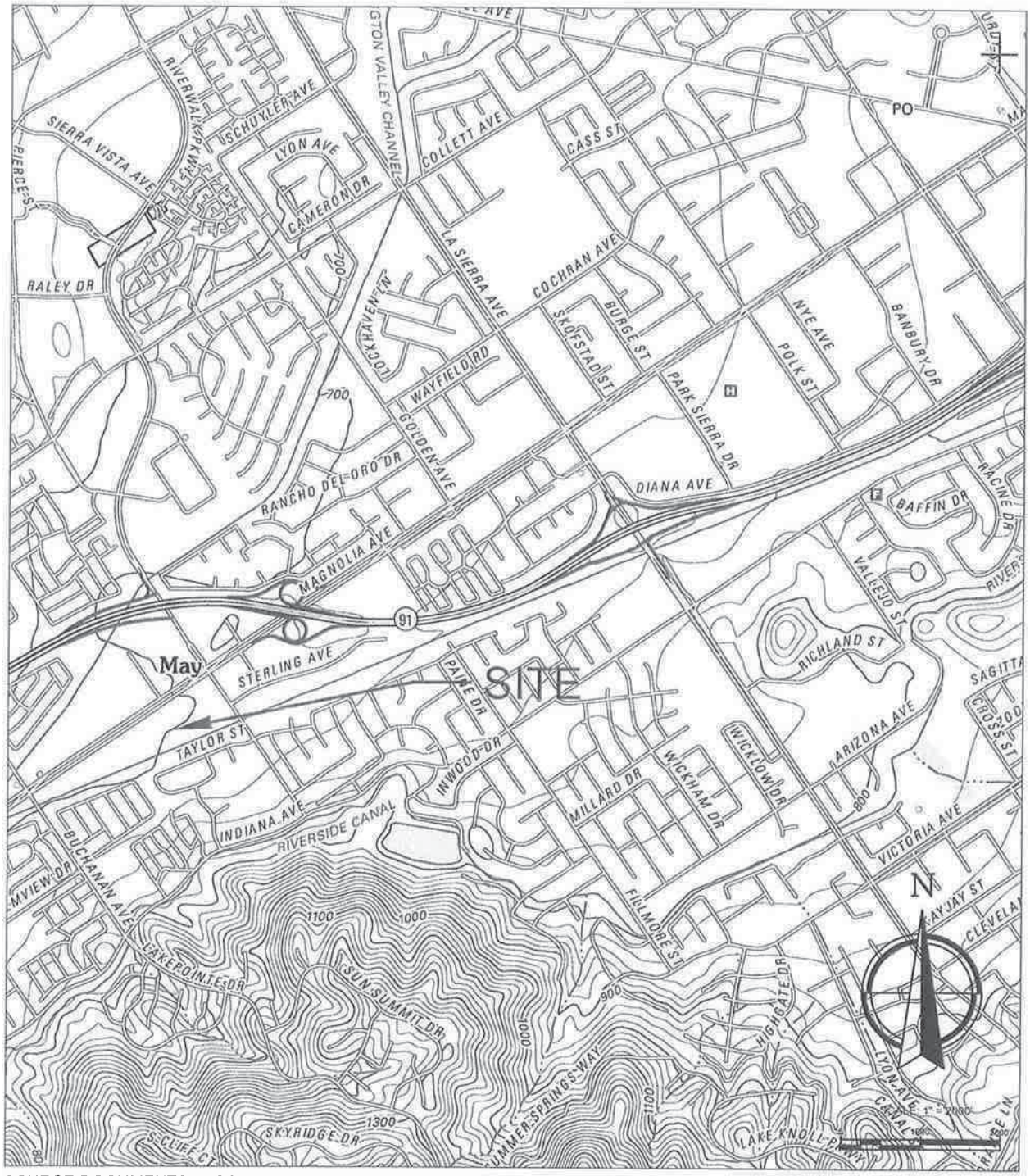
SITE CONDITIONS

The proposed 14.41-acre site is located on the southwest corner of Magnolia Avenue and Pierce Street in the city of Riverside. An Index Map showing the general vicinity of the site is presented on the following page. The coordinates of the site are latitude 33.8933° N and longitude 117.4923° W utilizing the North American Datum (NAD) from 1983. The property is enclosed by a chain-link fence. At the time of our study, the ground surface throughout the property had been recently disced. A 30-inch-diameter high-pressure gas transmission pipeline enters the property about 230 feet west of the southeast property corner and extends westerly through the property to an above-ground facility consisting of above-ground pipes and valves located at the west end of the property. Four 6-inch-diameter plastic pipe risers were noted just south of the north property boundary. These risers may be remnants of monitoring wells or percolation tests. An overhead electrical power line enters the northwest portion of the property from Magnolia Avenue. The study of previous site use by Stantec Consulting Corporation identified a gasoline service station with underground storage tanks at the southwest corner of Magnolia Avenue and Pierce Street. The Stantec report noted that the underground storage tanks were removed in 1990. No surface evidence of the previously existing service station was noted during our field investigation. Piles of trash and debris were noted in the westerly area of the site. Two water wells were noted near the northwest corner of the property. Existing commercial buildings are located north of the site across Magnolia Avenue and to the northeast across Pierce Street. The Burlington Northern & Santa Fe Railroad and Arlington Channel flood control channel run along the southern perimeter of the property. The area topography is generally flat, and the site slopes downward to the the south and southwest at an average gradient of less than 1 percent.

FIELD INVESTIGATION

The soils underlying the areas currently proposed for the infiltration basins were explored by means of six test pits excavated to depths ranging from 6.5 feet to 9.0 feet with a tractor-

INDEX MAP



SOURCE DOCUMENTS: USGS RIVERSIDE WEST QUADRANGLE, CALIFORNIA, 7.5 MINUTE SERIES, 2012

TOWNSHIP AND RANGE: SECTION 22, T3S, R6W

LATITUDE: 33.8933° N

LONGITUDE: 117.4923° W

John R. Byerly
INCORPORATED

Rpt. No.: 2953
File No.: S-13620

mounted backhoe. The approximate locations of these field explorations are shown on Enclosure 1. The soils encountered were examined and visually classified by one of our field engineers. A summary of the soil classifications appears as Enclosure 2. The exploration logs show subsurface conditions at the date and locations indicated, and may not be representative of subsurface conditions at other locations and times. The stratification depths presented on the logs represent the approximate soil type boundaries.

The City of Riverside – Public Works Department requires the use of a double-ring infiltrometer (ASTM D 3385-03, "Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer") to evaluate the percolation characteristics of the soils below infiltration basins. We have communicated with Kevin Marstall, Senior Engineer with the City of Riverside – Public Works Department, and were informed that he supported our intention to investigate the percolation characteristics of the subsoils underlying the areas proposed for the infiltration basins by six percolation tests. A backhoe was required to excavate the test pits for percolation testing at depths of the anticipated bottom of the infiltration basins. Within each of the test pits, we performed a percolation test with the double-ring infiltrometer following procedures required by the Riverside County Flood Control and Water Conservation District as indicated in the "Low Impact Development BMP Design Handbook, Revised September 2011" (Reference b). The percolation tests were performed on April 6 through 11, 2015. Enclosure 3 presents the field test data. Percolation testing was performed following procedures required by ASTM D 3385-03, "Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer." Graphs showing the double-ring infiltrometer test results are presented on Enclosure 4.

SOIL CONDITIONS

Artificial fill consisting of loose silty sands and silty sands with old metal pipes, concrete debris, and concrete standpipe was encountered in all of our test pits to depths ranging from 0.5 foot to 2.0 feet. The upper natural soils encountered in our test pits consisted of medium dense to very dense silty sands, silty sands with traces of clay, and stiff to very stiff sandy silts to the

maximum depth penetrated, consistent with the findings of the earlier soils investigation report (Reference a). The explorations conducted during the referenced soils investigation revealed that the soils below the percolation test levels consisted of medium dense to very dense sands, silty sands, stiff to hard sandy silts, and silty clays. In Reference (a), free ground water was noted in Boring 1 at a depth of 49 feet. Bedrock was not encountered at our exploration locations. The ground water study by Carson and Matti (USGS Open File Report, 82-1128, 1982) indicates that ground water levels at the site were at a depth in excess of 30 feet between the years 1973 and 1979. Based on ground water data, we conclude that the historic high ground water level should be assumed to be about 30 feet deep.

CONCLUSIONS AND RECOMMENDATIONS

The percolation tests yielded the percolation rates ranging from 0.2 inch per hour to 3.1 inches per hour. The test results are summarized in the following table.

Basin No.	Depth of Test (ft)	Infiltration Rate (inches per hour/cm per hour)
1	6.5	0.3/0.7
2	7.0	0.9/2.3
3	8.0	0.2/0.5
5	7.0	3.1/7.8
6	9.0	1.6/4.0
8	9.0	1.0/2.6

A safety factor has not been applied to these design values. The soils encountered in our infiltration rate study are consistent with our findings in our earlier field explorations excavated in close proximity to the percolation test locations.

We appreciate this opportunity to be of service. Should there be questions, please feel free to contact this office.

Respectfully submitted,

JOHN R. BYERLY, INC.

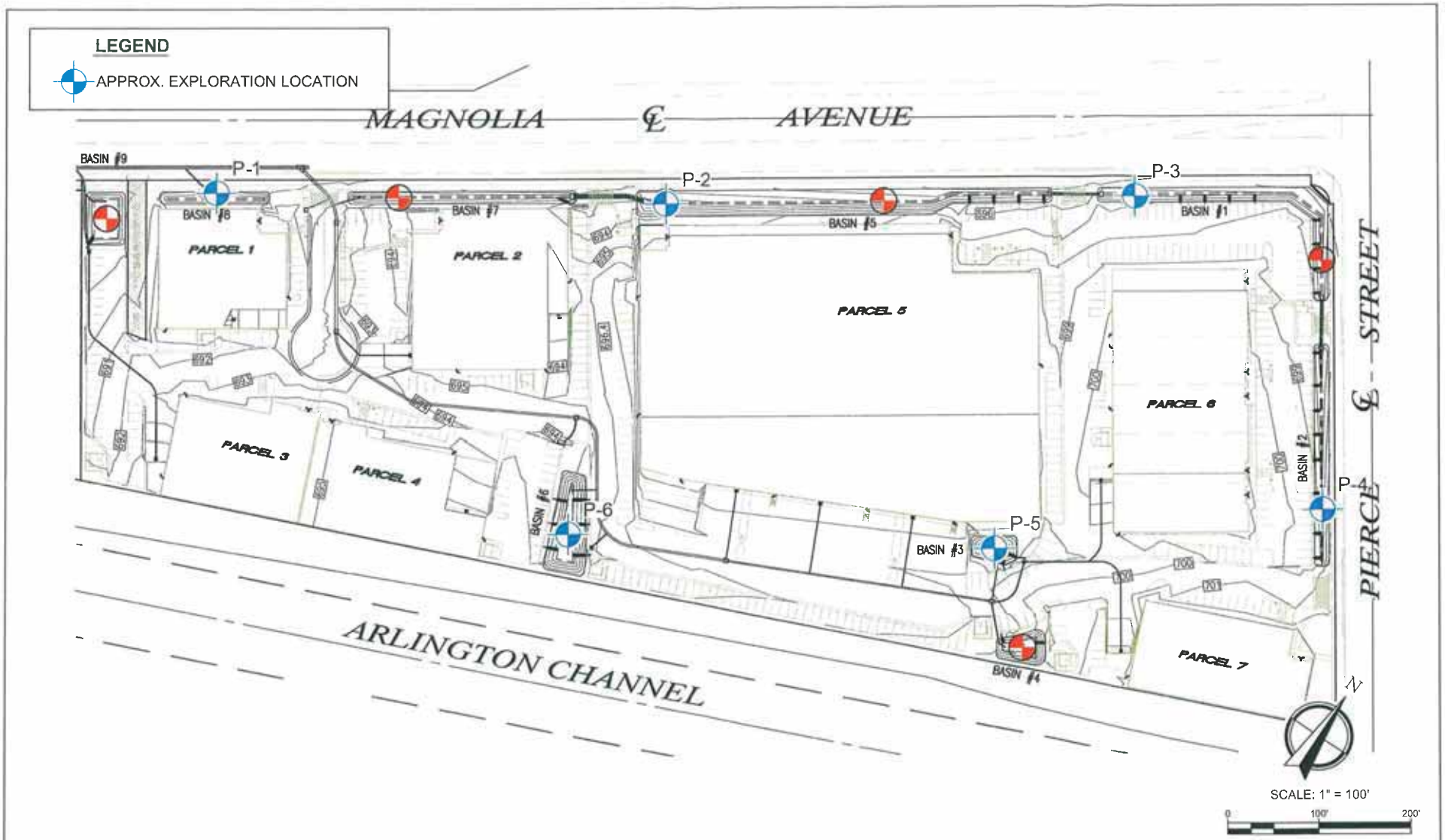
REGISTERED PROFESSIONAL ENGINEER
JOHN R. BYERLY
No. GE000179
Exp. Date 6-30-15
GEOTECHNICAL
STATE OF CALIFORNIA

John R. Byerly, Geotechnical Engineer
President

JRB:MLL:mh

Enclosures: (1) Plot Plan
(2) Exploration Logs
(3) Summary of Field Test Data
(4) Graph of Double-Ring Infiltrometer Test Results

Copies: (2) Investment Building Group
(2) RMDalton Corporation
(2) Thienes Engineering, Inc.



SOURCE DOCUMENT: SHEET 1, INFILTRATION TEST EXHIBIT, THIENES ENGINEERING, INC., 11 MARCH 2015

John R. Byerly INCORPORATED	PERCOLATION TESTING	PROPOSED BUSINESS CENTER SOUTHWEST CORNER OF MAGNOLIA AVENUE AND PIERCE STREET RIVERSIDE, CALIFORNIA	Enclosure 1 Rpt. No.: 2953 File No.: S-13620

Test Pit 1

Boring Date: 4/06/15
Surface Elevation:
Drilling Method: Backhoe

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand, dry and loose (FILL)
							SM	Red-brown silty fine to coarse sand, damp and medium dense (ORIGINAL GROUND)
2								
4							ML	Light gray-brown sandy silt, slightly cemented, moist, and very stiff
6								
8								
							END	Total Depth at 9.0 Feet No Free Groundwater Encountered
10								
12								
14								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\S-13620 (Rpt. No. 2953).log Date: 4/23/2015

LOG OF BORING

John R. Byerly, Inc.	**Proposed Business Center** **Riverside, California**	**Enclosure 2, Page 1** **Rpt. No.: 2953** **File No.: S-13620**

Test Pit 2

Boring Date: 4/06/15
Surface Elevation:
Drilling Method: Backhoe

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand, dry and loose (FILL)
							SM	Brown silty fine to coarse sand with a trace of clay, damp and medium dense (ORIGINAL GROUND)
2								
								- becoming very dense at 3.5 feet
4							ML	Light gray-brown sandy silt, slightly cemented, moist, and stiff
6								
							END	Total Depth at 7.0 Feet No Free Groundwater Encountered
8								
10								
12								
14								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-13620 (Rpt. No. 2953).log Date: 4/23/2015

LOG OF BORING

John R. Byerly, Inc.	**Proposed Business Center** **Riverside, California**	**Enclosure 2, Page 2** **Rpt. No.: 2953** **File No.: S-13620**

Test Pit 3

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table

Boring Date: 4/06/15
Surface Elevation:
Drilling Method: Backhoe

GWT not encountered

SM	Red-brown silty fine to coarse sand with old metal pipes, concrete debris, and old concrete standpipe, dry and loose (FILL)
SM	Gray-brown silty fine to coarse sand, damp and dense (ORIGINAL GROUND)
SM	Gray-brown silty fine sand, damp and very dense
END	Total Depth at 6.5 Feet No Free Groundwater Encountered

0 2 4 6 8 10 12 14

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\S-13620 (Rpt. No. 2953).log Date: 4/23/2015

LOG OF BORING

John R. Byerly, Inc.	**Proposed Business Center** **Riverside, California**	**Enclosure 2, Page 3** **Rpt. No.: 2953** **File No.: S-13620**

Test Pit 4

Boring Date: 4/06/15
Surface Elevation:
Drilling Method: Backhoe

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Light red-brown silty fine to medium sand, dry and loose (FILL)
							SM	Red-brown silty fine to coarse sand, damp and medium dense (ORIGINAL GROUND)
2							SM	Red-brown silty fine to coarse sand with a trace of clay, moist and dense
4							SM	Light gray-brown silty fine to coarse sand, damp and medium dense
6							END	Total Depth at 7.0 Feet No Free Groundwater Encountered
8								
10								
12								
14								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-13620 (Rpt. No. 2953).log Date: 5/4/2015

LOG OF BORING

Test Pit 5

Boring Date: 4/06/15
Surface Elevation:
Drilling Method: Backhoe

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Light gray-brown silty fine to medium sand, dry and loose (FILL)
							SM	Red-brown silty fine to coarse sand, damp and dense (ORIGINAL GROUND)
2								
4								
6							SM	Light gray-brown silty fine to coarse sand, damp and very dense
							SM	Gray-brown silty fine to medium sand, damp and very dense
8							END	Total Depth at 8.0 Feet No Free Groundwater Encountered
10								
12								
14								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\S-13620 (Rpt. No. 2953).log Date: 4/23/2015

LOG OF BORING

John R. Byerly, Inc.	**Proposed Business Center** **Riverside, California**	**Enclosure 2, Page 5** **Rpt. No.: 2953** **File No.: S-13620**

Test Pit 6

Boring Date: 4/06/15
Surface Elevation:
Drilling Method: Backhoe

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Light gray-brown silty fine to coarse sand, dry and loose (FILL)
							SM	Gray-brown silty fine to coarse sand, damp and medium dense (ORIGINAL GROUND)
2								
4								
6							SM	Brown silty fine to medium sand, damp and dense
8								
							ML	Light gray sandy silt, slightly cemented, moist, and stiff
							END	Total Depth at 9.0 Feet No Free Groundwater Encountered
10								
12								
14								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\S-13620 (Rpt. No. 2953).log Date: 4/23/2015

LOG OF BORING

John R. Byerly, Inc.	**Proposed Business Center** **Riverside, California**	**Enclosure 2, Page 6** **Rpt. No.: 2953** **File No.: S-13620**

GEOTEST INSTRUMENT CORP.

DATA FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620
Test Location BASIN #1
Tested by ERIC JOHNSON
Liquid used TAP WATER

Constants	Area	Depth of Liq.	Liq.Cont.: No.	Vol.
Inner Ring:	707cm²	10.2cm		
Anlr. Space:	2106cm²	10.2cm		

Penetration of rings: Inner: 5.1cm Outer: 15.2cm

Depth to water table 30 BGS pH _____ Groung Temp. 14.4°C Depth of 198.1cm

Liquid level maintained using float valve.

(P-3)

No.	S or E	Date yr 04-08-2015	Time hr. min	Elpd Time min	Flow Readings In. Rg. cm	Ring Flow cm³	Anlr. Space Rg. cm	Anlr. Space Flow cm³	Liq. Temp. °C	Iner. Infil. Rate Inr. cm/h	Anlr. cm/h	Remarks
1	S	"	10:10	0	0	225	0	400	17.2	1.27	0.76	18.9°C AIR TEMP.
	E	"	10:25	(15)	225		400					
2	S	"	10:26	15	0	200	0	350	17.2	1.13	0.66	
	E	"	10:41	(30)	200		350					
3	S	"	10:42	30	0	175	0	325	17.2	0.99	0.62	
	E	"	10:57	(45)	175		325					
4	S	"	10:58	45	0	150	0	300	17.2	0.85	0.57	
	E	"	11:13	(60)	150		300					
5	S	"	11:14	60	0	275	0	550	17.2	0.78	0.52	20.6°C AIR TEMP.
	E	"	11:44	(90)	275		550					
6	S	"	11:45	90	0	275	0	500	18.9	0.78	0.47	
	E	"	12:15	(120)	275		500					
7	S	"	12:16	120	0	500	0	1000	18.9	0.71	0.47	
	E	"	1:16	(180)	500		1000					
8	S	"	1:17	180	0	500	0	950	18.9	0.71	0.45	22.8°C AIR TEMP.
	E	"	2:17	(240)	500		950					
9	S	"	2:18	240	0	500	0	950	18.9	0.71	0.45	
	E	"	3:18	(300)	500		950					
10	S	"	3:19	300	0	500	0	950	23.3	0.71	0.45	
	E	"	4:19	(360)	500		950					

GEOTEST INSTRUMENT CORP.

DATA FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification 5-13620
Test Location BASIN #2
Tested by ERIC JOHNSON
Liquid used TAP WATER

Constants	Area	Depth of Liq.	Liq.Cont.: No.	Vol.
Inner Ring:	707 cm²	10.2 cm		
Anlr. Space:	2106 cm²	10.2 cm		

Penetration of rings: Inner: 5.1 cm Outer: 15.2 cm

Depth to water table 30 BGS pH _____ Groung Temp. 18.9°C Depth of 213.4 cm

Liquid level maintained using float valve.

(P-4)

No.	S or E	Date yr 04-06 2015	Time hr. min	Elpd Time min	Flow Readings In. Rg. cm	Ring Flow cm³	Anlr. Space Rg. cm	Anlr. Space Flow cm³	Liq. Temp. °C	Iner. Infil. Rate Inr. cm/h	Anlr. cm/h	Remarks
1	S	"	11:20	0	0	850	0	4000	21.1	4.81	7.60	22.8°C AIR TEMP.
	E	"	11:35	(15)	850		4000					
2	S	"	11:36	15	0	725	0	3500	21.1	4.10	6.65	
	E	"	11:51	(30)	725		3500					
3	S	"	11:52	30	0	600	0	3400	21.1	3.39	6.46	
	E	"	12:07	(45)	600		3400					
4	S	"	12:08	45	0	525	0	3300	21.1	2.97	6.27	
	E	"	12:23	(60)	525		3300					
5	S	"	12:24	60	0	900	0	5950	23.3	2.55	5.65	
	E	"	12:54	(90)	900		5950					
6	S	"	12:55	90	0	850	0	5800	23.3	2.40	5.51	23.3°C AIR TEMP.
	E	"	1:25	(120)	850		5800					
7	S	"	1:26	120	0	1650	0	11400	23.3	2.33	5.41	
	E	"	2:26	(180)	1650		11400					
8	S	"	2:27	180	0	1650	0	11300	23.3	2.33	5.37	
	E	"	3:27	(240)	1650		11300					
9	S	"	3:28	240	0	1600	0	11250	23.3	2.26	5.34	
	E	"	4:28	(300)	1600		11250					
10	S	"	4:29	300	0	1600	0	11250	23.3	2.26	5.34	
	E	"	5:29	(360)	1600		11250					

GEOTEST INSTRUMENT CORP.

DATA FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620
Test Location BASIN #3
Tested by ERIC JOHNSON
Liquid used TAP WATER

Constants	Area	Depth of Liq.	Liq.Cont.: No.	Vol.
Inner Ring:	707cm²	10.2cm		
Anlr. Space:	2106cm²	10.2cm		

Penetration of rings: Inner: 5.1cm Outer: 15.2cm
Depth to water table 30BGS pH _____ Groung Temp. 14.4°C Depth of 243.8 cm
Liquid level maintained using float valve.

(P-5)

No.	S or E	Date yr 04-07 2015	Time hr. min	Elpd Time min	Flow Readings In. Rg. cm	Ring Flow cm³	Anlr. Space Rg. cm	Anlr. Space Flow cm³	Liq. Temp. 0C	Iner. Infil. Rate Inr. cm/h	Anlr. cm/h	Remarks
1	S	"	10:20	0	0	275	0	1225	13.9	1.56	2.33	15.0°C AIR TEMP.
	E	"	10:35	(15)	275		1225					
2	S	"	10:36	15	0	225	0	1100	13.9	1.27	2.09	
	E	"	10:51	(30)	225		1100					
3	S	"	10:52	30	0	200	0	1000	13.9	1.13	1.90	
	E	"	11:07	(45)	200		1000					
4	S	"	11:08	45	0	175	0	900	13.9	0.99	1.71	
	E	"	11:23	(60)	175		900					
5	S	"	11:24	60	0	300	0	1500	15.0	0.85	1.42	16.7°C AIR TEMP.
	E	"	11:54	(90)	300		1500					
6	S	"	11:55	90	0	225	0	1450	15.0	0.64	1.38	
	E	"	12:25	(120)	225		1450					
7	S	"	12:26	120	0	400	0	2600	15.0	0.57	1.23	
	E	"	1:26	(180)	400		2600					
8	S	"	1:27	180	0	375	0	2550	15.0	0.53	1.21	
	E	"	2:27	(240)	375		2550					
9	S	"	2:28	240	0	375	0	2500	17.8	0.53	1.19	19.4°C AIR TEMP.
	E	"	3:28	(300)	375		2500					
10	S	"	3:29	300	0	350	0	2500	17.8	0.50	1.19	
	E	"	4:29	(360)	350		2500					

GEOTEST INSTRUMENT CORP.

DATA FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification 5-13620
Test Location BASIN #5
Tested by ERIC JOHNSON
Liquid used TAP WATER

Constants	Area	Depth of Liq.	Liq.Cont.: No.	Vol.
Inner Ring:	707 cm²	10.2 cm		
Anlr. Space:	2106 cm²	10.2 cm		

Penetration of rings: Inner: 5.1 cm Outer: 15.2 cm
Depth to water table 30 BGS pH _____ Groung Temp. 18.9°C Depth of 213.4 cm
Liquid level maintained using float valve.

(P-2)

No.	S or E	Date yr 04-09 2015	Time hr. min	Elpd Time min	Flow Readings In. Rg. cm	Ring Flow cm³	Anlr. Space Rg. cm	Anlr. Space Flow cm³	Liq. Temp. °C	Iner. Infil. Rate Inr. cm/h	Anlr. cm/h	Remarks
1	S	"	10:05	0	0	1675	0	8000	20.0	9.48	15.19	22.2°C AIR TEMP.
	E	"	10:20	(15)	1675		8000					
2	S	"	10:21	15	0	1625	0	7500	20.0	9.19	14.25	
	E	"	10:36	(30)	1625		7500					
3	S	"	10:37	30	0	1550	0	7250	20.0	8.77	13.77	
	E	"	10:52	(45)	1550		7250					
4	S	"	10:53	45	0	1500	0	7000	20.0	8.49	13.30	23.9°C AIR TEMP.
	E	"	11:08	(60)	1500		7000					
5	S	"	11:09	60	0	2900	0	13000	20.0	8.20	12.35	
	E	"	11:39	(90)	2900		13000					
6	S	"	11:40	90	0	2850	0	12000	22.2	8.06	11.40	
	E	"	12:10	(120)	2850		12000					
7	S	"	12:11	120	0	2850	0	11500	22.2	8.06	10.92	25.0°C AIR TEMP.
	E	"	12:41	(150)	2850		11500					
8	S	"	12:42	150	0	2800	0	11000	22.2	7.92	10.45	
	E	"	1:12	(180)	2800		11000					
9	S	"	1:13	180	0	2800	0	10750	22.2	7.92	10.21	
	E	"	1:43	(210)	2800		10750					
10	S	"	1:44	210	0	2775	0	10500	23.9	7.85	9.97	
	E	"	2:14	(240)	2775		10500					
11	S	"	2:15	240	0	2775	0	10500	23.9	7.85	9.97	
	E	"	2:45	(270)	2775		10500					
12	S	"	2:46	270	0	2750	0	10450	23.9	7.78	9.92	
	E	"	3:16	(300)	2750		10450					
13	S	"	3:17	300	0	2750	0	10450	23.9	7.78	9.92	
	E	"	3:47	(330)	2750		10450					
14	S	"	3:48	330	0	2750	0	10450	23.9	7.78	9.92	
	E	"	4:18	(360)	2750		10450					

GEOTEST INSTRUMENT CORP.

DATA FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620
Test Location BASIN #6
Tested by ERIC JOHNSON
Liquid used TAP WATER

Constants	Area	Depth of Liq.	Liq.Cont.: No.	Vol.
Inner Ring:	707 cm²	10.2 cm		
Anlr. Space:	2106 cm²	10.2 cm		

Penetration of rings: Inner: 5.1 cm Outer: 15.2 cm
Depth to water table 30 BGS pH _____ Groung Temp 18.9°C Depth of 274.3 cm
Liquid level maintained using float valve.

(P-6)

No.	S or E	Date yr 04-10 2015	Time hr. min	Elpd Time min	Flow Readings In. Rg. cm	Ring Flow cm³	Anlr. Space Rg. cm	Anlr. Space Flow cm³	Liq. Temp. 0C	Iner. Infil. Rate Inr. cm/h	Anlr. cm/h	Remarks
1	S	"	11:26	0	0	1350	0	8000	16.7	7.64	15.19	
	E	"	11:41	(15)	1350		8000					
2	S	"	11:42	15	0	1275	0	7700	16.7	7.21	14.62	17.2°C AIR TEMP.
	E	"	11:57	(30)	1275		7700					
3	S	"	11:58	30	0	1200	0	7300	16.7	6.79	13.87	
	E	"	12:13	(45)	1200		7300					
4	S	"	12:14	45	0	1125	0	7200	16.7	6.36	13.68	
	E	"	12:29	(60)	1125		7200					
5	S	"	12:30	60	0	1850	0	13000	16.7	5.23	12.35	
	E	"	1:00	(90)	1850		13000					
6	S	"	1:01	90	0	1600	0	11900	21.1	4.53	11.30	25.0°C AIR TEMP.
	E	"	1:31	(120)	1600		11900					
7	S	"	1:32	120	0	1550	0	11600	21.1	4.38	11.02	
	E	"	2:02	(150)	1550		11600					
8	S	"	2:03	150	0	1500	0	11200	21.1	4.24	10.64	
	E	"	2:33	(180)	1500		11200					
9	S	"	2:34	180	0	1475	0	11050	22.2	4.17	10.49	
	E	"	3:04	(210)	1475		11050					
10	S	"	3:05	210	0	1450	0	10950	22.2	4.10	10.40	24.4°C AIR TEMP.
	E	"	3:35	(240)	1450		10950					
11	S	"	3:36	240	0	1450	0	10900	22.2	4.10	10.35	
	E	"	4:06	(270)	1450		10900					
12	S	"	4:07	270	0	1425	0	10875	22.2	4.03	10.33	
	E	"	4:37	(300)	1425		10875					
13	S	"	4:38	300	0	1425	0	10850	22.2	4.03	10.30	
	E	"	5:08	(330)	1425		10850					
14	S	"	5:09	330	0	1400	0	10850	22.2	3.96	10.30	
	E	"	5:39	(360)	1400		10850					

GEOTEST INSTRUMENT CORP.

DATA FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620
Test Location BASIN #8
Tested by ERIC JOHNSON
Liquid used TAP WATER

Constants	Area	Depth of Liq.	Liq. Cont.: No.	Vol.
Inner Ring:	707 cm²	10.2 cm		
Anlr. Space:	2106 cm²	10.2 cm		

Penetration of rings: Inner: 5.1 cm Outer: 15.2 cm
Depth to water table 30 BGS pH _____ Groung Temp. 18.3°C Depth of 274.3 cm
Liquid level maintained using float valve.

(P-1)

No.	S or E	Date yr 04-11 2015	Time hr. min	Elpd Time min	Flow Readings In. Rg. cm	Ring Flow cm³	Anlr. Space Rg. cm	Anlr. Space Flow cm³	Liq. Temp. °C	Iner. Infil. Rate Inr. cm/h	Anlr. cm/h	Remarks
1	S	"	0	6:20	0	700	0	4000	16.1	3.96	7.60	12.8°C AIR TEMP.
	E	"	(15)	6:35	700		4000					
2	S	"	15	6:36	0	650	0	3800	16.1	3.68	7.22	
	E	"	(30)	6:41	650		3800					
3	S	"	30	6:42	0	600	0	3600	16.1	3.39	6.84	
	E	"	(45)	6:57	600		3600					
4	S	"	45	6:58	0	550	0	3400	16.1	3.11	6.46	
	E	"	(60)	7:13	550		3400					
5	S	"	60	7:14	0	1050	0	6300	17.2	2.97	5.98	16.7°C AIR TEMP.
	E	"	(90)	7:44	1050		6300					
6	S	"	90	7:45	0	975	0	6200	17.2	2.76	5.89	
	E	"	(120)	8:15	975		6200					
7	S	"	120	8:16	0	1850	0	12100	17.2	2.62	5.75	
	E	"	(180)	9:16	1850		12100					
8	S	"	180	9:17	0	1850	0	12000	17.2	2.62	5.70	
	E	"	(240)	10:17	1850		12000					
9	S	"	240	10:18	0	1825	0	12000	18.3	2.58	5.70	21.1°C AIR TEMP.
	E	"	(300)	11:18	1825		12000					
10	S	"	300	11:19	0	1825	0	12000	18.3	2.58	5.70	
	E	"	(360)	12:19	1825		12000					

GEOTEST INSTRUMENT CORP.

(P-3)

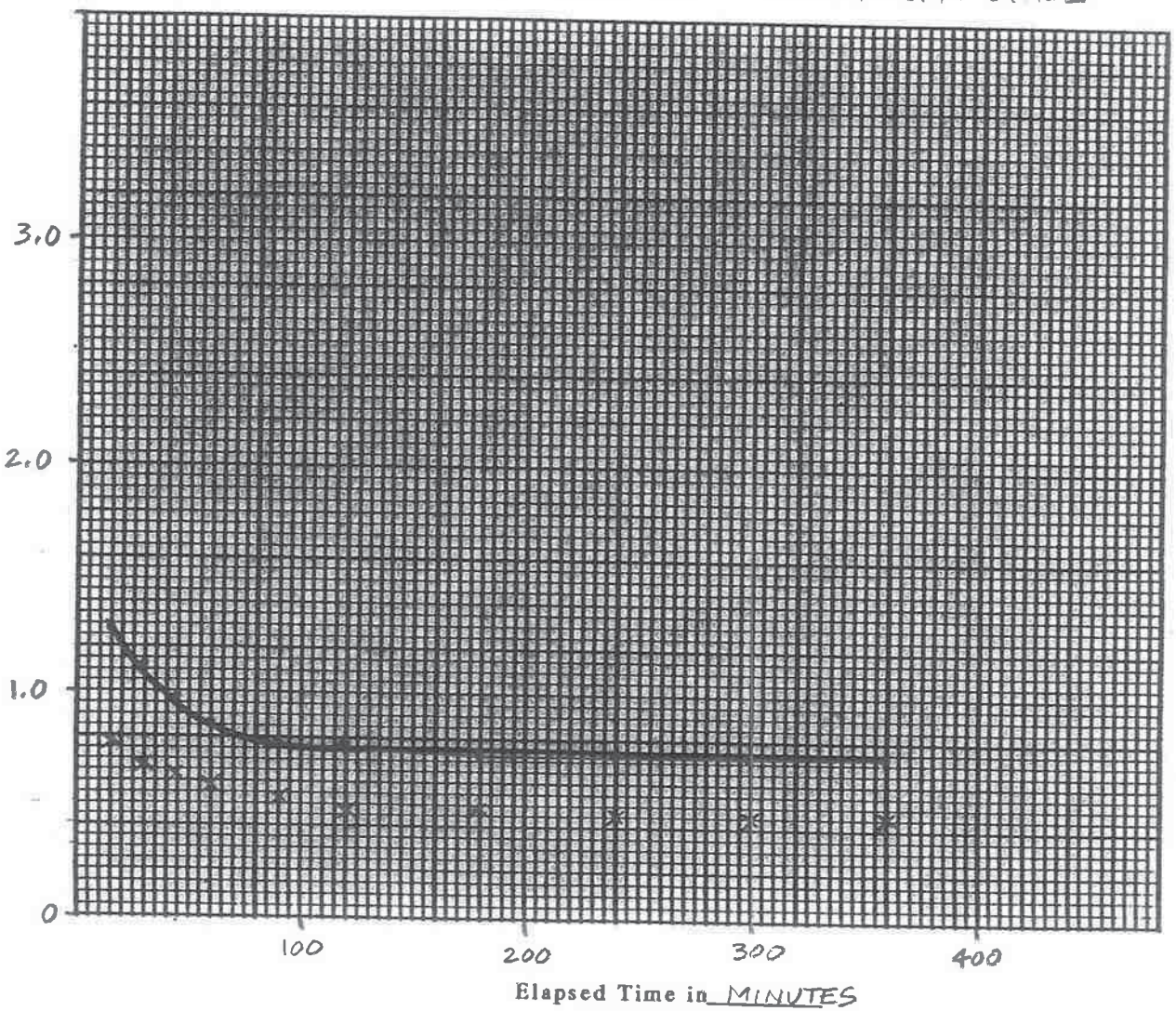
REPORT FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620 Prepared by ERIC JOHNSON Dates of Test: Start 4-8-15 ; Finish 4-8-15

Project Location BASIN #1 Liquid Used: TAP WATER ; pH _____ ; Ave. Temp. 18.5°C _____ (_____)

Horizontal Distance in _____

• INNER RING X ANNULAR SPACE



Depth in _____

Soil Profile Description
(SEE ENCLOSURE 2)

Remarks: _____

To reorder, specify S15

GEOTEST INSTRUMENT CORP.

(P-4)

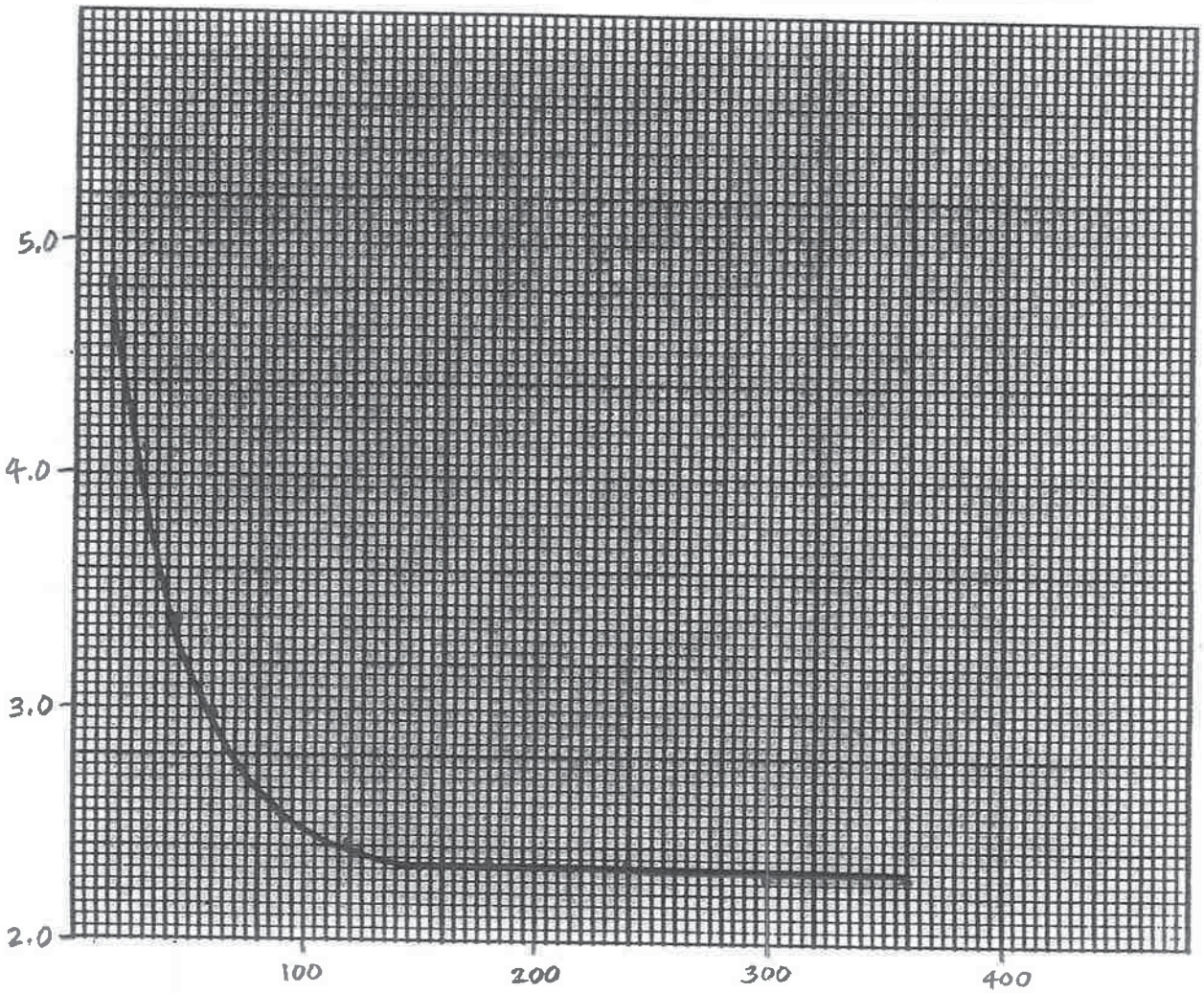
REPORT FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620 Prepared by ERIC JOHNSON Dates of Test: Start 4-6-15 ; Finish 4-6-15

Project Location BASIN #2 Liquid Used: TAP WATER ; pH _____ ; Ave. Temp. 22.4°C _____ (_____)

Horizontal Distance in _____

• INNER RING X ANNULAR SPACE



Elapsed Time in MINUTES

Depth in _____

Soil Profile Description
(SEE ENCLOSURE 2)

Remarks: _____

To reorder, specify S15

Enclosure 4, Page 2
Rpt. No.: 2953
File No.: S-13620

GEOTEST INSTRUMENT CORP.

(P-5)

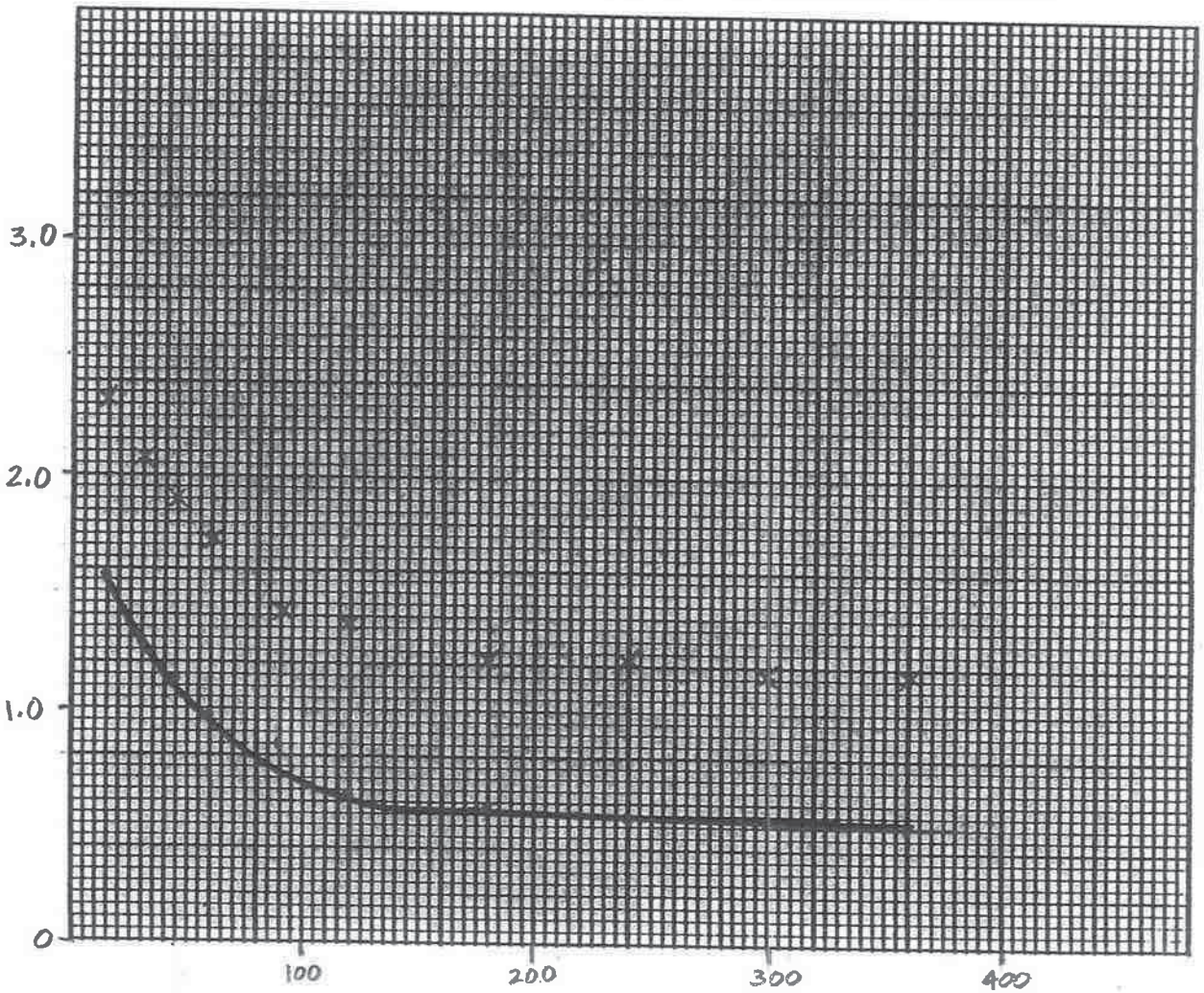
REPORT FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620 Prepared by ERIC JOHNSON Dates of Test: Start 4-7-15 ; Finish 4-7-15

Project Location BASIN #3 Liquid Used: TAP WATER ; pH _____ ; Ave. Temp. 15.1°C _____ (_____)

Horizontal Distance in _____

• INNER RING X ANNULAR SPACE



Depth in _____

Soil Profile Description
(SEE ENCLOSURE 2)

Remarks: _____

To reorder, specify S15

Enclosure 4, Page 3
Rpt. No.: 2953
File No.: S-13620

GEOTEST INSTRUMENT CORP.

(P-2)

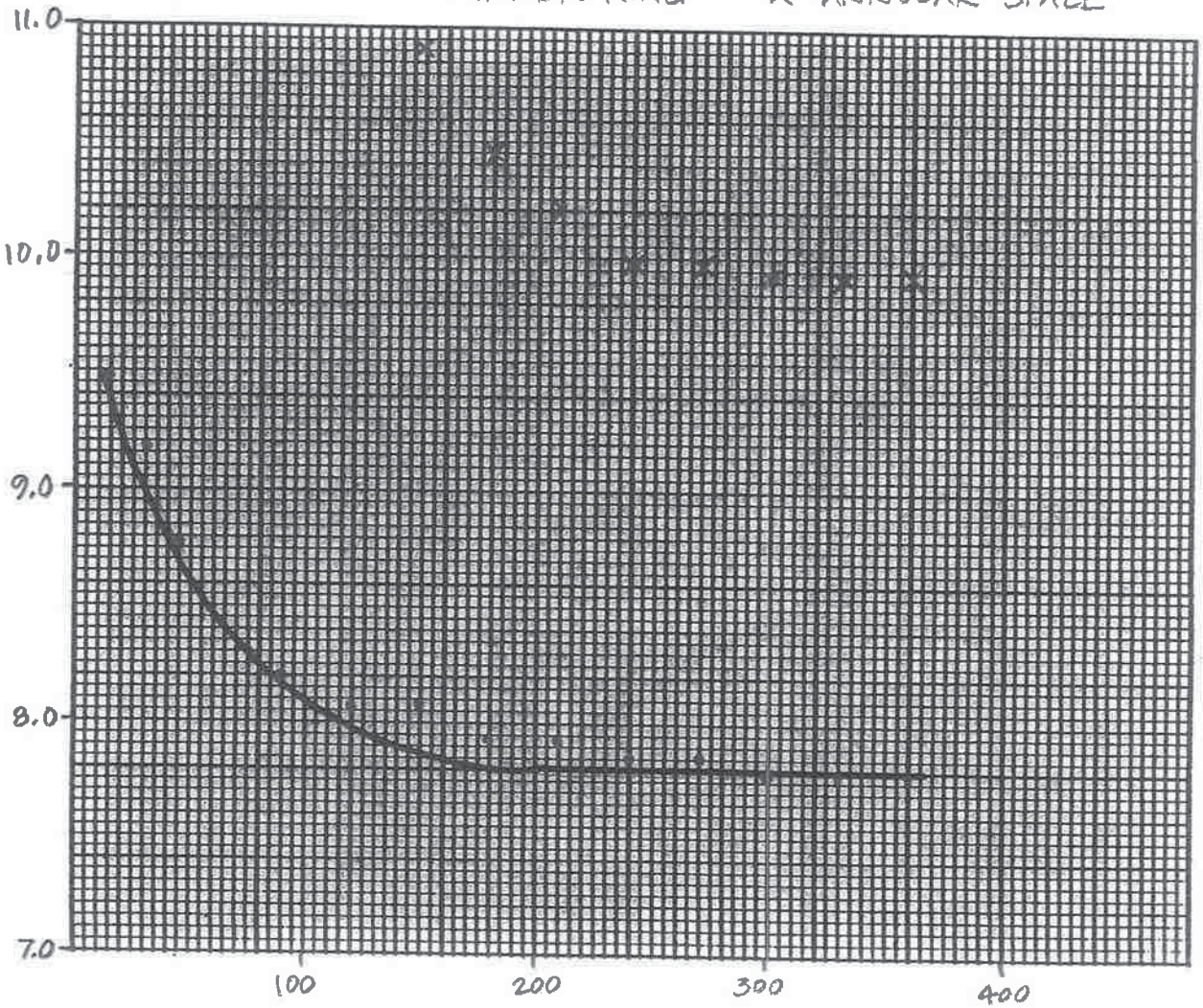
REPORT FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620 Prepared by ERIC JOHNSON Dates of Test: Start 4-9-15; Finish 4-19-15

Project Location BASIN #5 Liquid Used: TAP WATER; pH _____; Ave. Temp. 22.0°C _____ (_____)

Horizontal Distance in _____

• INNER RING X ANNULAR SPACE



Depth in _____

Soil Profile Description
(SEE ENCLOSURE 2)

Remarks: _____

To reorder, specify S15

Enclosure 4, Page 4
Rpt. No.: 2953
File No.: S-13620

GEOTEST INSTRUMENT CORP.

(P-6)

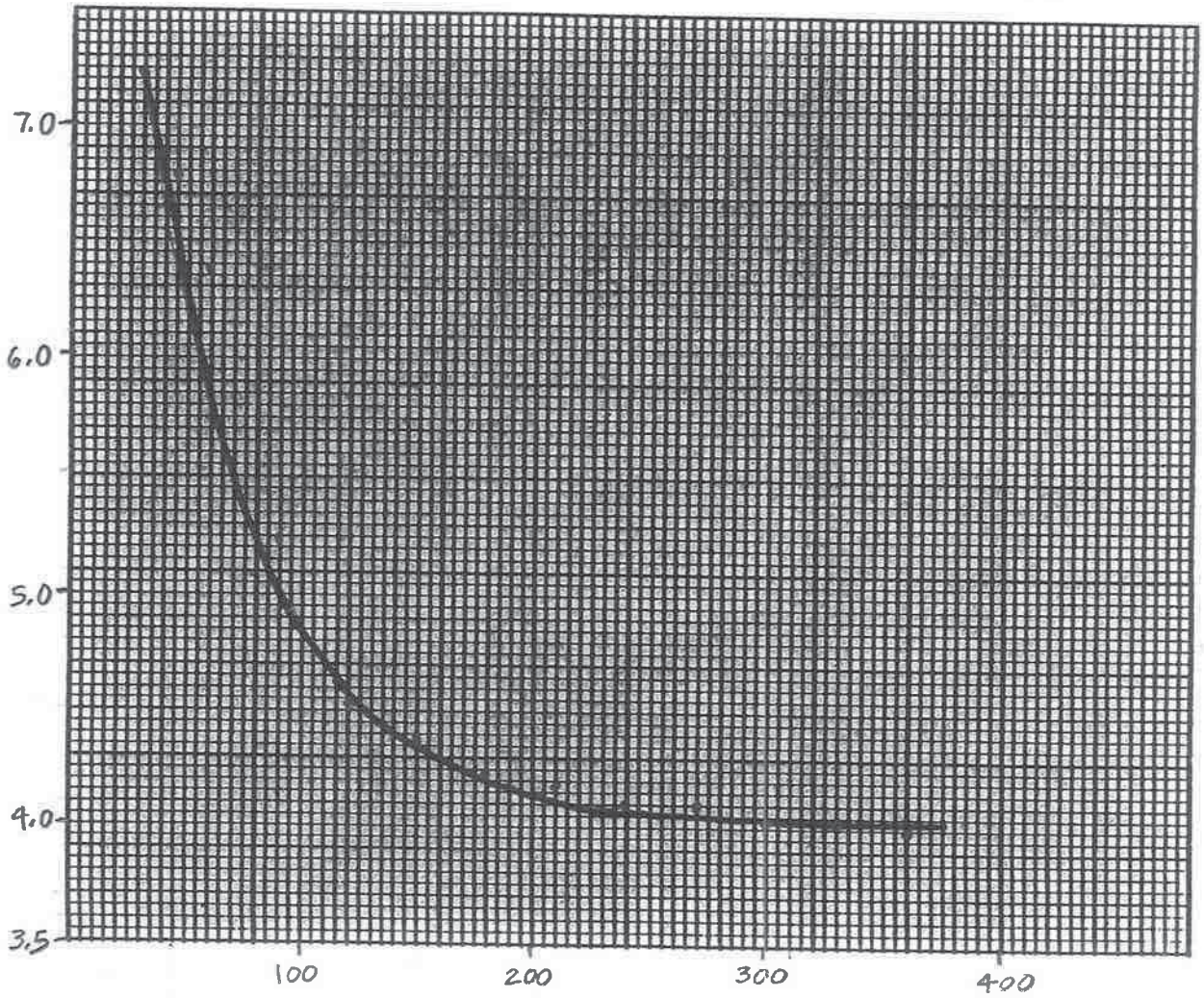
REPORT FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620 Prepared by ERIC JOHNSON Dates of Test: Start 4-10-15; Finish 4-10-15

Project Location BASIN #6 Liquid Used: TAP WATER; pH _____; Ave. Temp. 20.0°C _____ (_____)

Horizontal Distance in _____

• INNER RING X ANNULAR SPACE



Elapsed Time in MINUTES

Depth in _____

Soil Profile Description
(SEE ENCLOSURE 2)

Remarks: _____

To reorder, specify S15

GEOTEST INSTRUMENT CORP.

(P-1)

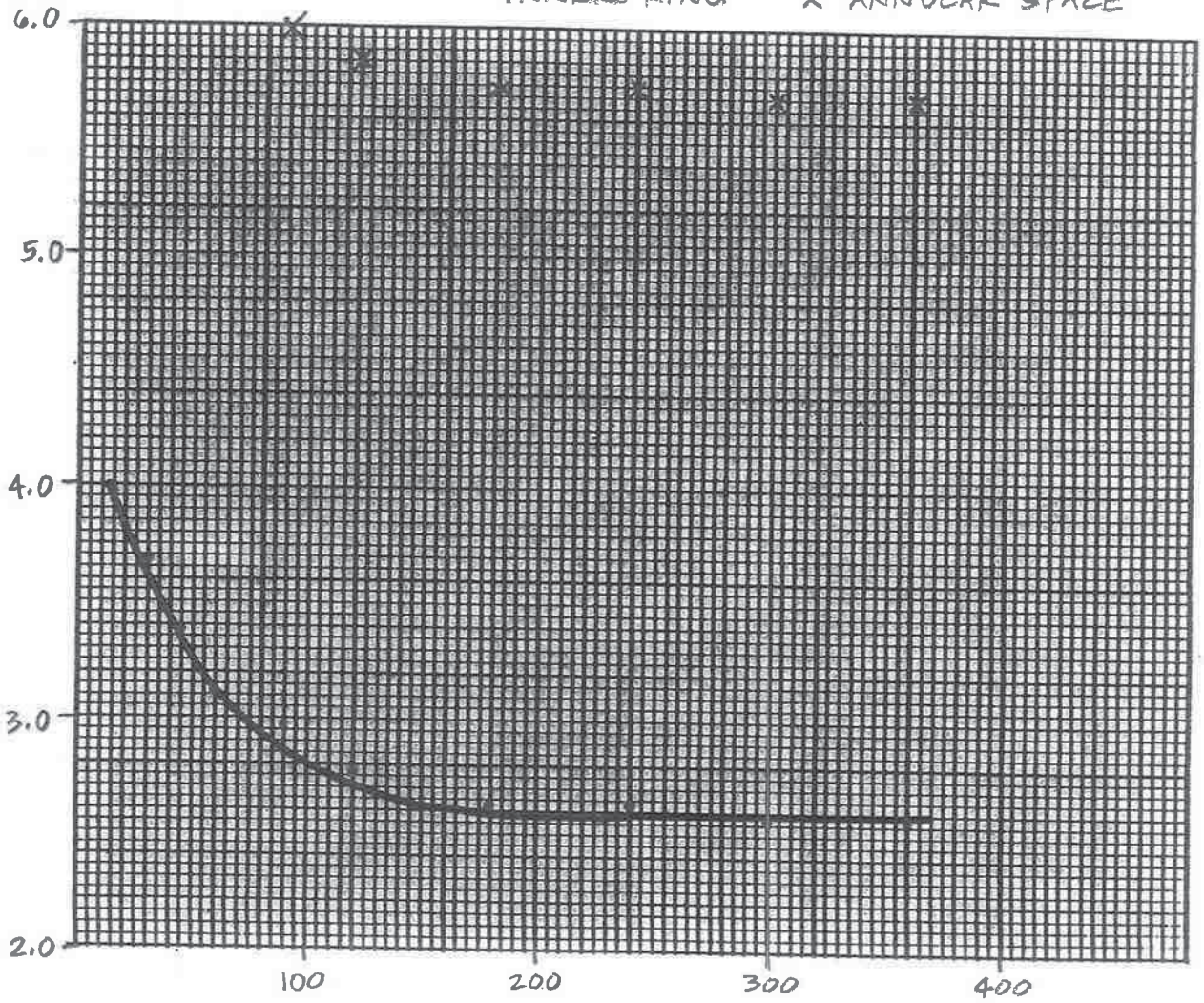
REPORT FORM FOR INFILTRATION TEST WITH SAMPLE DATA

Project Identification S-13620 Prepared by ERIC JOHNSON Dates of Test: Start 4-11-15; Finish 4-11-15

Project Location BASIN #8 Liquid Used: TAP WATER; pH _____; Ave. Temp. 17.0°C _____ (_____)

Horizontal Distance in _____

• INNER RING X ANNULAR SPACE



Elapsed Time in MINUTES

Depth in _____

Soil Profile Description
(SEE ENCLOSURE 2)

Remarks: _____

To reorder, specify S15

Enclosure 4, Page 6
Rpt. No.: 2953
File No.: S-13620

John R. Byerly
INCORPORATED

SOILS INVESTIGATION

MAGNOLIA BUSINESS CENTER AND REGIONAL CONCENTRATE REDUCTION FACILITIES

SOUTHWEST CORNER OF MAGNOLIA AVENUE AND PIERCE STREET

RIVERSIDE, CALIFORNIA

WESTERN MUNICIPAL WATER DISTRICT

GEOTECHNICAL ENGINEERS • TESTING AND INSPECTION
2257 South Lilac Ave., Bloomington, CA 92316-2907
Bloomington (909) 877-1324 Riverside (909) 783-1910 Fax (909) 877-5210

John R. Byerly
INCORPORATED

SOILS INVESTIGATION

DECEMBER 1, 2008

MAGNOLIA BUSINESS CENTER AND
REGIONAL CONCENTRATE REDUCTION FACILITIES

SOUTHWEST CORNER OF MAGNOLIA AVENUE AND PIERCE STREET

RIVERSIDE, CALIFORNIA

CLIENT:

WESTERN MUNICIPAL WATER DISTRICT

450 EAST ALESSANDRO BOULEVARD

RIVERSIDE, CALIFORNIA 92508

ATTENTION: JOHN ROSSI, GENERAL MANAGER

RPT. NO.: 4964
FILE NO.: S-12643

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INTRODUCTION

During November of 2008, an investigation of the soil conditions underlying the site for the proposed Magnolia Business Center was conducted by this firm. The purpose of our investigation was to evaluate the surface and subsurface conditions at the site with respect to safe and economical foundation types, vertical and lateral bearing values, liquefaction potential, support of concrete slabs-on-grade, and site preparation. Recommendations are also presented for the design of asphalt concrete pavement for proposed parking and driveway areas. The potential seismic ground motion has been evaluated by our staff as described in Enclosures 9 and 10, "Ground Motion Analysis." Our investigation, together with our conclusions and recommendations, is discussed in detail in the following report.

In addition, a Phase 1 environmental study was performed in our behalf by Stantec Consulting Corporation (SCC). The Phase 1 environmental site assessment generally conforms to the protocol outlined in ASTM E 1527-05. The Phase 1 Environmental Site Assessment report has been submitted under separate cover.

This report has been prepared for the exclusive use of the Western Municipal Water District (WMWD) and their design consultants for specific application to the project described herein. Should the project be modified, the conclusions and recommendations presented in this report should be reviewed by the geotechnical engineer. Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, express or implied.

PROJECT DESCRIPTION

For the preparation of this report, we have reviewed the project development plan (Pierce/Magnolia Site Layout, WMWD, Regional Concentrate Reduction Facilities, Drawing No. Option 5B, Carollo Engineers, Job No. 7576A10, undated). We understand that the 14.41-acre site is to be divided into five parcels ranging in size from 2.0 acres to 4.5 acres. The 4.5-acre parcel located in the southeastern corner of the property is to be developed by the WMWD as a concentration reduction facility. The project development plan indicates the

WMWD facility will include a pump station, an RO building, a chemical building, a buried 2-million-gallon reservoir, and a future reservoir. Smaller structures are also illustrated including pellet softeners, filter waste washwater tanks, backwash supply tanks, filters, and a sand tank. The remaining parcels are designated for retail development, a lumber sales facility (Center Lumber parcel), and a concrete contractor's office and yard (EBS parcel). Development plans for the remaining four parcels were not available at the time of our investigation. Based on the site topography, minimal cuts and fills appear likely for site development. The entire site configuration and proposed development of the WMWD facility are illustrated on Enclosure 1.

REVIEW OF PREVIOUS GEOTECHNICAL REPORT

Previous explorations at the subject site are described in the geotechnical investigation report prepared by Kleinfelder, Inc. (Preliminary Geotechnical Study, Magnolia Business Park, Magnolia Avenue and Pierce Street, Riverside, California, Kleinfelder, Inc., Project No. 62728, November 16, 2005). The subsurface exploration included six test borings drilled with a truck-mounted drill rig to depths of up to 31.5 feet below the then-existing ground surface. In addition, 12 test pits were excavated with a tractor-mounted backhoe to depths of up to 9.5 feet. The locations of the Kleinfelder explorations placed on the property are shown on Enclosure 1. The logs from these explorations are included in Enclosure 2. Artificial fill consisting of loose to medium dense silty sands and soft to medium stiff sandy silts was encountered in all of the test borings to depths ranging from 1.5 feet to 7.0 feet. The logs of the test pits do not mention the presence of artificial fill. The explorations also encountered alluvial materials consisting of medium dense to dense fine to coarse sands and silty sands, and very stiff to hard sandy silts and lean clays. Neither bedrock nor free ground water was noted at their exploration locations. Laboratory testing included maximum density, consolidation, expansion, gradation, and sand equivalent determinations. Chemical testing was comprised of pH, soluble sulfate, chloride content, and resistivity. The silty sands and sandy silts exhibited a very low and low expansion potential, respectively. Recommendations were provided for foundation and seismic design parameters and site preparation.

SITE CONDITIONS

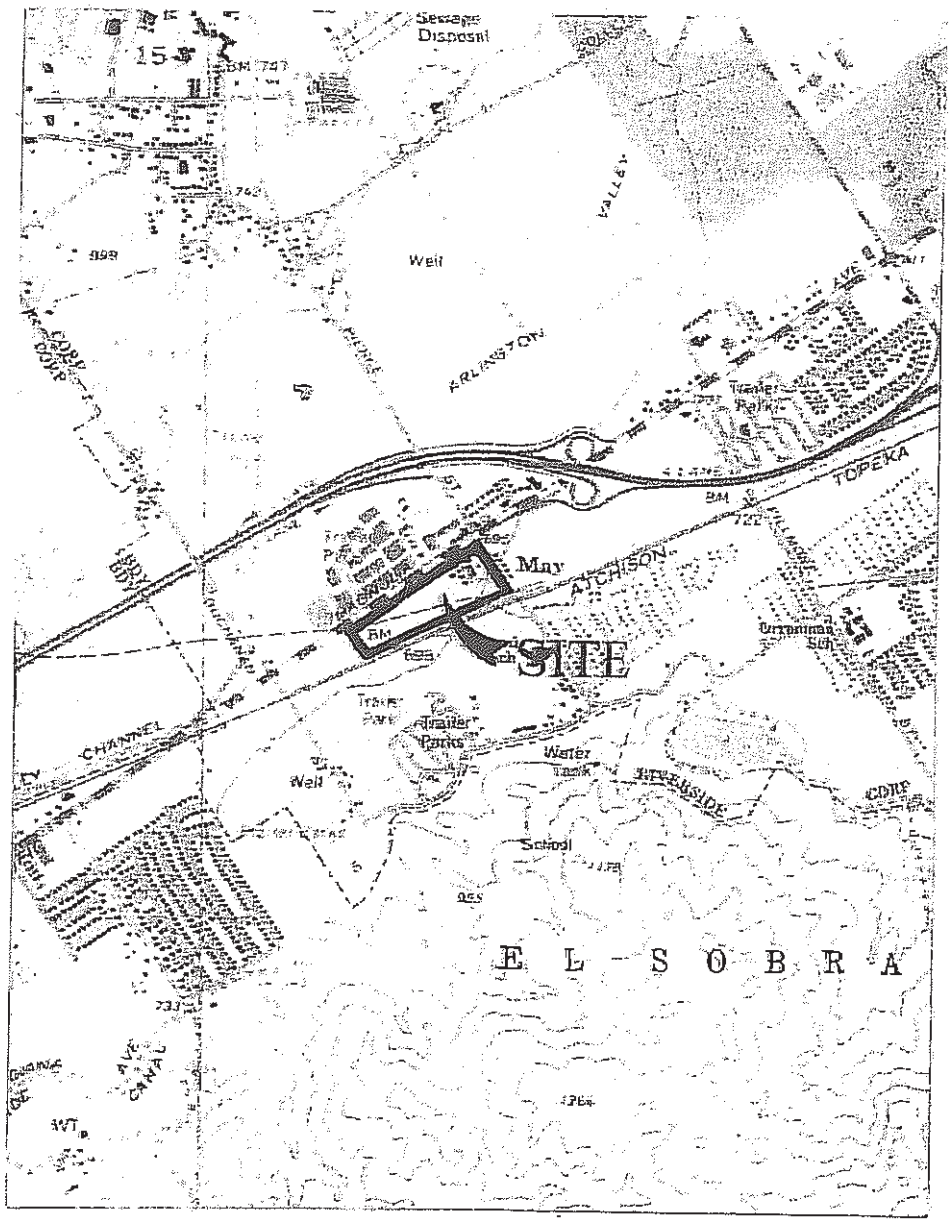
The proposed 14.41-acre site is located on the southwest corner of Magnolia Avenue and Pierce Street in the city of Riverside. An Index Map showing the general vicinity of the site is presented on the following page. The coordinates of the site are latitude 33.8933° N and longitude 117.4923° W, utilizing the North American Datum (NAD) from 1983. The property is enclosed by a chain-link fence. At the time of our field investigation, the ground surface throughout the property had been recently disced. A 30-inch-diameter high-pressure gas transmission pipeline enters the property about 230 feet west of the southeast property corner and extends westerly through the property to an above-ground facility located at the west end of the property and consisting of above-ground pipes and valves. Four 6-inch-diameter plastic pipe risers were noted just south of the north property boundary. These risers may be remnants of monitoring wells or percolation tests. An overhead electrical power line enters the northwest portion of the property from Magnolia Avenue. The study of previous site use by Stantec Consulting Corporation identified a gasoline service station with underground storage tanks at the southwest corner of Magnolia Avenue and Pierce Street. The Stantec report noted that the underground storage tanks were removed in 1990. No surface evidence of the previously existing service station was noted during our field investigation. Piles of trash and debris were noted in the westerly area of the site. Two water wells were noted near the northwest corner of the property. Existing commercial buildings are located north of the site across Magnolia Avenue and to the northeast across Pierce Street. The Burlington Northern & Santa Fe Railroad and Arlington Channel flood control channel run along the southern perimeter of the property. The site topography is relatively flat and slopes downward towards the south and southwest at an average gradient of less than 1 percent.

FIELD AND LABORATORY INVESTIGATION

The soils underlying the site were explored by means of an additional 32 test borings drilled with a truck-mounted flight-auger to depths of up to 51.5 feet below the existing ground surface. The approximate locations of the explorations are indicated on Enclosure 1. The soils encountered were examined and visually classified by one of our field engineers. A summary of the soil classifications appears as Enclosure 2. The exploration logs show subsurface conditions at the dates and locations indicated, and may not be representative of other locations and times. The

INDEX MAP

SCALE: 1"=2000'



T3S R6W SECTION 22
LATITUDE: N33.8933°
LONGITUDE: W117.4923°

MAP SOURCE: USGS MAPS CORONA NORTH AND RIVERSIDE WEST QUADRANGLES

Rpt. No.: 4964
File No.: S-12643

stratification lines presented on the logs represent the approximate boundaries between soil types, and the transitions may be gradual. Relatively undisturbed soil samples were recovered at various intervals in the borings with a California sampler. The relatively undisturbed samples, together with bulk samples of representative soil types, were returned to our laboratory for testing and evaluation. In Borings 1, 11, and 31, standard penetration tests were performed at selected intervals as the borings were advanced. The standard penetration test data are presented on the logs for these borings.

Included in our laboratory testing were moisture/density determinations on all undisturbed samples. Optimum moisture content/maximum dry density relationships were established for typical soil types so that the relative compaction of the subsoils could be determined. Consolidation testing was conducted on selected samples to evaluate the compressibility characteristics of the soil. Expansion index testing was performed on representative samples of soil containing detectable clay. Representative samples of subgrade soils were tested for gradation, sand equivalent, and "R" value for pavement design purposes. The moisture/density data are presented on the boring logs, Enclosure 2. Maximum density test data appear on Enclosure 3. The results of the consolidation and expansion index testing are shown on Enclosures 4 and 5, respectively. The subgrade test results are presented on Enclosure 6. Our consulting chemists, E. S. Babcock and Sons, Inc., are presently conducting chemical testing for this investigation. Chemical testing will be comprised of pH, soluble sulfate, sulfide, chloride, redox potential, and resistivity testing. When completed, their test results will be presented under separate cover.

SOIL CONDITIONS

Except for Borings 19 and 22, all test borings encountered artificial fill consisting of loose to dense silty sands with occasional debris, silty sands with traces of clay, and silty sands with traces of gravel. The depth of artificial fill generally varied from 1.0 foot to 5.0 feet. In Boring 32, in the area of underground storage tank removal, the artificial fill extended to a depth of 25 feet. The natural soils immediately underlying the fill consisted medium dense to very dense silty sands with occasional traces of clay, and very stiff to hard sandy silts. The natural soils exhibited varying degrees of cementation. A 2.0-foot-thick layer of loose soil was encountered in Boring 28 at a depth of 5.0 feet. In addition, a 2.5-foot-thick layer of loose soil

was encountered in Boring 29 at a depth of 7.5 feet. In Boring 17, in the area of the underground storage tank removal and at a depth of 17 feet to 25 feet, a hydrocarbon odor was noted. All other underlying natural soils encountered in our test borings were medium dense to very dense sands, silty sands, stiff to hard sandy silts, and silty clays. The depths of fill are itemized on the following table:

Boring Number	Depth of Fill (ft.)
B-1	2.0
B-2	1.0
B-3	2.0
B-4	5.0
B-5	1.0
B-6	1.0
B-7	2.0
B-8	1.0
B-9	1.0
B-10	1.0
B-11	1.0
B-12	2.0
B-13	1.0
B-14	5.0
B-15	3.0
B-16	5.0
B-17	6.0
B-18	3.0
B-19	NA
B-20	1.0
B-21	1.0
B-22	NA
B-23	1.0
B-24	1.0
B-25	2.0
B-26	1.0
B-27	1.0

Boring Number	Depth of Fill (ft.)
B-28	1.0
B-29	2.0
B-30	1.0
B-31	2.0
B-32	25.0

Bedrock was not encountered at our exploration locations. Free ground water was encountered in Boring 1 at a depth of 49 feet. The sandy silts and clayey silts encountered in our explorations have a medium expansion potential in accordance with ASTM D 4829. The silty sands are granular non-plastic materials and are considered to have a very low expansion potential.

LIQUEFACTION AND DYNAMIC SETTLEMENT

Liquefaction is a phenomenon that occurs when a soil undergoes a transformation from a solid state to a liquefied condition due to the effects of increased pore-water pressure. Loose saturated soils with particle sizes in the medium sand to silt range are particularly susceptible to liquefaction when subjected to seismic groundshaking. Affected soils lose all strength during liquefaction, and foundation failure can occur.

Free ground water was encountered in Boring 1 at a depth of 49 feet. A ground water study by Carson and Matti (USGS Miscellaneous Field Study MF-1802, 1982) indicates that ground water levels at the site were at a depth in excess of 30 feet between the years 1973 and 1979. We also searched the records of the California Division of Water Resources. No well data applicable to the subject site were found. For the purpose of a liquefaction analysis, we have assumed an historic high ground water level of 30 feet below existing grade.

It is anticipated that major earthquake groundshaking will occur during the lifetime of the proposed development from the seismically active Chino segment of the Elsinore fault zone, which is located approximately 9.96 kilometers southwest of the site. This fault would create the most significant earthshaking event. Based on an earthquake magnitude of 7.8 and a review of the 2007 California Building Code, a peak horizontal ground acceleration of 0.33g is assigned to the site. To evaluate the potential for liquefaction and seismically induced

settlement of the subsoils, the soils were analyzed for relative density. The most effective measurement of relative density of sands with respect to liquefaction potential is standard penetration resistance. For this reason, we employed blow count information in our analysis, as it is more meaningful than dry density and moisture content.

The standard penetration data provided input for the LiquefyPro Version 4.3 program for liquefaction and seismically induced settlement. The results of this evaluation are shown on Enclosure 7 and reveal a potential for liquefaction of some soil layers below a depth of 30 feet. Liquefaction at this depth is unlikely to produce disruption of foundation bearing soils. The analysis also reveals a potential for 2.21 inches, 2.06 inches, and 2.10 inches of total dynamic settlement in Borings 1, 11, and 31, respectively. The total settlement will occur over a large area and will not affect local buried utilities. The results of the calculations suggest that the dynamic settlement will likely be relatively uniform. Within the building areas, we would estimate the differential dynamic settlement would be less than one-half the total. Based on a minimum exterior building dimension of 42 feet, an angular distortion of about 1/454 is calculated. This is a relatively small amount and is less than the threshold value of 1/240. Therefore, seismically induced settlement need not be a factor in the design of structures at the site.

CONCLUSIONS

The artificial fill encountered in our explorations, including the backfill within the underground storage tank removal area, is not considered suitable in its present state for support of the new structures and pavement. Existing artificial fill should be removed and recompacted. Portions of the upper natural soils are loose and potentially compressible. In addition, demolition of previously existing buildings disturbed the upper soils and may have left buried structures such as septic tanks, cesspools, and basements. It is recommended that the on-site soils be overexcavated and recompacted to remove loose and compressible soil, to explore for buried structures, and to provide a uniform bearing surface below the proposed structures. Subsequent to site preparation, the structures may be safely founded on conventional shallow continuous and isolated footings. Structures with deeper footings may bear entirely on competent natural soil. The recommendations presented in this report assume medium

expansive soils. The occurrence of a hydrocarbon odor in Boring 17 should be evaluated by the project environmental consultant. Detailed recommendations are presented below.

RECOMMENDATIONS

FOUNDATION DESIGN

Where the site is prepared as recommended, the proposed structures may be founded on conventional continuous and isolated footings. The footings at least 12 inches wide and placed at least 12 inches below the lowest final adjacent grade may be designed for a maximum safe soil bearing pressure of 2,000 pounds per square foot for dead plus live loads. Increasing the footing embedment to 18 inches will allow the use of an allowable bearing capacity of 2,500 pounds per square foot for dead plus live loads. These values may be increased by one-third for wind or seismic loading.

To counteract the effects of medium expansive soils and the potential for ground subsidence, continuous footings should be reinforced with at least four No. 5 bars, two near the top and two near the bottom. This recommendation for foundation reinforcement is based on geotechnical considerations. Structural design may require additional foundation reinforcement.

For footings thus designed and constructed, we would anticipate a maximum settlement of less than 1 inch and a maximum differential settlement slope of 1:850.

GEOLOGIC DESIGN PARAMETERS

To assist the structural engineer in the selection of seismic coefficients to be incorporated into the design of the structures, we have reviewed the 2007 California Building Code and have performed a ground motion analysis as described in Enclosure 10. The site is located 9.96 kilometers from the Chino segment of the Elsinore fault. The various coefficients and factors are provided in the following table:

Factor or Coefficient	Value
S_s	1.5
S_1	0.6
S_{ms}	1.20
S_{m1}	1.006
F_a	1.0
F_v	1.5
S_{DS}	0.80
S_{D1}	0.6704
T_L	8
Site Class	D

LATERAL LOADING

Resistance to lateral loads will be provided by passive earth pressure and basal friction. For footings bearing against compacted fill, passive earth pressure may be considered to develop at a rate of 350 pounds per square foot per foot of depth. Basal friction may be computed at 0.4 times the normal dead load. Basal friction and passive earth pressure may be combined directly without reduction. The allowable passive earth pressure may be increased by one-third for wind and seismic loading.

SLABS-ON-GRADE

Concrete slab-on-grade design recommendations are listed below. The slab-on-grade recommendations assume underlying utility trench backfills and pad subgrade soils have been densified to a relative compaction of at least 90 percent (ASTM D 1557).

1. A sand blanket 4 inches in thickness should be placed below the slabs. The sand should have a minimum sand equivalent of 30.

2. The structure slab-on-grade floors should be at least 4.0 inches thick – structural considerations may require a thicker slab.

3. Due to the presence of medium expansive soils, it is recommended that concrete slabs-on-grade be reinforced with at least 6"x6"-W2.9/W2.9 welded wire fabric or equivalent throughout. Structural considerations may require additional slab reinforcement. All slab reinforcement should be supported by chairs or precast concrete blocks to ensure positioning of the reinforcement within the middle third of the slab. Lifting of unsupported reinforcement during concrete placement should not be allowed.

4. Slabs to receive moisture-sensitive floor coverings should be underlain with a moisture vapor retardant membrane, such as 10-mil Stego Wrap or equivalent. The moisture vapor retardant membrane should conform to ASTM E 1745-97 (Standard Specification for Plastic Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs). The moisture vapor retardant membrane should be lapped into the footing excavation to provide full coverage of the subgrade soils. Punctures and/or holes cut for plumbing should be taped to minimize moisture emissions through the membrane. The project superintendent and/or a representative of the geotechnical engineer should inspect the placement of the moisture vapor retardant membrane prior to covering. Installation of the moisture vapor retardant membrane should be performed in accordance with ASTM E 1643-98 (Standard Practice of Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs).

5. The moisture vapor retardant membrane should be covered with at least 2 inches of sand to promote uniform setting of the concrete. The sand overlying the membrane should be tested within 48 hours of concrete placement or after any rain storms to verify that the moisture in the sand does not exceed 2 percent below the optimum moisture content.

6. In lieu of placing a sand blanket above the moisture vapor retardant membrane as described above and to further minimize future moisture vapor emissions through the slabs-on-grade, the slab concrete may be placed directly on the moisture vapor retardant membrane. Placing concrete directly on the moisture vapor retardant membrane will increase shrinkage and curling forces and make finishing more difficult. To accommodate these concerns, the structural engineer should provide appropriate mix design criteria for concrete placed directly on the moisture vapor retardant membrane.

7. We recommend a maximum water-cement ratio of 0.50 for all slab concrete. Architectural or structural considerations may require the utilization of a lower water-cement ratio. Where slab concrete is placed directly on the moisture vapor retardant membrane without the presence of an intervening layer of absorptive sand, a lower maximum water-cement ratio may be needed.

8. Preparation of the concrete floor slabs that will receive moisture sensitive floor coverings should conform to ASTM F 710-98 (Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring) and the manufacturer's recommendations. Moisture vapor emission tests should be performed to verify acceptable moisture emission rates prior to flooring installation.

9. Prior to placement of the sand blanket and moisture vapor retardant membrane, the slab subgrade soils should be moisture conditioned to at least 3 percent over the optimum moisture content to a depth of at least 12 inches below the top of the subgrade. The moisture conditioning should be verified by the representative of the geotechnical engineer no earlier than 48 hours before placement of concrete.

10. Exterior slab-on-grade hardscape and walkways should be placed on subgrade soils moisture conditioned as recommended above (Item 9). Placing concrete directly on wet clayey soils will increase the potential for shrinkage and curling of the concrete. To mitigate this potential, we recommend the subgrade below exterior slabs-on-grade be blanketed with at least 2 inches of clean sand prior to concrete placement.

SITE PREPARATION

We assume that the site will be prepared in accordance with the California Building Code or the current City of Riverside Grading Ordinance. The recommendations presented below are to establish additional grading criteria. These recommendations should be considered preliminary. The project grading plans should be reviewed by the geotechnical engineer. Final recommendations can be provided at that time.

- All areas to be graded should be stripped of organic matter, man-made obstructions, and other deleterious materials. Buried structures and utilities that are encountered should be removed. All cavities created during site clearing should be cleaned of loose and disturbed soil, shaped to provide access for construction equipment, and backfilled with fill placed and compacted as described below.

- All artificial fill should be removed below areas to receive improvements. The artificial fill should be cleaned of objectionable debris and placed in prepared areas as described below. The depth of existing artificial fill generally varied from 1.0 foot to 5.0 feet. The existing artificial fill encountered in Boring 32 extended to a depth of 24 feet. Deeper deposits of existing artificial fill may exist at locations not explored.

- Overexcavation

    - Structure areas – The natural soils below the structure areas, including roof overhang footings, and for a horizontal distance of at least 5 feet beyond the aforementioned areas should be overexcavated to a depth of 5 feet below presently existing grade or to a depth of 24 inches below the bottom of the footings and floor slabs, whichever depth is greater. A representative of this firm should observe the bottom of all excavations. Compressible soil remaining in the bottom of the excavations should be removed until competent material is encountered. Competent soil is defined as undisturbed soil with an in-place relative compaction of at least 85 percent. Deeper deposits of compressible soils may be encountered in areas that were not explored. In an area of the former underground storage tanks, a hydrocarbon odor was noted in Boring 17 in the depth interval of 17.0 feet to 25.0 feet. The significance of this occurrence of hydrocarbon odor should be evaluated by the project environmental consultant.

    - In areas where overexcavation depths exceed 5 feet below structural elements other than hardscape, the horizontal limits of overexcavation outside the perimeter of the structural elements should be equal to the depth of the soil removals below the bottom of the structural elements.

- Screen walls – The soils below the bottom of screen wall footings and below the trash and electrical enclosure footings should be scarified to a minimum depth of 12 inches below existing grade or 12 inches below the bottom of the footings, whichever is deeper.

- Portions of the near-surface soils have a relatively high moisture content and may need to be dried back prior to processing and/or replacement as engineered fill. An alternative would be to export the wet material and import suitable soil or combine dry import soil with the on-site material.

- The soils below asphalt concrete and portland cement concrete pavement areas should be scarified to a minimum depth of 12 inches below existing grade or 12 inches below proposed finished grade, whichever is deeper. Finished grade is defined as the elevation of the top of the subgrade. These soils should be moistened or allowed to dry to within 2 percent of the optimum moisture content and densified to a minimum relative compaction of 90 percent (ASTM D 1557).

- Subexcavated surfaces and all other surfaces to receive fill should be scarified to a minimum depth of 12 inches, moistened or allowed to dry to within 2 percent of the optimum moisture content, and densified to a minimum relative compaction of 90 percent (ASTM D 1557).

- The on-site soils should provide adequate quality fill material provided they are free from organic matter and other deleterious materials. Asphalt concrete and portland cement concrete removed during site clearing may be pulverized into fragments not exceeding 3 inches in greatest dimension and incorporated into the fill at all levels. Import fill should be inorganic granular non-expansive soils free from rocks or lumps greater than 8 inches in maximum dimension. Import fill should be sampled by the geotechnical engineer at the source prior to importation to the site. The proposed import fill should be tested and approved by the geotechnical engineer relative to expansion potential, sulfate content, and corrosion potential. The contractor should obtain environmental certification that the proposed import is acceptable in accordance with the State of California Department of Toxic Substance Control (DTSC) standards.

- All fill should be placed in 8-inch or less lifts. Non-expansive soil should be moisture conditioned to near the optimum moisture content. The clayey on-site soil should be moisture conditioned to at least 2 percent above the optimum moisture content. Each lift of fill should be densified to a minimum relative compaction of 90 percent (ASTM D 1557).

- The surface of the site should be graded to provide positive drainage away from the structures. Drainage should be directed to established swales and then to appropriate drainage structures to minimize the possibility of erosion. Water should not be allowed to pond adjacent to footings.

SHRINKAGE AND SUBSIDENCE

Volume change in going from cut to fill conditions is anticipated where near-surface grading will occur. Assuming the fill will be compacted to an average relative compaction of 93 percent, an average cut-fill shrinkage of 10 to 15 percent is estimated. Further volume loss will occur through subsidence during preparation of the natural ground surface. Although the contractor's methods and equipment utilized in preparing the natural ground will have a significant effect on the amount of natural ground subsidence that will occur, our experience indicates as much as 0.10 to 0.15 foot of subsidence in areas prepared to receive fill should be anticipated. These values are exclusive of losses due to stripping or removal of subsurface obstructions.

ASPHALT CONCRETE PAVEMENT

Based on an assumed Traffic Index of 5.0 for interior parking and driveway areas for conventional vehicular traffic, a Traffic Index of 6.0 where heavier truck traffic will be accommodated, and in conjunction with the test data shown on Enclosure 6, we believe the sections presented on the following table should provide durable pavement.

Location	TI	"R" Value	Thickness (Inches) Asphalt Concrete	Aggregate Base
Pavement areas for conventional passenger cars and light trucks	5.0	18	2.5	9.0
Pavement areas for heavier trucks	6.0	18	3.0	11.0

The above designs are preliminary and for estimating purposes only. We recommend that during the process of rough grading, observation and additional testing of the actual subgrade soils should be performed. Final pavement design sections can then be determined.

The foregoing pavement sections assume that utility trench backfill below all proposed pavement areas will be compacted to at least 90 percent relative compaction. The upper 12 inches of subgrade below asphalt concrete pavement areas should be compacted to at least 90 percent relative compaction. Aggregate base should be densified to at least 95 percent relative compaction. Suggested specifications for aggregate base material are presented on Enclosure 8.

FOUNDATION AND GRADING PLAN REVIEW

The project foundation and grading plans should be reviewed by the geotechnical engineer. Additional recommendations may be required at that time.

CONSTRUCTION OBSERVATIONS

All grading operations, including the preparation of the natural ground surface, should be observed and compaction tests performed by this firm. No fill should be placed on any prepared surface until that surface has been evaluated by the geotechnical engineer and the engineering geologist. All footing excavations should be observed by the geotechnical engineer prior to placement of forms or reinforcing steel.

The conclusions and recommendations presented in this report are based upon the field and laboratory investigation described herein and represent our best engineering judgment. Should conditions be encountered in the field that appear different from those described in this report, we should be contacted immediately in order that appropriate recommendations might be prepared.

Respectfully submitted,

JOHN R. BYERLY, INC.

REGISTERED PROFESSIONAL ENGINEER
JOHN R. BYERLY
No. GE000179
Exp. Date 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

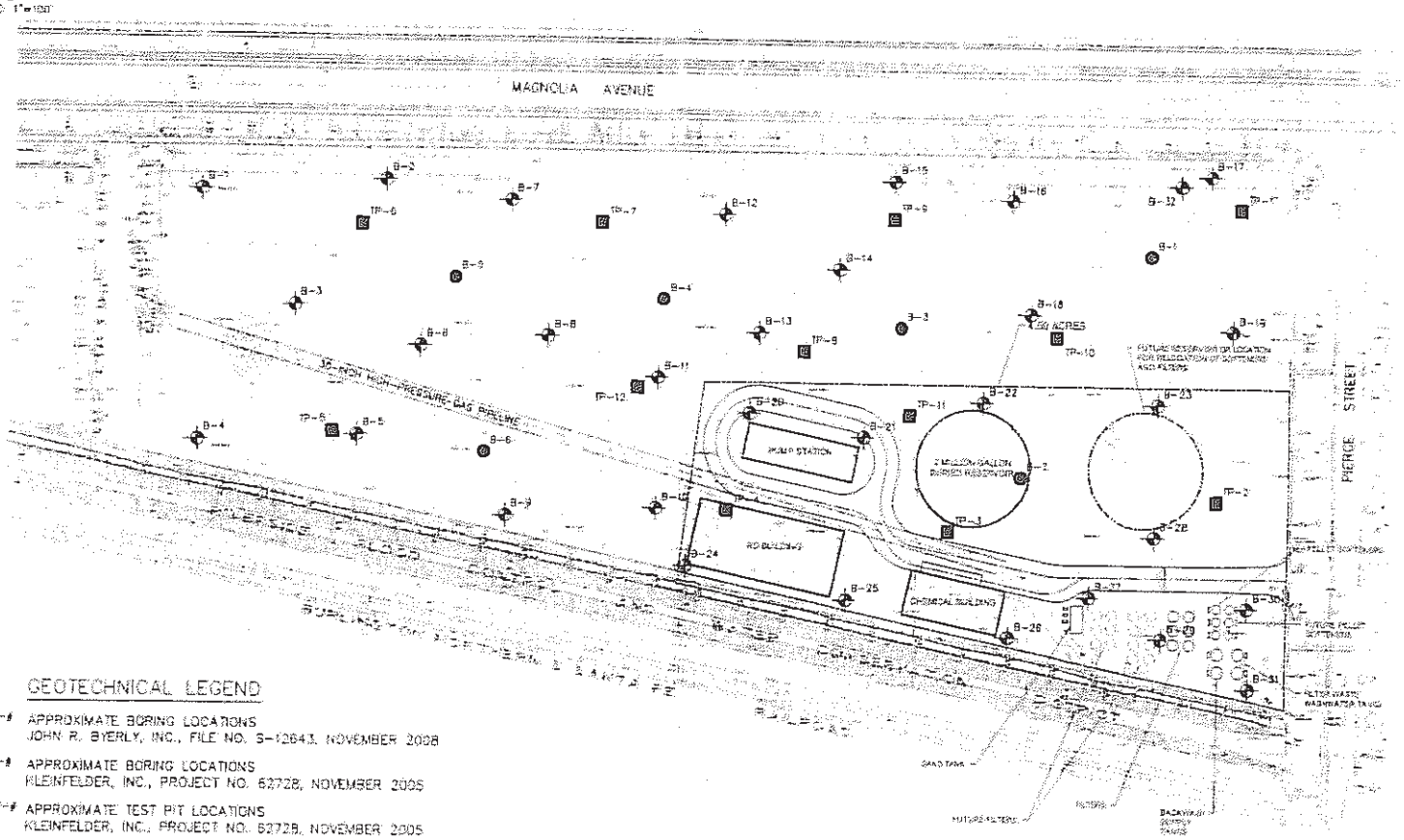
John R. Byerly, Geotechnical Engineer
President

JRB:MLL:jet

Enclosures: (1) Plot Plan
(2) Exploration Logs
(3) Maximum Density Determinations
(4) Consolidation Test Results
(5) Expansion Index Test Results
(6) Subgrade Test Data
(7) Liquefaction Analysis
(8) Specifications for Aggregate Base
(9) Spectral Accelerations Table
(10) Response Spectra

PLOT PLAN

SCALE: 1" = 100'



GEOTECHNICAL LEGEND

B-# APPROXIMATE BORING LOCATIONS
JOHN R. BYERLY, INC., FILE NO. S-12643, NOVEMBER 2008

B-# APPROXIMATE BORING LOCATIONS
KLEINFELDER, INC., PROJECT NO. 62728, NOVEMBER 2005

TP-# APPROXIMATE TEST PIT LOCATIONS
KLEINFELDER, INC., PROJECT NO. 62728, NOVEMBER 2005

Enclosure 1
Rpt. No.: 4964
File No.: S-12643

Boring 1

Boring Date: 11/7/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0		10.6	111	6.2	88		SM	Red-brown silty fine to coarse sand with a trace of clay, damp and medium dense (FILL)
		13.0	115	12.4	91		ML	Light gray-brown sandy silt, slightly cemented, moist and very stiff (ORIGINAL GROUND)
	20	11.6	113	13.2	90			
10	30	10.6	116	8.0	92		SM	Tan silty fine to medium sand, moist and dense
	31	12.0	—	—	—			
20	28	14.1	116	7.8	92		SM	Tan silty fine sand with a trace of clay, moist and medium dense
	21	10.6	106	16.5	90		CL	Gray-brown silty clay, moist and hard
30	25						SM	Light brown silty fine to coarse sand, moist and medium dense
	29						SP	Light brown fine sand with traces of silt, damp and medium dense
40	30						SM	Orange-brown silty fine sand with traces of clay, moist and dense
	31						SP	Light brown fine to coarse sand with traces of gravel, wet and dense
50	53					▼		- becoming saturated at 49.0 feet
								- becoming very dense at 50.0 feet
60								Total Depth at 51.5 Feet
								Free Ground Water Encountered at 49.0 Feet
70								

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LOG OF BORING

John R. Byerly, Inc.	**Magnolia Business Center** **Riverside, California**	**Enclosure 2, Page 1** **Report No.: 4964** **File No.: S-12643**

Boring 2

Boring Date: 11/12/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand with traces of clay, damp and medium dense (FILL)
	12.3	115	5.7	91			SM	Red-brown silty fine to coarse sand, slightly cemented, slightly porous, damp and dense (ORIGINAL GROUND)
	17.6	118	12.8	94			ML	Light gray-brown sandy silt, slightly cemented, moist and dense
5	14.8	116	12.6	92				
	7.0	110	6.1	86			SP	Light brown fine to coarse sand, damp and medium dense
10	8.1	111	8.8	87				- becoming moist at 10.5 feet
15	7.4	111	16.9	88			ML	Dark gray sandy silt with traces of clay, moist and stiff
20	8.8	109	19.1	86			SM	Light gray-brown silty fine sand with traces of clay, very moist and medium dense
25	14.1	111	15.6	94			CL	Light gray silty clay, moist and hard
30	10.6	110	7.8	87			SM	Dark brown silty fine sand, moist and medium dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 2
Report No.: 4964
File No.: S-12643

Boring 3

Boring Date: 11/7/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand with traces of clay, damp and dense (FILL)
	17.6	115	6.2	91			ML	Tan sandy silt, cemented, moist and hard (ORIGINAL GROUND)
	17.6	117	15.4	93				
5	15.8	114	7.9	90			SM	Tan silty fine sand, slightly cemented, moist and dense
	9.2	110	8.3	87				- becoming medium dense at 7.5 feet
10	7.0	108	12.8	86			ML	Red-brown sandy silt, moist and stiff
15	4.6	106	13.2	84			SP	Tan fine sand, very moist and medium dense
20	5.3	107	22.4	85			ML	Brown clayey silt, very moist and stiff
25	9.2	110	14.3	87			SC	Brown clayey sand, very moist and medium dense
30	15.8	117	2.5	92			SP	Light brown fine to coarse sand, dry and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.	**Magnolia Business Center** **Riverside, California**	**Enclosure 2, Page 3** **Report No.: 4964** **File No.: S-12643**

Boring 4

Boring Date: 11/12/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, slightly cemented, damp and dense (FILL)
	17.3	114	3.7	90				
	21.1	119	4.6	94				
5	13.0	116	15.4	92			ML	Red-brown sandy silt, slightly cemented, moist and hard (ORIGINAL GROUND)
	10.9	113	13.2	90				
10	5.6	107	18.1	85			ML	Light gray clayey silt, very moist and stiff
15	6.7	108	12.7	85			SP	Brown fine to medium sand, very moist and medium dense
20	7.4	108	5.2	85			SP	Light brown fine sand with traces of silt, damp and medium dense
25	9.9	109	19.1	86			SM	Gray-brown silty fine sand with some clay, very moist and medium dense
30	11.3	112	8.9	88			SP	Brown fine to medium sand, moist and medium dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 4
Report No.: 4964
File No.: S-12643

Boring 5

Boring Date: 11/12/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
							SM	Red-brown silty fine to medium sand, moderately cemented, damp and dense (ORIGINAL GROUND)
	21.1	115	4.7	91				
	16.9	116	7.1	92				- becoming moist at 3.5 feet
5	19.2	119	11.0	94			ML	Light brown sandy silt, moderately cemented, moist and hard
	14.4	117	10.6	93				
10	16.5	114	10.1	90				
15	10.9	119	8.0	93			SP	Brown fine to medium sand, moist and dense
20	9.2	109	7.5	86			SM	Light brown silty fine sand, moist and medium dense
25	10.6	112	21.4	89			ML	Gray clayey silt, very moist and hard
30	12.3	115	3.3	90			SP	Light gray fine to medium sand, damp and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 5
Report No.: 4964
File No.: S-12643

Boring 6

Boring Date: 11/12/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
							SM	Red-brown silty fine to medium sand, cemented, moist and dense (ORIGINAL GROUND)
	19.2	116	7.6	92			ML	Red-brown sandy silt, moderately cemented, moist and hard
	19.2	117	10.5	93				
5	16.9	113	10.7	90				
	30.2	120	11.5	95				
10	7.0	103	21.0	87			CL	Light gray-brown silty clay, very moist and very stiff
15	7.0	111	8.3	88			SM	Brown silty fine to coarse sand, moist and medium dense
20	7.7	110	5.5	86			SP	Light gray fine sand, damp and medium dense
25	10.9	113	14.6	89			ML	Light gray clayey silt, moist and very stiff to hard
30	13.4	115	5.4	90			SP	Brown fine to coarse sand with a trace of silt, damp and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 6
Report No.: 4964
File No.: S-12643

Boring 7

Boring Date: 11/7/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand, moderately cemented, moist and dense (FILL)
	21.1	114	7.1	90			ML	Brown sandy silt, slightly porous, moderately cemented, dry and hard (ORIGINAL GROUND)
	35.2	—	8.0	—				
5	19.2	118	9.8	94				
	15.1	115	9.0	91				
10	9.9	109	5.8	87			SP	Brown fine to medium sand, damp and medium dense
15	13.0	115	3.5	90			SP	Light gray fine sand, damp and dense
20	6.0	104	19.2	88			CL	Dark brown silty clay, moist and very stiff
25	35.2	121	7.1	96			ML	Light brown sandy silt, moderately cemented, dry and hard
30	14.1	117	4.1	92			SP	Light orange-brown fine sand, damp and dense
								Total Depth at 31.0 Feet No Free Ground Water Encountered
35								

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 7
Report No.: 4964
File No.: S-12643

Boring 8

Boring Date: 11/12/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with traces of gravel, dry and medium dense (FILL)
							SM	Red-brown silty fine to coarse sand, slightly cemented, slightly porous, damp and dense (ORIGINAL GROUND)
	11.6	115	5.8	91			ML	Light brown sandy silt, moderately cemented, dry and very stiff
	7.4	111	6.1	88				
5	21.1	118	6.9	94				
	13.4	115	13.8	91				- becoming moist and hard at 7.5 feet
10	8.1	109	15.4	87				- becoming very stiff at 10.5 feet
15	10.6	115	9.8	90			SP	Light brown fine to coarse sand, moist and dense
20	10.6	110	14.7	87			SM	Light brown silty fine sand, wet and medium dense
25	70.4	123	16.5	98			ML	Light gray-brown sandy silt, moist and hard
30	9.9	104	13.1	88			CL	Light gray-brown silty clay, moist and very stiff
								Total Depth at 31.0 Feet No Free Ground Water Encountered
35								

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 8
Report No.: 4964
File No.: S-12643

Boring 9

Boring Date: 11/12/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
	21.1	117	3.4	92			SM	Red-brown silty fine to coarse sand, moderately cemented, slightly porous, damp and dense (ORIGINAL GROUND)
	23.5	119	5.8	94				
5	14.1	115	6.6	91			ML	Light brown sandy silt, cemented, dry and hard
	19.2	117	9.8	93				
10	16.5	114	10.6	90				
15	13.0	116	5.9	91			SP	Light gray fine to coarse sand, damp and dense
20	7.4	109	13.0	86			SM	Light brown silty fine sand, very moist and medium dense
25	11.6	112	17.7	89			ML	Light gray-brown sandy silt, moist and hard
30	9.9	111	5.6	88			SM	Brown silty fine sand with a trace of clay, damp and medium dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 9
Report No.: 4964
File No.: S-12643

Boring 10

Boring Date: 11/11/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
		17.6	117	3.4	92		SM	Red-brown silty fine to coarse sand, slightly cemented, damp and dense (ORIGINAL GROUND)
		23.5	122	5.0	96			
5		10.6	109	15.9	87		ML	Light brown sandy silt, slightly porous, moist and very stiff
		6.3	107	15.7	85			
10		17.6	118	15.8	94			
15		7.4	109	12.6	86		SM	Light brown silty fine sand, slightly porous, very moist and medium dense
20		13.4	116	1.4	91		SP	Light brown fine to medium sand, dry and dense
25		5.6	101	20.4	86		CL	Gray-brown silty clay, very moist and very stiff
30		9.9	111	8.3	88		SM	Brown silty fine sand, moist and medium dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 10
Report No.: 4964
File No.: S-12643

Boring 11

Boring Date: 11/12/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0		17.6	122	7.3	96	GWT not encountered	SM	Brown silty fine to coarse sand, dry and medium dense (FILL)
		17.6	121	7.8	96		SM	Red-brown silty fine to coarse sand, moderately cemented, moist and very dense (ORIGINAL GROUND)
	35	13.4	116	13.5	92		ML	Brown sandy silt, slightly cemented, moist and hard
10	27	11.3	112	18.9	89		ML	Light gray clayey silt, moist and hard
	25	9.2	110	10.1	87		SM	Light brown silty fine sand with a trace of coarse sand, moist and medium dense
20	14							
	13						CL	Light gray-brown silty clay, moist and very stiff
30	30						SM	Brown silty fine sand with traces of clay, moist and dense
	52						SP	Light gray fine to coarse sand, damp and dense
40	18						SM	Light gray silty fine sand, damp and dense
	32						SP	Light gray fine sand with a trace of silt, damp and dense
50	32						SP	Light gray-brown fine to coarse sand, damp and dense
60								Total Depth at 51.5 Feet
70								No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.	**Magnolia Business Center** **Riverside, California**	**Enclosure 2, Page 11** **Report No.: 4964** **File No.: S-12643**

Boring 12

Boring Date: 11/7/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand, damp and dense (FILL)
	15.8	115	5.9	91			SM	Light gray silty fine sand, slightly cemented, damp and dense (ORIGINAL GROUND)
	35.2	120	6.6	95			ML	Red-brown sandy silt, moderately cemented, dry and hard
5	13.7	116	9.2	92				
	12.0	113	14.5	90				- becoming moist at 7.5 feet
10	7.7	111	13.4	88				- becoming very stiff at 10.5 feet
15	5.3	106	8.8	84			SM	Brown silty fine sand, moist and medium dense
20	6.7	—	26.9	—			CL	Light gray silty clay, very moist and very stiff
25	9.2	110	15.5	87			ML	Brown sandy silt, moist and very stiff
30	14.8	116	3.3	91			SP	Light orange-brown fine to coarse sand, damp and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/25/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 12
Report No.: 4964
File No.: S-12643

Boring 13

Boring Date: 11/13/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
		13.4	113	7.4	90		ML	Red-brown sandy silt, slightly cemented, dry and hard (ORIGINAL GROUND)
		17.6	116	6.9	92			
5		17.6	116	6.5	92			
		8.5	107	16.1	85		ML	Light gray clayey silt, moist and very stiff
10		11.6	109	16.7	87		ML	Brown sandy silt, moist and hard
15		8.5	109	11.9	86		SM	Light gray-brown silty fine sand, moist and medium dense
20		5.3	107	2.5	84		SP	Light brown fine to medium sand, dry and medium dense
25		6.0	102	22.1	86		CL	Brown silty clay, very moist and very stiff
30		9.5	111	8.5	88		SM	Brown silty fine sand with a trace of clay, moist and medium dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.	**Magnolia Business Center** **Riverside, California**	**Enclosure 2, Page 13** **Report No.: 4964** **File No.: S-12643**

Boring 14

Boring Date: 11/14/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand, slightly cemented, damp and dense (FILL)
	19.2	117	6.5	92				
	10.6	111	4.7	88				
5							SM	Light brown silty sand with traces of clay, slightly cemented, moist and dense (ORIGINAL GROUND)
	17.6	115	8.0	91				
	13.4	114	7.9	90				
10								
	10.9	110	13.3	87				- becoming very moist and medium dense at 10.5 feet
15							SP	Light brown fine to medium sand, damp and medium dense
	9.9	111	5.9	87				
20								
	8.8	110	9.7	86				- becoming moist at 20.5 feet
25							CL	Gray-brown silty clay, moist and very stiff
	4.9	100	17.9	85				
30							SM	Light brown silty fine sand, moist and dense
	14.1	115	11.9	91				
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 14
Report No.: 4964
File No.: S-12643

Boring 15

Boring Date: 11/7/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand with a trace of clay, damp and medium dense (FILL)
	10.6	110	3.6	87				
	17.6	116	12.9	92			ML	Red-brown sandy silt, moderately cemented, moist and hard (ORIGINAL GROUND)
5	21.1	118	13.3	94				
	13.4	115	11.9	91				
10	12.0	113	10.8	90				
15	8.8	111	8.9	88			SM	Brown silty fine to coarse sand with traces of clay, moist and medium dense
20	10.6	113	10.4	89			SM	Light brown silty fine sand, moist and medium dense
25	8.8	110	15.6	87			ML	Light gray clayey silt, moist and very stiff
30	12.7	116	2.6	91			SP	Brown fine to coarse sand, dry and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 15
Report No.: 4964
File No.: S-12643

Boring 16

Boring Date: 11/7/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Red-brown silty fine to coarse sand, moderately cemented, damp and dense (FILL)
	19.2	116	5.0	92				
	23.5	121	4.3	96				- becoming very dense at 3.5 feet
5	15.5	115	13.4	91			ML	Light brown sandy silt, slightly cemented, moist and hard (ORIGINAL GROUND)
	14.1	113	18.6	90				
10	9.9	111	15.4	88				- becoming very stiff at 10.5 feet
15	7.0	112	18.5	89				
20	10.6	114	5.8	89			SP	Brown fine to coarse sand with a trace of clay, damp and medium dense
25	37.2	123	12.8	98			ML	Light gray clayey silt, moderately cemented, moist and hard
30	12.3	116	6.1	91			SP	Brown fine sand, damp and dense
								Total Depth at 31.0 Feet No Free Ground Water Encountered
35								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 16
Report No.: 4964
File No.: S-12643

Boring 17

Boring Date: 11/14/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, damp and dense (FILL)
	21.1	116	4.2	92				
	16.2	117	5.7	92				
5	15.1	119	7.1	94			SM	Light brown silty sand, moist and dense (ORIGINAL GROUND)
	10.6	111	15.1	88			ML	Light brown sandy silt, moist and very stiff to hard
10	11.3	112	15.8	89				
15	9.5	110	2.6	86			SP	Orange-brown fine sand, dry and medium dense - with hydrocarbon odor below 17.0 feet
20	14.1	116	7.4	91				- becoming moist and dense at 20.5 feet
25	42.3	121	13.7	96			ML	Gray sandy silt with hydrocarbon odor, moist and hard
30	17.6	118	7.4	93			SM	Brown silty fine sand, moist and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/25/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 17
Report No.: 4964
File No.: S-12643

Boring 18

Boring Date: 11/14/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with concrete debris, dry and dense (FILL)
	17.6	119	2.9	94				
	12.3	116	4.7	92			SM	Red-brown silty fine to coarse sand, moderately cemented, damp and dense (ORIGINAL GROUND)
5	10.9	116	4.4	92				
	21.1	118	13.4	94			ML	Brown sandy silt, cemented, moist and hard
10	23.5	120	12.8	95				
15	9.2	109	11.3	86			SM	Light brown silty fine sand, moist and medium dense
20	9.9	112	4.1	88			SP	Light gray fine sand with traces of silt, damp and medium dense
25	6.7	101	20.6	86			CL	Dark gray silty clay, moist and very stiff
30	10.6	114	7.5	90			SM	Brown silty fine sand, moist and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\S-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 18
Report No.: 4964
File No.: S-12643

Boring 19

Boring Date: 11/14/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand, slightly porous, dry and medium dense (ORIGINAL GROUND)
	8.5	110	2.6	87				
	14.4	113	2.4	89				
5	6.0	106	3.1	84				- becoming damp at 5.5 feet
	23.5	118	6.8	93				- becoming dense at 7.5 feet
10	17.6	114	12.6	90			SM	Light brown silty fine sand with traces of clay, very moist and dense
15	7.0	110	1.9	86			SP	Light brown fine to coarse sand, dry and medium dense
20	9.9	—	13.8	—			SM	Gray-brown silty fine to medium sand with some clay, very moist and medium dense
25	7.0	108	8.1	85			SP	Light gray fine sand, moist and medium dense
30	10.6	115	8.8	91			SM	Gray silty fine sand, slightly cemented, moist and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

Boring 20

Boring Date: 11/11/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
							SM	Red-brown silty fine to medium sand, moderately cemented, slightly porous, damp and dense (ORIGINAL GROUND)
	19.2	118	5.9	93				
	14.4	115	6.8	91				
5							ML	Brown sandy silt, slightly cemented, moist and very stiff to hard
	8.1	111	10.1	88				
	11.6	113	11.2	90				
10								
	12.7	116	19.6	92				
15							SP	Light gray fine to medium sand, dry and medium dense
	10.6	111	2.5	87				
20							SM	Light gray-brown silty fine sand, moist and medium dense
	9.5	111	8.2	88				
25							CL	Dark brown silty clay, very moist and very stiff
	6.0	101	20.4	86				
30							SP	Light gray-brown fine sand with a trace of silt, damp and dense
	10.6	115	6.2	90				
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 20
Report No.: 4964
File No.: S-12643

Boring 21

Boring Date: 11/13/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
		21.1	119	5.0	94		SM	Red-brown silty fine to coarse sand, moderately cemented, slightly porous, damp and dense (ORIGINAL GROUND)
		17.6	117	5.5	92			
		12.7	114	5.2	90			
		16.9	115	13.5	91		ML	Brown sandy silt, moist and hard
10		17.6	117	16.6	93			
		11.6	114	4.0	90		SM	Light brown silty fine to medium sand, damp and dense
20		11.3	110	11.7	87		ML	Light gray-brown sandy silt, moist and hard
		6.0	100	20.5	85		CL	Brown silty clay, very moist and stiff to very stiff
30		7.0	101	23.7	86			
		13.4	116	12.6	92		SM	Orange-brown silty fine sand, very moist and dense
40								Total Depth at 36.0 Feet
								No Free Ground Water Encountered
50								
60								
70								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS\S-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.	**Magnolia Business Center** **Riverside, California**	**Enclosure 2, Page 21** **Report No.: 4964** **File No.: S-12643**

Boring 22

Boring Date: 11/14/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand, moderately cemented, damp and dense (ORIGINAL GROUND)
	17.6	116	4.8	92				
	16.2	114	3.7	90				
5	7.0	110	3.2	87				- becoming medium dense at 5.5 feet
	17.6	118	11.7	93			SM	Red-brown silty sand with a trace of clay, slightly cemented, moist and dense
10	23.5	120	12.4	95				- becoming very dense at 10.5 feet
15	8.8	111	17.0	88			ML	Light gray sandy silt, moist and very stiff
20	14.1	115	10.9	91			SM	Gray silty sand, moist and dense
25	9.9	104	20.8	88			CL	Gray silty clay, moist and very stiff
30								Total Depth at 26.0 Feet No Free Ground Water Encountered
35								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

Boring 23

Boring Date: 11/13/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel and concrete debris, dry and medium dense (FILL)
	8.8	110	2.6	87			SM	Red-brown silty fine to coarse sand, slightly porous, dry and medium dense (ORIGINAL GROUND)
	7.0	110	2.3	87				
5	4.9	106	1.9	84				
	15.8	114	7.4	90			ML	Light brown sandy silt, slightly cemented, dry and hard
10	21.1	119	7.9	94				
15	7.4	103	18.8	87			CL	Light gray silty clay, moist and very stiff
20	9.2	110	10.5	87			SM	Brown silty fine to medium sand with a trace of clay, moist and medium dense
25	9.2	113	11.6	89			SM	Brown silty fine sand, moist and medium dense
30	12.3	116	12.9	92				- with a trace of clay and becoming dense at 30.5 feet
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/25/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 23
Report No.: 4964
File No.: S-12643

Boring 24

Boring Date: 11/11/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, damp and medium dense (FILL)
	19.2	119	3.8	94			SM	Red-brown silty fine to coarse sand, slightly cemented, slightly porous, damp and dense (ORIGINAL GROUND)
	17.6	115	6.3	91				
5	10.6	110	9.4	87			ML	Light gray-brown sandy silt, slightly porous, dry and very stiff to hard
	17.6	117	10.0	93				
10	26.4	120	16.5	95				- becoming moist at 10.5 feet
15	6.7	106	10.3	84			SM	Light gray silty fine sand, moist and medium dense
20	10.6	113	2.5	89			SP	Light brown fine to coarse sand with a trace of gravel, dry and medium dense
25								Total Depth at 21.0 Feet No Free Ground Water Encountered
30								
35								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

Boring 25

Boring Date: 11/11/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, damp and dense (FILL)
	17.6	116	4.4	92			SM	Red-brown silty fine to coarse sand, moderately cemented, slightly porous, damp and dense (ORIGINAL GROUND)
	17.6	119	4.6	94				
5	12.3	113	5.6	90			ML	Light brown sandy silt, dry and hard
	23.5	118	9.7	94				
10	17.6	116	16.1	92				- becoming moist at 10.5 feet
15	6.0	107	10.5	84			SP	Light gray fine sand, moist and medium dense
20	6.3	108	7.3	85				
25	17.6	118	4.6	93			SP	Gray-brown fine to coarse sand with a trace of gravel and silt, damp and dense
30	9.9	111	11.6	88			SM	Gray-brown silty fine sand, moist and medium dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 25
Report No.: 4964
File No.: S-12643

Boring 26

Boring Date: 11/11/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, damp and dense (FILL)
	17.6	116	4.5	92			SM	Red-brown silty fine to coarse sand, slightly cemented, slightly porous, damp and dense (ORIGINAL GROUND)
	17.6	116	6.3	92				
5	8.5	111	5.1	88				- becoming medium dense at 5.5 feet
	8.1	110	7.6	87			ML	Light brown sandy silt, dry and very stiff to hard
10	19.2	115	10.6	91				
15	6.7	108	12.0	85			SM	Light brown silty fine sand, moist and medium dense
20	9.9	110	7.1	87				
25	13.0	116	8.2	91			SP	Light brown silty fine to coarse sand, moist and dense
30	14.4	116	11.2	92			SM	Gray-brown silty fine sand with a trace of clay, slightly cemented, moist and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

Boring 27

Boring Date: 11/13/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with debris, dry and medium dense (FILL)
	11.6	111	6.2	88			SM	Red-brown silty fine to coarse sand, slightly cemented, slightly porous, damp and medium dense (ORIGINAL GROUND)
	12.0	111	7.0	88				
5	7.0	109	5.9	86				
	12.7	117	5.0	92				- becoming dense at 7.5 feet
10	11.3	113	16.3	90			ML	Light gray-brown sandy silt, moist and hard
15	7.7	108	15.4	86				- becoming very stiff at 15.5 feet
20	7.0	108	9.7	85			SM	Light orange-brown silty fine sand, moist and medium dense
25	9.9	111	4.8	87			SP	Brown fine to coarse sand, damp and medium dense
30	9.2	113	8.1	89			SM	Brown silty fine sand, moist and medium dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 27
Report No.: 4964
File No.: S-12643

Boring 28

Boring Date: 11/13/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0	19.2	119	2.6	94		GWT not encountered.	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
	8.5	109	3.7	86			SM	Red-brown silty fine to coarse sand, slightly cemented, dry and dense (ORIGINAL GROUND)
	2.8	102	2.0	80			SP	- becoming medium dense at 3.5 feet
	7.7	111	11.3	88			ML	Red-brown fine to coarse sand, dry and loose
10	15.1	116	12.7	92				Red-brown sandy silt, slightly cemented, moist and very stiff to hard
	9.9	114	11.4	90				
20	11.3	115	4.1	91			SM	Light gray silty fine sand, damp and dense
	11.6	110	7.8	86			SP	Light gray fine to coarse sand, moist and medium dense
30	7.0	100	21.8	85			CL	Gray silty clay, very moist and very stiff
	11.6	113	12.0	89			SM	Brown silty fine to medium sand, moist and medium dense
40								Total Depth at 36.0 Feet
								No Free Ground Water Encountered
50								
60								
70								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

Boring 29

Boring Date: 11/11/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand, damp and medium dense (FILL)
		6.3	108	3.8	85		SM	Red-brown silty fine to coarse sand, moderately cemented, damp and dense (ORIGINAL GROUND)
		11.6	114	6.9	90			
		10.9	117	5.0	92			
		4.6	105	5.1	83			- becoming loose at 7.5 feet
10		21.1	118	12.1	94		ML	Red-brown sandy silt, cemented, moist and hard
		17.6	116	12.8	92			
20		7.0	109	10.5	86		SM	Light gray-brown silty fine sand, moist and medium dense
		11.3	111	1.7	87		SP	Light brown fine to coarse sand, dry and medium dense
30		6.0	109	20.1	87		ML	Gray-brown sandy silt, moist and very stiff
		5.3	109	15.9	86		SM	Gray-brown silty fine to coarse sand with a trace of clay, very moist and medium dense
40		9.2	113	4.5	89		SP	Light gray fine to coarse sand, damp and medium dense to dense
		13.0	117	3.5	92			
50								Total Depth at 46.0 Feet No Free Ground Water Encountered
60								
70								

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECTS-12643 (Rpt. No. 4964).log Date: 11/24/2008

LOG OF BORING

Boring 30

Boring Date: 11/13/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0						GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, dry and medium dense (FILL)
	8.1	109	4.0	86			SM	Red-brown silty fine to coarse sand, slightly cemented, slightly porous, damp and medium dense (ORIGINAL GROUND)
	17.6	120	6.8	95				- becoming very dense at 3.5 feet
5	9.5	---	4.7	---				
	8.5	108	9.0	85			SM	Red-brown silty fine sand, moist and medium dense
10	17.6	120	11.1	95				- becoming very dense at 10.5 feet
15	15.1	118	13.9	94			ML	Light gray-brown sandy silt, slightly cemented, moist and hard
20	8.5	108	12.2	85			SM	Light brown silty fine sand, very moist and medium dense
25	10.6	113	1.8	89			SP	Light brown fine to coarse sand with a trace of gravel, dry and medium dense
30	11.6	116	9.1	92			SM	Brown silty fine sand, moist and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
Riverside, California

Enclosure 2, Page 30
Report No.: 4964
File No.: S-12643

Boring 31

Boring Date: 11/11/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0		9.9	113	3.0	89	GWT not encountered	SM	Brown silty fine to coarse sand, slightly cemented, dry and medium dense (FILL)
		8.1	110	4.4	87		SM	Red-brown silty fine to coarse sand, slightly cemented, slightly porous, damp and medium dense (ORIGINAL GROUND)
	20	11.6	115	5.3	91			- becoming dense at 5.5 feet
10	35	13.4	117	11.5	93		ML	Red-brown sandy silt, slightly cemented, moist and hard
	17	17.3	120	13.4	95		ML	Light gray clayey silt, moderately cemented, moist and hard
20	21						SM	Light brown silty fine sand, moist and medium dense
	30						SP	Light brown fine to medium sand with a trace of silt, damp and dense
30	14						SM	Gray-brown silty fine sand, moist and medium dense
	23						SP	Light brown fine to medium sand, moist and medium dense
40	21							
	32							
50	40						SP	Light brown fine to coarse sand with a trace of gravel, damp and dense
60								Total Depth at 51.5 Feet No Free Ground Water Encountered
70								

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LOG OF BORING

Boring 32

Boring Date: 11/14/08
Surface Elevation:
Drilling Method: Flight-auger

Depth	SPT Blows Per Foot	Driving Energy (k-ft/ft)	Dry Density (PCF)	Moisture Content (%)	Rel. Compaction (%)	Water Table		
0	17.6	119	5.1	94		GWT not encountered	SM	Brown silty fine to coarse sand with a trace of gravel, damp and dense (FILL)
5	6.3	110	7.9	87				- becoming moist and medium dense at 5.5 feet
10	2.5	99	9.2	78				- becoming loose at 10.5 feet
15	2.8	101	13.9	80				- becoming very moist at 15.5 feet
20	3.2	102	5.9	81			SP	Light brown fine sand with a trace of silt, damp and loose
25	13.0	115	13.8	91			ML	Gray sandy silt, moist and hard (ORIGINAL GROUND)
30	14.8	119	4.2	94			SM	Brown silty fine to medium sand, damp and dense
35								Total Depth at 31.0 Feet No Free Ground Water Encountered

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LOG OF BORING

John R. Byerly, Inc.

Magnolia Business Center
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Enclosure 2, Page 32
Report No.: 4964
File No.: S-12643

Date Drilled:	11/7/05	Water Depth:	(feet)
Drilled By:	JET DRILLING	Date Measured:	
Drilling Method:	Hollow Stem Auger 8"	Reference Elevation:	696 (feet)
Logged By:	FG	Datum:	MSL

Elevation	Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests
-695-			1	40		FILL SILTY SAND (SM), orange brown, dry	106	7.4	
-690-	5		2	50/2"				12.4	
						ALLUVIUM SILTY SAND (SM), fine to coarse, orange brown, slightly moist, medium dense, layers of fine tan silty sand			
-685-	10		3	90		Pin hole porosity	112	9.0	
-680-	15		4	57		SILTY SAND (SM), fine to coarse, orange brown, moist, medium dense to dense	109	2.5	
-675-	20		5	50		SILTY SAND (SM), fine, grey, slightly moist, layers of fine to coarse silty sand	113	4.6	
-670-	25		6	20		LEAN CLAY with SAND (CL), brown, moist, very stiff to hard, carbonate nodules	108	18.6	
						Auger refusal at 26 1/2 feet No groundwater encountered Boring backfilled with auger soil cuttings			

KLEINFELDER

PROJECT NO. 62728

MAGNOLIA BUSINESS PARK

Magnolia Ave and Pierce Street, Riverside

LOG OF BORING B-1

PLATE A-4

Explanation Of Logs On Plates A-3a & A-3b

Date Drilled:	11/7/05	Water Depth:	(feet)
Drilled By:	JET DRILLING	Date Measured:	
Drilling Method:	Hollow Stem Auger 8"	Reference Elevation:	696 (feet)
Logged By:	FG	Datum:	MSL

Elevation	Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests
-695-						FILL SILTY SAND (SM), orange brown, dry			
			1			SILTY SAND (SM), fine to coarse, orange brown, slightly moist, medium dense, pin hole porosity		4.8	
	5		2	26			113	5.0	
-690-						ALLUVIUM			
	10		3	60		SANDY SILT (ML), mottled tan and brown, moist, stiff to hard, carbonates, pin hole porosity	96	15.5	
-685-									
	15		4	34			99	24.0	
-680-						Cobbles or concretions at 17 to 20 feet			
						SILTY SAND (SM), fine to coarse, light brown to light grey, moist, medium dense to dense			
	20		5	44			118	5.1	
-675-									
						End of boring at 21 1/2 feet No groundwater encountered Boring backfilled with auger soil cuttings			

KLEINFELDER

PROJECT NO. 62728

MAGNOLIA BUSINESS PARK

Magnolia Ave and Pierce Street, Riverside

LOG OF BORING B-2

PLATE A-5

Enclosure 2, Page 34

Rpt. No.: 4964

File No.: S-12643

Explanation Of Logs On Plates A-3a & A-3b

Date Drilled:	11/7/05	Water Depth:	(feet)
Drilled By:	JET DRILLING	Date Measured:	
Drilling Method:	Hollow Stem Auger 8"	Reference Elevation:	696 (feet)
Logged By:	FG	Datum:	MSL

Elevation	Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests
-695-						FILL SILTY SAND (SM), orange brown, dry			
			1	18		ALLUVIUM SILTY SAND (SM), fine to coarse, orange brown, slightly moist, medium dense, carbonate	104	8.0	
-690-	5		2	62		SANDY SILT (ML), orange brown, moist, stiff to hard, pin hole porosity Becomes mottled brown and tan	110	14.0	
-685-	10		3	48			114	12.4	
-680-	15		4	64		SILTY SAND (SM), fine to coarse, light brown to light grey, moist, medium dense to dense, fine gravel	111	3.2	
-675-	20		5	48		Inclusions of tan lean clay	108	4.0	
-670-	25		6	65		LEAN CLAY with SAND (CL), tan, moist, very stiff	103	18.9	

Boring terminated at 26 1/2 feet
No groundwater encountered
Boring backfilled with auger soil cuttings

KLEINFELDER

PROJECT NO. 62728

MAGNOLIA BUSINESS PARK

Magnolia Ave and Pierce Street, Riverside

LOG OF BORING B-3

PLATE A-6

Enclosure 2, Page 35
Rpt. No.: 4964
File No.: S-12643

Explanation Of Logs On Plates A-3a & A-3b

Date Drilled:	11/7/05	Water Depth:	(feet)
Drilled By:	JET DRILLING	Date Measured:	
Drilling Method:	Hollow Stem Auger 8"	Reference Elevation:	696 (feet)
Logged By:	FG	Datum:	MSL

Elevation	Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests
-695-						FILL SILTY SAND (SM), orange brown, dry			
			1	52		ALLUVIUM SILTY SAND (SM), fine to coarse, orange brown, slightly moist, medium dense, pin hole porosity	115	4.9	
	5		2	52		SANDY SILT (ML), mottled tan and brown, moist, stiff to hard	113	15.9	
-690-									
						SILTY SAND (SM), fine to coarse, light brown to grey, moist, medium dense to dense			
	10		3	49			122	5.4	
-685-									
	15		4	36		SILTY SAND (SM), fine to coarse, moist, brown, layer of lean clay with sand at bottom of sample	108	23.2	
-680-									
	20		5	58		SILTY SAND (SM), fine to coarse, light brown to light grey, slightly moist, medium dense to dense	103	2.1	
-675-									
						LEAN CLAY with SAND (CL), brown, moist, carbonate specks, very stiff to hard			
	25		6	46			111	19.1	
-670-									
						Auger refusal at 26 1/2 feet No groundwater encountered Boring backfilled with auger soil cuttings			

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PROJECT NO. 62728

MAGNOLIA BUSINESS PARK

Magnolia Ave and Pierce Street, Riverside

LOG OF BORING B-4

PLATE

A-7

Enclosure 2, Page 36

Rpt. No.: 4964

File No.: S-12643

Explanation Of Logs On Plates A-3a & A-3b

Date Drilled:	11/7/05	Water Depth:	(feet)
Drilled By:	JET DRILLING	Date Measured:	
Drilling Method:	Hollow Stem Auger 8"	Reference Elevation:	696 (feet)
Logged By:	FG	Datum:	MSL

Elevation	Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests
-695-						FILL SILTY SAND (SM), orange brown, dry			
			1	46		ALLUVIUM SANDY SILT (ML), fine to coarse, orange brown, moist, carbonate nodules, hard, pin hole porosity	109	13.6	
-690-	5		2	49		SANDY SILT (ML), mottled tan and grey, moist, very stiff to hard	105	15.4	
-685-	10		3	35		SAND with SILT (SP), fine to coarse, orange brown, moist, medium dense to dense	113	4.2	
-680-	15		4	43		SILTY SAND (SM), fine to coarse, moist, brown and grey, layer of sandy silt, moist, medium dense to dense	117	6.5	
-675-	20		5	47		LEAN CLAY with SAND (CL), olive brown, moist, very stiff to hard	101	24.3	
-670-	25		6	50		SANDY SILT (ML), tan to light grey, moist, carbonate, very stiff to hard	111	17.2	
-665-	30		7	87		SILTY SAND (SM), fine to medium, tan to orange brown, moist, medium dense to dense Auger refusal at 31 1/2 feet No groundwater encountered	111	9.3	

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PROJECT NO. 62728

MAGNOLIA BUSINESS PARK

Magnolia Ave and Pierce Street, Riverside

LOG OF BORING B-5

PLATE A-8

Enclosure 2, Page 37

Rpt. No.: 4964

File No.: S-12643

Explanation Of Logs On Plates A-3a & A-3b

Date Drilled:	11/7/05	Water Depth:	(feet)
Drilled By:	JET DRILLING	Date Measured:	
Drilling Method:	Hollow Stem Auger 8"	Reference Elevation:	696 (feet)
Logged By:	FG	Datum:	MSL

Elevation	Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests
-695-						FILL SILTY SAND (SM), orange brown, dry			
			1	24		ALLUVIUM SANDY SILT (ML), fine to coarse, orange brown, slightly moist, very stiff to hard, pin hole porosity	100	10.6	
-690-	5		2	50		SANDY SILT (ML), mottled tan and brown, moist, stiff to hard, pin hole porosity	111	8.6	
-685-	10		3	41		SILTY SAND (SM), fine to coarse, light brown to grey, moist, medium dense to dense, carbonate	98	11.7	
-680-	15		4	81		SILTY SAND (SM), fine to coarse, moist, light brown, dense	113	4.3	
-675-	20		5	54		SILTY SAND (SM), fine to medium, light brown to light grey, moist, medium dense to dense, layers and lenses of sandy silt	99	11.2 22.6	

End of Boring at 21 1/2 feet
No groundwater encountered
Boring backfilled with auger soil cuttings

KLEINFELDER

PROJECT NO. 62728

MAGNOLIA BUSINESS PARK

Magnolia Ave and Pierce Street, Riverside

LOG OF BORING B-6

PLATE A-9

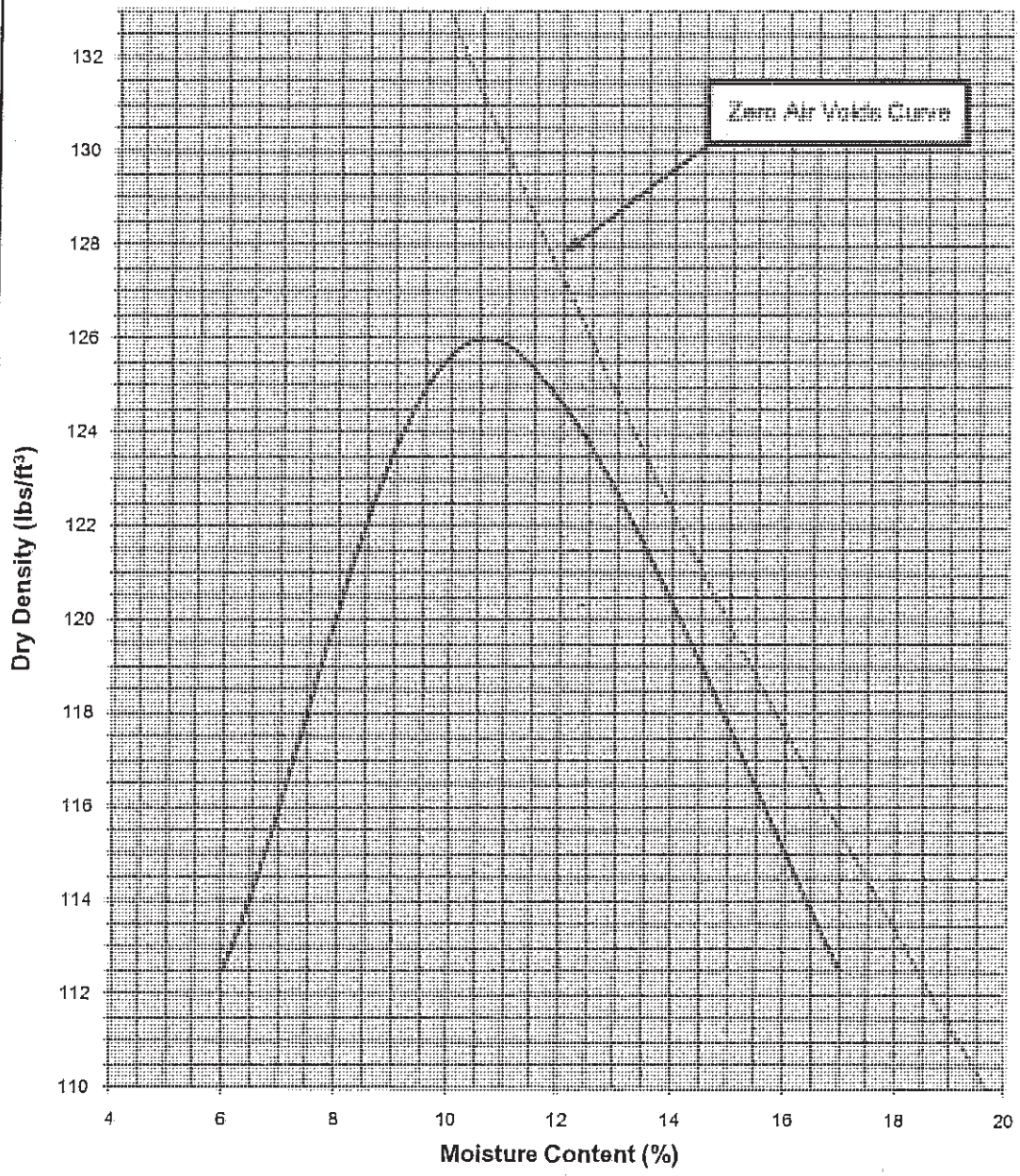
Enclosure 2, Page 38

Rpt. No.: 4964

File No.: S-12643

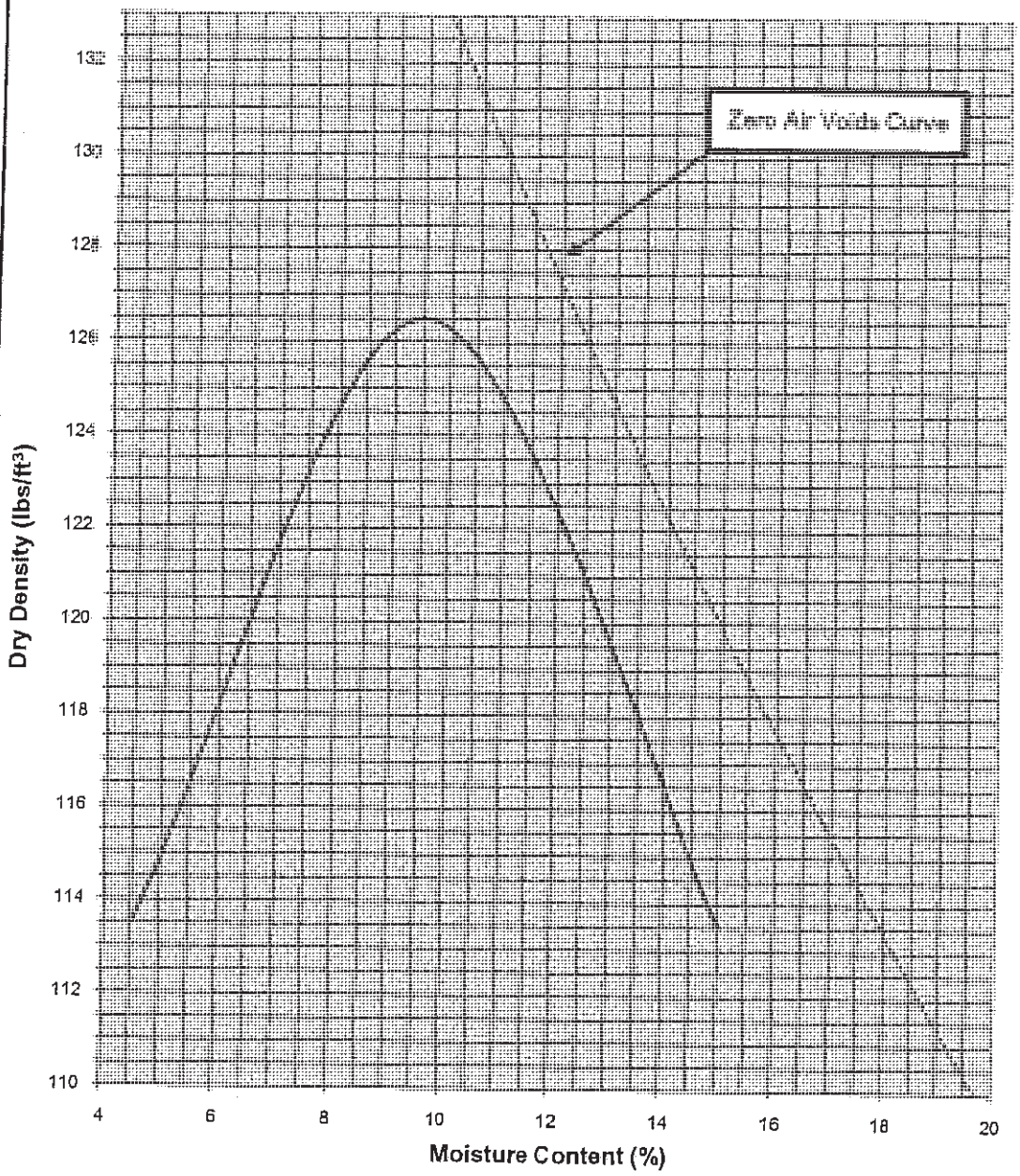
Explanation Of Logs On Plates A-3a & A-3b

Moisture/Density Relationship
ASTM D-1557



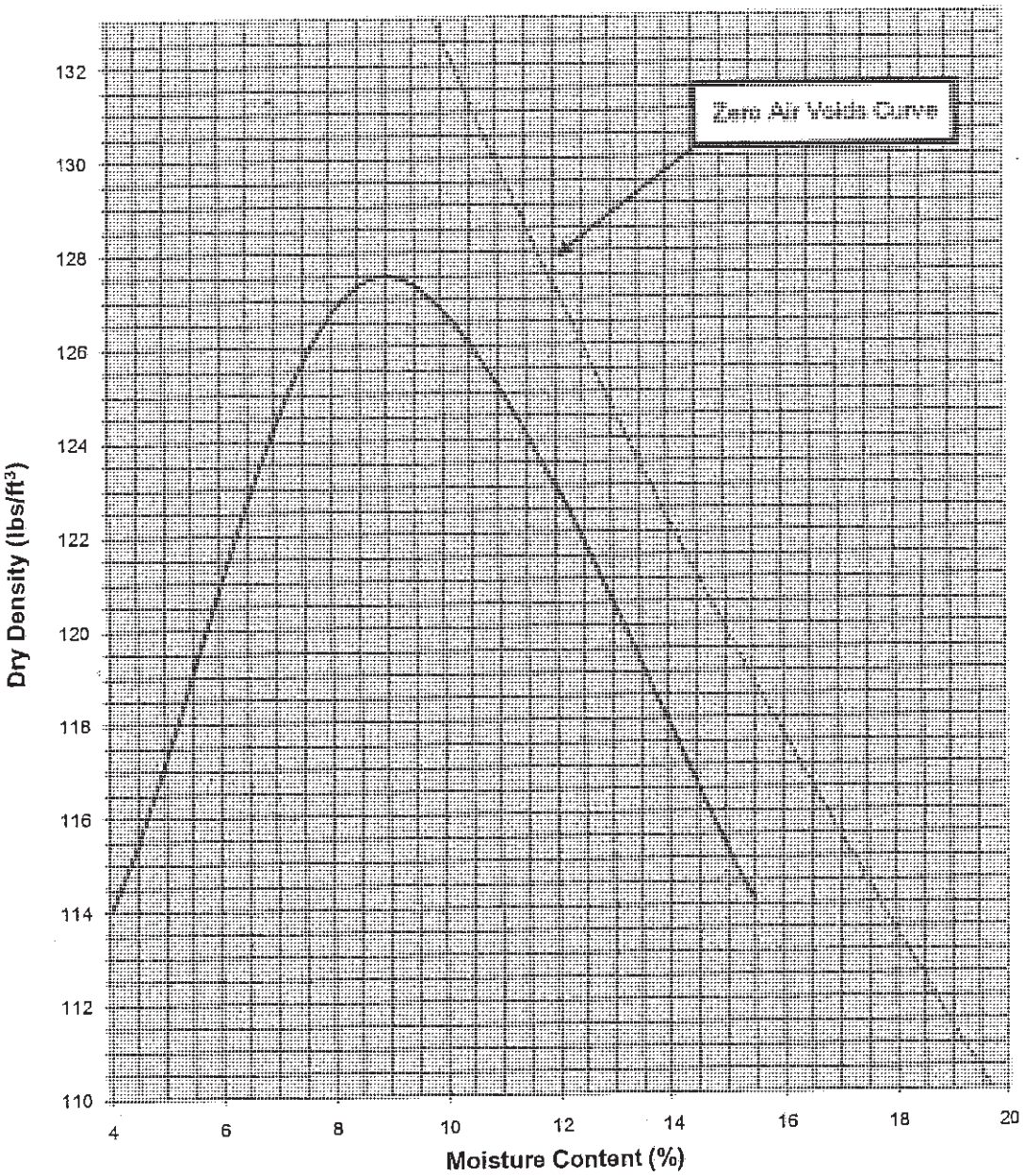
Boring No.	B-1 (Sample I.D. #1)
Depth (ft.)	3.0
Optimum Moisture (%)	10.6
Maximum Dry Density (pcf)	126.0
Soil Classification	Light gray-brown sandy silt (ML)

Moisture/Density Relationship
ASTM D-1557



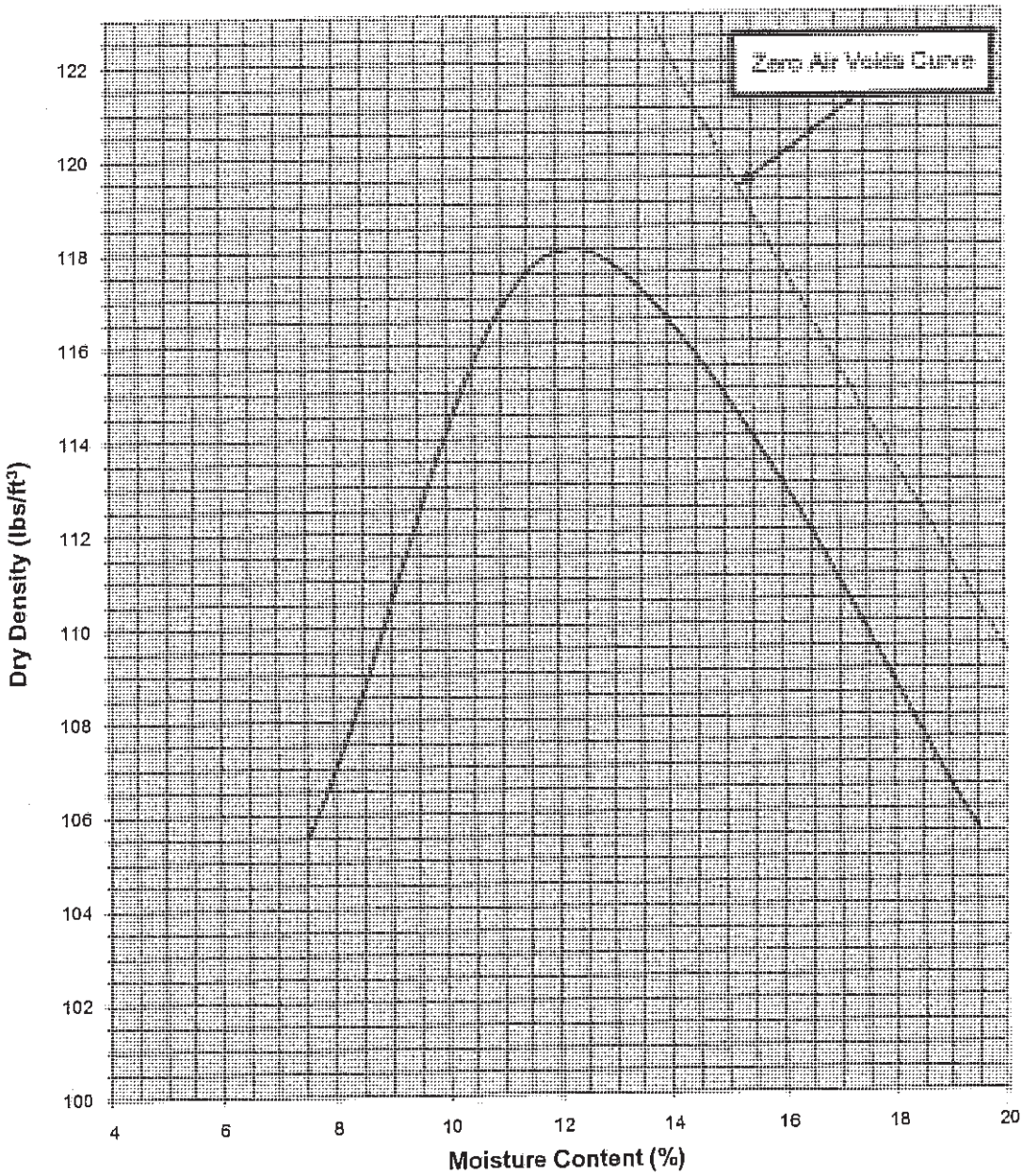
Boring No.	B-3 (Sample I.D. #2)
Depth (ft.)	1.0
Optimum Moisture (%)	9.5
Maximum Dry Density (pcf)	126.5
Soil Classification	Red-brown silty fine to coarse sand with a trace of clay (SM)

Moisture/Density Relationship
ASTM D-1557



Boring No.	B-28 (Sample I.D. #3)
Depth (ft.)	5.0
Optimum Moisture (%)	9.0
Maximum Dry Density (pcf)	127.5
Soil Classification	Red-brown fine to coarse sand (SP)

Moisture/Density Relationship
ASTM D-1557



Boring No.	B-23 (Sample I.D. #4)
Depth (ft.)	15.0
Optimum Moisture (%)	12.3
Maximum Dry Density (pcf)	118.0
Soil Classification	Light gray silty clay (CL)

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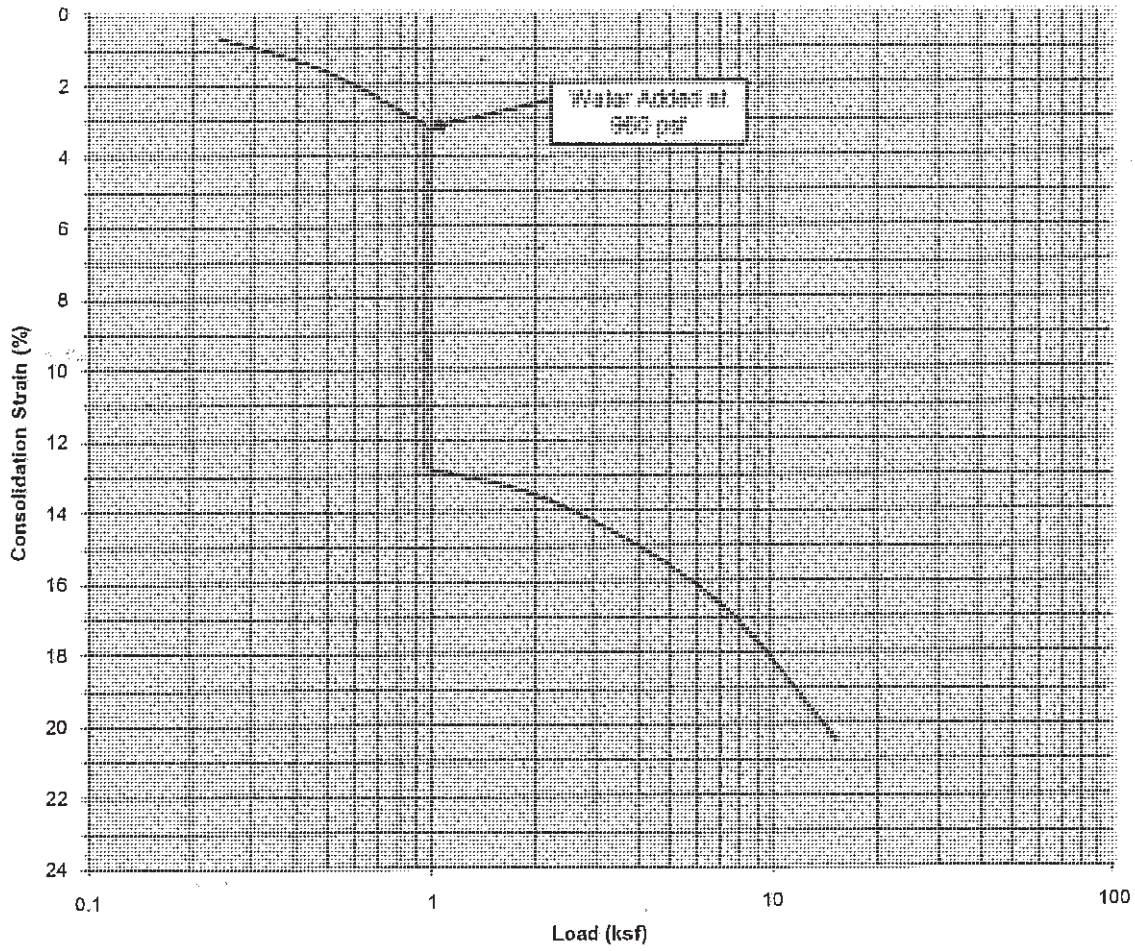
Consolidation Test Results



Classification: SM

Boring Number:	B-23	Initial Moisture Content (%)	1.9
Depth (ft)	5.5	Final Moisture Content (%)	14.5
Specimen Diameter (in)	2.4	Initial Dry Density (pcf)	106
Specimen Thickness (in)	1.0		

Enclosure 4, Page 1
Rpt. No.: 4964
File No.: S-12643

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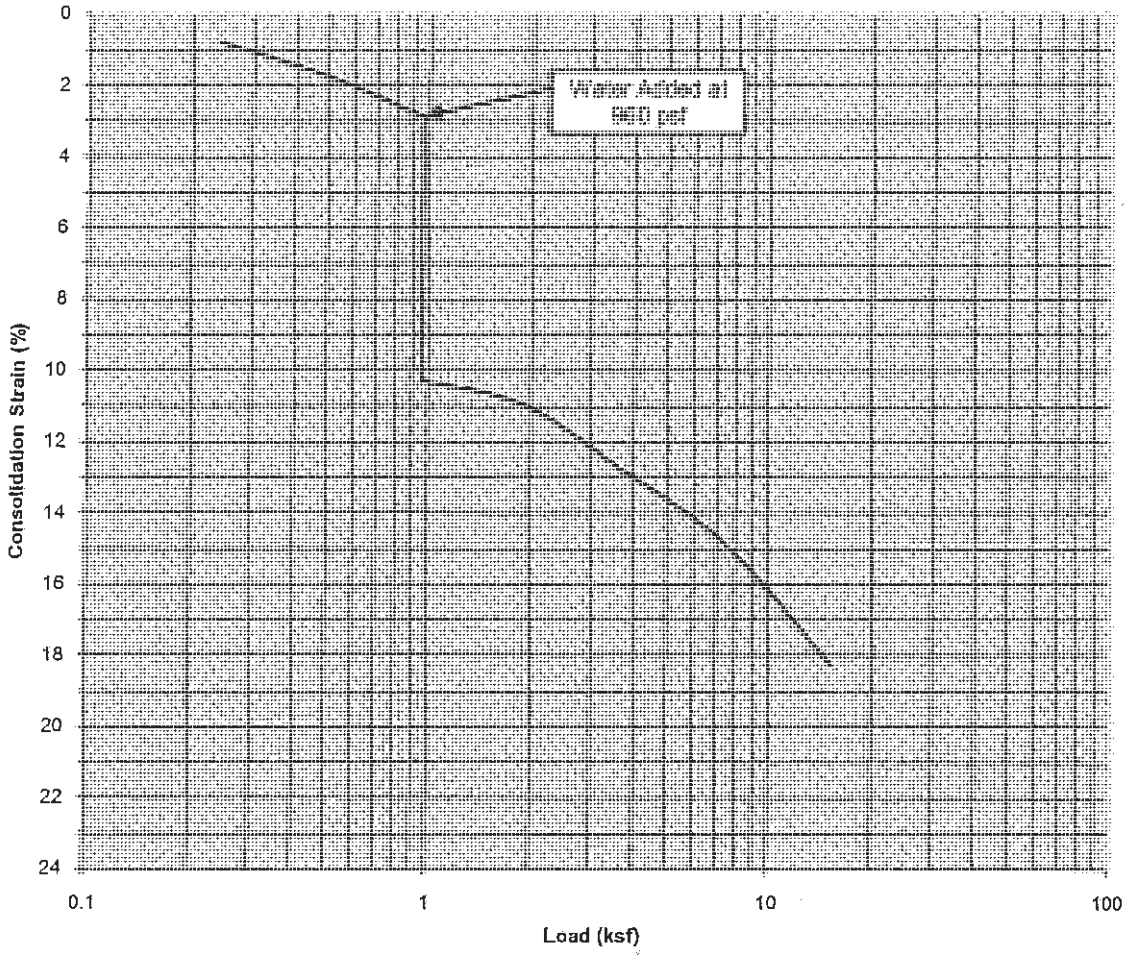
Consolidation Test Results



Classification: SM

Boring Number:	B-29	Initial Moisture Content (%)	5.1
Depth (ft)	7.5	Final Moisture Content (%)	15.8
Specimen Diameter (in)	2.4	Initial Dry Density (pcf)	105
Specimen Thickness (in)	1.0		

Enclosure 4, Page 2
Rpt. No.: 4964
File No.: S-12643

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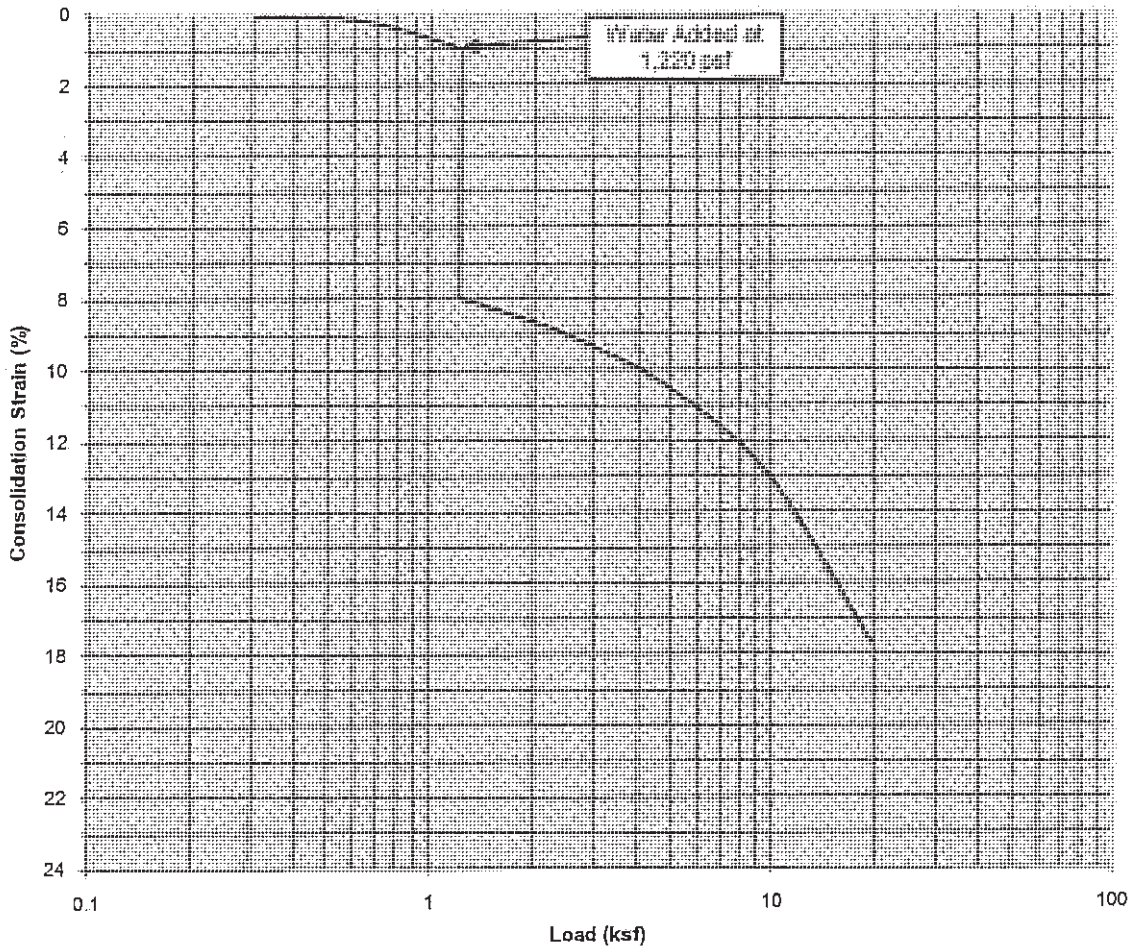
Consolidation Test Results



Classification: SM

Boring Number:	B-32	Initial Moisture Content (%)	9.2
Depth (ft)	10.5	Final Moisture Content (%)	16.4
Specimen Diameter (in)	2.4	Initial Dry Density (pcf)	99
Specimen Thickness (in)	1.0		

Enclosure 4, Page 3
Rpt. No.: 4964
File No.: S-12643

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EXPANSION INDEX TEST DATA

Test Description

The sample was moistened so that the as-compacted moisture content was between 49 and 51 percent saturation. The moistened sample was compacted into a 4-inch-diameter mold in two layers; each layer was compacted by 15 blows of a 5.5-pound hammer falling 12 inches. The sample was trimmed to a thickness of 1 inch and placed in a consolidometer loaded with 12.63 pounds. The sample was then submerged in distilled water, and the expansion to constant volume was noted.

Test Pit/ Boring No.	Depth (ft.)	Compaction Moisture Content (%)	Dry Density (pcf)	Expansion Index	Expansion Potential
B-7	5.0-7.0	11.7	109	61	Medium
B-16	10.0-12.0	13.0	104	57	Medium
B-22	10.0-12.0	8.0	105	51	Medium

Enclosure 5
Rpt. No.: 4964
File No.: S-12643

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RESULTS OF SUBGRADE SOIL TESTS

California Department of Transportation Test Methods 202, 217, & 301
ASTM Designations C136 and D2419

PROJECT: Magnolia Business Center

Sample No.	Location	Percent Passing Sieve Size: 3"	2½"	2"	1½"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	Sand Equiv.
1	B-29 at 1.0'-4.0'						100	99	99	98	88	76	65	56	48	40	18

STABILOMETER "R" VALUE

Sample No.		1	
Moisture Content (%)	9.2	10.9	11.8
Dry Density (lbs./cu. ft.)	130.6	125.1	123.0
Exudation Pressure (psi)	661	350	247
Expansion Pressure (psf)	21.65	17.32	8.66
"R" Value	45	21	14
"R" Value at 300 PSI Exudation		18	

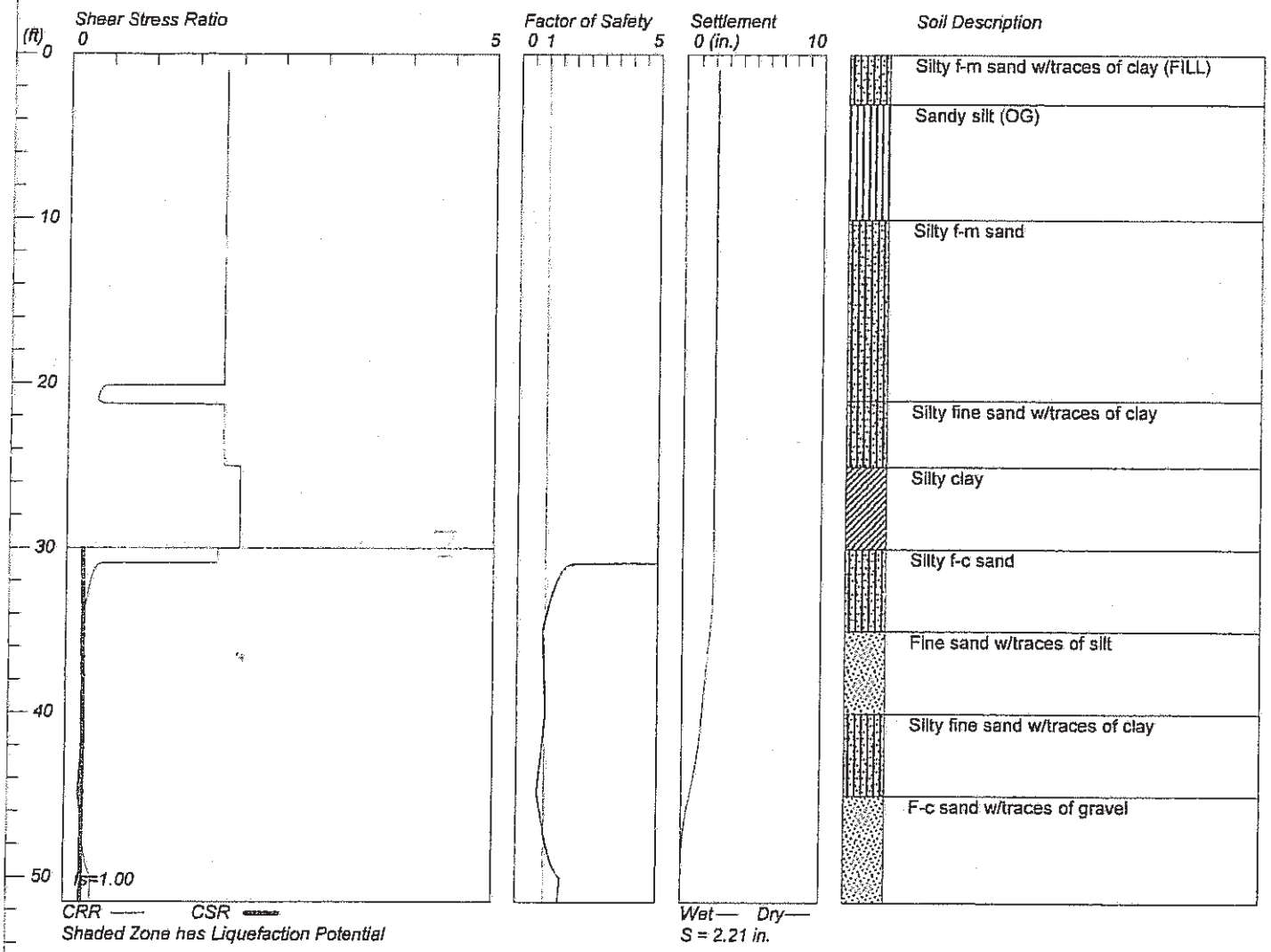
Enclosure 6
Rpt. No.: 4964
File No.: S-12643

LIQUEFACTION ANALYSIS

WESTERN MUNICIPAL WATER DISTRICT - MAGNOLIA BUSINESS CENTER

Hole No.=B-1 Water Depth=30.0 ft

Magnitude=7.8
Acceleration=0.33g



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*****************************************************************************************
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        Input File Name: C:\Liquefy\S-12643A.liq
        Title:  WESTERN MUNICIPAL WATER DISTRICT - MAGNOLIA BUSINESS CENTER
        Subtitle:  S-12643A

        Surface Elev.=
        Hole No.=B-1
        Depth of Hole= 51.5 Ft
        Water Table during Earthquake= 30.0 Ft
        Water Table during In-Situ Testing= 49.0 Ft
        Max. Acceleration= 0.33 g
        Earthquake Magnitude= 7.8
        User request factor of safty (applied to CSR),  Fs(user)=1
        Fs=user,  Plot one CSR (Fs=user)

        Hammer Energy Ratio, Ce=1.00
        Borehole Diameter, Cb=1
        Sampeling Method, Cs=1
        SPT Fines Correction Method: Stark/Olson et al.*
        Settlement Analysis Method: Ishihara / Yoshimine*
        Fines Correction for Liquefaction: Stark/Olson et al.*
        Fine Correction for Settlement: Post-Liq. Correction *
        Average Input Data: Smooth*
        * Recommended Options
```

Input Data:

Depth ft	SPT	Gamma pcF	Fines %
1.0	21.0	117.9	25.0
3.0	26.0	129.3	70.0
6.0	20.0	127.9	70.0
11.0	30.0	125.3	30.0
16.0	31.0	125.3	30.0
21.0	20.0	125.0	30.0
26.0	31.0	123.5	NoLiq
31.0	35.0	130.0	25.0
35.0	29.0	130.0	10.0
40.0	30.0	135.0	25.0
45.0	31.0	135.0	3.0
50.0	53.0	135.0	3.0

Output Results:

Settlement of saturated sands=2.11 in.
Settlement of dry sands=0.09 in.

Total settlement of saturated and dry sands=2.21 in.
Differential Settlement=1.103 to 1.456 in.

Depth ft	CRRm	CSRfs w/fs	F.S.	S_sat. in.	S_dry in.	S_all in.
1.00	1.81	0.21	5.00	2.11	0.09	2.21
6.00	1.81	0.21	5.00	2.11	0.08	2.20
11.00	1.81	0.21	5.00	2.11	0.07	2.18
16.00	1.81	0.21	5.00	2.11	0.05	2.16
21.00	0.35	0.20	5.00	2.11	0.02	2.14
26.00	2.00	0.20	5.00	2.11	0.00	2.11
31.00	0.30	0.20	1.91	2.11	0.00	2.11
36.00	0.20	0.21	0.95*	1.78	0.00	1.78
41.00	0.20	0.21	0.97*	1.26	0.00	1.26
46.00	0.18	0.21	0.86*	0.30	0.00	0.30
51.00	0.31	0.20	1.55	0.01	0.00	0.01

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units Depth = ft, Stress or Pressure = tsf (atm), Unit Weight = pcf, Settlement = in.

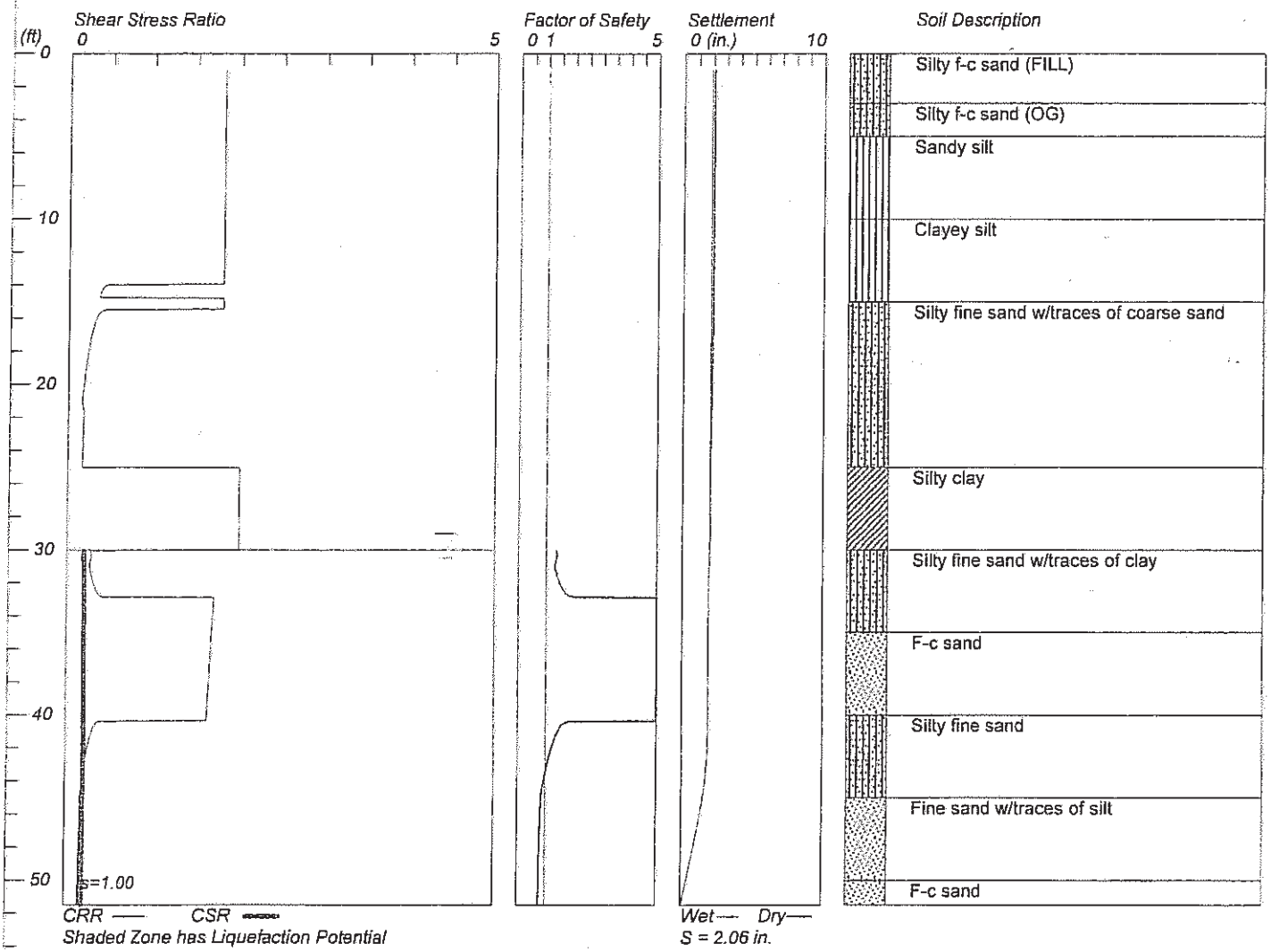
CRRm Cyclic resistance ratio from soils
CSRfs Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of SaFety against liquefaction, F.S.=CRRm/CSRfs
S_sat Settlement from saturated sands
S_dry Settlement from dry sands
S_all Total settlement from saturated and dry sands
NoLiq No-Liquefy Soils

LIQUEFACTION ANALYSIS

WESTERN MUNICIPAL WATER DISTRICT - MAGNOLIA BUSINESS CENTER

Hole No.=B-11 Water Depth=30.0 ft

Magnitude=7.8
Acceleration=0.33g



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Input File Name: C:\LiqueFy\S-12643B.liq
Title: WESTERN MUNICIPAL WATER DISTRICT - MAGNOLIA BUSINESS CENTER
Subtitle: S-12643B

Surface Elev.=
Hole No.=B-11
Depth of Hole= 51.5 ft
Water Table during Earthquake= 30.0 ft
Water Table during In-Situ Testing= 52.0 ft
Max. Acceleration= 0.33 g
Earthquake Magnitude= 7.8
User request factor of safty (applied to CSR), fs(user)=1
fs=user, Plot one CSR (fs=user)

Hammer Energy Ratio, Ce=1.00
Borehole Diameter, Cb=1
Sampeling Method, Cs=1
SPT Fines Correction Method: Stark/Olson et al.*
Settlement Analysis Method: Ishihara / Yoshimine*
Fines Correction for Liquefaction: Stark/Olson et al.*
Fine Correction for Settlement: Post-Liq. Correction *
Average Input Data: Smooth*
* Recommended Options

Input Data:

Depth ft	SPT	Gamma pcf	Fines %
1.0	35.0	130.9	25.0
3.0	35.0	130.4	25.0
6.0	35.0	131.7	70.0
11.0	27.0	133.2	85.0
16.0	25.0	121.1	25.0
21.0	14.0	125.0	25.0
26.0	13.0	125.0	NoLiq
31.0	30.0	130.0	25.0
35.0	52.0	130.0	3.0
40.0	30.0	130.0	35.0
45.0	32.0	130.0	10.0
50.0	32.0	130.0	10.0

Output Results:
Settlement of saturated sands=1.88 in.
Settlement of dry sands=0.18 in.

Total settlement of saturated and dry sands=2.06 in.
Differential Settlement=1.028 to 1.356 in.

Depth ft	CRRm	CSRfs w/fs	F.S.	S_sat. in.	S_dry in.	S_all in.
1.00	1.81	0.21	5.00	1.88	0.18	2.06
6.00	1.81	0.21	5.00	1.88	0.17	2.05
11.00	1.81	0.21	5.00	1.88	0.16	2.04
16.00	0.31	0.21	5.00	1.88	0.14	2.02
21.00	0.16	0.20	5.00	1.88	0.08	1.96
26.00	2.00	0.20	5.00	1.88	0.00	1.88
31.00	0.26	0.20	1.31	1.85	0.00	1.85
36.00	1.69	0.21	5.00	1.81	0.00	1.81
41.00	0.30	0.21	1.44	1.80	0.00	1.80
46.00	0.17	0.21	0.83*	1.26	0.00	1.26
51.00	0.16	0.20	0.78*	0.12	0.00	0.12

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units Depth = ft, Stress or Pressure = tsf (atm), Unit Weight = pcf, Settlement = in.

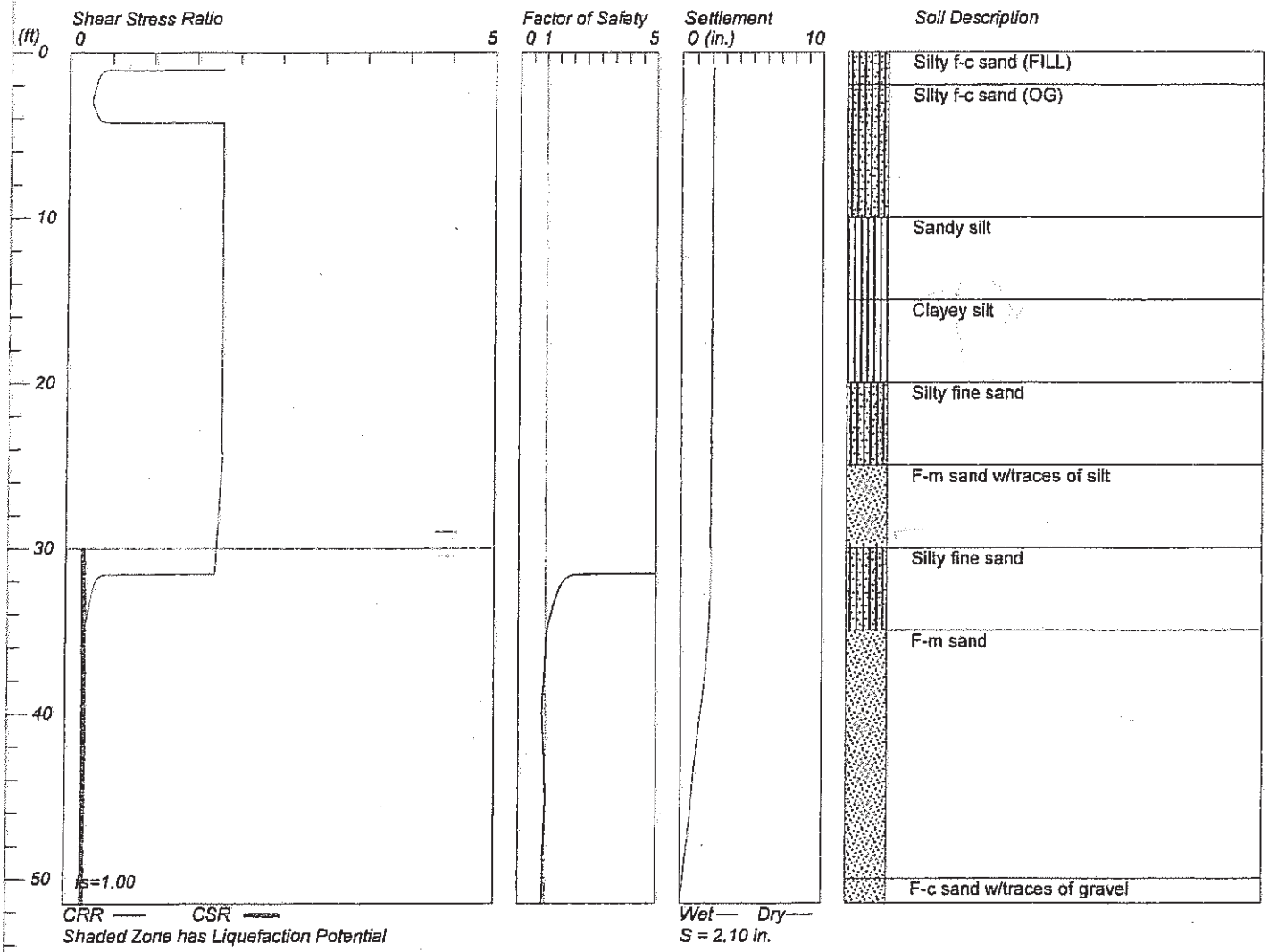
CRRm Cyclic resistance ratio from soils
CSRfs Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRfs
S_sat Settlement from saturated sands
S_dry Settlement from dry sands
S_all Total settlement from saturated and dry sands
NoLiq No-Liquefy Soils

LIQUEFACTION ANALYSIS

WESTERN MUNICIPAL WATER DISTRICT - MAGNOLIA BUSINESS CENTER

Hole No.=B-31 Water Depth=30.0 ft

Magnitude=7.8
Acceleration=0.33g



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Input File Name: C:\Liquefy\S-12643C.liq
Title: WESTERN MUNICIPAL WATER DISTRICT - MAGNOLIA BUSINESS CENTER
Subtitle: S-12643C

Surface Elev.=
Hole No.=B-31
Depth of Hole= 51.5 ft
Water Table during Earthquake= 30.0 ft
Water Table during In-Situ Testing= 52.0 ft
Max. Acceleration= 0.33 g
Earthquake Magnitude= 7.0
User request factor of safty (applied to CSR), Fs(user)=1
Fs=user, Plot one CSR (Fs=user)

Hammer Energy Ratio, Ce=1.00
Borehole Diameter, Cb=1
Sampeling Method, Cs=1
SPT Fines Correction Method: Stark/Olson et al.*
Settlement Analysis Method: Ishihara / Yoshimine*
Fines Correction for Liquefaction: Stark/Olson et al.*
Fine Correction for Settlement: Post-Liq. Correction *
Average Input Data: Smooth*
* Recommended Options

Input Data:

Depth ft	SPT	Gamma pcf	Fines %
1.0	20.0	116.4	25.0
3.0	16.0	114.8	25.0
6.0	25.0	121.1	25.0
11.0	35.0	135.5	70.0
16.0	37.0	136.1	70.0
21.0	31.0	125.0	35.0
26.0	40.0	130.0	10.0
31.0	34.0	130.0	35.0
35.0	33.0	130.0	10.0
40.0	31.0	130.0	10.0
45.0	30.0	130.0	10.0
50.0	40.0	130.0	3.0

Output Results:
Settlement of saturated sands=2.00 in.
Settlement of dry sands=0.10 in.

Total settlement of saturated and dry sands=2.10 in.
Differential Settlement=1.050 to 1.386 in.

Depth ft	CRRm	CSRfs w/fs	F.S.	S_sat. in.	S_dry in.	S_all in.
1.00	1.81	0.21	5.00	2.00	0.10	2.10
6.00	1.81	0.21	5.00	2.00	0.09	2.09
11.00	1.81	0.21	5.00	2.00	0.08	2.08
16.00	1.01	0.21	5.00	2.00	0.07	2.07
21.00	1.81	0.20	5.00	2.00	0.05	2.05
26.00	1.80	0.20	5.00	2.00	0.03	2.02
31.00	1.74	0.20	5.00	2.00	0.00	2.00
36.00	0.21	0.21	1.02	1.00	0.00	1.00
41.00	0.19	0.21	0.91*	1.16	0.00	1.16
46.00	0.20	0.21	0.99*	0.62	0.00	0.62
51.00	0.19	0.20	0.92*	0.06	0.00	0.06

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units Depth = ft, Stress or Pressure = tsf (atm), Unit Weight = pcf, Settlement = in.

CRRm Cyclic resistance ratio from soils
CSRfs Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRfs
S_sat Settlement from saturated sands
S_dry Settlement from dry sands
S_all Total settlement from saturated and dry sands
NoLiq No-Liquefy Soils

John R. Byerly
INCORPORATED

SUGGESTED SPECIFICATIONS FOR CLASS II BASE

Sieve Size	Percent Finer Than
1 Inch	100
3/4 Inch	90 - 100
No. 4	35 - 60
No. 30	10 - 30
No. 200	2 - 9
Sand Equivalent (Minimum)	25
"R" Value (minimum) at 300 psi Exudation	78

Enclosure 8
Rpt. No.: 4964
File No.: S-12643

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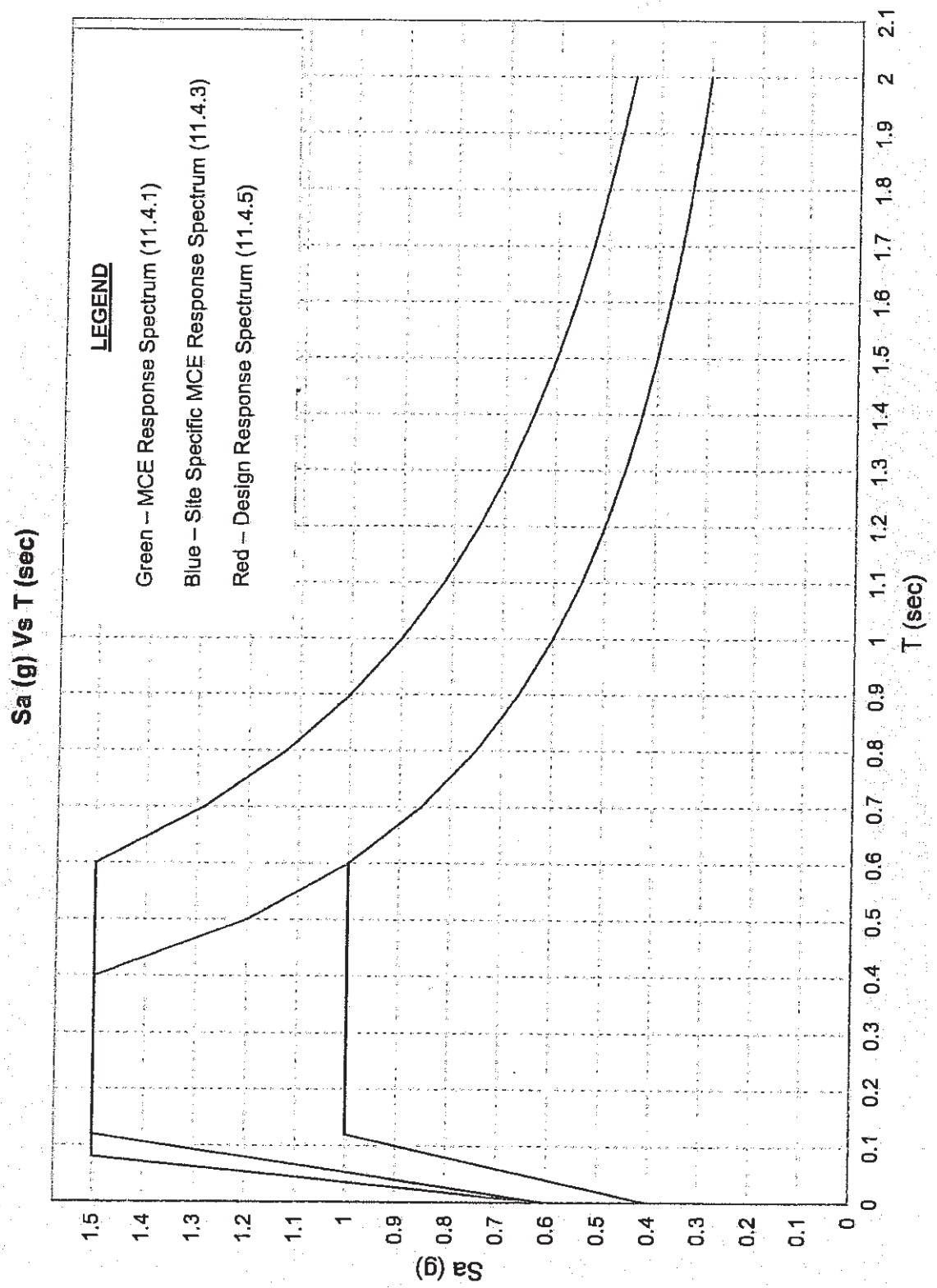
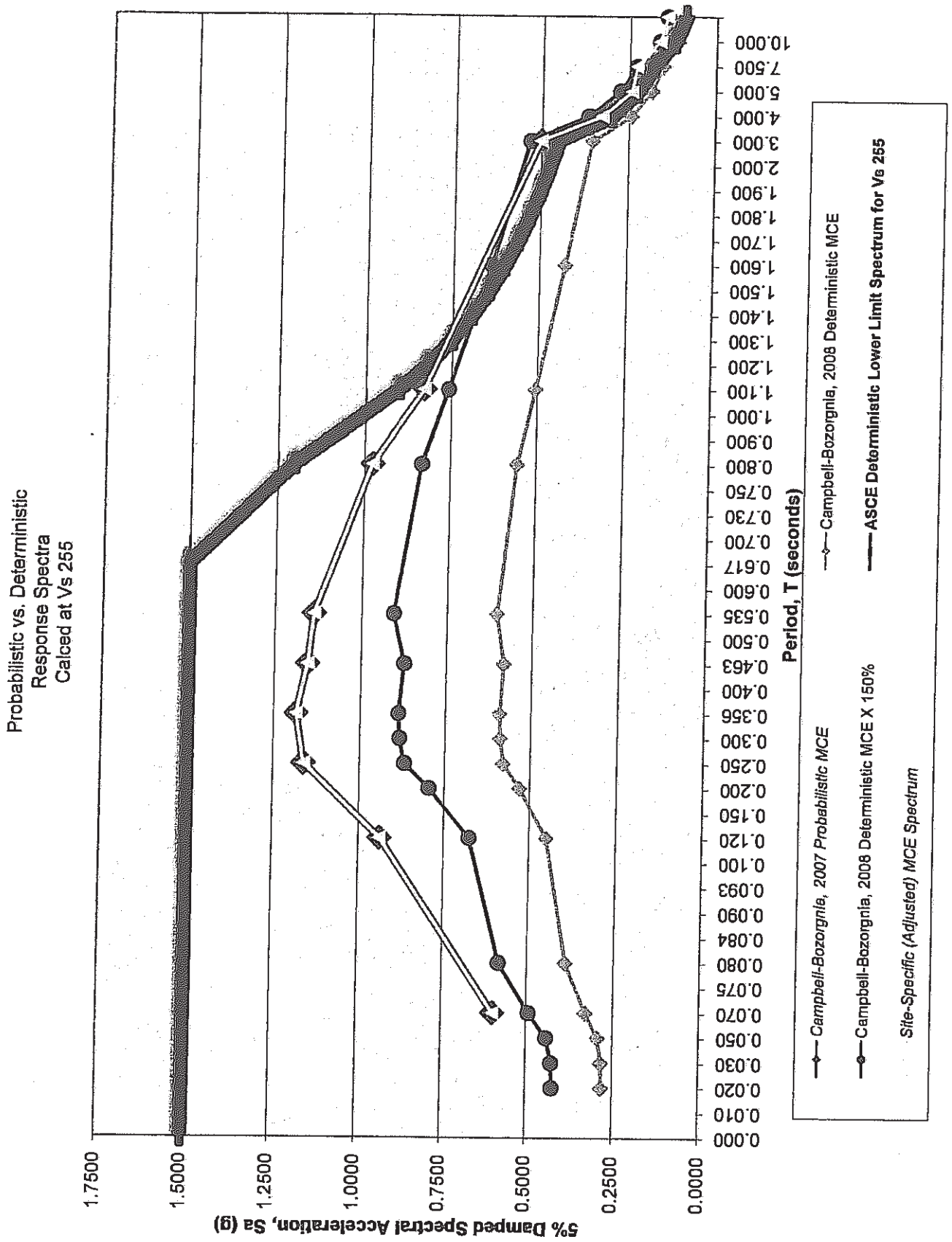
SPECTRAL ACCELERATION TABLE
Calculated at Vs 255
File No. S-12643

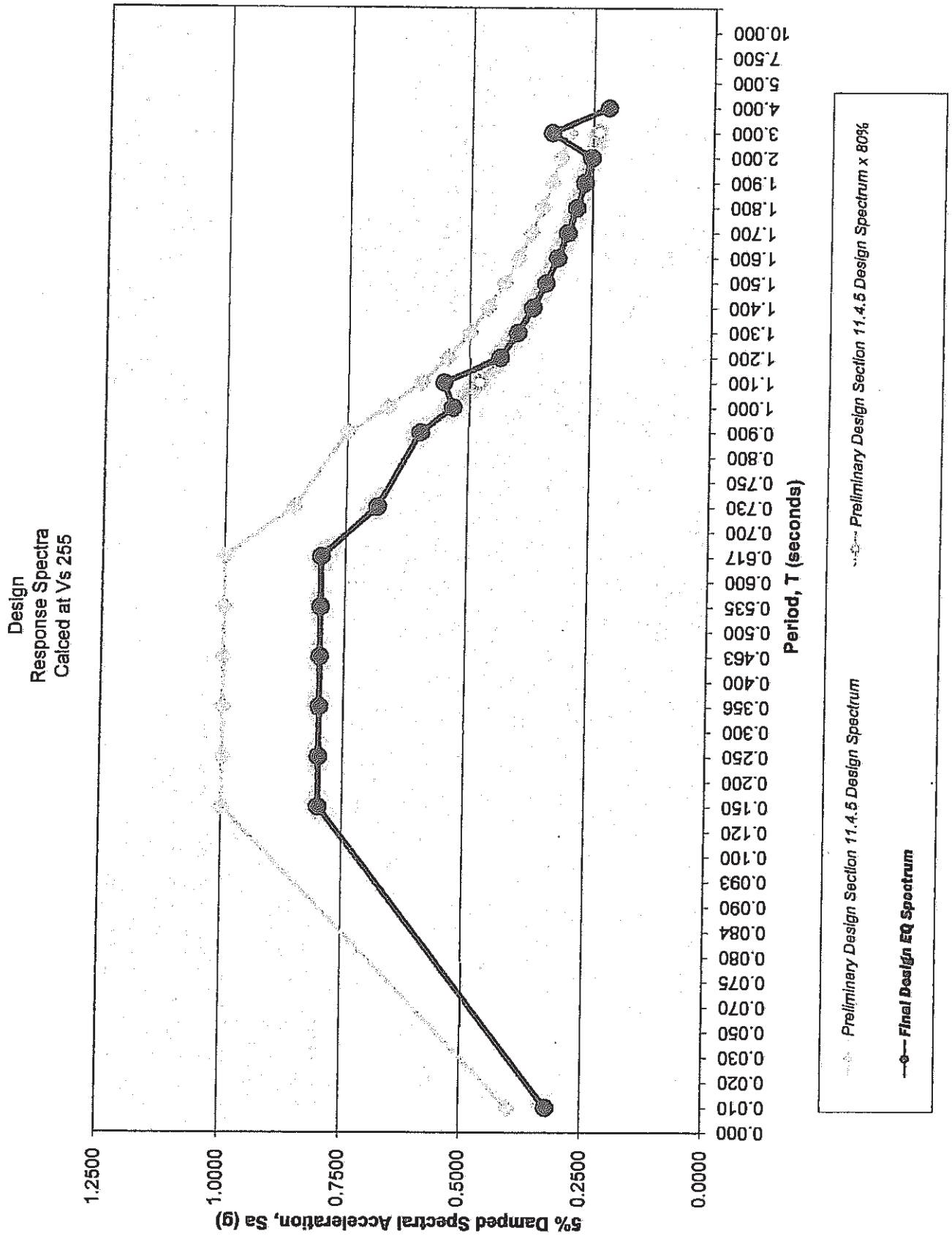
Period	Campbell-Bozorgnia, 2007 Probabilistic MCE (from spectrum)	Campbell-Bozorgnia, 2008 Deterministic MCE (from spectrum)	Campbell-Bozorgnia, 2008 Deterministic MCE X 150% (C x 1.5)
0.0000			
0.0001			
0.0100		0.2820	0.4230
0.0200		0.2837	0.4256
0.0300		0.2941	0.4412
0.0500	0.5991	0.3294	0.4941
0.0700			
0.0750		0.3892	0.5838
0.0800			
0.0840			
0.0900			
0.0930			
0.1000	0.9388	0.4505	0.6758
0.1200			
0.1500		0.5309	0.7964
0.2000	1.1620	0.5795	0.8693
0.2500		0.5893	0.8840
0.3000	1.1850	0.5923	0.8885
0.3560			
0.4000	1.1540	0.5824	0.8736
0.4630			
0.5000	1.1380	0.6047	0.9071
0.5350			
0.6000			
0.6170			
0.7000			
0.7300			
0.7500	0.9764	0.5556	0.8334
0.8000			
0.9000			
1.0000	0.8290	0.5057	0.7586
1.1000			
1.2000			
1.3000			
1.4000			
1.5000		0.4259	0.6389
1.6000			
1.7000			
1.8000			
1.9000			
2.0000	0.5028	0.3554	0.5331
3.0000	0.3285	0.2438	0.3657
4.0000	0.2434	0.1845	0.2768
5.0000		0.1530	0.2295
7.5000		0.1093	0.1640
10.0000		0.0952	0.1429

SPECTRAL ACCELERATION TABLE
Calculated at Vs 255
File No. S-12643

ASCE Deterministic Lower Limit Spectrum for Vs 255	Constrained Deterministic MCE Spectrum (Greater of D vs. E)	Site-Specific (Adjusted) MCE Spectrum (Lesser of B vs. F)	Preliminary Design EQ Spectrum (G x 2/3)	Mapped MCE Spectrum
1.5000	1.5000			
1.5000	1.5000			0.600
1.5000	1.5000			
1.5000	1.5000			
1.5000	1.5000			
1.5000	1.5000	0.5991	0.3994	
1.5000				
1.5000	1.5000			
1.5000				1.500
1.5000				
1.5000	1.5000	0.9388	0.6259	
1.5000				
1.5000	1.5000			
1.5000	1.5000	1.1620	0.7747	1.500
1.5000	1.5000			
1.5000	1.5000	1.1850	0.7900	1.500
1.5000				
1.5000	1.5000	1.1540	0.7693	1.500
1.5000	1.5000	1.1380	0.7587	1.200
1.5000	1.5000			1.000
				0.857
1.2000	1.2000	0.9764	0.6509	
				0.750
				0.667
0.9000	0.9000	0.8290	0.5527	0.600
0.8180				0.545
0.7500				0.500
0.6920				0.462
0.6430				0.429
0.6000	0.6389			0.400
0.5625				0.375
0.5294				0.353
0.5000				0.333
0.4740				0.316
0.4500	0.5331	0.5028	0.3352	0.300
0.3000	0.3657	0.3285	0.2190	
0.2250	0.2768	0.2434	0.1623	
0.1800	0.2295	0.2295	0.1530	
0.1200	0.1640	0.1640	0.1093	
0.0900	0.1429	0.1429	0.0953	


Sa (g) Vs T (sec)
LEGEND
Green – MCE Response Spectrum (11.4.1)
Blue – Site Specific MCE Response Spectrum (11.4.3)
Red – Design Response Spectrum (11.4.5)
Sa (g)
T (sec)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1


Probabilistic vs. Deterministic
Response Spectra
Calced at Vs 255
5% Damped Spectral Acceleration, Sa (g)
1.7500
1.5000
1.2500
1.0000
0.7500
0.5000
0.2500
0.0000
Period, T (seconds)
0.000
0.010
0.020
0.030
0.050
0.070
0.075
0.080
0.084
0.090
0.093
0.100
0.120
0.150
0.200
0.250
0.300
0.356
0.400
0.463
0.500
0.535
0.600
0.617
0.700
0.730
0.750
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500
1.600
1.700
1.800
1.900
2.000
3.000
4.000
5.000
7.500
10.000
Campbell-Bozorgnia, 2007 Probabilistic MCE
Campbell-Bozorgnia, 2008 Deterministic MCE X 150%
Site-Specific (Adjusted) MCE Spectrum
Campbell-Bozorgnia, 2008 Deterministic MCE
ASCE Deterministic Lower Limit Spectrum for Vs 255


Design
Response Spectra
Calced at Vs 255
5% Damped Spectral Acceleration, Sa (g)
1.2500
1.0000
0.7500
0.5000
0.2500
0.0000
Period, T (seconds)
0.000
0.010
0.020
0.030
0.050
0.070
0.075
0.080
0.084
0.090
0.093
0.100
0.120
0.150
0.200
0.250
0.300
0.356
0.400
0.463
0.500
0.535
0.600
0.617
0.700
0.730
0.750
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500
1.600
1.700
1.800
1.900
2.000
3.000
4.000
5.000
7.500
10.000
Preliminary Design Section 11.4.5 Design Spectrum
Preliminary Design Section 11.4.5 Design Spectrum x 80%
Final Design EQ Spectrum

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use (NOT APPLICABLE)

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis (NOT APPLICABLE)

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#01

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}= 0.62 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)
1-A	9,150	Roofs	1	0.89	8161.8			
1-B	10,735	Ornamental Landscaping	0.1	0.11	1185.8			
1-C	21,497	Concrete or Asphalt	1	0.89	19175.3			
	41382	Total			28522.9	0.62	1473.7	8,017

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#01	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.95	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,474	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 =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	14.5	ft
Total Effective Depth, d_E			
d_E = [(0.3) x d_S + (0.4) x 1] + 0.5	d_E =	1.50	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	983	ft^2
Proposed Surface Area	A=	5,345	ft^2
Minimum Required Length of Bioretention Facility, L	L =	67.8	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.5 ft / 1.5' x Proposed Surface Area = 8,017 cf > Vbmp

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#02

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}= 0.62 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)
2-A	17,365	Roofs	1	0.89	15489.6			
2-B	8,570	Ornamental Landscaping	0.1	0.11	946.6			
2-C	21,981	Concrete or Asphalt	1	0.89	19607.1			
	47916	Total			36043.3	0.62	1862.2	4,582

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#02	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	1.1	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,863	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 =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	14.8	ft
Total Effective Depth, d_E			
d_E = [(0.3) x d_S + (0.4) x 1] + 0.5	d_E =	1.50	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	1,242	ft^2
Proposed Surface Area	A=	3,055	ft^2
Minimum Required Length of Bioretention Facility, L	L =	84.2	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.5 ft / 1.5' x Proposed Surface Area = 4,582 cf > Vbmp

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#03

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}= 0.62 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)
3-A	33,850	Roofs	1	0.89	30194.2			
3-B	7,455	Ornamental Landscaping	0.1	0.11	823.5			
3-C	26,213	Concrete or Asphalt	1	0.89	23382			
	67518	Total			54399.7	0.62	2810.7	2,826

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#03	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	1.55	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	2,811	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 =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	27.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	1,562	ft^2
Proposed Surface Area	A=	1,570	ft^2
Minimum Required Length of Bioretention Facility, L	L =	57.9	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		n/a	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.8 ft / 1.8' x Proposed Surface Area = 2,826 cf > Vbmp

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#04

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}= 0.62 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)
4-A	0	Roofs	1	0.89	0			
4-B	5,035	Ornamental Landscaping	0.1	0.11	556.2			
4-C	3,677	Concrete or Asphalt	1	0.89	3279.9			
	8712	Total			3836.1	0.62	198.2	2,248

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#04	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.2	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	199	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 =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	29.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.50	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	133	ft^2
Proposed Surface Area	A=	1,499	ft^2
Minimum Required Length of Bioretention Facility, L	L =	4.6	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		n/a	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.5 ft / 1.5' x Proposed Surface Area = 2,248 cf

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#05

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}= 0.62 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)
5-A	78,300	Roofs	1	0.89	69843.6			
5-B	21,210	Ornamental Landscaping	0.1	0.11	2342.8			
5-C	22,458	Concrete or Asphalt	1	0.89	20032.5			
	121968	Total			92218.9	0.62	4764.6	14,700

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#05	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	2.8	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	4,765	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 =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	26.8	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.50	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	3,177	ft^2
Proposed Surface Area	A=	9,800	ft^2
Minimum Required Length of Bioretention Facility, L	L =	118.8	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.5 ft / 1.5' x Proposed Surface Area = 14,700 cf > Vbmp

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#06

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}= 0.62 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)
6-A	60,340	Roofs	1	0.89	53823.3			
6-B	13,630	Ornamental Landscaping	0.1	0.11	1505.5			
6-C	80,668	Concrete or Asphalt	1	0.89	71955.9			
	154638	Total			127284.7	0.62	6576.4	6,716

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#06	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	3.55	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	6,577	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 =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	36.0	ft
Ponding Depth, p	p =	0.60	ft
Total Effective Depth, d_E			
dE = [(0.3) x dS + (0.4) x 1] + p	d_E =	1.90	ft
Minimum Surface Area, A_m	A_M =	3,462	ft^2
Proposed Surface Area	A=	3,535	ft^2
Minimum Required Length of Bioretention Facility, L	L =	96.2	ft

$$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$$

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		n/a	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.9 ft / 1.9' x Proposed Surface Area = 6,716 cf > Vbmp

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#07

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}= 0.62 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)
7-A	14,130	Roofs	1	0.89	12604			
7-B	6,675	Ornamental Landscaping	0.1	0.11	737.3			
7-C	9,687	Concrete or Asphalt	1	0.89	8640.8			
	30492	Total			21982.1	0.62	1135.7	3,454

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#07	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.7	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,136	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 =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	12.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.50	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	758	ft^2
Proposed Surface Area	A=	2,303	ft^2
Minimum Required Length of Bioretention Facility, L	L =	63.2	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.5 ft / 1.5' x Proposed Surface Area = 3,454 cf > Vbmp

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#08

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}= 0.62 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)
8-A	48,525	Roofs	1	0.89	43284.3			
8-B	13,545	Ornamental Landscaping	0.1	0.11	1496.2			
8-C	38,118	Concrete or Asphalt	1	0.89	34001.3			
	100188	Total			78781.8	0.62	4070.4	7,239

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#08	Legend:	Required Entries / Calculated Cells
Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	2.3	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	4,070	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 =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	12.0	ft
Total Effective Depth, d_E			
d_E = [(0.3) x d_S + (0.4) x 1] + 0.5	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	2,262	ft^2
Proposed Surface Area	A=	1,751	ft^2

ERROR, the proposed surface area must be equal to or greater than the minimum surface area

Minimum Required Length of Bioretention Facility, L	L =	188.5	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

Notes: Effective Depth = 1.5 ft / 1.5' x Proposed Surface Area = 3,151 cf

BIO#08 will utilize equalizer pipe to BIO#09 to achieve remaining 511 SF needed (2,262 - 1,751)

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

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	Thienes Engineering, Inc.	Date	1/8/2016
Designed by	Vicky Li	Case No	
Company Project Number/Name	IBG Magnolia Center (2609E)		

BMP Identification

BMP NAME / ID: BIO#09

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}= 0.62 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)
9-A	13,105	Roofs	1	0.89	11689.7			
9-B	10,750	Ornamental Landscaping	0.1	0.11	1187.4			
9-C	28,597	Concrete or Asphalt	1	0.89	25508.5			
	52452	Total			38385.6	0.62	1983.3	7,239

Notes:

Bioretention Facility - Design Procedure	BMP ID BIO#09	Legend:	Required Entries / Calculated Cells

Company Name:	Thienes Engineering, Inc.	Date:	8-Jan
Designed by:	Vicky Li	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	1.2	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,984	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 =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	40.5	ft
Total Effective Depth, d_E			
d_E = [(0.3) x d_S + (0.4) x 1] + 0.5	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	1,103	ft^2
Proposed Surface Area	A=	2,271	ft^2
Minimum Required Length of Bioretention Facility, L	L =	27.2	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	0	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Shrubs	

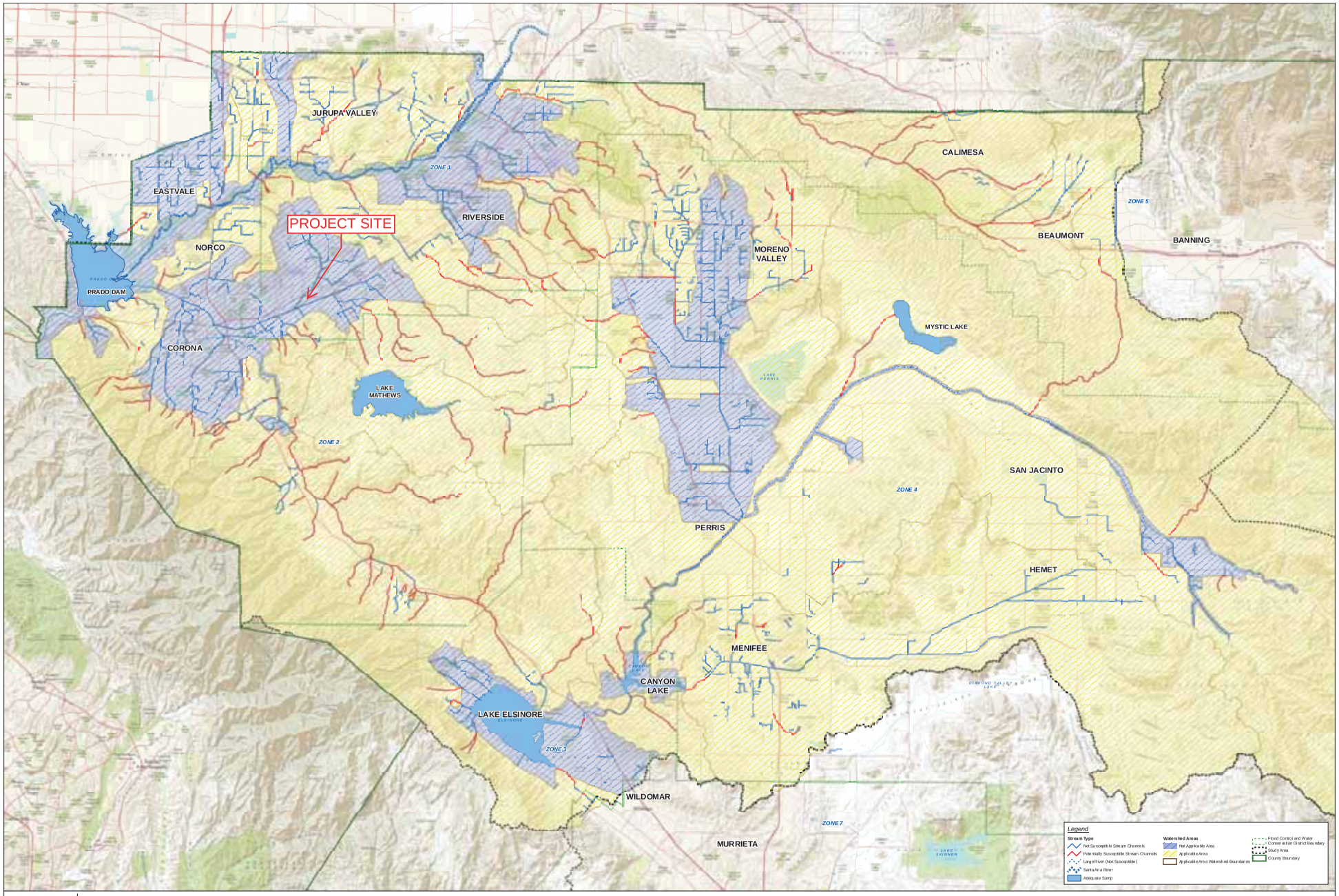
Notes: Effective Depth = 1.5 ft / 1.5' x Proposed Surface Area = 4,088 cf > Vbmp

An additional 511 SF is needed in BIO#09 to mitigate DMA 8.

1,103 + 511 = 1,614 SF < 2,271 SF proposed

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern



HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2

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.**

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.**

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.**

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
❑ 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.**

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**

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
❑ 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.**	

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

Operation and Maintenance Plan

Project Title: IBG Magnolia Center

Original Date Prepared: January 8, 2016

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Contact Information:

Prepared for:
Investment Building Group
5100 Campus Drive, Suite #300
Newport Beach, CA 92660
(949) 263-1111

Prepared by:
Thienes Engineering, Inc.
14349 Firestone Boulevard
La Mirada, CA 90638
(714) 521-4811
Contact: Vicky Li (vicky@thieneseng.com)
Job No. 2609E

Table of Contents

I. Inspection and Maintenance Log 2
II. Updates, Revisions, and Errata 3
III. Introduction 4
IV. Responsibility for Maintenance 5
IV.A General 5
IV.B Staff Training Program 5
IV.C Records 5
IV.D Safety 5
V. Summary of Drainage Management Areas and Stormwater BMPs 6
V.A Drainage Areas 6
V.B Structural Post-Construction BMPs 7
V.C Self-Retaining Areas or Other 7
VI. Stormwater BMP Design Documentation 8
VI.A "As-Built" Drawings of each Stormwater BMP 8
VI.B Manufacturer's Data, Manuals, and Maintenance Requirements 8
VI.C Specific Operation and Maintenance Concerns and Troubleshooting 8
VII. Maintenance Schedule or Matrix 9
VII.A Maintenance Schedule 9
VII.B Service Agreement Information 9

List of Appendices

Appendix 1: Inspection and Maintenance Logs
Appendix 2: Updates, Revisions, and Errata
Appendix 3: Maintenance Mechanism
Appendix 4: Training Records
Appendix 5: Site Plan and Details
Appendix 6: "As-Built" Drawings
Appendix 7: Manufacturer Information
Appendix 8: Service Agreement Information

I. Inspection and Maintenance Log

Date	Observations/Actions	Inspector

Additional inspection and maintenance logs to be included in Appendix 1 of this O&M Plan.

II. Updates, Revisions, and Errata

Revision Number	Date	Brief Description of Update/Revision/Errata, include section and page number	Prepared and Approved By

Additional updates, revisions, and errata to be include in Appendix 2 of this O&M Plan.

III. Introduction

The proposed project site encompasses approximately 14.4 acres. The site is currently a graded dirt lot. Improvements to the site include the construction of seven office type buildings. There will be landscaping adjacent to Magnolia Avenue and Pierce Street. The remainder of the site will be paved for vehicle parking. Infiltration and biofiltration facilities are utilized as BMPs to treat the design capture volume (DCV).

Master Plan Storm Drain

Runoff from the project site was tabled to a Master Plan storm drain in Magnolia Avenue in a report prepared by Thienes Engineering, Inc., date January 16, 2008. Also included in the storm drain study was offsite runoff southwesterly of the project site as well as runoff from Magnolia Avenue. Storm drain plans using peak flow rates from this study were approved, however the storm drain was not constructed.

Proposed Conditions

The project site occupies the same area and land use (commercial) as the previous study. However, the number of buildings and layout is considerably different. Runoff from the proposed improvements generally drains from east to west through the site. Catch basins are located throughout the site. An onsite storm drain system conveys runoff to the proposed storm drain in Magnolia Avenue at two locations.

The westerly portion of the project site drains to a catch basin at the southwest corner of the project site. A storm drain lateral conveys this runoff to the proposed storm drain system in Magnolia Avenue.

Flow from the landscaped areas adjacent to the streets will surface drain to the respective streets. This is the same as under the previous study.

IV. Responsibility for Maintenance

IV.A General

Funding will be provided by the owner:

Investment Building Group
5100 Campus Drive, Suite #300
Newport Beach, CA 92660
(949) 263-1111
Contact: Brian Bargemann

A copy of the "Covenant Agreement - Establishing Notification Process And Responsibility For Water Quality Management Plan Implementation And Maintenance" is attached in Appendix 3 of this O&M Plan.

IV.B Staff Training Program

Staff training records and descriptions will be inserted in Appendix 4 of this O&M Plan.

IV.C Records

Maintenance records are to be inserted chronologically in Appendix 1 of this O&M Plan.

IV.D Safety

All maintenance procedures shall comply with the latest OSHA standards.

V. Summary of Drainage Management Areas and Stormwater BMPs

V.A Drainage Areas

See Appendix 5 of this O&M Plan for WQMP site map.

DMA Name or ID	BMP Name or ID
1-A	BIO#01 (Biofiltration with Underdrain)
1-B	BIO#01 (Biofiltration with Underdrain)
1-C	BIO#01 (Biofiltration with Underdrain)
2-A	BIO#02 (Biofiltration with Underdrain)
2-B	BIO#02 (Biofiltration with Underdrain)
2-C	BIO#02 (Biofiltration with Underdrain)
3-A	BIO#03 (Bioretention w/o underdrain)
3-B	BIO#03 (Bioretention w/o underdrain)
3-C	BIO#03 (Bioretention w/o underdrain)
4-A	BIO#04 (Bioretention w/o underdrain)
4-B	BIO#04 (Bioretention w/o underdrain)
4-C	BIO#04 (Bioretention w/o underdrain)
5-A	BIO#05 (Biofiltration with Underdrain)
5-B	BIO#05 (Biofiltration with Underdrain)
5-C	BIO#05 (Biofiltration with Underdrain)
6-A	BIO#06 (Bioretention w/o underdrain)
6-B	BIO#06 (Bioretention w/o underdrain)
6-C	BIO#06 (Bioretention w/o underdrain)
7-A	BIO#07 (Biofiltration with Underdrain)
7-B	BIO#07 (Biofiltration with Underdrain)
7-C	BIO#07 (Biofiltration with Underdrain)
8-A	BIO#08 (equalized with BIO#09) (Biofiltration with Underdrain)
8-B	BIO#08 (equalized with BIO#09) (Biofiltration with Underdrain)
8-C	BIO#08 (equalized with BIO#09) (Biofiltration with Underdrain)
9-A	BIO#09 (equalized with BIO#08) (Biofiltration with Underdrain)
9-B	BIO#09 (equalized with BIO#08) (Biofiltration with Underdrain)
9-C	BIO#09 (equalized with BIO#08) (Biofiltration with Underdrain)

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Geo-location of the BMPs using latitude and longitude coordinates

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	Latitude	Longitude
BIO#01	Biofiltration with Underdrain	TBD	33.894689	-117.491150
BIO#02	Biofiltration with Underdrain	TBD	33.894034	-117.490458
BIO#03	Bioretention without Underdrain	TBD	33.893366	-117.491343
BIO#04	Bioretention without Underdrain	TBD	33.893112	-117.491209
BIO#05	Biofiltration with Underdrain	TBD	33.894114	-117.492171
BIO#06	Bioretention without Underdrain	TBD	33.892715	-117.492338
BIO#07	Biofiltration with Underdrain	TBD	33.893388	-117.493496
BIO#08	Biofiltration with Underdrain	TBD	33.893023	-117.494103
BIO#09	Biofiltration with Underdrain	TBD	33.892626	-117.494655

V.B Structural Post-Construction BMPs

See Appendix 5 of this O&M Plan for WQMP site map.

There are a total of nine bioretention/biofiltration facilities throughout the property to achieve the DCV. Additional BMP details are available in Appendix 10 of the WQMP.

V.C Self-Retaining Areas or Other

Not applicable.

VI. Stormwater BMP Design Documentation

VI.A "As-Built" Drawings of each Stormwater BMP

See Appendix 6 of this O&M Plan for "as-built" drawings.

VI.B Manufacturer's Data, Manuals, and Maintenance Requirements

Not applicable, there are no manufactured stormwater BMPs.

VI.C Specific Operation and Maintenance Concerns and Troubleshooting

Not applicable.

VII. Maintenance Schedule or Matrix

VII.A Maintenance Schedule

Schedule (Bioretention)	Inspection and Maintenance Activity (Bioretention)
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

VII.B Service Agreement Information

See Appendix 8 of this O&M Plan for service agreement information with any contractors regarding the O&M of BMPs at the site, if any.

Appendix 1: Inspection and Maintenance Logs

Insert Additional Inspection or Maintenance Logs Here

Date	Observations/Actions	Inspector

Appendix 2: Updates, Revisions, and Errata

Insert Additional Updates, Revisions, and Errata Logs Here

Revision Number	Date	Brief Description of Update/Revision/Errata, include section and page number	Prepared and Approved By

Appendix 3: Maintenance Mechanism

Copy of Covenant Agreement
Establishing Notification Process And Responsibility
For Water Quality Management Plan Implementation And Maintenance

WHEN RECORDED MAIL TO:

City Clerk
City of Riverside
City Hall, 3900 Main Street
Riverside, CA 92522

Planning Case: P13-0530

For Recorder's Office Use Only

COVENANT AND AGREEMENT
ESTABLISHING NOTIFICATION PROCESS AND RESPONSIBILITY FOR
WATER QUALITY MANAGEMENT PLAN IMPLEMENTATION AND MAINTENANCE

THIS COVENANT AND AGREEMENT FOR WATER QUALITY MANAGEMENT PLAN IMPLEMENTATION AND MAINTENANCE is made and entered into this _____ day of _____, 2016, by _____Investment Building Group _____ _____("Declarant"), with reference to the following facts:

A. Declarant is the fee owner of the real property (the "Property") situated in the City of Riverside, County of Riverside, State of California, and legally described in Exhibit "A", which is attached hereto and incorporated within by reference.

B. Declarant has applied to the City of Riverside ("City") for _____ Seven new industrial buildings (Planning Case No. P13-0530) _____.

C. As a condition of approval and prior to the map recordation and/or issuance of any permits, the City is requiring Declarant to execute and record an agreement stating that the future property owners shall be informed of the requirements to implement and maintain the Best Management Practices ("BMPs") as described in the approved project specific Water Quality Management Plan.

D. Declarant intends by this document to comply with the conditions imposed by the City and to impose upon the Property mutually beneficial restrictions, conditions, covenants and agreements for the benefit of Property.

NOW, THEREFORE, for the purposes of complying with the conditions imposed by the City of Riverside for the approval of Planning Case P13-0530, Declarant hereby declares that the Property is and hereafter shall be held, conveyed, transferred, mortgaged, encumbered, leased, rented, used, occupied, sold and improved subject to the following declarations, limitations, covenants, conditions, restrictions and easements, all of which are imposed as

equitable servitudes pursuant to a general plan for the development of the Property for the purpose of enhancing and protecting the value and attractiveness of the Property, and each Parcel thereof, in accordance with the plan for the improvement of the Property, and to comply with certain conditions imposed by the City for the approval of P13-0530, and shall be binding and inure to the benefit of each successor and assignee in interest of each such party. Any conveyance, transfer, sale, assignment, lease or sublease made by Declarant of a Parcel of the Property shall be and hereby is deemed to incorporate by reference all the provisions of the Covenant and Agreement including, but not limited to, all the covenants, conditions, restrictions, limitations, grants of easement, rights, rights-of-way, and equitable servitude contained herein.

1. This Covenant and Agreement hereby establishes a notification process for future individual property owners to ensure they are subject to and adhere to the Water Quality Management Plan implementation measures and that it shall be the responsibility of the Declarant, its heirs, successors and assigns to implement and maintain all Best Management Practices (BMPs) in good working order.

2. Declarant shall use its best efforts to diligently implement and maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Declarant, its heirs, successors and assigns, in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, Declarant, its heirs, successors and assigns shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3. In the event Declarant, or its heirs, successors or assigns, fails to undertake the maintenance contemplated by this Covenant and Agreement within twenty-one (21) days of being given written notice by the City, or fails to complete any maintenance contemplated by this Covenant and Agreement with reasonable diligence, the City is hereby authorized to cause any maintenance necessary to be completed and charge the entire cost and expense to the Declarant or Declarant's successors or assigns, including administrative costs, reasonable attorneys fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full. As an additional remedy, the Public Works Director may withdraw any previous urban runoff-related approval with respect to the Property on which BMPs have been installed and/or implemented until such time as Declarant, its heirs, successors or assigns, repays to City its reasonable costs incurred in accordance with this paragraph.

4. Any person who now or hereafter owns or acquires any right, title or interest in or to any parcel of the Property shall be deemed to have consented and agreed to every covenant, condition, restriction and easement contained herein.

5. In addition, each of the provisions hereof shall operate as covenants running with the land for the benefit of the Property and each Parcel thereof and shall inure to the benefit of all owners of the Parcels thereof, their successors and assigns in interest, and shall apply to and bind each successive owner of each Parcel, their successors and assigns in interest.

6. The terms of this Covenant and Agreement may be enforced by the City, its successors or assigns, and by any owner, lessee or tenant of the Parcels of the Property. Should the City or any owner, lessee or tenant bring an action to enforce any of the terms of this Covenant and Agreement, the prevailing party shall be entitled to costs of suit including reasonable attorneys' fees.

7. Subject to the prior written approval of the City by its Public Works Director, any provision contained herein may be terminated, modified or amended as to all of the Property or any portion thereof. No such termination, modification or amendment shall be effective until there shall have been executed, acknowledged and recorded in the Office of the Recorder of Riverside County, California, an appropriate instrument evidencing the same including the consent thereto by the City.

IN WITNESS WHEREOF, Declarant has caused this Covenant and Agreement to be executed as of the day and year first written above.

Brian Bargemann

_____

Name:
Title:

_____

Name:
Title:

APPROVED AS TO FORM:

_____

Name:
Deputy City Attorney

APPROVED AS TO CONTENT

_____

Name:
Public Works Department:

STATE OF)
)
COUNTY OF)

On _____, before me, _____, Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence, to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of _____ that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____ (SEAL)
Notary Public Signature

STATE OF)
)
COUNTY OF)

On _____, before me, _____, Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence, to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of _____ that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____ (SEAL)
Notary Public Signature

EXHIBIT A
(Legal Description)

EXHIBIT B
(Map/Illustration)

Appendix 4: Training Records

Insert Training Records with Brief Discussion Here

Appendix 5: Site Plan and Details

WQMP Site Map and BMP Details

Appendix 6: “As-Built” Drawings

Insert “As-Builts” Here When Available

Appendix 7: Manufacturer Information

Brochures, Manuals, and Maintenance Requirements

Appendix 8: Service Agreement Information

Insert Contractor Information (if any)

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Bioretention TC-32

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 monthly landscaping maintenance, including measures to ensure that the area is functioning properly and irrigation during dry periods. In many cases, bioretention areas initially require intense maintenance, but less maintenance is needed over time. Maintenance tasks may be conducted by a landscaping contractor, who may already be hired at the site.

Sediment may enter the bioretention cell and form a crust on the soil surface, limiting the porosity of the soil. Raking of the mulch and soil surface may be needed to maintain high infiltration rates. In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Bioretention systems can become a nuisance due to mosquito and midge breeding. Maintaining soil porosity and basic housekeeping practices such as removal of debris accumulations and vegetation management are necessary to ensure that the system dewaters completely (recommended 72 hour residence time or less) to prevent creating mosquito and other vector habitats.

Advanced BMPs Covered

Maintenance Concerns

- *Clogged Soil or Outlet Structures*
- *Sediment Accumulation*
- *Invasive Species Management*
- *Vegetation/Landscape Maintenance*
- *Erosion*
- *Channelization of Flow*
- *Vector Control*
- *Aesthetics*

Targeted Constituents

Sediment	■
Nutrients	▲
Trash	■
Metals	■
Bacteria	■
Oil and Grease	■
Organics	■

Legend (Removal Effectiveness)

● Low ■ High ▲ Medium

✱ Requires Pretreatment

Note: The removal effectiveness ratings shown in the table are for properly designed, sited, and maintained BMPs; some configurations will have variations in pollutant effectiveness.

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 vegetation 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. ☐ Irrigate during dry periods. ☐ Treat diseased trees and shrubs. ☐ Mow turf areas. ☐ Repair erosion at inflow points. ☐ Repair outflow structures. ☐ Unclog underdrain. ☐ Regulate soil pH. ☐ Make structural changes or repairs as needed to eliminate pools of water that stand longer than 96 hrs to prevent mosquito production, particularly during the warmer months of the year. Identify and eliminate sources of non-stormwater runoff that feed standing water pools. Coordinate with the local mosquito and vector control agency to control mosquitoes, if necessary.	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 or infiltration rates are reduced. 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.

For areas with low permeability native soils or steep slopes, bioretention areas can be designed with an underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration.

Special considerations are required for bioretention to be effective in cold climates – see the Stormwater Managers Resource Center for more information.

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3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

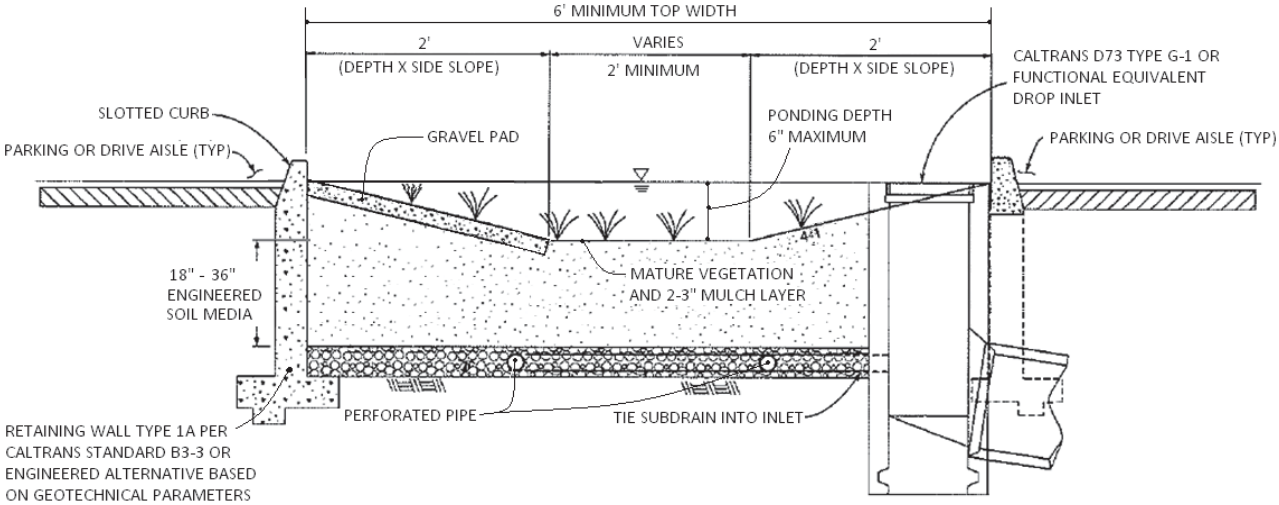
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/

Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

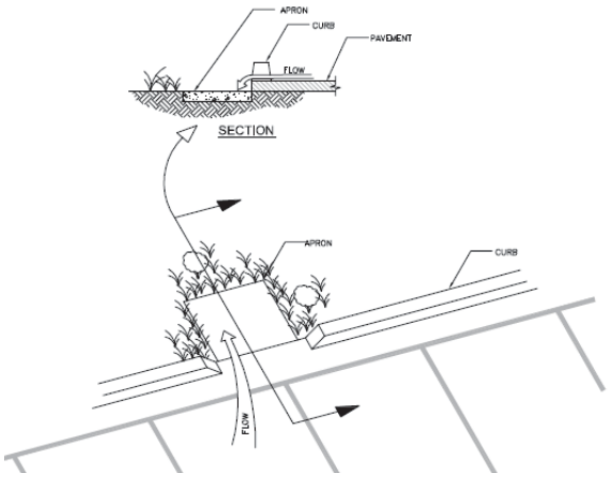


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

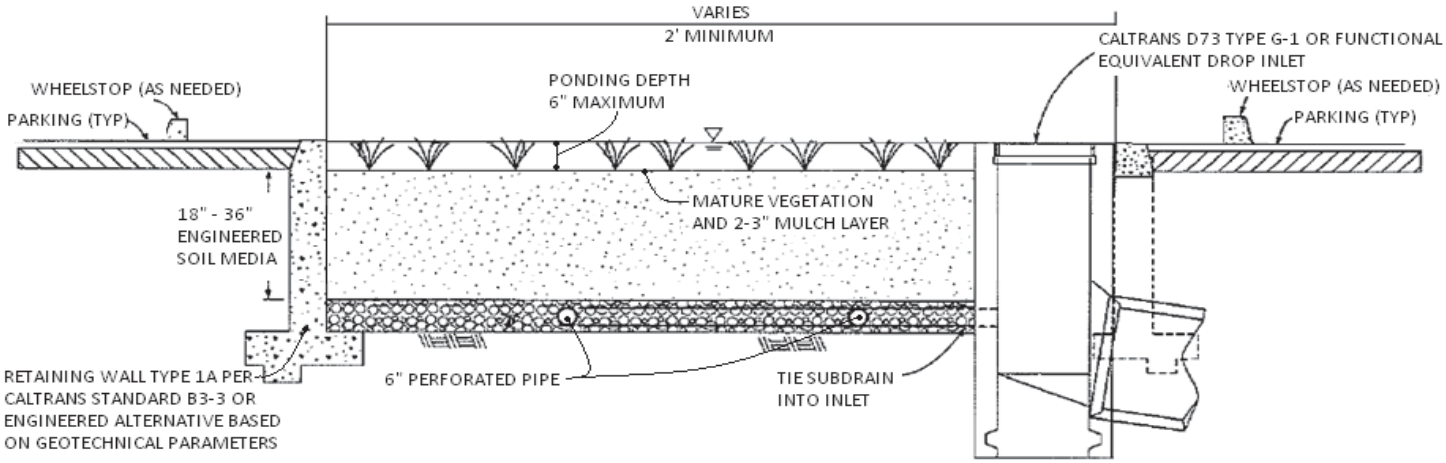
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.

Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

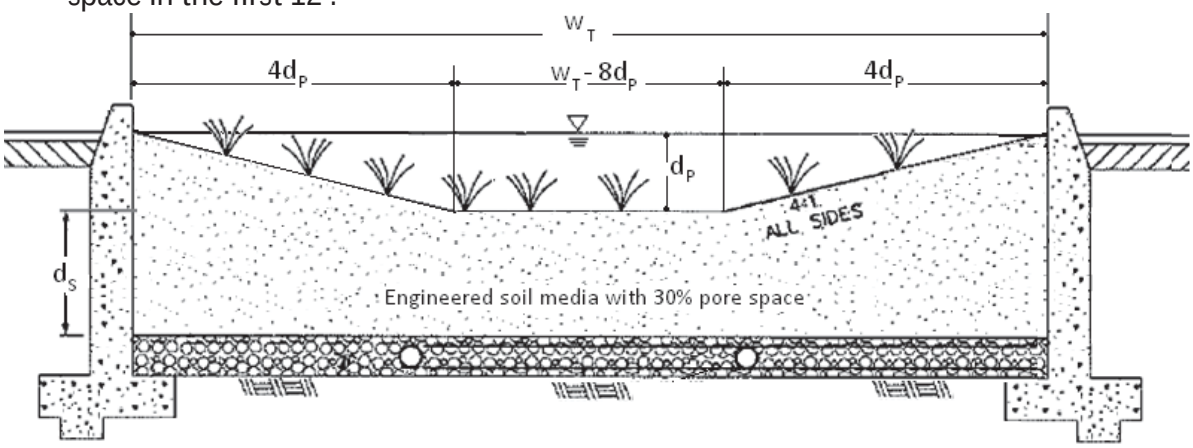
2) Enter the Design Volume, V_{BMP}, determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \text{ x } 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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Non-Stormwater Discharges SC-10

Art Credit: Margie Winter

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

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.

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.

CASQA
California Stormwater Quality Association

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:

- 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)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 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

Photo Credit: Geoff Brosseau

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/

Outdoor Equipment Operations SC-32

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, solid waste treatment and disposal, are examples of process operations that can lead to contamination of stormwater runoff. Source controls for outdoor process equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

Approach

Pollution Prevention

- Perform the activity during dry periods.
- Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.

Suggested Protocols

- Consider enclosing the activity in a building and connecting the floor drains to the sanitary sewer.
- Cover the work area with a permanent roof if possible.
- Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention). If possible, connect process equipment area to public sewer or facility wastewater treatment system. Some municipalities require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- Dry clean the work area regularly.

Training

- Train employees to perform the activity during dry periods only or substituting benign materials for more toxic ones.
- Train employee and contractors in proper techniques for spill containment and cleanup. Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

CASQA
California Stormwater Quality Association

- Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.
- Inspect storage areas regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.

Other Considerations

- Providing cover may be expensive.
- Space limitations may preclude enclosing some equipment.
- Storage sheds often must meet building and fire code requirements.

Requirements

Costs

Costs vary depending on the complexity of the operation and the amount of control necessary for stormwater pollution control.

Maintenance

- Conduct routine preventive maintenance, including checking process equipment for leaks.
- Clean the storm drain system regularly.

Supplemental Information

Further Detail of the BMP

Hydraulic/Treatment Modifications

If stormwater becomes polluted, it should be captured and treated. If you do not have your own process wastewater treatment system, consider discharging to the public sewer system. Use of the public sewer might be allowed under the following conditions:

- If the activity area is very small (less than a few hundred square feet), the local sewer authority may be willing to allow the area to remain uncovered with the drain connected to the public sewer.
- It may be possible under unusual circumstances to connect a much larger area to the public sewer, as long as the rate of stormwater discharges does not exceed the capacity of the wastewater treatment plant. The stormwater could be stored during the storm and then transferred to the public sewer when the normal flow is low, such as at night.

Industries that generate large volumes of process wastewater typically have their own treatment system and corresponding permit. These industries have the discretion to use their wastewater treatment system to treat stormwater within the constraints of their permit requirements for process treatment. It may also be possible for the industry to discharge the stormwater directly to an effluent outfall without treatment as long as the total loading of the discharged process

water and stormwater does not exceed the loading had a stormwater treatment device been used. This could be achieved by reducing the loading from the process wastewater treatment system. Check with your Regional Water Quality Control Board or local sewering agency, as this option would be subject to permit constraints and potentially regular monitoring.

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

Waste Handling & Disposal SC-34

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Pollution Prevention

- Accomplish reduction in the amount of waste generated using the following source controls:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers and protect them from vandalism.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.

Run-on/Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.

- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff in pollution prevention measures and proper disposal methods.
- Train employees and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

Other Considerations (Limitations and Regulations)

Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

Minimize runoff of polluted stormwater from land application by:

- Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, and there is a closed drainage system

- Avoiding application of waste to the site when it is raining or when the ground is saturated with water
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site
- Maintaining adequate barriers between the land application site and the receiving waters (planted strips are particularly good)
- Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working

Examples

The port of Long Beach has a state-of-the-art database for identifying potential pollutant sources, documenting facility management practices, and tracking pollutants.

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

Solid Waste Container Best Management Practices – Fact Sheet On-Line Resources – Environmental Health and Safety. Harvard University. 2002.

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

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Safer Alternative Products SC-35

Description

Promote the use of less harmful products and products that contain little or no TMDL pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The “Precautionary Principle,” which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.
- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies

Objectives

- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

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- Procedures
  - Standard operating procedures (SOPs)
  - Purchasing guidelines and procedures
  - Bid packages (services and supplies)
- Materials
  - Preferred or approved product and supplier lists
  - Product and supplier evaluation criteria
  - Training sessions and manuals
  - Fact sheets for employees

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC20 – SC22) and SC41, Building and Grounds Maintenance.

Training

- Employees who handle potentially harmful materials in the use of safer alternatives.
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations

This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements,
- Storm water runoff sampling requirements,
- Training and licensing requirements, and
- Record keeping and reporting requirements.

Equipment

- There are no major equipment requirements to this BMP.

Limitations

- Alternative products may not be available, suitable, or effective in every case.

Requirements

Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Rerefined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment (www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety (www.nema.org)

Sustainable Conservation (www.suscon.org)

- Auto Recycling Project
- Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (http://dioxin.abag.ca.gov/)

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, polyphosphates 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/

Building Repair and Construction SC-42

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Recycle

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Modifications are common particularly at large industrial sites. The activity may vary from minor and normal building repair to major remodeling, or the construction of new facilities. These activities can generate pollutants including solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos installation. Protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling, and construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

Approach

Pollution Prevention

- Recycle residual paints, solvents, lumber, and other materials to the maximum extent practical.
- Buy recycled products to the maximum extent practical.
- Inform on-site contractors of company policy on these matters and include appropriate provisions in their contract to ensure certain proper housekeeping and disposal practices are implemented.

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- Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.

Suggested Protocols

Repair & Remodeling

- Follow BMPs identified in Construction BMP Handbook.
- Maintain good housekeeping practices while work is underway.
- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Cover materials of particular concern that must be left outside, particularly during the rainy season.
- Do not dump waste liquids down the storm drain.
- Dispose of wash water, sweepings, and sediments properly.
- Store materials properly that are normally used in repair and remodeling such as paints and solvents.
- Sweep out the gutter or wash the gutter and trap the particles at the outlet of the downspout if when repairing roofs, small particles have accumulated in the gutter. A sock or geofabric placed over the outlet may effectively trap the materials. If the downspout is tight lined, place a temporary plug at the first convenient point in the storm drain and pump out the water with a vactor truck, and clean the catch basin sump where you placed the plug.
- Properly store and dispose waste materials generated from construction activities. See Construction BMP Handbook.
- Clean the storm drain system in the immediate vicinity of the construction activity after it is completed.

Painting

- Enclose painting operations consistent with local air quality regulations and OSHA.
- Local air pollution regulations may, in many areas of the state, specify painting procedures which if properly carried out are usually sufficient to protect water quality.
- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint containers.
- Mix paint indoors before using so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100% effective.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.

- Do not transfer or load paint near storm drain inlets.
- Plug nearby storm drain inlets prior to starting painting and remove plugs when job is complete when there is significant risk of a spill reaching storm drains.
- Cover nearby storm drain inlets prior to starting work if sand blasting is used to remove paint.
- Use a ground cloth to collect the chips if painting requires scraping or sand blasting of the existing surface. Dispose the residue properly.
- Cover or enclose painting operations properly to avoid drift.
- Clean the application equipment in a sink that is connected to the sanitary sewer if using water based paints.
- Capture all cleanup-water and dispose of properly.
- Dispose of paints containing lead or tributyl tin and considered a hazardous waste properly.
- Store leftover paints if they are to be kept for the next job properly, or dispose properly.
- Recycle paint when possible. Dispose of paint at an appropriate household hazardous waste facility.

Training

Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employees can be lost by unknowing off-site contractors, so make sure they are well informed about what they are expected to do.

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.
- Clean up spills immediately.
- Excavate and remove the contaminated (stained) soil if a spill occurs on dirt.

Limitations

- This BMP is for minor construction only. The State's General Construction Activity Stormwater Permit has more requirements for larger projects. The companion "Construction Best Management Practice Handbook" contains specific guidance and best management practices for larger-scale projects.
- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Be certain that actions to help stormwater quality are consistent with Cal- and Fed-OSHA and air quality regulations.

Requirements

Costs

These BMPs are generally low to modest in cost.

Maintenance

N/A

Supplemental Information

Further Detail of the BMP

Soil/Erosion Control

If the work involves exposing large areas of soil, employ the appropriate soil erosion and control techniques. See the Construction Best Management Practice Handbook. If old buildings are being torn down and not replaced in the near future, stabilize the site using measures described in SC-40 Contaminated or Erodible Areas.

If a building is to be placed over an open area with a storm drainage system, make sure the storm inlets within the building are covered or removed, or the storm line is connected to the sanitary sewer. If because of the remodeling a new drainage system is to be installed or the existing system is to be modified, consider installing catch basins as they serve as effective "in-line" treatment devices. See Treatment Control Fact Sheet TC-20 Wet Pond/Basin in Section 5 of the New Development and Redevelopment Handbook regarding design criteria. Include in the catch basin a "turn-down" elbow or similar device to trap floatables.

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

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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

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.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

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

Drain Inserts MP-52

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.

California Experience

The number of installations is unknown but likely exceeds a thousand. Some users have reported that these systems require considerable maintenance to prevent plugging and bypass.

Advantages

- Does not require additional space as inserts as the drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- As there is no standing water, there is little concern for mosquito breeding.
- A relatively inexpensive retrofit option.

Limitations

Performance is likely significantly less than treatment systems that are located at the end of the drainage system such as ponds and vaults. Usually not suitable for large areas or areas with trash or leaves than can plug the insert.

Design and Sizing Guidelines

Refer to manufacturer's guidelines. Drain inserts come any many configurations but can be placed into three general 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

Design Considerations

- Use with other BMPs
- Fit and Seal Capacity within Inlet

Targeted Constituents

- ☑ Sediment
- ☑ Nutrients
- ☑ Trash
- ☑ Metals
- Bacteria
- ☑ Oil and Grease
- ☑ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

one box; that is, the setting area and filtration through media occurs in the same box. One manufacturer has a double-box. Stormwater enters the first box where setting occurs. The stormwater flows into the second box where the filter media is located. Some products consist of one or more trays or mesh grates. The trays can hold different types of media. Filtration media vary with the manufacturer: types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Construction/Inspection Considerations

Be certain that installation is done in a manner that makes certain that the stormwater enters the unit and does not leak around the perimeter. Leakage between the frame of the insert and the frame of the drain inlet can easily occur with vertical (drop) inlets.

Performance

Few products have performance data collected under field conditions.

Siting Criteria

It is recommended that inserts be used only for retrofit situations or as pretreatment where other treatment BMPs presented in this section area used.

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

Likely require frequent maintenance, on the order of several times per year.

Cost

- The initial cost of individual inserts ranges from less than $100 to about $2,000. The cost of using multiple units in curb inlet drains varies with the size of the inlet.
- The low cost of inserts may tend to favor the use of these systems over other, more effective treatment BMPs. However, the low cost of each unit may be offset by the number of units that are required, more frequent maintenance, and the shorter structural life (and therefore replacement).

References and Sources of Additional Information

Hrachovec, R., and G. Minton, 2001, Field testing of a sock-type catch basin insert, Planet CPR, Seattle, Washington

Interagency Catch Basin Insert Committee, Evaluation of Commercially-Available Catch Basin Inserts for the Treatment of Stormwater Runoff from Developed Sites, 1995

Larry Walker Associates, June 1998, NDMP Inlet/In-Line Control Measure Study Report

Manufacturers literature

Santa Monica (City), Santa Monica Bay Municipal Stormwater/Urban Runoff Project - Evaluation of Potential Catch basin Retrofits, Woodward Clyde, September 24, 1998

Woodward Clyde, June 11, 1996, Parking Lot Monitoring Report, Santa Clara Valley Nonpoint Source Pollution Control Program.

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.

- 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

– 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.

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

SAMPLE STENCIL

PER BMP SD-13

Maintenance Bays & Docks SD-31

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair 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 requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.

- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.

- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.

- Other features may be 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.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

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.

- 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.