# COMMUNITY DEVELOPMENT DEPARTMENT

## Planning Division

City of Arts & Innovation

# Draft Mitigated Negative Declaration

WARD: 2

1. **Case Number:** P14-0045 (General Plan Amendment), P14-0046 (Specific Plan Amendment), P14-0047 (Rezone), P14-0048 (Site Plan Review), P15-0953 (Variance), P15-0954 (Variance), and P15-0939 (Certificate of Appropriateness)

2. **Project Title:** Mission Lofts

3. **Hearing Date:** March 24, 2016 Cultural Heritage Board (CHB)

   April 07, 2016 City Planning Commission (CPC)

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

5. **Contact Person:** Brian Norton, Senior Planner
   **Phone Number:** (951) 826-2308

6. **Project Location:** The Project site is generally located north of 9th Street, south of Mission Inn Avenue, east of Commerce Street, and west of Park Avenue in the City of Riverside, California as identified in **Figure 1 – Project Location**. The Project site is bisected by University Avenue but connected by an existing vacated Southern Pacific Railroad (SPRR) railroad bridge. The Project is located within Sections 23 & 24, Township 2 South, Range 5 West, San Bernardino Base and Meridian and consists of the following assessor's parcel numbers (APNs):

| North Side of University Ave. | South Side of University Ave. |
|---|---|
| 211-121-002 | 211-122-004 |
| 211-121-020 | 211-122-022 |
| 211-121-024 | 211-122-023 |
| 211-121-027 | 211-122-024 |
| 211-121-028 | |
| 211-121-032 | |
| 211-121-033 | |

7. **Project Applicant/Project Sponsor's Name and Address:**

   Mission Lofts LLC
   1201 Dove Street, Suite 520
   Newport Beach, CA 92660
   (949) 975-1122

8. **Existing General Plan Designation:** Industrial (I), Mixed Use Village (MU-V) and Business/Office Park (B/OP)

   **Proposed General Plan Designation:** Mixed Use-Urban (MU-U)

9. **Existing Zoning:** I-SP-CR – Industrial - Specific Plan (Marketplace Specific Plan) – Cultural Resources (Seventh Street East Historic District) Overlay Zones, BMP-SP-CR – Business and Manufacturing Park – Specific Plan (Marketplace Specific Plan) – Cultural Resources (Seventh Street East Historic District) Overlay Zones, BMP-SP – Business and Manufacturing – Specific Plan (Marketplace Specific Plan) Overlay Zone, CR-SP – Commercial Retail – Specific Plan (Market Plan Specific Plan) Overlay Zone, I-SP – Industrial – Specific Plan (Marketplace Specific Plan) Overlay Zone

   **Proposed Zoning:** MU-U-SP - Mixed Use-Urban – Specific Plan (Marketplace Specific Plan) Overlay Zones and MU-U-SP-CR – Mixed Use – Urban – Specific Plan (Marketplace Specific Plan) – Cultural Resources (Seventh Street East Historic District) Overlay Zones

   **Existing Specific Plan SubArea**: Neighborhood Market SubArea and Marketplace/Urban Industrial SubArea

   **Proposed Specific Plan SubArea**: Mixed Use Marketplace SubArea

10. **Description of Project:** The proposed Mission Lofts Project (Project) is a 212 unit multiple family residential development located north of 9th Street, south of Mission Inn Avenue, east of Commerce Street, and west of Park Avenue. The proposed Project site is bisected into two separate areas by University Avenue and will be connected by an existing railroad bridge over University Avenue that was vacated by the Southern Pacific railroad (SPRR). The portion of the Project site north of University Avenue consists of the apartment units and approximately 46% of the on-site parking. Vehicle access to the northern area will be provided by two driveways; one on Mission Inn Avenue and the second on University Avenue. The portion of the Project site south of University Avenue consists of the remaining residential parking, 1,221 square feet of commercial along 9th Street. Vehicle access to the southern area will be provided by a single gated driveway directly across from the Metrolink parking lot driveway (See **Plate 1 – Architectural Site Plan**).

    The total Project site encompasses 4.69 gross acres. The Project's apartment complex and approximately 46% of the on-site parking will be developed on approximately 3.11 net acres of the Project site, north of University Avenue (APNs 211121032, 211121033, 211121020, 211121024, 211121027, 211121028, and 211121002). Residential parking, commercial lease space will be developed on approximately 1.50 net acres of the Project site, south of University Avenue (APNs 211122022, 211122023, 211122024, and 211122004).

    A portion of the Project site is located within the Seventh Street East Historic District. The site is currently vacant, but the area north of University Avenue contains an old concrete loading dock from the site's prior use. The dock will be demolished during Project construction.

    The Mission Lofts project proposes one 2-story and one 4-story apartment building containing 212 units. The Project provides a range of apartment housing options consisting of 52 studio apartments, 77 one-bedroom apartments, and 83 two-bedroom apartments. Amenities include; a courtyard containing a pool, spa, cabanas, outdoor showers, sun beds, fire pit, barbecue area, dining terrace, dog run, , enhanced pedestrian bridge with seating and landscaping, and an indoor fitness room and clubroom. The entirety of the Project site will be landscaped as shown on **Plate 2a – Conceptual Landscape Plan (North Site)** and **Plate 2b – Conceptual Landscape Plan (South Site)**.

    The Project includes design components intended to integrate historic rail and citrus industrial uses in the Project area and the historic character of the Citrus Thematic Industrial Historic District. The Project incorporates large, functional, full-height continuous masses that appear segmented or linked by articulated

columns of perforated metal balconies reminiscent of railway gangways or couplings between passenger and freight cars (see **Plates 3a, 3b, and 3c**). Mission Lofts utilizes railroad-related features as functional design elements, which mimic the historic use and look of the former SPRR right-of-way area.

The cutaway corner at Mission Inn Avenue and Commerce Street mimics a corner freight-inspired cantilever, clad in corrugated metal siding painted red and signed with bold, block letters (See **Plate 4 –Perspectives**). The Project uses corrugated metal siding as well as stucco, cementitous plaster, exterior metal systems, and concrete block, which incorporates and modernizes functional, historic industrial materials. While brick is not proposed, the color scheme includes deep red and various shades of gray, which invokes brick and metal. The SPRR Bridge, which will be cleaned of graffiti, repaved for ADA compliance and enhanced, will remain visible in its current state from University Avenue and Commerce Street.

The Project will be constructed to Title 24 (CalGreen) standards, which requires energy efficient and water saving fixtures. The Project also incorporates advanced filtration into the Project design. The Project will install air filtration systems with efficiencies equal to or exceeding Minimum Efficiency Reporting Value (MERV) 16, as defined by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 52.2.

The proposed Project includes the following land use applications:

<u>P14-0045 General Plan Amendment</u>: Implementation and development of the Project requires an amendment to the City's General Plan (GPA), to change the land use designation for the Project site. The proposed GPA will change the land use designation of approximately 4.69 acres from Industrial (I), Mixed Use Village (MU-V) and Business/Office Park (B/OP) to Mixed Use Urban (MU-U). Refer to **Figure 2 – General Plan Amendment**.

<u>P14-0046 Specific Plan Amendment</u>: An amendment to the Neighborhood Market SubArea and the Marketplace Urban Industrial SubArea within the Marketplace Specific Plan to create the Mixed Use Marketplace SubArea and adopt development standards of Title 19. Refer to **Figure 3 – Specific Plan Amendment**.

<u>P14-0047 Zone Change</u>: A rezone to the adopted Municipal Code, Title 19is proposed to rezone 4.69 acres from I-SP-CR – Industrial - Specific Plan (Marketplace Specific Plan) – Cultural Resources (Seventh Street East Historic District) Overlay Zones, BMP-SP-CR – Business and Manufacturing Park – Specific Plan (Marketplace Specific Plan) – Cultural Resources (Seventh Street East Historic District) Overlay Zones, BMP-SP – Business and Manufacturing – Specific Plan (Marketplace Specific Plan) Overlay Zone, CR-SP – Commercial Retail – Specific Plan (Market Plan Specific Plan) Overlay Zone, I-SP – Industrial – Specific Plan (Marketplace Specific Plan) Overlay Zone to MU-U-SP - Mixed Use Urban – Specific Plan (Marketplace Specific Plan) Overlay Zones and MU-U-SP-CR – Mixed Use-Urban – Specific Plan (Marketplace Specific Plan) – Cultural Resources (Seventh Street East Historic District) Overlay Zones. Refer to **Figure 4 – Zone Change Amendment**.

<u>P14-0048 Site Plan Review</u>: A site plan review to ensure a high quality project through compatibility, environmental factors and attractive and harmonious development. Refer to **Plate 1**.

With the exception of two variances, the Project meets all applicable development standards:

- P15-0954: to permit315 parking spaces where 365 parking spaces are required by the City's Municipal Code,
- P15-0953: to allow 16 tandem parking stalls;

Findings to support these variances can be found in the Staff Report.

P15-0939 Certificate of Appropriateness: For the development of a mixed-use project partially within the Seventh Street East Historic District and partially within the boundaries of the Citrus Thematic Industrial Potential Historic District.

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

| | Existing Land Use | General Plan Designation | Zoning Designation |
|---|---|---|---|
| **Project Site** | Vacant land (north of University Avenue)<br>Parking lot (south of University Avenue) | Mixed Use Village and Business/Office Park (north of University Avenue)<br>Industrial (south of University Avenue) | Industrial with specific plan and cultural resources overlay, Business and Manufacturing Park with specific plan and cultural resources overlays, and Commercial Retail with specific plan overlay (north of University Avenue).<br>Industrial with specific plan overlay (south of University Avenue) |
| **North** | Industrial and single family residential | Business/Office Park | Business and Manufacturing Park with specific plan and cultural resources overlays. |
| **East** | Single family residential, public facility (health center) and vacant lot | Mixed Use Village and Industrial | Single Family Residential (R-1-7000) with specific plan overlay, Commercial Retail- Specific Plan; Industrial-Specific Plan; and Business and Manufacturing Park with specific plan |
| **South** | Metrolink parking lot | Industrial | Industrial-Specific Plan |
| **West** | Train tracks | Business office park and industrial (note that these uses are separated from the site by the train tracks immediately west of the site) | Industrial-Specific Plan and Business and Manufacturing-Specific Plan-Cultural Resources Overlay (note that these uses are separated from the site by the train tracks immediately west of the site) |

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

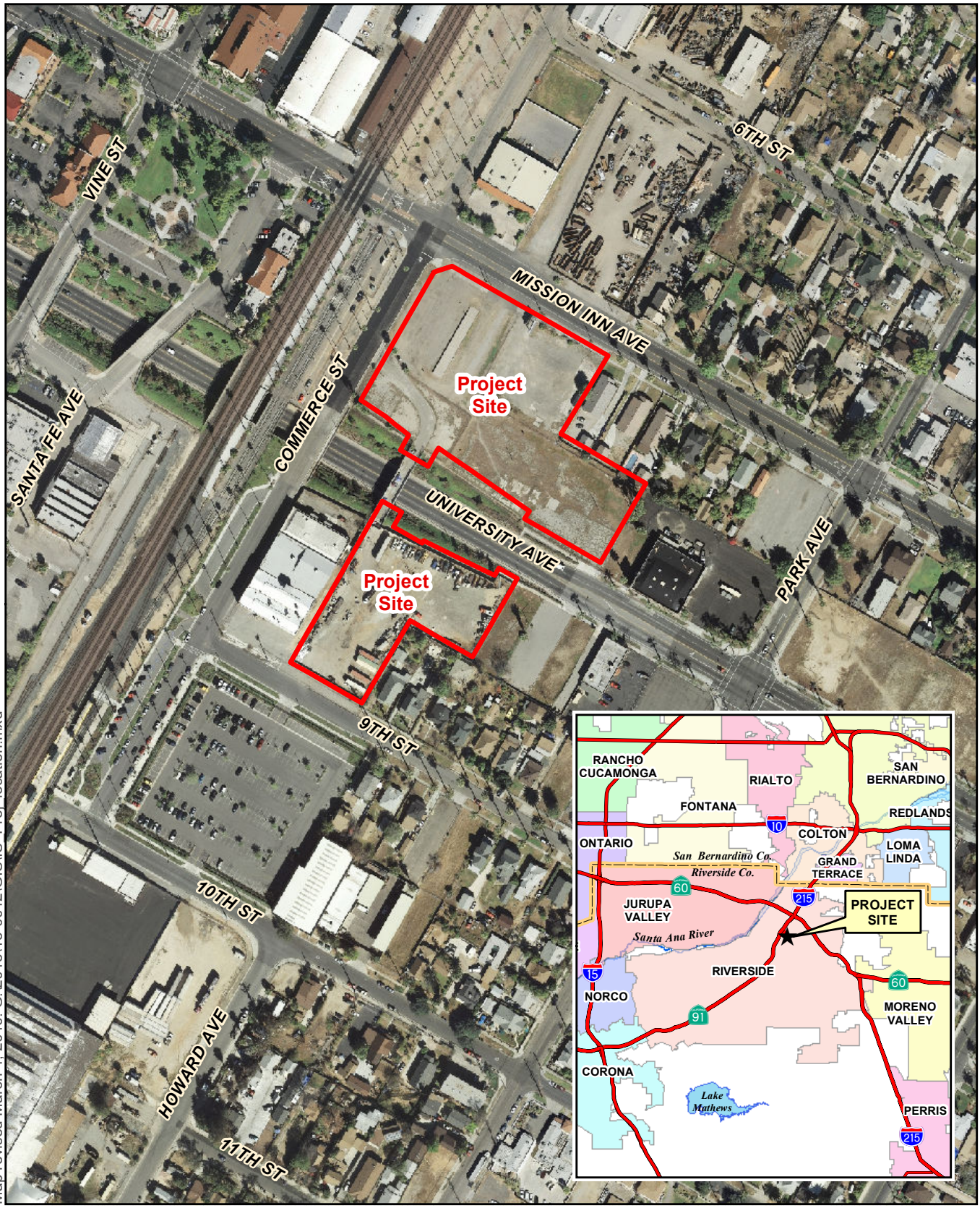
    a. RCALUC – Riverside County Airport Land Use Commission

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

a. General Plan 2025
b. GP 2025 FPEIR
c. Geotechnical Investigation prepared by Geotechnical Professionals Inc., February 17, 2014
d. Project Specific Water Quality Management Plan prepared by KHR Associates, February 23, 2016
e. Transportation Impact Analysis prepared by Fehr and Peers, April 2015
f. Air Quality/Greenhouse Gas Analysis prepared by Albert A. Webb Associates, May 27, 2015
g. Air Toxic and Criteria Pollutant Health Risk Assessment prepared by Urban Crossroads, May 26, 2015
h. Cultural Resources Survey prepared by JM Research & Consulting, June 2015
i. Noise Impact Analysis prepared by Kunzman Associates, Inc., May 31, 2015

14. **Acronyms**

| | |
|---|---|
| AQMP - | Air Quality Management Plan |
| CBC | California Building Code |
| CEQA - | California Environmental Quality Act |
| CMP - | Congestion Management Plan |
| EIR - | Environmental Impact Report |
| EOP - | Emergency Operations Plan |
| FEMA - | Federal Emergency Management Agency |
| FPEIR - | GP 2025 Final Programmatic Environmental Impact Report |
| GIS - | Geographic Information System |
| GHG - | Greenhouse Gas |
| GP 2025 - | General Plan 2025 |
| HRA | Health Risk Assessment |
| IS - | Initial Study |
| MSHCP - | Western Riverside County Multiple-Species Habitat Conservation Plan |
| OPR - | Office of Planning & Research, State |
| PEIR - | Program Environmental Impact Report |
| 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 |
| 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 |
| SPRR | Southern Pacific Railroad |
| SWPPP - | Storm Water Pollution Prevention Plan |
| TOD | Transit Oriented Development |
| USGS - | United States Geologic Survey |
| WQMP - | Water Quality Management Plan |




Map revised March 4, 2016. G:\2015\15-0042\GIS\IS_Proj_location.mxd

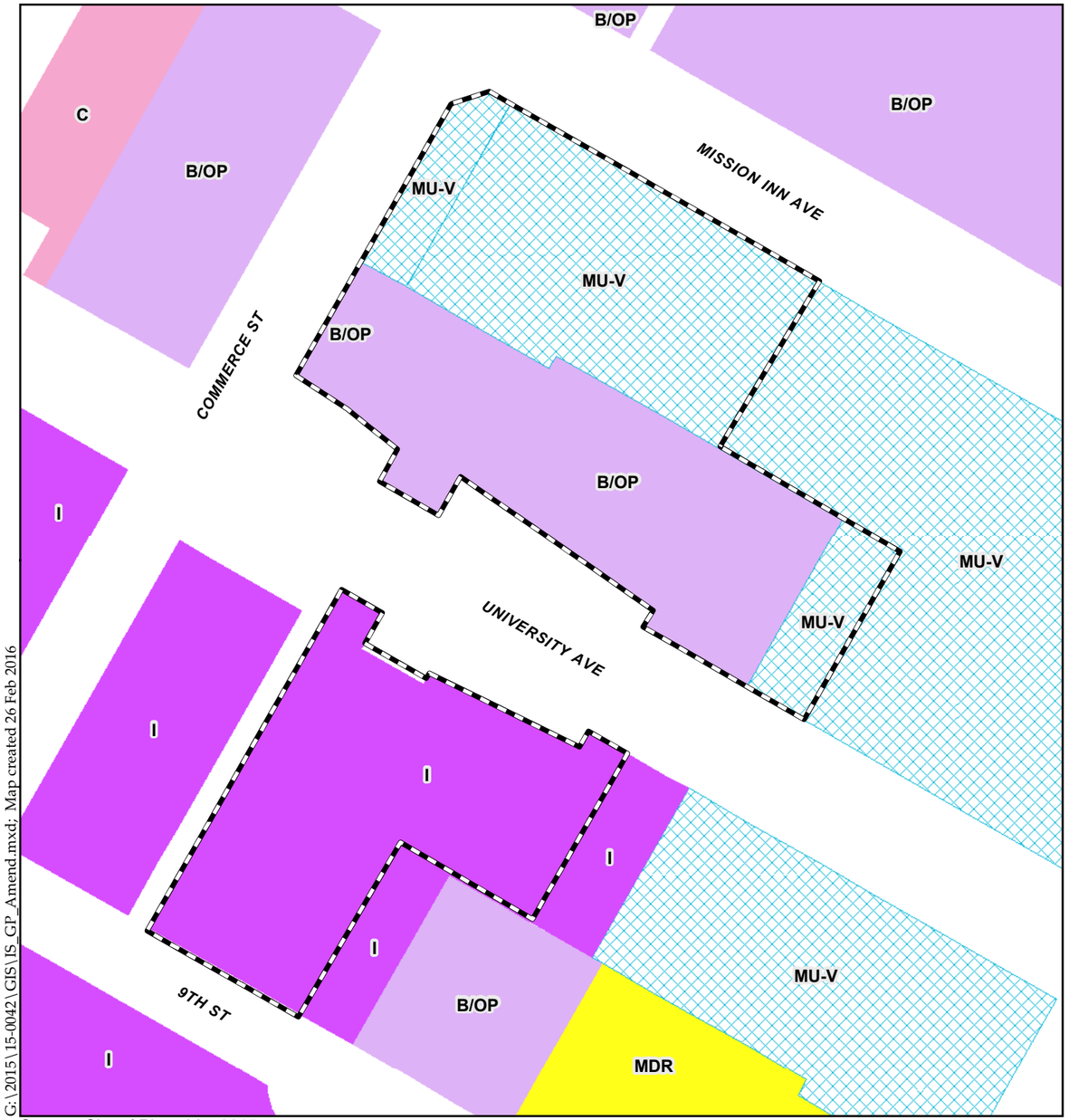
Sources: County of Riverside GIS, 2016; City of Riverside, 2014.

**Figure 1 – Project Location**

Mission Lofts

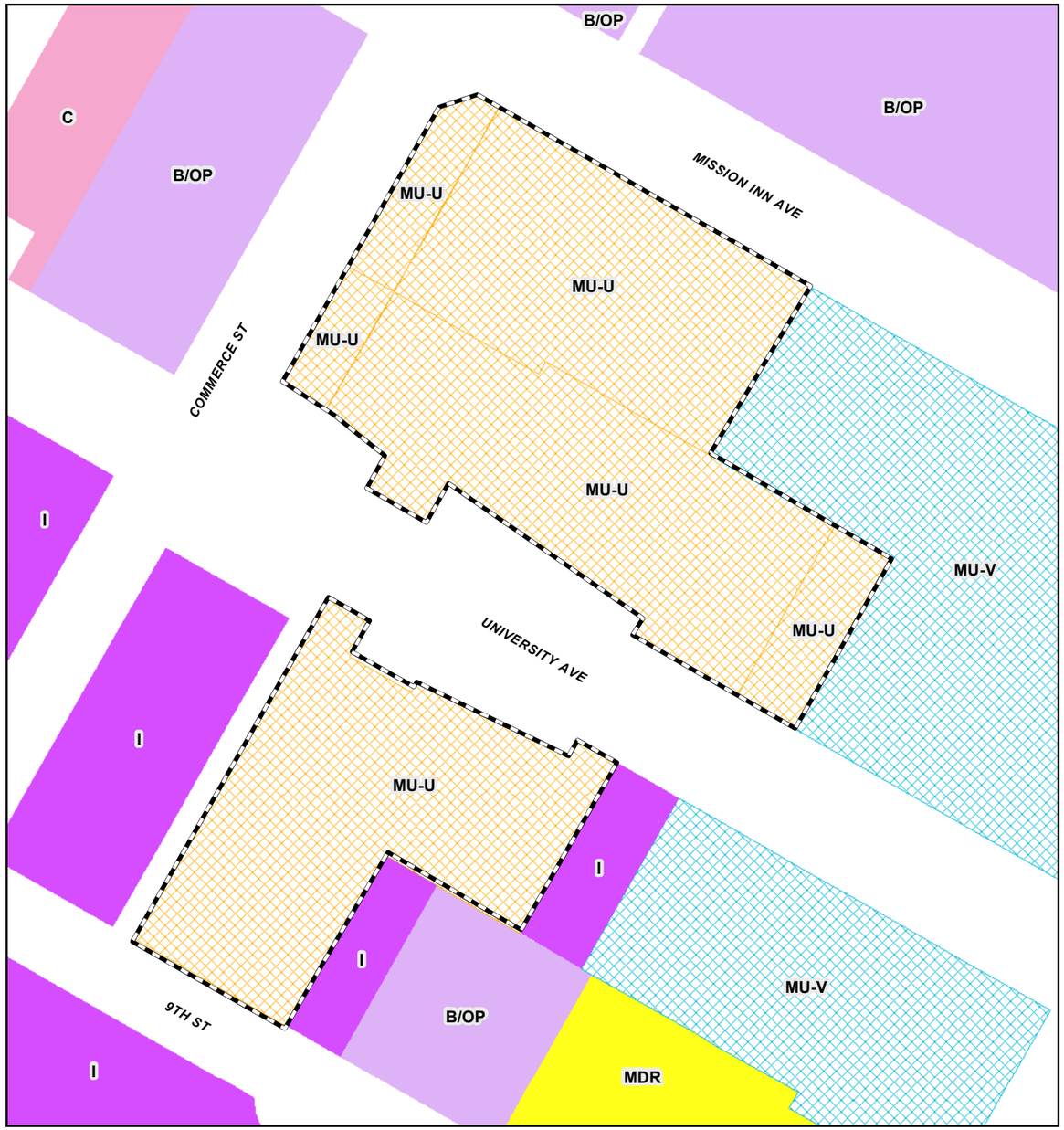
0 250 500 750 Feet

ALBERT A. WEBB ASSOCIATES




Source: City of Riverside, 2015

**Existing General Plan Designations**




**Proposed General Plan Designations**

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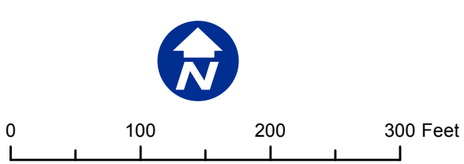
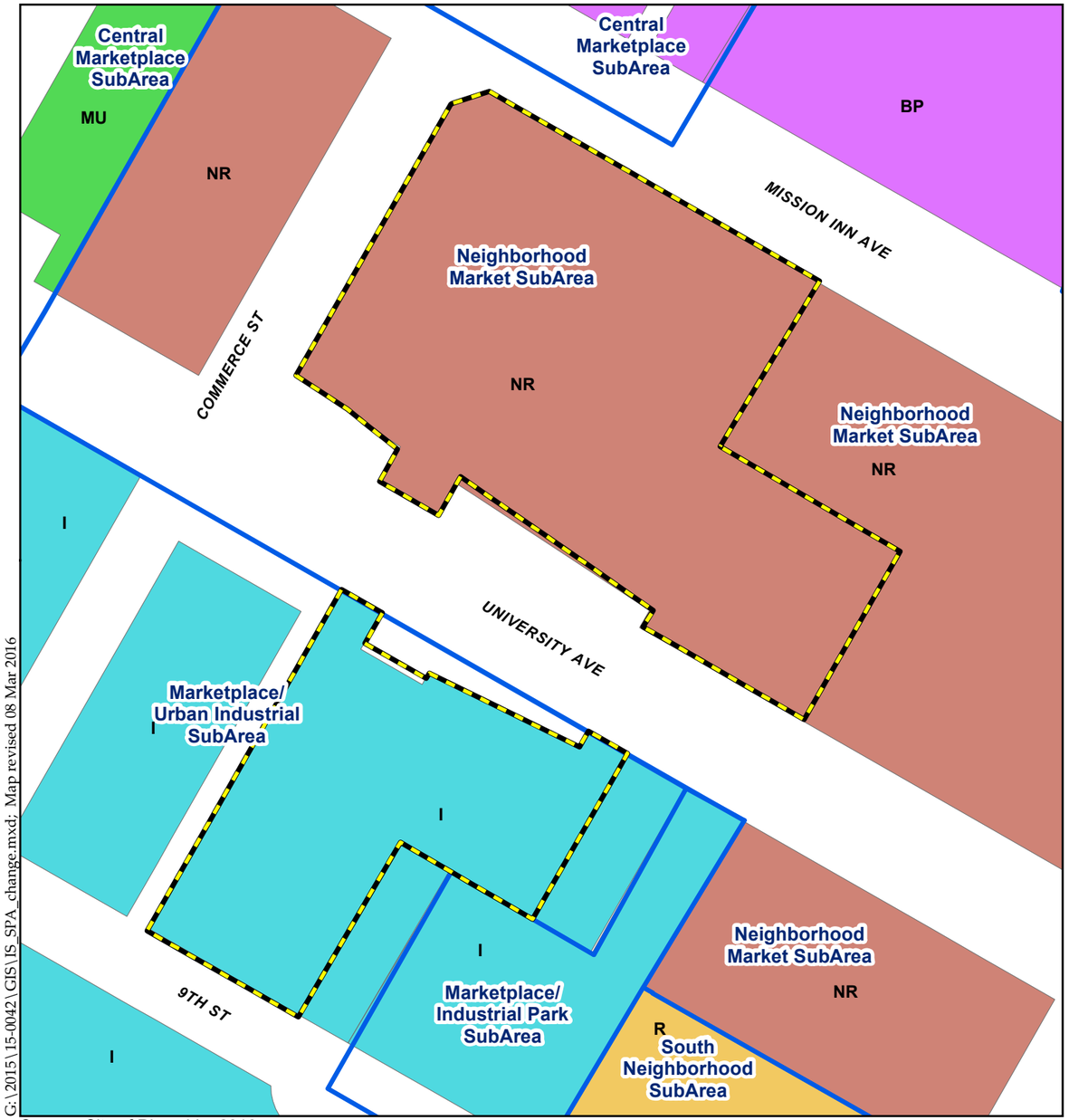



- Project Boundary
- Medium Density Residential
- Commercial
- Business/Office Park
- Industrial
- Mixed Use - Village
- Mixed Use - Urban

**Figure 2 - General Plan Amendment**

Mission Lofts

ALBERT A. WEBB ASSOCIATES




Source: City of Riverside, 2016

**Existing Specific Plan**

**Proposed Specific Plan Amendment**

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0 100 200 300 Feet

Project Boundary/Proposed Mixed Use Marketplace SubArea

Name Marketplace SP SubAreas

SP/SPA Landuse

Mixed Use Urban (MU-U)

Residential (R)

Business Park (BP)

Industrial (I)

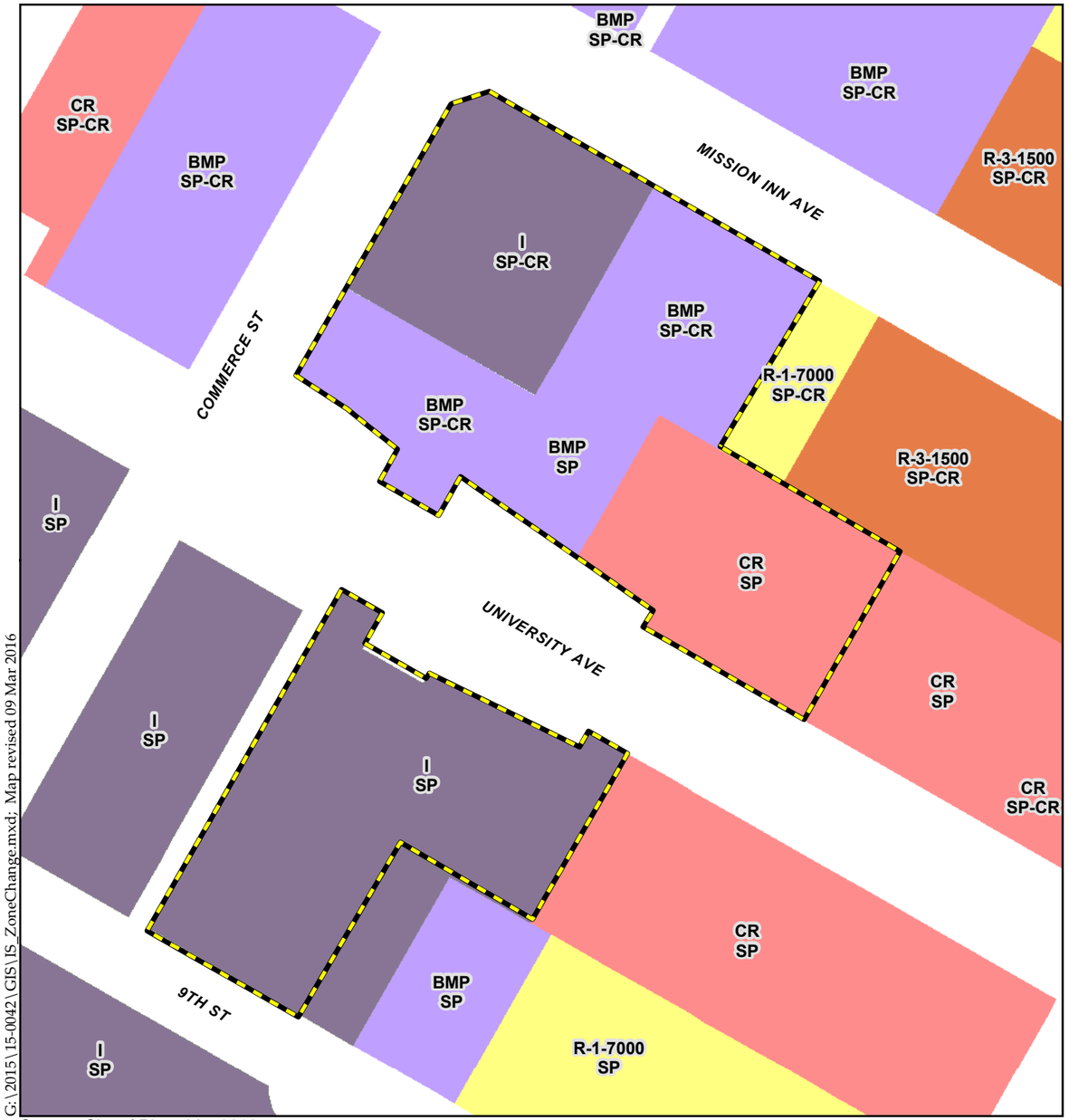
Mixed Use (MU)

Neighborhood Retail (NR)

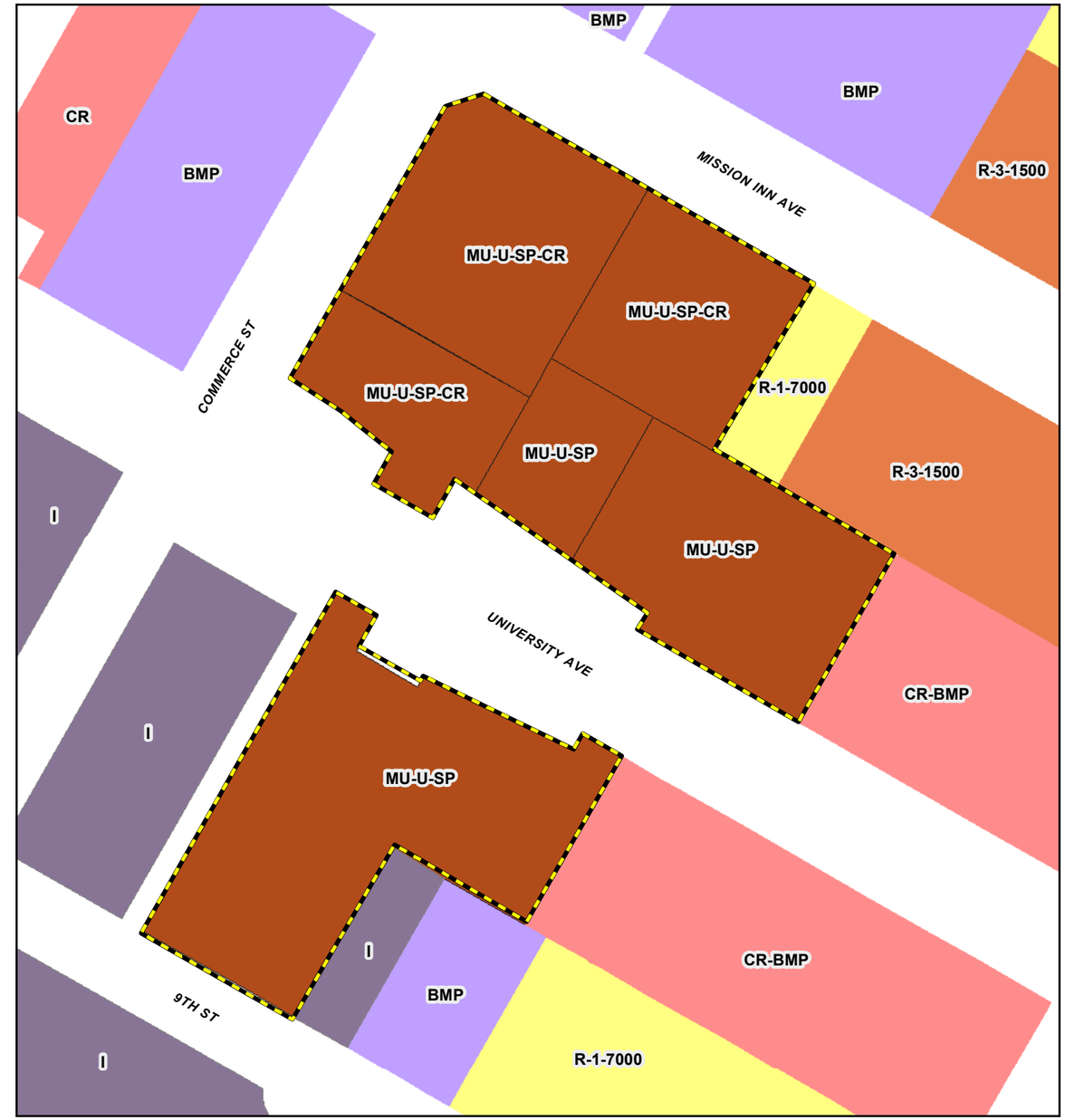
**Figure 3 - Specific Plan Amendment**

Mission Lofts

ALBERT A. WEBB ASSOCIATES




Existing Zoning




Proposed Zoning

Source: City of Riverside, 2016

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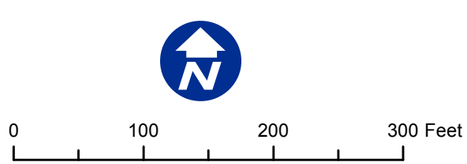


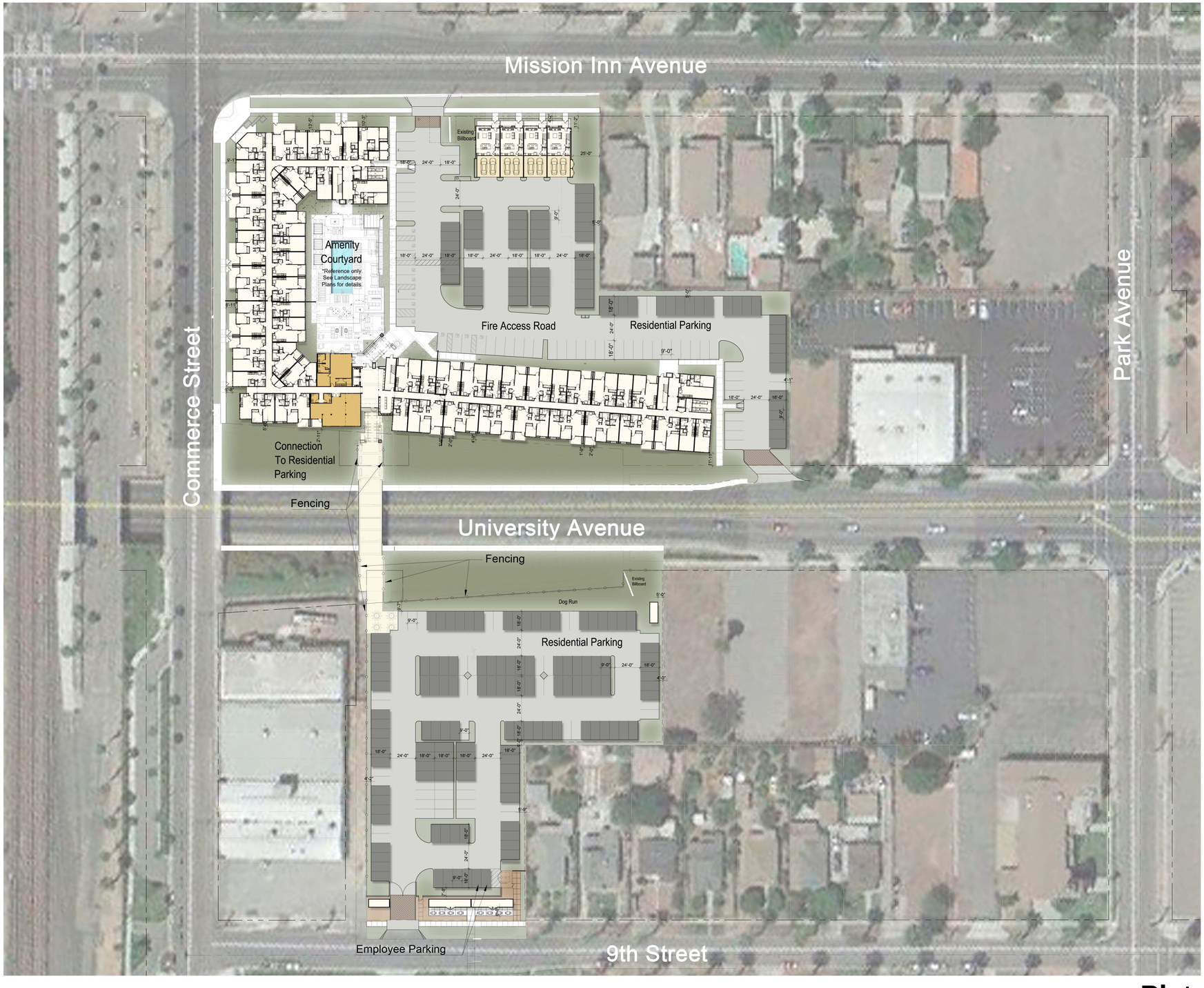

***LEGEND***

- Project Boundary
- R-1-7000; R-1-7000-SP; R-1-7000-SP-CR
- R-3-1500; R-3-1500-SP-CR
- CR; CR-BMP; CR-SP; CR-SP-CR
- BMP; BMP-SP; BMP-SP-CR
- I; I-SP; I-SP-CR
- MU-U-SP; MU-U-SP-CR

**Figure 4 - Zone Change Amendment**

Mission Lofts

ALBERT A. WEBB ASSOCIATES




| Project Data | | | |
|---|---|---|---|
| Project | Mission Lofts<br>Riverside, CA | | |
| Site Area Information | | | |
| Parcel North | Gross Site Area | | 3.16 AC |
| Parcel South | Gross Site Area | | 1.53 AC |
| Total | Gross Site Area | 4.69 AC | |
| | Total Dwelling Units | 212 DU | |
| | Density | 45.2 DU/AC | |

| Building Plan Summary | | Type V Construction |
|---|---|---|
| Building A | | 4 Story Residential on Grade |
| Building B | | 2 Story Residential on Grade |
| Building A | | 208 DU |
| Building B | | 4 DU |
| **Total** | | **212 DU** |
| **Building Area Summary** | | |
| Parcel North | FAR 1.50 | 205,865 GSF |
| Building A | | 196,523 GSF |
| Building B | | 9,342 GSF |
| Parcel South | FAR 0.02 | 1,540 GSF |
| Shipping Containers (2-Full, 2-Half) | | 960 GSF |
| Patio Area | | 580 GSF |

| Unit Plan | Unit Type | Gross SF | Total | Percent |
|---|---|---|---|---|
| Plan 0-1 | Studio | 459 | 51 | 24.1% |
| Plan 0-2 | Studio | 639 | 1 | 0.5% |
| Plan 1-0 | 1 Bd / 1 Ba | 624 | 16 | 7.5% |
| Plan 1-1 | 1 Bd / 1 Ba | 657 | 4 | 1.9% |
| Plan 1-2 | 1 Bd / 1 Ba | 661 | 52 | 24.5% |
| Plan 1-3 | 1 Bd / 1 Ba | 739 | 2 | 0.9% |
| Plan 1-4 | 1 Bd / 1 Ba | 828 | 3 | 1.4% |
| Plan 2-0 | 2 Bd / 2 Ba | 888 | 73 | 34.4% |
| Plan 2-1 | 2 Bd / 2 Ba | 952 | 6 | 2.8% |
| Plan 2-2 | 2 Bd / 2 Ba | 1,177 | 4 | 1.9% |
| **Totals** | | | **212** | **100%** |
| Average Unit Size | | 709 SF | | |
| Studio Plan | | | 52 | 25% |
| 1 Bedroom Plan | | | 77 | 36% |
| 2 Bedroom Plan | | | 83 | 39% |
| Totals | | | 212 | 100% |

| | |
|---|---|
| Residential Parking Provided | |
| Parcel North Parking | |
| Covered Parking | 65 stalls |
| Open Parking | 79 stalls |
| Total Parcel North Parking | 144 stalls |
| Parcel South Parking | |
| Covered Parking | 124 stalls |
| Open Parking | 47 stalls |
| Total Parcel South Parking | 171 stalls |
| Total Covered Parking | 189 stalls |
| Total Open Parking | 126 stalls |
| **Total Stalls Provided** | **315 stalls** |
| **Parking Ratio** | **1.49 stalls per unit** |

Carport Parking

0 20 40 80

**Plate 1**

# MISSION LOFTS

# ARCHITECTURAL SITE PLAN

# SP1.0

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 02.26.2016

**KTGY Group, Inc.**
**Architecture+Planning**
17911 Von Karman Ave., Suite 200
Irvine, CA 92614
949.851.2133
ktgy.com

## PROPOSED PLANT LIST

| SYMBOL | BOTANICAL NAME | COMMON NAME | SIZE | WUCOLS |
|---|---|---|---|---|
| **TREES** | | | | |
| | ACACIA STENOPHYLLA | SHOESTRING ACACIA | 36" BOX | LOW |
| | ARBUTUS 'MARINA' | HYBRID STRAWBERRY TREE | 24" BOX | MEDIUM |
| | CERCIDIUM X 'DESERT MUSEUM' | PALO VERDE | 36" BOX | MEDIUM |
| | MELALEUCA QUINQUENERVIA | CAJEPUT TREE | 24" BOX | MEDIUM |
| | POPLAR NIGRA 'ITALICA' | LOMBARDY POPLAR | 36" BOX | MEDIUM |
| **PALMS/ACCENT/EVERGREEN VERTICAL SHRUBS** | | | | |
| | BAMBUSA OLDHAMII | GIANT TIMBER BAMBOO | 15 GAL. | MEDIUM |
| | DRACAENA DRACO | DRAGON TREE | 6' BTH | LOW |
| | PODOCARPUS MACROPHYLLUS | YEW PINE | 15 GAL. | MEDIUM |
| | WASHINGTONIA FILIFERA | CALIFORNIA FAN PALM | 16' BTH | MEDIUM |
| **STREET TREES** | | | | |
| | MISSION INN AVENUE / COMMERCE STREET / 9TH STREET STREET TREE PER CITY OF RIVERSIDE MASTER STREET TREE PROGRAM | | 24" BOX | T.B.D. |
| **SHRUBS - HYDRO-ZONE 1 NORTH/EAST EXPOSURE** | | | | |
| | MEDIUM SHRUBS | | | |
| | ASPARAGUS DENSIPLORUS 'MYERSII' | MYER ASPARAGUS | 5 GAL. | LOW |
| | CHONDROPETALUYM 'ELEPHANTINUM' | LARGE CAPE RUSH | 5 GAL. | LOW |
| | CARISSA M. 'HORIZONTALIS' | NATAL PLUM | 5 GAL. | MEDIUM |
| | SMALL SHRUBS | | | |
| | CAREX DIVULSA | BERKELEY SEDGE | 5 GAL. | MEDIUM |
| | LIRIOPE MUSCARI | BIG BLUE LILY TURF | 5 GAL. | MEDIUM |
| | LOMANDRA LONGIFOLIA 'BREEZE' | SPIKY HEADED MAT RUSH | 5 GAL. | MEDIUM |
| | PHILODENDRON XANADU | PHILODENDRON | 5 GAL. | MEDIUM |
| **SHRUBS - HYDRO-ZONE 2 SOUTH/WEST EXPOSURE** | | | | |
| | LARGE SHRUBS | | | |
| | DASYLIRION WHEELERI | DESERT SPOON | 5 GAL | LOW |
| | KALANCHOE BEHARENSIS | FELT PLANT | 15 GAL | LOW |
| | PHORMIUM HYBRIDS | NEW ZEALAND FLAX | - | - |
| | MEDIUM SHRUBS | | | |
| | ALOE STRIATA | CORAL ALOE | 5 GAL | LOW |
| | DIANELLA REVOLUTA | LITTLE REV | 5 GAL | LOW |
| | CALLISTEMON 'LITTLE JOHN' | DWARF CALLISTEMON | 5 GAL | LOW |
| | ECHEVERIA PEACOCKII | PEACOCK ECHEVERIA | 5 GAL | LOW |
| | FESTUCA OVINA GLAUCA | BLUE FESCUE | 5 GAL | LOW |
| | HESPERALOE PARVIFLORA | RED YUCCA | 5 GAL | VERY LOW |
| | LIMONIUM PEREZII | SEA LAVENDAR | 5 GAL | LOW |
| | MUHLENBURGIA CAPILLARIS | PINK MUHLY | 5 GAL | MEDIUM |
| | SMALL SHRUBS | | | |
| | ROSMARINUS PROSTRATUS | DWARF ROSEMARY | 5 GAL | LOW |
| | FESTUCA OVINA GLAUCA | BLUE FESCUE | 5 GAL | LOW |
| | SENECIO MANDRALISCAE | SENECIO | 1 GAL | LOW |
| **SYNTHETIC TURF** | | | | |
| | SYNTHETIC TURF AT POOL COURTYARD | | | |

### PLANT PALETTE NOTES:

THIS PRELIMINARY PLANT PALETTE IS INTENDED TO REPRESENT A TYPICAL SAMPLE OF THE PROPOSED PLANTS BUT DOES NOT INDICATE THE EXACT SPECIES WHICH WILL BE DEVELOPED ON THE DETAILED PLANS.

### WUCOLS NOTE:

WUCOLS, WATER USE CLASSIFICATION OF LANDSCAPE SPECIES, IS A UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION PUBLICATION AND IS A GUIDE TO THE WATER NEEDS OF LANDSCAPE PLANTS.

### TREE SURVEY NOTE:

1. NO EXISTING TREES ON-SITE TO BE PROTECTED.

### WATER EFFICIENT LANDSCAPING

THE FOLLOWING MEASURES WILL BE INCORPORATED INTO THE PROJECT TO CONSERVE WATER:

1. THE IRRIGATION SYSTEM SHALL MEET THE REQUIREMENTS OF THE CITY OF RIVERSIDE GUIDELINES FOR WATER EFFICIENT LANDSCAPES.
2. THE ESTIMATED APPLIED WATER USE ALLOWED FOR THE LANDSCAPE AREA SHALL NOT EXCEED THE MAWA CALCULATION.

**Plate 2a**

0 10 20 40

# MISSION LOFTS

# CONCEPTUAL LANDSCAPE PLAN (NORTH SITE)

# L.1

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.22.2014

**MJS Design Group**
Cannery Lofts
507 30th Street
Newport Beach, CA 92663
(949) 675-9964

## PROPOSED PLANT LIST

| SYMBOL | BOTANICAL NAME | COMMON NAME | SIZE | WUCOLS |
|---|---|---|---|---|
| **TREES** | | | | |
| | ACACIA STENOPHYLLA | SHOESTRING ACACIA | 36" BOX | LOW |
| | ARBUTUS 'MARINA' | HYBRID STRAWBERRY TREE | 24" BOX | MEDIUM |
| | CERCIDIUM X 'DESERT MUSEUM' | PALO VERDE | 36" BOX | MEDIUM |
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| | POPLAR NIGRA 'ITALICA' | LOMBARDY POPLAR | 36" BOX | MEDIUM |
| **PALMS/ACCENT/EVERGREEN VERTICAL SHRUBS** | | | | |
| | BAMBUSA OLDHAMII | GIANT TIMBER BAMBOO | 15 GAL. | MEDIUM |
| | DRACAENA DRACO | DRAGON TREE | 6' BTH | LOW |
| | PODOCARPUS MACROPHYLLUS | YEW PINE | 15 GAL. | MEDIUM |
| | WASHINGTONIA FILIFERA | CALIFORNIA FAN PALM | 16' BTH | MEDIUM |
| **STREET TREES** | | | | |
| | MISSION INN AVENUE / COMMERCE STREET / 9TH STREET STREET TREE PER CITY OF RIVERSIDE MASTER STREET TREE PROGRAM | | 24" BOX | T.B.D. |
| **SHRUBS - HYDRO-ZONE 1 NORTH/EAST EXPOSURE** | | | | |
| | MEDIUM SHRUBS | | | |
| | ASPARAGUS DENSIPLORUS 'MYERSII' | MYER ASPARAGUS | 5 GAL. | LOW |
| | CHONDROPETALUYM 'ELEPHANTINUM' | LARGE CAPE RUSH | 5 GAL. | LOW |
| | CARISSA M. 'HORIZONTALIS' | NATAL PLUM | 5 GAL. | MEDIUM |
| | SMALL SHRUBS | | | |
| | CAREX DIVULSA | BERKELEY SEDGE | 5 GAL. | MEDIUM |
| | LIRIOPE MUSCARI | BIG BLUE LILY TURF | 5 GAL. | MEDIUM |
| | LOMANDRA LONGIFOLIA 'BREEZE' | SPINY-HEADED MAT RUSH | 5 GAL. | MEDIUM |
| | PHILODENDRON XANADU | PHILODENDRON | 5 GAL. | MEDIUM |
| **SHRUBS - HYDRO-ZONE 2 SOUTH/WEST EXPOSURE** | | | | |
| | LARGE SHRUBS | | | |
| | DASYLIRION WHEELERI | DESERT SPOON | 5 GAL | LOW |
| | KALANCHOE BEHARENSIS | FELT PLANT | 15 GAL | LOW |
| | PHORMIUM HYBRIDS | NEW ZEALAND FLAX | - | - |
| | MEDIUM SHRUBS | | | |
| | ALOE STRIATA | CORAL ALOE | 5 GAL | LOW |
| | DIANELLA REVOLUTA | LITTLE REV | 5 GAL | LOW |
| | CALLISTEMON 'LITTLE JOHN' | DWARF CALLISTEMON | 5 GAL | LOW |
| | ECHEVERIA PEACOCKII | PEACOCK ECHEVERIA | 5 GAL | LOW |
| | FESTUCA OVINA GLAUCA | BLUE FESCUE | 5 GAL | LOW |
| | HESPERALOE PARVIFLORA | RED YUCCA | 5 GAL | VERY LOW |
| | LIMONIUM PEREZII | SEA LAVENDAR | 5 GAL | LOW |
| | MUHLENBURGIA CAPILLARIS | PINK MUHLY | 5 GAL | MEDIUM |
| | SMALL SHRUBS | | | |
| | ROSMARINUS PROSTRATUS | DWARF ROSEMARY | 5 GAL. | LOW |
| | FESTUCA OVINA GLAUCA | BLUE FESCUE | 5 GAL | LOW |
| | SENECIO MANDRALISCAE | SENECIO | 1 GAL | LOW |
| **SYNTHETIC TURF** | | | | |
| | SYNTHETIC TURF AT POOL COURTYARD | | | |

### PLANT PALETTE NOTES:

THIS PRELIMINARY PLANT PALETTE IS INTENDED TO REPRESENT A TYPICAL SAMPLE OF THE PROPOSED PLANTS BUT DOES NOT INDICATE THE EXACT SPECIES WHICH WILL BE DEVELOPED ON THE DETAILED PLANS.

### WUCOLS NOTE:

WUCOLS, WATER USE CLASSIFICATION OF LANDSCAPE SPECIES, IS A UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION PUBLICATION AND IS A GUIDE TO THE WATER NEEDS OF LANDSCAPE PLANTS.

### TREE SURVEY NOTE:

1. NO EXISTING TREES ON-SITE TO BE PROTECTED.

### WATER EFFICIENT LANDSCAPING

THE FOLLOWING MEASURES WILL BE INCORPORATED INTO THE PROJECT TO CONSERVE WATER:

1. THE IRRIGATION SYSTEM SHALL MEET THE REQUIREMENTS OF THE CITY OF RIVERSIDE GUIDELINES FOR WATER EFFICIENT LANDSCAPES.
2. THE ESTIMATED APPLIED WATER USE ALLOWED FOR THE LANDSCAPE AREA SHALL NOT EXCEED THE MAWA CALCULATION.

**Plate 2b**

0 10 20 40

# MISSION LOFTS

# CONCEPTUAL LANDSCAPE PLAN (SOUTH SITE)

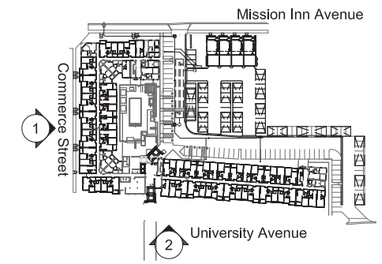
L.2

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.22.2014

**MJS Design Group**
Cannery Lofts
507 30th Street
Newport Beach, CA 92663
(949) 675-9964




Key Map n.t.s.

1. Commerce Street Elevation

2. University Avenue Elevation

## Material Legend

1. Corrugated Metal Siding
2. Exterior Metal System
3. Stucco
4. Cementitious Plaster
5. Recessed Window
6. Metal Awning
7. Perforated Metal
8. Concrete Block
9. Project Signage
10. Carport

**Plate 3a**

0 8 16 32

# MISSION LOFTS

# BUILDING A: ELEVATIONS

# A1.4

**Mission Lofts LLC**
1201 Dove Street, Suite 250
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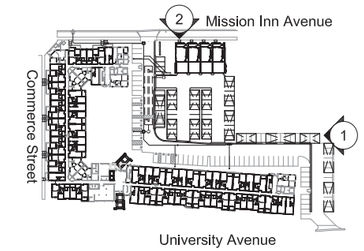
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

**KTGY Group, Inc.**
**Architecture+Planning**
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com




Key Map n.t.s.

1. East Elevation

2. Mission Inn Avenue Elevation

## Material Legend

1. Corrugated Metal Siding
2. Exterior Metal System
3. Stucco
4. Cementitious Plaster
5. Recessed Window
6. Metal Awning
7. Perforated Metal
8. Concrete Block
9. Project Signage
10. Carport

**Plate 3b**

# MISSION LOFTS

# BUILDING A: ELEVATIONS

0 8 16 32

# A1.5

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

**KTGY Group, Inc.**
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17922 Fitch
Irvine, CA 92614
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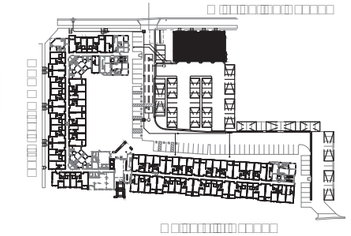
ktgy.com



2
3

**Plate 3c**

# MISSION LOFTS

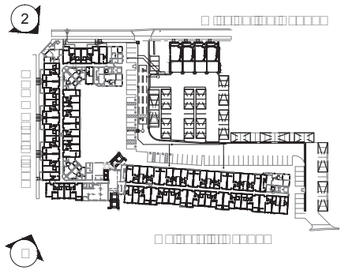
# BUILDING B: ELEVATIONS

A2.1

**Mission Lofts LLC**
2
2
22

RIVERSIDE, CA
KTGY # 2012-0471 10.20.2014

**KTGY Group, Inc.**
**Architecture+Planning**
22
2
8 2 33



2

**Plate 4**

# MISSION LOFTS

## PERSPECTIVES

# A4.2

**Mission Lofts LLC**

RIVERSIDE, CA

KTGY # 2012-0471

10.20.2014

**KTGY Group, Inc.**
**Architecture+Planning**

**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 Brian Norton, Senior Planner _____ 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 with in 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 FPEIR; 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; General Plan 2025 Figure LU-3-Riverside Park; Citywide Design Guidelines and Sign Guidelines CDGSG)***

**Less Than Significant Impact.** According to page 5.1-2 of the General Plan 2025 FPEIR, the hills and ridgelines that surround the City provide scenic vistas to residents of the City where they can experience long distance views of natural terrain. Vista points can be found throughout the City, both as viewed from urban areas toward the hills and from wilderness areas toward Riverside. The most notable scenic vistas in the City include the La Sierra/Norco Hills, Sycamore Canyon Wilderness Park, and Box Springs Mountain Regional Park.

General Plan 2025 Figure LU-3 shows natural and scenic vistas within the City of Riverside. Per Figure LU-3, there are no scenic vistas in the immediate vicinity of the Project site. Although the proposed Project would alter the Project site by introducing new development to the site, implementation of the Project will not impair any views of the distant natural vistas since the Project site is located in a developed urban area. Furthermore, the proposed Project's proposed site plan and architectural elevations ensure that the Project is consistent with the Citywide Design Guidelines. The Citywide Design Guidelines encourage high-quality design, and implementation of the Guidelines will ensure that any potential impacts are **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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; Citywide Design Guidelines and Sign Guidelines CDGSG)***

**Less Than Significant Impact**. According to the General Plan FPEIR, the City has designated several scenic and special boulevards within the City that meet local criteria for designation as scenic routes. University Avenue and Mission Inn Avenue are both listed in City's General Plan FPEIR as a "Scenic Boulevard" (see 2025 FPEIR Figure 5.1-1-Scenic and Special Boulevards and Parkways and Table 5.1-A, Scenic and Special Boulevards, in the General Plan FPEIR). In addition, Table 5.1-B, Scenic Parkways, in the General Plan FPEIR also designates University Avenue as a "Scenic Parkway."

While the Project is adjacent to two designated scenic boulevards, University Avenue and Mission Inn Avenue. The proposed Project site is vacant and as such does not contain any scenic resources.

With regard to post-project impacts to scenic boulevards, most of the Project site is not visible from University Avenue because of the grade difference as University Avenue crosses under the SPRR Bridge. Thus, the Project will not substantially affect the views from this scenic boulevard. **Plate 3a – Building A Elevations**, shows the building elevations in relation to the grade difference. The Project site is highly visible from Mission Inn Avenue and as discussed in the Project Description incorporates design elements that integrate historic rail and citrus industrial uses in the Project area and the historic character of the Citrus Thematic Industrial Historic District. **Plate 3c – Building B Elevations**, shows the view of the Project from Mission Inn Avenue. To ensure consistency with the surrounding built environment, the Project will be subject to a Certificate of Appropriateness and is required to be consistent with the Citywide Design Guidelines. The Citywide Design Guidelines encourage high-quality design, and will reduce any potential impacts to **less than significant**.

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

With regard to State designed scenic highways, page 5.1-4 of the General Plan FPEIR states that there are no officially designated State scenic highways or any eligible State scenic highways that traverse the City or its Sphere of Influence. Therefore, the proposed Project would have no impact in this regard.

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

**1c. Response:** ***(Source: Citywide Design Guidelines and Sign Guidelines CDGSG, Project Description)***

**Less Than Significant Impact.** As discussed in the Project Description and in response 1b, above, the Project has been designed to integrate historic rail and citrus industrial uses in the Project area through the use of corrugated metal siding as well as stucco, cementitous plaster, exterior metal systems, and concrete block. The Project's color scheme includes deep red and various shades of gray to invoke brick and metal. See response to item 5a for additional discussion regarding the Project's aesthetic compatibility with surrounding historic districts.

To ensure consistency with the surrounding built environment, the Project will be subject to a Certificate of Appropriateness and is required to be consistent with the Citywide Design Guidelines. Implementation of the Project will not degrade the quality of the site or its surroundings. Rather implementation of the Project will actually improve the quality of the site with the construction of new development designed to be consistent with the historical character of the Project area on a site that is currently vacant, underutilized and blighted. Due to all these factors, Project impacts on the visual character and quality of the site and its surroundings are **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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, General Plan 2025 FPEIR Figure 5.1-2 – Mount Palomar Lighting Area)***

**Less Than Significant Impact** The proposed Project will involve the introduction of new lighting typically associated with residential development. This lighting would be similar to that which exists in the surrounding area and would not be considered significant. Additionally, the site is not within the Mount Palomar Lighting Area. Therefore, impacts are **less than significant**.

| 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, | ☐ | ☐ | ☐ | ☒ |

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| to non-agricultural use? | | | | |

**2a. Response:** ***(Source: General Plan 2025 – Figure OS-2 – Agricultural Suitability, General Plan 2025 – Figure OS-3 - Williamson Act Preserves, General Plan 2025 FPEIR – Figure 5.2-4 – Proposed Zones Permitting Agricultural Uses)***

**No Impact.** The Project site is located in an urbanized area and does not contain any farmland. According to General Plan 2025 Figure OS-2, the proposed Project site is identified as "Other Land," and there is no designated Farmland on the Project site. Per General Plan 2025 Figure OS-3, the Project site is not designated as Williamson Act Preserve. Per General Plan FPEIR Figure 5.2-4, Proposed Zones Permitting Agricultural Uses, the existing zoning of the site does not permit agriculture uses, nor would the proposed Change of Zone to Mixed-Use Urban (MU-U) permit agriculture uses. Thus, the proposed Project will have **no impact** in this regard.

| | | | | |
|---|---|---|---|---|
| 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)***

**No Impact.** The project site is within an urbanized area, not zoned for agricultural use, and is not subject to a Williamson Act contract. There is no property within proximity of the Project site zoned for agricultural use or under a Williamson Act contract. As such the proposed Project will not conflict with existing zoning for agricultural uses or any applicable Williamson Act contracts. For these reasons the Project will have **no impact.**

| | | | | |
|---|---|---|---|---|
| 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: General Plan 2025 Zoning Map for the City of Riverside)***

**No Impact.** The Project site is currently zoned Industrial and Business and Manufacturing Park, and Commercial Retail. The Project site is located in an urbanized area and is not zoned for forestland, timberland or timberland production. Therefore, **no impacts** will occur.

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

**2d. Response:** ***(Source: General Plan 2025 Zoning Map for the City of Riverside)***

**No Impact.** As stated in 2c above, the Project site is currently zoned Industrial, Business and Manufacturing Park, and Commercial Retail, is located in an urbanized area and is surrounded by existing development. Neither the site nor its surroundings are zoned for forestland, timberland or timberland production. Therefore, **no impacts** will occur.

| | | | | |
|---|---|---|---|---|
| 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, General Plan 2025 Zoning Map for the City of Riverside)***

**No Impact**. Per Figure OS-2, Agricultural Suitability, in the Open Space and Conservation Element of the City of Riverside General Plan, the Project site is located on urban and built-up and is surrounded by other urban uses. As stated in 2b above,

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

the Project site is not located on land that is designated with Williamson Act lands. As stated in 2c above, the Project site is located in an urbanized area and is not zoned for forestland, timberland or timberland production. Therefore, **no impacts** will occur from this Project.

| 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), GP 2025 FPEIR)***

**Less Than Significant Impact.** The City is located within the South Coast Air Basin ("the Basin"). The South Coast Air Quality Management District (SCAQMD) prepares the Air Quality Management Plan (AQMP) for the Basin. The AQMP sets forth a comprehensive program that will lead the Basin into compliance with all federal and state air quality standards. The AQMP's control measures and related emission reduction estimates are based upon emissions projections for a future development scenario derived from land use, population, and employment characteristics defined in consultation with local governments. Accordingly, if a project demonstrates compliance with local land use plans and/or population projections, then the AQMP would have taken into account such uses when it was developed.

The proposed Project includes a General Plan Amendment to change the land use designation from I - Industrial, MU-V - Mixed Use Village and BO/P - Business/Office Park to a MU-U - Mixed Use-Urban land use designation. Although this change is not consistent with the General Plan 2025 land uses which were incorporated in the AQMP, the Project will not result in a substantial change for the following reasons. The GP 2025 FPEIR estimated a total of 127,692 dwelling units at build-out within the City's sphere under the "Typical Growth Scenario." The Project's increase of 212 units is less than a one percent increase. The GP 2025 FPEIR determined that implementation of the General Plan 2025 would generally meet attainment forecasts and attainment of the standards of the AQMP. The General Plan 2025 contains policies to promote mixed use, pedestrian-friendly communities that serve to reduce air pollutant emissions over time, this Project is consistent with those policies. Because the proposed Project is consistent with air quality policies within the General Plan 2025 and the GP 2025 FPEIR determined the General Plan 2025 to be consistent with the AQMP, the proposed Project will not conflict or obstruct implementation of the AQMP. The Project will also be subject to the applicable control measures contained in the AQMP. Therefore, the Project will have **less than significant** impacts directly, indirectly, or cumulatively to the implementation of an air quality plan.

| | | | | |
|---|---|---|---|---|
| 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, Air Quality/Greenhouse Gas Analysis prepared by WEBB on May 27, 2015)***

**Less Than Significant Impact.** Air quality impacts can be described in a short- and long-term perspective. Short-term impacts will occur during site grading and Project construction. Long-term air quality impacts will occur once the Project is in operation.

The Project's short-term and long-term emissions were evaluated using the CalEEMod version 2013.2.2 computer program (Appendix A – AQ/GHG Analysis). Project construction will be subject to SCAQMD Rule 403 for fugitive dust. The AQ/GHG Analysis evaluated Project compliance with Rule 403 by incorporating the option of watering the site three times daily. Short-term emissions consist of fugitive dust and other particulate matter, as well as exhaust emissions generated by construction-related vehicles. Maximum daily emissions from Project construction are summarized below and compared to

the SCAQMD's daily regional thresholds: The maximum emissions from Project operation are summarized in the subsequent table and compared to the SCAQMD daily regional thresholds.

| **CalEEMod MODEL RESULTS** SHORT-TERM IMPACTS | | | | | | |
|---|---|---|---|---|---|---|
| Activity | Maximum Daily Emissions (lbs/day) | | | | | |
| | **VOC** | **$NO_X$** | **CO** | **$SO_2$** | **PM-10** | **PM-2.5** |
| **SCAQMD Daily Thresholds Construction** | 75 | 100 | 550 | 150 | 150 | 55 |
| **Daily Project - Emissions Construction** | **56.33** | **60.06** | **53.88** | **0.09** | **6.64** | **4.29** |
| **Exceeds Y/N Threshold?** | **N** | **N** | **N** | **N** | **N** | **N** |

Source: Table 2, AQ/GHG Analysis

| **CalEEMod MODEL RESULTS** LONG-TERM IMPACTS | | | | | | |
|---|---|---|---|---|---|---|
| Activity | Maximum Daily Emissions (lbs/day) | | | | | |
| | **VOC** | **$NO_X$** | **CO** | **$SO_2$** | **PM-10** | **PM-2.5** |
| **SCAQMD Daily Thresholds Operation** | 55 | 55 | 550 | 150 | 150 | 55 |
| **Daily Project - Emissions Operational** | **12.48** | **20.06** | **84.14** | **0.16** | **11.40** | **3.32** |
| **Exceeds Y/N Threshold?** | **N** | **N** | **N** | **N** | **N** | **N** |

Source: Table 3 and 4, AQ/GHG Analysis

As shown in the tables above, the emissions from construction and operation of the Project are below the SCAQMD daily construction thresholds for all the criteria pollutants. In addition, the short-term emissions do not exceed SCAQMD's localized significance thresholds (LST) without mitigation, as contained in the AQ/GHG Analysis.

Therefore, the Project will have **less than significant** impacts directly, indirectly, or cumulatively.

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

**Less Than Significant Impact.** The portion of the South Coast Air Basin within which the Project is located is designated as a non-attainment area for ozone, PM-10, and PM-2.5 under both state and federal standards. Since the Project's emissions do not exceed the SCAQMD established thresholds of significance (see Response 3b, above); the Project's net increase in criteria pollutant emissions for which the Project region is non-attainment is not cumulatively considerable. Impacts will be **less than significant**.

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

**3d. Response:** ***(Source: Air Quality/Greenhouse Gas Analysis prepared by WEBB on May 27, 2015; Health Risk Assessment prepared by Urban Crossroads on May 26, 2015)***

**Less Than Significant Impact.** The proposed Project is located in a developed area with a mix of uses. As detailed in the AQ/GHG Analysis, the closest sensitive receptors are the residences adjacent to the local area streets and Project site. Short-term emissions will be generated in the Project area during construction of the Project and have been found to be less than significant (see Response 3b and Appendix A of this Initial Study). In addition, Project will not result in carbon monoxide (CO) hot spots.

Because it is recognized that the effects of freeway traffic and rail road pollutants may impact the proposed Project's residents, an off-site health risk assessment (HRA) was prepared to identify the cancer and non-cancer health risk resulting from exposure to toxics from the freeway and diesel particulates from the rail line. The Project is approximately 875 feet east of State-Route 91 and 150 feet east of the existing rail line, used daily by a total of 105 freight, Amtrak, and Metrolink trains. The HRA found that maximum cancer risk from the freeway and rail line is 7.6 in one million, which is less than the SCAQMD significance threshold of 10 in one million. The HRA also found that non-cancer risks were below the SCAQMD threshold, which is a hazard index of 1.0. In addition, the HRA also predicted concentrations of criteria pollutants (PM-10, PM-2.5, CO, and $NO_2$) from the freeway and rail line and concluded that the ambient concentrations were also below identified thresholds of significance and/or ambient air quality standards.

Hence, the Project will not expose sensitive receptors to substantial pollutant concentrations and impacts are considered **less than significant** directly, indirectly, or cumulatively.

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

**3e. Response:** ***(Source: Air Quality/Greenhouse Gas Analysis prepared by WEBB on March 24, 2015)***

**Less Than Significant Impact.** The Project presents the potential for generation of objectionable odors in the form of diesel exhaust during construction in the immediate vicinity of the Project site. Odors generated during construction will be short-term and will not result in a long-term odorous impact to the surrounding area. Recognizing the short-term duration and quantity of emissions in the Project area, the Project will result in **less than significant** impacts relating to objectionable odors directly, indirectly, or cumulatively.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| **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: RCIP Conservation Summary Report Generator, 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, and General Plan 2025 FPEIR Figure 5.4-8 – MSHCP Burrowing Owl Survey Area)***

**No Impact.** The Project site is a previously disturbed site within an urbanized area and does not contain any sensitive species or habitat. A portion of the Project site is paved. Therefore, the Project will have **no impact** on habitat modifications, species identified as a candidate, sensitive, or special status species in local or regional plans, and policies or regulations of the California Department of Fish and Game or U.S. Fish and Wildlife Service.

| | | | | |
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| 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: RCIP Conservation Summary Report Generator, 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, and General Plan 2025 FPEIR Figure 5.4-8 – MSHCP Burrowing Owl Survey Area)***

**No Impact.** See response to 4a above. The Project site is located on a previously disturbed site within an urbanized area and does not contain any evidence of wetland or riparian habitat. The Project site is located within an urban built-up area, and is surrounded on all sides by existing development. 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**,** the Project will have **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.

| | | | | |
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| 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: RCIP Conservation Summary Report Generator, General Plan 2025 – Figure OS-5 – Habitat Areas and Vegetation Communities)***

**No Impact.** The Project site consists of two previously disturbed properties, within an urbanized area, that do not present any evidence of federally protected wetlands or riparian vegetation; there will be **no impacts**.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| 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: RCIP Conservation Summary Report Generator, General Plan 2025 –Figure OS-7 – MSHCP Cores and Linkage)***

**No Impact.** The project site is located in a developed/urban area of the City and is not located within an MSHCP Criteria Cell. The Project site is surrounded on all sides by developed land and as such is not located in an area that facilitates the movement of resident or migratory species. Per General Plan 2025 Figure OS-7, MSHCP Cores and Linkages, the Project site is not designated as an existing Core or Linkage, and is not designated as a proposed Core, Habitat Block, or designated Linkage. Therefore, there will be **no impact**.

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

**4e. Response:** ***(Source: City of Riverside Urban Forestry Policy Manual UFPM)***

**Less Than Significant Impact.** The project will adhere to the City of Riverside Urban Forest Tree Policy in respect to street trees, therefore a **less than significant** impact will occur.

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| 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: RCIP Conservation Summary Report Generator, General Plan 2025 – Figure OS-6 – Stephen's Kangaroo Rat (SKR) Core Reserve and Other Habitat Conservation Plans (HCP))***

**No Impact.** The purpose of the Western Riverside Multiple Species Habitat Conservation Plan (MSHCP) is to conserve habitat for selected species throughout western Riverside County. The MSHCP consists of a Criteria Area that assists in facilitating the process by which individual properties are evaluated for inclusion and subsequent conservation. In addition to Criteria Area requirements, the MSHCP requires consistency with Sections 6.1.2 (Protection of Species within Riparian/Riverine Areas and Vernal Pools), 6.1.3 (Protection of Narrow Endemic Plant Species), 6.1.4 (Urban Wildlands Interface), 6.3.2 (Additional Survey Needs and Procedures), Appendix C (Standard Best Management Practices), and 7.5.3 (Construction Guidelines). The MSHCP serves as a comprehensive, multi-jurisdictional Habitat Conservation Plan (HCP), pursuant to Section (a)(1)(B) of the Endangered Species Act (ESA), as well as the Natural Communities Conservation Plan (NCCP) under the State NCCP Act of 2001.

The Project site is not within an MSHCP Criteria Cell, Core, or Habitat Block and therefore does not have any conservation goals for species covered in the MSHCP. The Project site is also not within focused survey areas for any MSHCP-covered plant or animal species. The Project is not located in an area with SKR core reserves nor is the Project located within the El Sobrante Landfill or Lake Mathews Habitat Conservation Plans. With payment of MSHCP fees, the project will be in compliance with the MSHCP. Because the Project will not conflict with the provisions of a habitat conservation plan or natural community conservation plan and there will be no impact.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| **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, and site specific Cultural Resources Survey prepared by JM Research and Consulting, June 2015; Citywide Design Guidelines and Sign Guidelines [CDGSG])***

**Less Than Significant Impact.** A Cultural Resources Survey (the Survey) was completed for the proposed Project by JM Research and Consulting. The Survey included a literature and records search at the Eastern Information Center (EIC), and additional research including review of historic maps, aerial images, previous surveys, published local and regional historical accounts were collected and reviewed, and intensive property ownership and construction history was researched. In addition to the research, an intensive level historical and archaeological survey of the Project site was conducted by walking parallel transects spaced approximately 15 meters apart. The site and soil exposures were carefully inspected for evidence of historic resources or archaeological activities. Current condition and architectural features were noted in the field and architectural quality and integrity were assessed.

A large portion of the Project site is within the boundaries of the locally designated Seventh Street East Historic District and the locally eligible Citrus Thematic Industrial Potential Historic District. The Project site is also immediately adjacent to the locally eligible Ninth Street Potential Neighborhood Conservation Area (NCA). These three historic districts are considered "historical resources" under CEQA.

The edge of the Ninth Street Potential NCA, which is currently lined with an existing block wall, has always been clearly demarcated. Although the lots within the Project area located to the rear of the potential NCA once supported similar housing stock, the parcels adjacent to the west were never developed or functioned as part of the adjacent historic residential neighborhood along 9$^{th}$ Street. The large parcel across 9$^{th}$ Street once supported a citrus packing house, and is now a parking lot. The Project proposes to construct surface parking in this southerly portion of the Project site as well as add small-scale amenities structures fronting 9$^{th}$ Street. The Project's proposed use of railroad freight shipping containers will blend with the neighboring residences and are appropriate as is the use of railroad-related features as functional design elements, which is a familiar historic neighbor to the Ninth Street properties. Therefore, as currently proposed, the Mission Lofts project constitutes a less than significant impact to the adjacent residential Ninth Street Potential NCA.

The Seventh Street East Historic District reflects a diverse collection of architectural styles in residences (1880-1945) compatible in scale, age and tone that reflect the lives of average citizens. However, the portion of this District in which a portion of the Project site is located never supported housing stock and contains no contributing features. The potential for Project-related impacts to this District exists near Building B at the northeasterly project boundary, which is closest to the historic neighborhood development. However, the three residences adjacent to this project boundary are modern, non-contributing compatible infill of slightly larger size and it appears slightly less setback than the 25-foot setback of earlier historic construction further east and are separated from the Project by an existing block wall. This infill buffer is further enhanced by several proposed design components, including the reduction of Building B to two stories in height, the use of 5-foot patios for Building B to soften the effect of a more shallow, and approximately 11-foot front setback from the back of sidewalk to the building elevation, the approximately 20-foot open space side setback, which will be planted with a specimen tree, and the placement of rear carports and surface parking, which maximizes the distance between the modest-scale historic neighborhood and the four-story Building A. Therefore, as currently proposed, the Mission Lofts project appears to constitute a less than significant impact to the residential Seventh Street East Historic District.

The Citrus Thematic Industrial Potential Historic District is located at the west end of the Eastside adjacent to residential neighborhoods and is characterized by the combination of rail transportation, water infrastructure, citrus industrial, and light industrial development that together formed the basis of Riverside's early economy and catalyst for prosperity in the late-19$^{th}$ and early-20$^{th}$ centuries. Historic development is scattered throughout this wide corridor, including rail stations, tracks,

loading docks and platforms, packing houses, warehouses, mills, and canal segments. As described in the Project Description, design components of the proposed Mission Lofts project are intended to integrate historic rail and citrus industrial uses in the Project area and the historic character of the Citrus Thematic Industrial Historic District into the new design. In keeping with the industrial uses of the area, the Project incorporates large, functional, full-height continuous masses that appear segmented or linked by articulated columns of perforated metal balconies reminiscent of railway gangways or couplings between passenger and freight cars. Although the four-story height of the main Building A is higher than any other historic period industrial or current development in the area, the size and scale of citrus packinghouses, warehouses, and mills were larger, more imposing buildings compared to their contemporary property types with high, open raftered ceiling space for added storage. Thus, the size and scale of the proposed improvements may be viewed as acceptable, particularly as they are distant from other construction and historic buildings such as the AT&SF train station across Commerce Street and the AT&SF right-of-way, and packing house and warehouse industrial buildings across Mission Inn Avenue and the lowered University Avenue.

The Project proposes the use of railroad-related features as functional design elements, which mimic the historic use and look of the former SPRR right-of-way area and is a familiar and longtime neighbor in this location. The cutaway corner at Mission Inn Avenue and Commerce Street makes focal a corner freight-inspired cantilever that is clad in corrugated metal siding painted red and signed with bold, block letters. The metal square arch entry to the interior leasing office suggests a railroad signal bridge. The project proposes the use of corrugated metal siding as well as stucco, cementitous plaster, exterior metal systems, and concrete block, which both incorporates and modernizes functional, historic industrial materials. While brick is not proposed, the color scheme includes deep red and various shades of gray, which invokes brick and metal. Although utilized as part of the project, the SPRR bridge, which will be cleaned of graffiti and repaved for ADA compliance, will remain as visible as it is currently to the motoring public on University Avenue and Commerce Street.

The site, building, and architectural design components proposed for this large, nearly vacant Project Area have the potential to visually improve internal cohesion, and strengthen the existing boundary, of the Citrus Thematic Industrial Potential Historic District. Therefore, as currently proposed, the Mission Lofts project appears to constitute a less than significant impact to the Citrus Thematic Industrial Potential Historic District.

During the field survey two potential cultural resources were also identified: a long, rectangular concrete loading dock (ca. 1930-1947) framed by steel railroad rails near the corner of Mission Inn Avenue and Commerce Street and an abandoned railroad bridge over University Avenue. The Project proposes to demolish the loading dock and reuse the railroad bridge as a pedestrian walkway connecting the two portions of the Project site. The Survey concluded that these two potential historic resources lacked the level of architectural distinction, strength of historic association, and sufficient integrity that would meet criteria for importance under CEQA, or for inclusion in the National Registrar of Historic Places, the California Registrar of Historical Resources, or local designation under the City's recently revised Cultural Resources Ordinance (Title 20; Ord. 7108 §1, 2010). Therefore, Project impacts to these resources will be less than significant.

In addition to the loading dock and abandoned railroad bridge, several historic and modern remnants and features of limited diagnostic value were also found within the Project boundaries, including concrete pads of various age (1925 and 1970s), various broken, clay (date unknown) and concrete (ca. 2000) roof tiles in a small debris pile adjacent (south) to the loading dock, a curved vehicular asphalt drive (ca. 2000) from Commerce Street to the abandoned railroad bridge, asphalt brow ditches (ca. 1960) above University Avenue, several wood creosote utility poles (one tagged by 1935), a billboard pole sign (1971), a broken, *in situ* piece of clay sewer pipe of unknown date perpendicular to Mission Inn Avenue and a standard cast iron manhole cover (ca. 1950s-1960s) above the north side of University Avenue, a green glass bottle fragment (ca. 1983), and two out of context railroad spikes of unknown date near the sewer pipe and by the northern brow ditch. It appears that rather than buried, all railroad tracks have been removed (1960 and ca. 2000) or cut and reused in the construction of the loading dock and as upright posts within the Project Area. No remains of earlier citrus industrial-related or residential construction were evident. These historic remnants and features were examined, partially researched, and ultimately determined not to be potential cultural resources. Therefore, any impacts to these items would be less than significant and no mitigation is required. Although not required as a mitigation measure based on the analysis and findings of the Survey, the City is including a standard condition with procedures in the event that unanticipated historic period resources are encountered.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
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For the reasons set forth above, the Project's potential cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5 of the CEQA Guidelines is **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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 and site specific Cultural Resources Survey prepared by JM Research and Consulting, June 2015 [JMRC])***

**Archaeological Resources**

**Less Than Significant with Mitigation Incorporated.** The Cultural Resources Survey prepared for the proposed Project by JM Research and Consulting included a records search and intensive field survey of the Project site, the results of which did not reveal the presence of any previously recorded or potential archaeological resources. Further, the site has been previously disturbed and it is highly unlikely that any archaeological resources could exist. However, in order to provide protection in the unlikely event that archaeological resources are unearthed during Project construction, implementation of mitigation measure **MM CR 1** will reduce potential impacts to **less than significant with mitigation**.

> **MM CR 1:** Prior to initiation of ground-disturbing activities, construction personnel shall be alerted to possibility of buried historic-period cultural deposits. Should any cultural and/or archaeological resources be inadvertently discovered during construction, construction activities in the vicinity of the discovery shall immediately halt and shall be moved to other parts of the Project site and a qualified archaeologist shall be contacted to determine the significance of the resource(s). If the find is determined to be a historical or unique archaeological resource, as defined in Section 15064.5 of the California Code of Regulations (State *CEQA Guidelines*), avoidance or other appropriate measures shall be implemented.

**Tribal Cultural Resources**

**Less Than Significant with Mitigation Incorporated.** Assembly Bill 52 (AB 52), signed into law in 2014, amends CEQA and establishes new requirements for tribal notification and consultation. AB 52 applies to all projects for which a notice of preparation or notice of intent to adopt a negative declaration/mitigated negative declaration is issued after July 1, 2015. AB 52 also broadly defines a new resource category of tribal cultural resources and establishes a more robust process for meaningful consultation that includes:

- Prescribed notification and response timelines;
- Consultation on alternatives, resource identification, significance determinations, impact evaluation, and mitigation measures; and
- Documentation of all consultation efforts to support CEQA findings.

On August 10, 2015, the City of Riverside provided written notification of the Project in accordance with AB 52 to all of the Native American tribes that requested to receive such notification. Responses were received by the Morongo Band of Mission Indians, San Manuel Band of Mission Indians, and Soboba Band of Luiseño Indians. The Morongo Band of Mission Indians did not request a formal consultation meeting, but requested that Standard Development Conditions be imposed and that the tribe be contacted in the event of undiscovered finds. The San Manuel Band of Mission Indians requested a formal consultation meeting that was held on September 10, 2015. The meeting resulted in no significant concerns after implementation of the City's standard conditions. The Soboba Band of Luiseño Indians also requested a formal consultation meeting that was held on September 14, 2015. The meeting resulted in a request to obtain records search results from the Cultural Resources Survey, that the City's standard conditions be imposed with tribal notification for inadvertent finds. The Soboba consultation was closed on September 21, 2015. The City will implement its standard condition as set forth in California Health and Safety Code section 7050.5 regarding the encountering of human remains, There shall be no further

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
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disturbance until the County Coroner has a made a determination of origin and disposition pursuant to Public Resources code Section 5097.98. The County Coroner will be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. Further, **MM CR 1**, above will be implemented.

The Cultural Resources Survey prepared for the proposed Project by JM Research and Consulting included a records search and intensive field survey of the Project site, the results of which did not reveal the presence of any previously recorded or potential archaeological resources. Further, the site has been previously disturbed and it is highly unlikely that any tribal resources could exist. However, in order to provide protection in the unlikely event that cultural resources are unearthed during Project construction, implementation of mitigation measure **MM CR 1** and the City's standard conditions will reduce potential impacts to **less than significant with mitigation**.

| | | | | |
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| 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)***

**Less than Significant with Mitigation Incorporated.** The Project area is identified in the General Plan EIR as having an unknown potential for paleontological resources. However, given that the Project area is mostly developed and the Project site has been previously disturbed, discovery of any unique paleontological resource is considered highly unlikely. Nonetheless, to ensure impacts to paleontological resources at the Project site are less than significant in the event of accidental discovery, the Project will incorporate **MM CR 2** which will reduce potential impacts to **less than significant with mitigation**.

> **MM CR 2:** If any paleontological resources are exposed during Project related excavation, ground disturbance activities in the vicinity of the discovery shall be moved and a qualified paleontological resources specialist will be retained by the Project Applicant to evaluate the resources. If the find is determined to be significant, avoidance or other appropriate measures as identified by the paleontological resources specialist shall be implemented. Appropriate measures include a qualified paleontologist to be permitted to recover, evaluate, and curate the finds in accordance with the standards and guidelines of the City of Riverside and the Society of Vertebrate Paleontology

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| 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.** The Project site is not located on any known cemetery. In the unlikely event that unknown human remains are uncovered during Project construction, California Health and Safety Code Sections 7052 and 7050.5 require the Riverside County Coroner's Office to be contacted within 24 hours and all work to be halted until a clearance is given by that office and any other involved agencies. Further, in that event, the Project Applicant will comply with the requirements of Public Resources Code Section 5097.98, as amended. Therefore, with adherence to existing laws and codes, impacts will be **less than significant**.

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

**6i. Response:** ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones, site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc., [GPI])***

**Less Than Significant Impact.** Southern California is a seismically-active region that contains many earthquake faults. Per General Plan 2025 Figure PS-1, Regional Fault Zones, there are no Alquist-Priolo zones or fault lines that traverse the City. Therefore, the proposed Project site in not located within an Alquist-Priolo Earthquake Fault Zone and no known earthquake faults traverse the site. Thus, the potential for fault rupture is low. Additionally, any structure developed as a part of the Project will be subject to seismic design criteria in accordance with the 2013 California Building Code (CBC) which will reduce potential impacts to **less than significant**.

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| ii. Strong seismic ground shaking? | ☐ | ☐ | ☒ | ☐ |

**6ii. Response:** ***(Source: General Plan 2025 Figure PS-1 – Regional Fault Zones site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc., February 17, 2014 [GPI])***

**Less Than Significant Impact.** As stated above, Southern California is prone to seismic activity. Although the proposed Project site is not located within a fault zone and is not located within ½ mile of a fault; the Project site is located within an area that is subject to strong ground shaking due to being in close proximity of the San Jacinto Fault Zone (approximately 9 miles east of the site) and the Elsinore Fault Zone (approximately 17 miles southwest of the site). These faults have the potential to cause moderate to strong ground shaking. However, the proposed Project would be required to implement all requirements of the current edition of the California Building Code, applicable to the Project, which provides criteria for the seismic design of buildings. Therefore, with compliance with the California Building Code regulations, impacts will be **less than significant**.

| | | | | |
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| 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, and Appendix E – Geotechnical Report site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc. on February 17, 2014 [GPI])***

**Less Than Significant Impact.** Seismically-induced liquefaction occurs when ground shaking causes water-saturated soils to become fluid and lose strength. Liquefaction historically has been responsible for significant damage, creating problems with bridges, buildings, buried pipes and underground storage tanks. The City is underlain by areas susceptible to varying degrees of liquefaction, ranging from very low to very high. According to the General Plan 2025 Figure PS-2, Liquefaction Zones Map, the proposed Project site is located in area identified as having low potential for liquefaction. The Project specific Geotechnical Investigation also determined that the potential for liquefaction to occur at the site is low due to the depth of groundwater, which was determined to be at a depth of 50 feet below existing grade. Therefore impacts related to seismic failure, including liquefaction will be **less than significant.**

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| iv. Landslides? | ☐ | ☐ | ☒ | ☐ |

**6iv. Response:** ***(Source: General Plan 2025 FPEIR Figure 5.6-1 – Areas Underlain by Steep Slope site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc. on February 17, 2014 [GPI])***

**Less Than Significant Impact.** According to General Plan 2025 FPEIR Figure 5.6-1, Areas Underlain by Steep Slope, the Project site is in an area designated as having a 0 to 10 percent slope. The Project site is currently vacant and is relatively flat, with no steep slopes. However University Avenue is located below both portions of the site along vegetated cut slopes ranging from approximately 1 to 6 feet near the eastern limits of the site to approximately 15 to 20 feet along the western limits of the site. The cut slopes are at an inclination of approximately 2:1 (horizontal:vertical). However, the proposed Project is designed to be set back from these slopes. Because these existing slopes are currently vegetated and maintained, and given the relatively small size of these slopes, they are not capable of producing landslides. Therefore, impacts will be **less than significant.**

| | | | | |
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| 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 site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc., [GPI])***

**Less Than Significant Impact.** Construction activities have the potential to result in soil erosion or the loss of topsoil. However, erosion will be addressed through the implementation of existing State and Federal requirements, and the preparation of a Storm Water Pollution Prevention Plan (SWPPP) which will identify Best Management Practices (BMPs) to address soil erosion. Upon compliance with these standard regulatory requirements, the project is not anticipated to result in substantial soil erosion or the loss of topsoil and no additional mitigation measures would be required. For these reasons impacts will be **less than significant**.

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| 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, and site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc. on February 17, 2014 [GPI])***

**Less Than Significant Impact.** Impacts related to landslides are addressed above in response to 6a.iv; impacts related to liquefaction are addressed above in response to 6a.iii. This analysis addresses impacts related to unstable soils, as a result of lateral spreading, subsidence, or collapse

*Lateral Spreading:* lateral spreading consists of lateral movement of level or near-level ground associated with liquefaction during an earthquake. As discussed in response to 6a.iv above, the Project site is located in an area identified as having a low potential for liquefaction and as such a low potential for lateral spreading.

*Subsidence:* Seismic ground subsidence (not related to liquefaction induced settlements) occurs when strong earthquake shaking results in the densification of loose to medium density sandy soils above groundwater. The Project specific Geotechnical Investigation determined that the total magnitude of subsidence would be on the order of ¼ to 1 inch. The majority of subsidence would occur in soils at depths from 10 to 25 feet below the existing ground surface.

*Collapse:* A collapsible soil will undergo a reduction in volume upon wetting. Collapsible soils will typically have a low dry density and low moisture content. Collapsible soils may support large pressures with low compressibility when dry but

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

experience significant compression upon wetting without an increase in pressure. According to the Project specific Geotechnical Investigation, the soils on the site exhibit a moderate potential for collapse. However, to lessen the potential impacts of collapsible soils at the site, the proposed Project will be constructed in accordance with the requirements of the CBC and the recommendations of the site specific Geotechnical Investigation.

For the reasons set forth above, impacts with regard to unstable geologic units or soils will be **less than significant**.

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| 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, California Building Code as adopted by the City of Riverside and set out in Title 16 of the Riverside Municipal Code and site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc., February 17, 2014 [GPI])***

**Less Than Significant Impact.** Expansive soils have a significant amount of clay particles or other minerals that have the ability to give up water (shrink) or take on water (swell). Fine grained soils, such as silts and clays, may contain variable amounts of expansive clay minerals. When these soils swell, the change in volume exerts significant pressures on loads that are placed on them. This shrink/swell movement can adversely affect building foundations. According to the General Plan 2025 FPEIR Figure 5.6-4, Soils, the Project site is underlain by Arlington soil, which has low to moderate shrink swell potential (as indicated in Table 5.6-B, Soil Types in the General Plan 2025 FPEIR). According to the General Plan 2025 FPEIR Figure 5.6-5, Soils with High Shrink-Swell Potential, the Project site is not located in a part of the City which has soils with high shrink-swell potential. Compliance with the recommendations of the site specific Geotechnical Investigation and with applicable provisions of the CBC will reduce potential impacts to **less than significant**.

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| e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water? | ☐ | ☐ | ☐ | ☒ |

**6e. Response:** ***(Source: Project Description)***

**No Impact.** The proposed Project will be served by a sewer system and no septic tanks or alternative wastewater disposal systems would be required. There will be no **impacts**.

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| **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: AQ/GHG Analysis prepared by WEBB, May 27, 2015)***

**Less Than Significant Impact.** The AQ/GHG Analysis evaluated the Project's greenhouse gas (GHG) emissions associated with the Project and indicates that an estimated total of 2,862.42 metric tons per year of carbon dioxide ($CO_2$) equivalents ($MTCO_2E$) will occur from the Project, which includes construction-related emissions amortized over a typical project life of 30 years. The total GHG emissions are below the SCAQMD recommended screening level of 3,000 $MTCO_2E$/yr for non-industrial projects.

Therefore, the proposed Project will not generate GHG emissions and the impact is considered to be **less than significant** directly, indirectly, or cumulatively.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| 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: Project Description)***

**Less Than Significant Impact.** As stated in response 7a, above, the Project's GHG emissions are below the SCAQMD recommended screening threshold and will not result in substantial amount of GHG emissions. Further, the Project will be subject to a variety of measures that reduce GHG emissions, including, but not limited to the current 2013 Title 24 (Building Energy Efficiency Standards), 2013 CalGreen Code (Green Building Standards Code), and measures being implemented under the California Air Resources Board Climate Change Scoping Plan. Therefore, the Project will not conflict with any applicable plan, policy, or regulation for the reduction in GHG emissions. Impacts are **less than significant**.

| **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 Tables 5.7 A – D, California Health and Safety Code, Title 49 of the Code of Federal Regulations, California Building Code)***

**Less Than Significant Impact.** Construction and operation of the proposed Project may include the transportation and storage of hazardous materials, such as fuels, cleaning solvents or pesticides. The transportation of hazardous materials can result in accidental spills, leaks, toxic releases, fire, or explosion.

However, a number of federal and state agencies prescribe strict regulations for the safe transportation of hazardous materials. Hazardous material transport, storage and response to upsets or accidents are primarily subject to federal regulation by the United States Department of Transportation (DOT) Office of Hazardous Materials Safety in accordance with Title 49 of the Code of Federal Regulations. California regulations applicable to Hazardous material transport, storage and response to upsets or accidents are codified in Title 13, (motor vehicles) Title 8 (Cal/OSHA), Title 22 (Health and Safety Code), Title 26 (Toxics) of the California Code of Regulations, Chapter 6.95 of the Health and Safety Code (Hazardous Materials Release Response Plans and Inventory) and the California Building Code.

Compliance with all applicable federal and state laws related to the transportation, storage and response to upsets or accidents that may involve hazardous materials would reduce the likelihood and severity of upsets and accidents during transit and storage, and potential impacts will be **less than significant**.

| | | | | |
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| 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)***

**Less Than Significant Impact.** As noted in response 8a above, the Project may involve the use of hazardous materials but shall comply with all applicable federal and state laws pertaining to the transport, use, disposal, handling, and storage of hazardous materials, including but not limited to Title 49 of the Code of Federal Regulations and Title 13, (motor vehicles) Title 8 (Cal/OSHA), Title 22 (Health and Safety Code), Title 26 (Toxics) of the California Code of Regulations, Chapter 6.95 of the Health and Safety Code (Hazardous Materials Release Response Plans and Inventory) and the California Building Code, which describes strict regulations for the safe transportation of hazardous materials. Compliance with all

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
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applicable federal and state laws related to the transportation, use and storage of hazardous materials would reduce the likelihood and severity of accidents during transit, use and storage to a **less than significant** impact.

| | | | | |
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| 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: Google Earth)***

**Less Than Significant Impact.** The proposed Project is not located within one-quarter mile of an existing or proposed school site. The nearest school is Longfellow Elementary School, located at 3610 Eucalyptus Avenue, in the City of Riverside which is approximately a 0.5 miles to the east of the Project site. Therefore, potential impacts will be **less than significant**.

| | | | | |
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| 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:** ***(DTSC EnviroStor Database)***

**Less Than Significant Impact.** On May 21, 2015 the California Department of Toxic Substance Control (DTSC) EnviroStor database was reviewed for hazardous material sites. The proposed Project site does not appear on any hazardous material site list compiled pursuant to Government Code Section 65962.5. The nearest site is the So Cal Gas/Riverside MGP located approximately 0.25 miles to the south of the site. The So Cal Gas/Riverside MGP is not listed on a National Priorities List and is a voluntary cleanup program. Two other sites are also listed approximately 0.25 miles to the north of the site. However both sites are listed as "inactive" and need further evaluation. Therefore, impacts are **less than significant**.

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| 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, RCALUCP and March Air Reserve Base/March Inland Port Comprehensive Land Use Plan dated November 13, 2014))***

**Less Than Significant Impact.** The proposed Project site is located within Airport Compatibility Zone E of the March Air Reserve Base/Inland Port Airport Influence Area (AIA), and therefore is subject to development review by the Riverside County Airport Land Use Commission (ALUC). Compatibility Zone E allows for residential development and has no restrictions on density. Neither residential density nor non-residential intensity is limited within Zone E, pursuant to the Countywide Policies section of the 2004 Riverside County Airport Land Use Compatibility Plan (RCALUCP). The proposed Project site is located more than 20,000 feet from the runways at Riverside Municipal Airport and March Air Reserve Base/Inland Port Airport (March ARB/IP). The top point elevation of the proposed structure will be more than 500 feet lower in elevation than the runway at March ARB/IP. The proposed Project site is also located approximately 12,000 feet from the northeasterly end of Runway 6-24 at Flabob Airport. Based on the distance and a runway elevation of 766.8 feet above mean sea level (AMSL), Federal Aviation Administration (FAA) review would be required for any structures with top of roof exceeding 1006.8 feet AMSL. The proposed Project site has an existing elevation of approximately 885 feet AMSL. With a maximum structure height of 55 feet 2 inches, the top point elevation would be 940.17 feet AMSL. Thus, FAA obstruction evaluation review for height/elevation reasons is not required.

On November 16, 2015, ALUC determined the Project's Site Plan Review is consistent with the 2014 March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan, subject to the following conditions:

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
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1) Any new outdoor lighting that is installed shall be hooded or shielded so as to prevent either the spillage of lumens or reflection into the sky. Outdoor lighting shall be downward facing.
2) The following uses shall be prohibited:
    a. Any use which would direct a steady light or flashing light of red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA-approved navigational signal light or visual approach slope indicator.
    b. Any use which would cause sunlight to be reflected towards an aircraft engaged in an initial straight climb following takeoff or towards an aircraft engaged in a straight final approach towards a landing at an airport.
    c. Any use which would generate smoke or water vapor or which would attract large concentrations of birds, or which may otherwise affect safe air navigation within the area. (Such uses include landscaping utilizing water features, aquaculture, production of cereal grains, sunflower, and row crops, artificial marshes, wastewater management facilities, composting operations, construction and demolition debris facilities, fly ash disposal, and incinerators.)
    d. Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.
3) The attached notice shall be provided to all potential purchasers of the property and to tenants of the proposed building.
4) Any new aboveground detention or water quality basins on the site shall be designed so as to provide for a maximum 48-hour detention period following the conclusion of the storm event for the design storm (may be less, but not more), and to remain totally dry between rainfalls. Vegetation in and around the detention/water quality basin(s) that would provide food or cover for bird species that would be incompatible with airport operations shall not be utilized in project landscaping.

The above conditions of approval are recommended by ALUC should the City decide to approve the Project. Given ALUC's determination that the Project is consistent with 2014 March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan, impacts with regard to safety hazards for people residing or working in the area are **less than significant** directly, indirectly, or cumulatively.

| | | | | |
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| 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**. The proposed Project is not located within the proximity of a private airstrip, and does not propose a private airstrip. As a result, the proposed Project will not expose people residing or working in the City to excessive noise levels related to a private airstrip. Therefore, **no impacts** are anticipated.

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| 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)***

**No Impact.** The City has developed an extensive Emergency Operations Plan (EOP), created by the Emergency Management Office. The City's Fire Department promotes a high level of multi-jurisdictional cooperation and communication for emergency planning and response management through activation of the Standardized Emergency Management System. Additionally, the General Plan also provides policies to identify methods of implementing the emergency plan.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
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The Project will be served by existing, fully improved streets (Mission Inn Avenue, University Avenue, and 9th Street). All streets have already been improved and have been designed to meet the Public Works and Fire Departments' specifications. Project compliance with City Fire codes, regulations, and conditions will ensure that implementation of the proposed project will not interfere or impair an adopted emergency response plan or emergency evacuation plan. Thus, **no impacts** are anticipated in this regard.

| | | | | |
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| 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)***

**No Impact.** The proposed Project is located in an urbanized area and is surrounded by development. According to General Plan Figure PS-7, Fire Hazard Areas, the Project site is not located in a fire hazard area. The vicinity of the project site is considered to have a low fire risk and is not identified in the City's General Plan as a high fire severity zone. Therefore **no impact** regarding wildland fires 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 Project Specific Water Quality Management Plan prepared by KHR Associates, February 23, 2016 [KHR])***

**Less Than Significant Impact.** Activities associated with the construction of the proposed Project would include grading and site preparation, which may have the potential to release pollutants (e.g., oil from construction equipment, cleaning solvents, paint) and silt off-site which could impact water quality. However, the Project is required to prepare a Stormwater Pollution Prevention Plan (SWPPP) pursuant to the statewide General Construction Permit (NPDES General Permit No. CAS000002, Waste Discharge Requirements, Order No. 2009-0009-DWQ, adopted September 2, 2009 and effective as of July 2, 2010) issued by the State Water Resources Control Board (SWRCB) for construction projects. Further, the Project would incorporate appropriate Best Management Practices (BMPs) to minimize potential runoff and erosion.

Development of the proposed Project would add impervious surfaces to the site. Upon completion of the Project, the impervious area would cover approximately 80% of the site. By increasing the percentage of impervious surfaces on the site, less water would percolate into the ground and more surface runoff would be generated. Paved areas and streets would collect dust, soil and other impurities that would then be assimilated into surface runoff during rainfall events. Operation of the Project has the potential to release pollutants resulting from replacing vacant land with roadways, walkways, and parking lots. These improvements may potentially impact water quality. A project-specific Preliminary Water Quality Management Plan (WQMP) KHR Associates to address the potential for operational impacts. The Preliminary WQMP has been submitted to the City Public Works Department for review. Prior to issuance of a grading or building permit, a final WQMP will be required for the Project.

The Project incorporates site design, source controls and treatment control BMPs to address storm water runoff. A majority of the flows from the site will occur over impervious surfaces that discharge to the underground onsite infiltration tank. The proposed infiltration systems are considered to have zero discharge. These BMPs combined with compliance of existing regulations will have a **less than significant impact** with regard to violation of water quality standards or waste discharge requirements.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
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| 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, and Project Specific Water Quality Management Plan prepared by KHR Associates, February 23, 2016 [KHR] and site specific Geotechnical Investigation prepared by Geotechnical Professionals Inc., February 17, 2014 [GPI], BlueRiverside.com website)***

**Less Than Significant Impact.** Water service will be provided to the Project by Riverside Public Utilities (RPU). RPU's water is sourced from local area wells in the Bunker Hill, San Bernardino, and Riverside Basins. The Project site is located within the Riverside South Water Supply Basin. The General Plan 2025 FPEIR concluded that implementation of the General Plan would not substantially deplete groundwater supplies such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. Because the Project includes a GPA and zone change that will change the land use designation of approximately 4.69 acres from Industrial (I), Mixed Use Village (MU-V) and Business/Office Park (B/OP) to Mixed Use-Urban (MU-U), the Project's water use was not considered during preparation of the General Plan 2025 FPEIR. However, the Project will comply with the CalGreen building code, which had not been adopted at the time the General Plan 2025 FPEIR was prepared. Because CalGreen requires a 20 percent reduction in indoor water use, even if the Project did not entail a GPA; the amount or what that will be used by the Project would be less than what would have evaluated in the General Plan 2025 FPEIR. Additionally, the proposed land use changes are minimal when compared to the overall buildout of the General Plan. Thus, the Project is not anticipated to substantially deplete the groundwater supplies.

The Project site is in an urbanized area and portions of the site are paved. These conditions are not conducive to groundwater recharge. Thus, development of the Project site will not substantially interfere with groundwater recharge.

For the reasons set forth above, impacts with regard to the depletion of groundwater supplies and substantial interference with ground water recharge will be **less than significant**.

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| 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 Water Quality Management Plan prepared by KHR Associates, February 23, 2016 [KHR])***

**Less Than Significant Impact.** The Project is located in an urban area of the City and as such, the Project will not alter the course of a stream or river. The Project is subject to NPDES requirements including preparing and implementing a SWPPP for the prevention of runoff during construction. Erosion, siltation and other possible pollutants associated with long-term implementation of the Project is addressed as part of the project-specific Preliminary WQMP and grading permit process. Therefore, through compliance with existing regulations and policies impacts will be **less than significant.**

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| 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 Water Quality Management Plan prepared by KHR Associates on February 23, 2016 [KHR])***

**Less Than Significant Impact.** According to Figure PS-4 in the General Plan 2025, the Project site is not located in a flood hazard area. The runoff from the Project in a developed condition has been studied in the Project specific Preliminary WQMP and is required to be attenuated on-site, so that the off-site discharge is the same as the undeveloped condition. Therefore, no flooding on or off-site as a result of the project will occur. Impacts are **less than significant**.

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| 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 Water Quality Management Plan prepared by KHR Associates on February 23, 2016)***

**Less Than Significant Impact** The project incorporates site design, source controls and treatment control BMPs to address storm water runoff. A majority of the flows from the site will occur over impervious services that will discharge into a proposed underground onsite infiltration tank. Other flows will drain into adjacent landscaping for retention. In addition, all downstream conveyance channels that will receive runoff from the Project are engineered and regularly maintained to ensure flow capacity. As such, impacts will be **less than significant**.

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

**9f. Response:** ***(Source: Project Specific Water Quality Management Plan prepared by KHR Associates on February 23, 2016)***

**Less Than Significant Impact.** A Preliminary Project specific WQMP was prepared and has been submitted to the City Public Works Department for review and approval. The Preliminary WQMP identified pathogens, lead and copper as pollutants of concern. As such, appropriate site design, source control and treatment control best management practices were incorporated into the Project design to address the pollutants of concern in addition to and other potential and expected pollutants generally associated with a residential land use, such as trash and debris, oil, etc. As the Project will be reviewed by the City's Public Works Department and appropriate best management practices have been incorporated into the project design, impacts with regard to water quality will be **less than significant**.

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| 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 )***

**No Impact**. General Plan 2025 FPEIR Figure 5.8-2 -- Flood Hazard Areas shows that the Project site is not located within or near a 100-year flood hazard area. Therefore, no impact will occur.

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

**No Impact**. General Plan 2025 FPEIR Figure 5.8-2 -- Flood Hazard Areas shows that the Project site is not located within or near a 100-year flood hazard area. Therefore, **no impacts** will occur.

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| 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)***

**No Impact.** According to General Plan 2025 Figure PS-4, Flood Hazard Areas, which shows the potential dam inundation zones throughout the City, the Project site is not located in a dam inundation area. Therefore, **no impacts** will occur.

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| 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.

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| **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, Project site plan)***

**No Impact**. The Project site is currently vacant and can be accessed via Mission Inn Avenue, University Avenue, and 9th Street. Because Mission Lofts is an in-fill project, its development will not disrupt or divide the physical arrangement of an established community. Additionally, the Project does not propose to eliminate any existing roadways or create barriers to accessing existing development. Therefore, **no impacts** are anticipated

| | | | | |
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| 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, Downtown Specific Plan and Citywide Design and Sign Guidelines [CDGSG], Project Specific Traffic Impact Analysis prepared by Fehr & Peers, April 2015 [TIA[)***

**Less Than Significant Impact.** The proposed Project involves a GPA, to change the land use designation for the Project site from Industrial (I), Mixed Use Village (MU-V) and Business/Office Park (B/OP) to Mixed Use-Urban (MU-U) and a

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

Specific Plan Amendment to create the Mixed Use Marketplace SubArea and adopt the standards and uses of the Mixed Use-Urban land use found within Title 19 into the Marketplace Specific Plan and a change of zone to rezone 4.69 acres from General Industrial with specific plan and cultural resources overlays (I-SP-CR), General Industrial with specific plan overlay (I-SP), Business and Manufacturing Park with specific plan overlay (BMP-SP), Business Manufacturing Park with specific plan overlay and cultural resources overlay (BMP-SP-CR), and Commercial Retail with specific plan overlay (CR-SP) to MU-U-SP – Mixed Use-Urban – Specific Plan (Marketplace Specific Plan) and MU-U-SP-CR – Mixed-Use – Urban – Specific Plan (Marketplace Specific Plan) – Cultural Resources (Seventh Street East Historic District). Due to the Project's location to existing residential uses, the project would continue the development pattern of residential uses in the Project Area. Additionally, units step down from 4 stories to 2 stories along Mission Inn Avenue to be compatible with surrounding residential development.. A request for two variances has been submitted: (1) P15-0954; to permit fewer parking spaces than required by the City's Municipal Code, and (2) P15-0953; to allow 16 tandem parking stalls.

Because the Project is a Transit Oriented Development (TOD), it includes a request for a variance from Section 19.580.060 of the Zoning Code to allow fewer parking spaces than required by the City's Municipal Code. The project is proposing 315 parking stalls, at a ratio of 1.49 parking stalls per unit, a reduction of 50 parking stalls. The reduction in the number of stalls includes those for both the residential use and the 5 required for the commercial space located along 9$^{th}$ Street. The Project also includes variances to allow the use of tandem parking spaces. A Parking Demand Study (Section 8.0 of the TIA) was prepared to determine an appropriate parking ratio for the Project. Empirical data from national research on residential parking demand, research on parking in TODs, as well as the results of a parking study conducted at a residential development in Corona, California, were used to develop alternative parking estimates for the Project.

The results of the Parking Demand Study indicate that because the City's Zoning Code applies to the entire City, which includes a mix of suburban and urban areas, the Code requirements may not be well suited to the proposed Project, because the Project site is served by multi-modal transit and is within walking distance to employment, retail, and entertainment destinations in Downtown Riverside. A 2004 study[1] funded by Caltrans found that residents of TODs typically drive less than residents of traditional developments, and may be less likely to own a car or at least less likely to be a two-car household. This same study determined that TODs and projects within walking distance of downtown uses exhibit peak parking demands well below the minimum off-street parking requirements of most suburban zoning codes.

TODs and projects in downtowns tend to attract young single people and older couples whose children have left home. Therefore, the need for larger units with higher parking requirements is reduced. This leads to increased demand for one-bedroom units (occupied by one person) and more use of two bedroom units by a single person who uses the second bedroom as a study, home office, weekend bedroom for a child under a shared custody arrangement, or a guest bedroom for an occasional visitor. All of the above factors influence the size of units (with more small units being built), the density of habitation (with more single people occupying a one- or two-bedroom unit) and therefore, the amount of parking needed to serve the new demographic.

The results of an Urban Land Institute (ULI) sponsored study in 1984 established a basic methodology for analyzing parking demand and developed averages for parking rates by land use. The recommended parking ratio for residential rental units from this study was 1.65 spaces per dwelling unit (1.5 spaces per unit plus 0.15 guest space per unit). Fehr & Peers compiled data from TOD parking studies completed across the United States. While the provision of parking varies between TODs, in general, the average parking ratio per unit in TODs in both suburban and urban locations is substantially lower (1.0 to 1.3 spaces per dwelling unit compared with 1.7 spaces per dwelling unit) than what the Code would require for the Mission Lofts project.

Based on the range of parking ratios detailed in research on TODs and the empirical parking demand found at the comparable development in Southern California, a reduction to the required parking ratios found in the Riverside Zoning Code would be appropriate given the nature of the Mission Lofts development. Based on all of the available data, the parking demand at the Mission Lofts project is projected to be between 1.0 and 1.5 spaces per dwelling unit inclusive of on-site parking. The Project proposes 315 parking spaces.

[1] Lund, Cervero, and Wilson. *Travel Characteristics of Transit-Oriented Development in California*, 2004.

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

With approval of the proposed GPA SPA, Change of Zone, parking variances, and certificate of appropriateness, the Project will have adequate parking and not conflict with any applicable land use plan, policy or regulation of an agency with jurisdiction over the Project. Therefore, impacts are considered **less than significant**.

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

**10c. Response:** ***(Source: RCIP Conservation Summary Report Generator, General Plan 2025 – Figure OS-6 – Stephen's Kangaroo Rat (SKR) Core Reserve and Other Habitat Conservation Plans (HCP)***

**No Impact.** See 4f, above.

| **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)***

**Less Than Significant Impact**. The mineral resource zone (MRZ) mapped for this area is MRZ-3. This classification is an area where the available geologic information indicates that mineral deposits are likely to exist, however, the significance of the deposit is undetermined. Given the size and location of the Project site in relationship to surrounding urban uses, it is highly unlikely that any surface mining or mineral recovery operation could feasibly take place in these areas. For these reasons impacts with regard to the loss of a known mineral resource are **less than significant**.

| | | | | |
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| 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 within the City or its Sphere of Influence 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. **No impacts** are anticipated.

| **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, Title 7 – Noise Code, and Project Specific Noise Impact Analysis prepared by Kunzman Associates, Inc., May 31, 2015 )***

**Less than Significant with Mitigation Incorporated.** Noise impacts are evaluated from two perspectives – impacts to the Project and impacts from the Project. Noise impacts to a project may occur as a result of excessive off-site noise sources.

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

Noise impacts from a project may occur as a result of on-site activities or project-related traffic. To evaluate these impacts a Noise Impact Analysis (NIA) was prepared for the Project by Kunzman Associates Inc.

*Impacts to the Project:* The dominant noise source at the Project site is from vehicles on University Avenue and Mission Inn Avenue and trains using the railroad track northwest of the Project site. Measured ambient noise in the Project area ranges from 60.8 dBA to 82.5 dBA.

During long term operation of the Project, exterior noise levels for the proposed residential buildings could exceed the City of Riverside land use compatibility guidelines set forth in the General Plan. The General Plan noise/landuse compatibility criteria for infill residential land uses states that noise would be "normally acceptable" in areas with noise levels up to 65 dBA CNEL and "conditionally acceptable" in areas with noise levels up to 75 dBA CNEL. The NIA determined that unmitigated future buildout traffic noise levels in the Project area could reach up to 73 dBA CNEL at the façade of the proposed apartment buildings. Noise levels at the Project's proposed outdoor recreation area are not expected to exceed 59.3 dba CNEL. The 59.3 dBA CNEL noise leave falls within the "normally acceptable" category and the 73 dBA CNEL falls into the category of what is considered to be "conditionally acceptable." As a matter of policy, the City supports new residential development within already urbanized areas where ambient noise levels may be higher than those experienced in neighborhoods located on the urban periphery. New construction is still required to comply with standards set forth in Title 24 of the State Health and Safety Code. Special insulation, windows and sealants shall be utilized to ensure that the interior noise levels meet the 45 dBA CNEL standard. The Project also includes heating, ventilating, and air conditioning units (HVAC) to allow windows and doors to remain closed for prolonged periods of time to maintain interior noise standards. Due to the proximity of the existing rail crossing at Mission Inn Avenue, the proposed apartment units will be subject to rail crossing bells and train horns. Noise from the train horns is anticipated to reach up to 98 dBA at the Project site; however, this noise is intermittent it contributes very little to the 24-hour averaged and weighted noise level (CNEL) standard. To ensure that future noise levels on the Project site do not exceed the City's interior noise standards for residences, mitigation measure **MM Noise 1** will be implemented. **MM Noise 2** will be implemented to ensure that train proximity and schedules are disclosed to potential residents. Rail related vibration is discussed below in response 12b.

*Impacts from the Project*: Existing traffic noise modeling resulted in noise levels ranging between 58.6 dBA and 70.0 dBA at 50 feet from the centerlines of Commerce Street (from University Avenue to Mission Inn Avenue), Lime Street (from 9$^{th}$ Street to University Avenue), Mission Inn Avenue (from Vine Street to Commerce Street) and University Avenue (from Lemon Street to Lime Street; Park Avenue to Victoria Avenue; and Santa Fe Avenue to Commerce Street). With the addition of Project-related traffic to these street segments, the modeled noise levels range between 58.7 dBA and 70.1 dBA. (See Table 5 in the NIA.) Because the increase in noise is less than 5 dBA, impacts are considered less than significant.

During Project construction, temporary increases to ambient noise levels may occur. Sensitive receptors that may be affected by Project generated noise during construction include single-family detached residential dwelling units located south and southeast of the Project site, commercial establishments and a medical clinic located just south of the Project site. Noise levels may increase due to the operation of construction equipment and increased traffic volumes from workers commuting to and from the Project sites and delivery of construction material. Construction noise is further discussed below in response 12c.

The City does not provide specific construction noise control standards but controls construction noise by limiting the hours that construction activities may occur. According to the Municipal Code Section 7.35.010 (General Noise Regulations), temporary construction activities are allowed provided they do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between 5:00 p.m. on Fridays and 8 a.m. on Saturdays, after 5:00 p.m. Saturdays or at any time on Sunday or Federal Holidays. By adhering to the above listed limitations on working hours, which are standard conditions for typical projects in the City, the proposed Project will avoid creating offensive noise during nighttime hours and/or on Sundays or Federal Holidays when noise standards are more stringent. However, despite the restrictions on construction hours, construction noise levels could still exceed the City's exterior noise standards. To decrease construction noise levels experienced at noise sensitive land uses, mitigation measures **MM Noise 3** through **MM Noise 5** will be implemented.

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

For the reasons set forth above, impacts with regard to the exposure of persons to or the generation of noise levels in excess of established City standards are considered **less than significant with mitigation incorporated**.

**MM Noise 1:** Prior to issuance of building permit, the Project proponent shall demonstrate to the City that all exposed residential exterior window/wall assemblies facing Mission Inn Avenue provide a Sound Transmission Class (STC) rating of a least 28 dB; window/wall assemblies facing Commerce Street and the Railroad provide an STC rating of at least 25 dB; and window/wall assemblies facing University Avenue provide an STC rating of at least 23.4 dB. The building plans submitted to the City for review and approval shall identify the STC rating of the materials used to construct the exterior windows/wall assemblies.

**MM Noise 2**: All future property managers at the project site shall be required to disclose to potential residents the number of trains that pass by per day and at what time of day they pass. They should also be required to inform potential residents that the train horn noise will be audible in most of the proposed residential dwelling units. Relatively current train inventory data can be found on the Federal Railroad Administration's website. More specifically, data can currently be found at http://safetydata.fra.dot.gov/officeofsafety/publicsite/crossing/crossing.aspx.

**MM Noise 3:** Two weeks prior to the commencement of construction, notification must be provided to surrounding land uses disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period. For the duration of construction activities, the construction manager shall serve as the contact person should noise levels become disruptive to local residents. A sign shall be posted at the Project site with the contact phone number.

**MM Noise 4:** Prior to and during construction activities, the Project contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturer standards.

**MM Noise 5:** The construction contractor shall locate noise generating construction equipment and construction staging in areas that will create the greatest distance between construction related noise sources and noise sensitive receptors (nearby residences)that are nearest the Project site. The location of the construction staging areas shall be shown on the construction specifications and shall be reviewed by the City prior to the issuance of grading permit.

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

**12b. 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, FPEIR Table 5.11-G – Vibration Source Levels For Construction Equipment, and Project Specific Noise Impact Analysis prepared by Kunzman Associates, Inc., May 31, 2015)***

**Less than Significant Impact**. Construction related activities although short term, are the most common source of groundborne noise and vibration that could affect occupants of neighboring uses. Intermittent train vibration is also a source of groundborne noise and vibration. Since the Project is located next to the railroad tracks and will involve short term construction activities a Noise and Vibration Study was conducted for the proposed Project and is included as Appendix E to the NIA.

During construction vibratory equipment including loaded trucks, large bulldozes and a hoe-ram may be utilized during demolition activities that would include the tearing up of concrete. The most vibration causing piece of equipment that will likely be used on-site is a vibratory roller. Vibratory equipment may be annoying to people if operated within 25 feet of the existing adjacent single family dwelling units. Because construction-generated groundborne vibration is temporary and infrequent, and is considered a less than significant impact.

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

The Project site is located approximately 170 feet from an existing rail crossing at Mission Inn Avenue. The Noise Impact Analysis documented that 9 passenger trains and 105 freight trains pass by the Project site during a 24-hour period; 52 freight train pass-bys occur between the hours of 6:00 PM and 6:00 AM. Considering the number of trains that pass by the Project site and the fact that most are freight trains, the correct threshold to evaluate potential ground borne vibration impacts to the proposed project is 72 VdB (for more than 70 events per day) per the FTA Transit Noise and Vibration Impact Assessment Guidelines (2006). In addition, the FTA prescribes third-octave band limitations on vibration levels from 4 Hz to 80 Hz. On-site vibration measurements did not exceed 72 VdB between 4 Hz and 80 Hz. Because rail-related ground borne vibration is not expected to exceed the FTA vibration thresholds, impacts are considered less than significant.

For the reasons set forth above, Project impacts with regard to the exposure of persons to or the generation of excessive groundborne vibration or groundborne noise levels is **less than significant**.

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

**12c. 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, FPEIR Table 5.11-I – Existing and Future Noise Contour Comparison, Table 5.11-E – Interior and Exterior Noise Standards, Title 7 – Noise Code, and Project Specific Noise Impact Analysis prepared by Kunzman Associates, Inc., May 31, 2015)***

The Project site is located in a urbanized and built out area. Although noise sensitive residential uses exist adjacent to the site, given that the Project is located along a major arterial street that is a contributor to the existing noise environment. As discussed in response 12a, above, the NIA found that Project-related traffic will not result in substantial increases in ambient noise levels. Further, as a residential project, there are no operational activities that would result in a substantial increase in ambient noise. Impacts will be **less than significant**.

| | | | | |
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| 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, and Project Specific Noise Impact Analysis prepared by Kunzman Associates, Inc., May 31, 2015)***

**Less than Significant with Mitigation.** The primary source of temporary noise associated with the proposed Project is from construction activity. A likely worst-case one-hour construction noise scenario was modeled to determine what construction noise levels would be at the nearest sensitive receptors (adjacent residential properties). The worst-case scenario included three pieces of equipment most likely to be operated simultaneously near the adjacent single-family detached residential dwelling units during the demolition/excavation phase (hydra break ram, backhoe, dozer, and dump truck). The equipment was modeled at a distances ranging between 25-200 feet from the receptor. Unmitigated construction noise levels experienced at the sensitive receptors nearest to the project site could reach 82.6 dBA Leq. The loudest piece of equipment that may be used on the project site (a jackhammer) operating at the property line could generate a maximum noise level of up to 94.9 dBA Lmax at a receptor within 25 feet. With implementation of mitigation measures **MM Noise 3 through MM Noise 5** (see response 12a, above); impacts will be reduced to **less than significant with mitigation**.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| 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, March Air Reserve Base/March inland Port Comprehensive Land Use Plan November 13, 2014)***

**Less Than Significant Impact.** The proposed Project is located within Airport Compatibility Zone E of the March Air Reserve Base /Inland Port Airport Influence Area: however the proposed Project is not located within the 60 dB CNEL contour and is not located within any of the airport noise contour areas as depicted on Exhibit MA-4 of the RCALUCP. As a result, the proposed Project would not expose people residing or working in the project area to excessive noise levels related to airport noise. Therefore, the impacts are **less than significant**.

| | | | | |
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| 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)***

The proposed Project is not located within 2 miles of a private airstrip and as such will have **no impact** on people residing or working in the project area to excessive noise levels.

| **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, and Table 5.12-D - General Plan Housing Projections 2025)***

**Less Than Significant Impact**. The proposed Project consists of the construction of a 212 unit apartment complex, which may directly induce growth. According to the General Plan 2025, the City's projected population by the year 2025 is 346,867. Although the Project proposes a GPA, SPA, and zone change that will change the land use designation of approximately 4.69 acres from Industrial (I), Mixed Use Village (MU-V) and Business/Office Park (B/OP) to Mixed Use-Urban (MU-U), the Project will not induce substantial population growth for the following reasons. The GP 2025 FPEIR estimated a total of 127,692 dwelling units at build-out within the City's sphere under the "Typical Growth Scenario." The Project's increase of 212 units is less than a one percent increase. Because this is an infill Project and does not include the extension of roads or other infrastructure facilities, it will not indirectly induce population growth. For these reasons, impacts to population growth will be **less than significant**.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere? | ☐ | ☐ | ☐ | ☒ |

**13b. Response:** ***(Source: Google Earth; Site Visit)***

**No Impact**. The Project will not displace existing housing or people, necessitating the construction of replacement housing elsewhere because the Project site is vacant. There will be **no impact**.

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

**13c. Response:** ***(Source: Google Earth; Site Visit)***

**No Impact.** The Project will not displace existing housing or people, necessitating the construction of replacement housing elsewhere because the Project site is vacant. There will be **no impact**.

| **14. PUBLIC SERVICES.** | | | | |
|---|---|---|---|---|
| Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: | | | | |
| a. Fire protection? | ☐ | ☐ | ☒ | ☐ |

**14a. Response:** ***(Source: FPEIR Table 5.13-B – Fire Station Locations, Table 5.13-C – Riverside Fire Department Statistics and Ordinance 5948 § 1)***

**Less Than Significant Impact.** The development of the proposed Project will result in the construction of 212 residential dwelling units. The addition of these structures and residents would increase the number of responses for fire protection services and emergency medical services to the Project site and vicinity.

The City of Riverside Fire Department (RFD) operates 14 fire stations throughout the city. The Project will be served by City of Riverside Fire Station 1, located at 3420 Mission Inn Avenue, which is approximately 0.5 miles west of the site. The fire department currently serves the exiting parcel; therefore the construction of the proposed Project will not represent a significant increase in the number of developments requiring service.

The proposed Project will be required to implement General Plan 2025 policies and comply with existing codes, standards and practices set forth by the City of Riverside Fire Department. In addition, per Ordinance 5984, adopted in 1991, new development is required to pay impact fees which can go toward purchasing land and construction of new fire facilities. With adherence to these regulations, impacts are considered **less than significant**.

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| b. Police protection? | ☐ | ☐ | ☒ | ☐ |

**14b. Response:** ***(Source: General Plan 2025 FPEIR Section 5.13-Public Services)***

**Less Than Significant Impact.** The Riverside Police Department (RPD) does not use a formula for calculating the number of officers per capita. Instead, staffing for the department is based on the business and residential growth and evaluated on a project by project basis. Residential staffing is based on dwellings per development and business staffing is based on square

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
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footage of the business, type of business and type of police services required. As a result RPD estimates its staffing projections through 2025 are 110 additional sworn officers and 55 additional non-sworn personnel above present levels. According to General Plan Policy PS-7.5 RPD will endeavor to respond to Priority 1 calls within 7 minutes, and to respond to Priority 2 calls within 12 minutes. As the proposed Project consists of the construction of a 212 unit apartment complex, the number of new units and subsequent growth in population is minimal when compared to the overall population of the City. Hence, while the proposed Project will increase population, the amount of growth is not significant and is within the rate of growth projected under General Plan buildout projections. Therefore with implementation of General Plan 2025 policies and compliance with existing codes and standards, there will be a **less than significant impact** on the demand for additional police facilities or services.

| | | | | |
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| c. Schools? | ☐ | ☐ | ☒ | ☐ |

**14c. Response:** ***(Source: FPEIR Figure 5.13-2 – RUSD Boundaries, RUSD- Elementary School Attendance Areas, RUSD-Middle School Attendance Areas, RUSD-High School Attendance Areas )***

**Less Than Significant Impact**. The project site is located within the Riverside Unified School District (RUSD). The closest elementary school is Longfellow Elementary School, located at 3610 Eucalyptus Avenue which is approximately a 0.5 miles to the east of the Project site. The closest middle school is the University Heights Middle School, located at 1155 Massachusetts Avenue, approximately 2 miles east of the site. The closest high school is Riverside Poly High School, located at 5450 Victoria Avenue, approximately 3 miles south of the site.

Development of the Project would result in 212 dwelling units, thereby increasing the number of school age children within the local Districts. However, Assembly Bill 2926 and Senate Bill 50 assist in providing school facilities to serve students generated by new development projects by allowing school districts to collect impact fees from developers of new residential. Therefore, with the payment of school impact mitigation fees, impacts are **less than significant**.

| | | | | |
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| 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)***

**Less Than Significant Impact.** Per Figure PR-1 and Table PR-1 in the City's General Plan, the Project is located in proximity to several parks including: North Park (located approximately 500 feet west of the Project site) this is a 1.23-acre neighborhood park and Lincoln Park (located approximately 0.6 mile south of the Project site) this is a 3.26- acre park with lighted basketball horseshoe courts, community center playground, and picnic facilities.

With the addition of an estimated 212 dwelling units, it is anticipated that development of the project may increase the use of existing neighborhood parks. However, Chapter 16.60, Local Park Development Fees, of the City of Riverside Municipal Code was created to enable the acquisition, development, or improvement of neighborhood and community parks to provide both passive and active recreational opportunities to the residents of the City in order to improve the quality of life for the public. Per Chapter Section 16.60.020, Determinations, of the City's Municipal Code, "The imposition of a Local Park Development Fee is necessary to provide funding for the acquisition and/or development of new parks and the expansion and/or improvement (including rehabilitation) of existing parks in order to provide adequate neighborhood and community parks benefiting the development upon which the fee is imposed. The amount of the Local Park Development Fee is to be calculated based upon the following adopted minimum standards: that the public interest, convenience, health, welfare and safety requires the provision of three acres of local parks per thousand population, consisting of 0.75 acre of Community Park per thousand population and 2.25 acres of Neighborhood Park per thousand population." In lieu of payment of all or a portion of the Local Park Development Fee, land may be dedicated to the City for park and recreational purposes. The proposed Project does not propose to dedicate any land to the City for park and recreational purposes. The proposed project is therefore required to pay park fees. These fees are a requirement for project development and will reduce impacts to parks to **less than significant**.

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

**Less Than Significant Impact.** The proposed Project will result in an incremental increased demand for library services and community services due to the addition of 212 dwelling units. The proposed Project is located within the service areas of adequate public facilities and services, including libraries and community centers that are available to serve the proposed Project. Implementation of General Plan 2025 policies, compliance with existing codes and regulations and through payment of development impact fees, impacts will be **less than significant.**

| 15. RECREATION. | | | | |
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| 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)***

**Less Than Significant Impact.** Refer to response 15d above regarding parks. Payment of required park fees will reduce impacts to **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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 Description)***

**Less Than Significant Impact**. The proposed Project includes onsite amenities consisting of a pool, community fitness area, spa, dog run, pedestrian bridge, bar-be-que area and fire pit with a lounge. These proposed private amenities would serve future residents and would not require additional maintenance services from the City. While the proposed Project may increase the use of existing neighborhood parks, the recreational amenities that are provided as a part of the Project will lessen any substantial physical deterioration to existing recreation facilities in the area. For these reasons impacts to existing parks will be **less than significant**.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| **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: Project Specific Traffic Impact Analysis prepared by Fehr & Peers, April 2015 [TIA[)***

**Less than Significant with Mitigation.** A Traffic Impact Analysis (TIA) was prepared for the Project to evaluate the proposed Project's impacts on traffic. Based on the analysis in the TIA, the Project is anticipated to generate a total of 1,410 daily trip-ends including 108 total trip-ends during the AM peak hour and 131 total trip-ends during the PM peak hour.

Nine (9) study intersections were analyzed in the TIA. These locations are listed below and are shown on Figure 2-1 in the TIA:

1. SR-91 Westbound Off Ramp and Mission Inn Avenue
2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue
3. Lime Street and University Avenue
4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue
5. Lime Street and 9th Street
6. Commerce Street and Mission Inn Avenue
7. Lime Street and 10th Street/SR-91 Westbound On Ramp
8. Park Avenue and University Avenue
9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1

In addition Six (6) roadway segments were analyzed in the TIA. The locations are listed below and are shown on Figure 4-2 in the TIA:

1. University Avenue between Lemon Street and Lime Street
2. Lime Street between 9th Street and University Avenue
3. Mission Inn Avenue between Vine Street and Commerce Street
4. University Avenue between Santa Fe Street and Commerce Street
5. Commerce Street between University Avenue and Mission Inn Avenue
6. University Avenue between Park Avenue and Victoria Avenue

As part of the analysis the TIA analyzed the following future scenarios:

- Existing (2015) Conditions
- Existing Plus Project (2016) Conditions
- Cumulative (2016) Conditions
- Cumulative (2016) Plus Project Conditions
- Build Out (2025) Conditions
- Build Out (2025) Plus Project Condition

The results of the TIA indicate that none of the study locations would be significantly impacted by the proposed project traffic during any of the scenarios. As a result, no off-site improvements are required.

In addition to evaluating the intersections and road segments identified above, the TIA evaluated Project site access, including the anticipated delay and level of service for the Project access driveways. The proposed Project driveway on University Avenue is forecasted to operate at LOS F during the PM peak hour under Build Out (2025) Plus Project

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

Conditions. A peak hour traffic signal warrant was prepared for the intersection for the Build-Out (2025) Plus Project scenario volumes to identify if a traffic signal may be warranted. However, the intersection does not meet the signal warrant in the peak hour due to low egress volumes.

To address the access control at the Project's proposed driveways, the City Public Works Department requested preparation of a Lane and Striping Study. The results of this study (included in Section 9.0 of the TIA) indicate that the access driveways from Mission Inn Avenue and 9th Street will not require any striping modifications. The proposed driveway from University Avenue will require striping modifications to accommodate the eastbound left turn movement into the Project site. To ensure the access at University Avenue will operate at an acceptable level of service, the Project will incorporate mitigation measure **MM Trans 1**, which requires striping modifications and adequate space for vehicles to queue. Impacts will **less than significant mitigation**.

> **MM Trans 1:** To provide adequate and safe access to the Project site from University Avenue, the Project Applicant shall coordinate with the City Public Works Department and provide a striping plan in substantial conformance to the University Avenue Driveway Access Striping Exhibit shown on Figure 9-1 of the TIA unless the City Public Works Department determines that an alternate plan would provide acceptable access to the Project site.

| | | | | |
|---|---|---|---|---|
| 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: General Plan 2025 Figure CCM-4 – Master Plan of Roadways, RCTC 2011 Riverside County Congestion Management Program)***

**No Impact.** Each county in California is required to develop a Congestion Management Program (CMP) that analyzes at the links between land use, transportation and air quality. The Riverside County Transportation Commission (RCTC) is the County of Riverside's Congestion Management Agency. The RCTC prepares and periodically updates the County's CMP to meet federal Congestion Management System guidelines and state CMP legislation.

According to Table 2-1-CMP System of Highways and Roadways, in the 2011 Riverside County Congestion Management Program, the segments of Mission Inn Avenue and University Avenue from Market Street to SR 91 are the only roads in proximity to the Project site listed as part of the CMP System of Highways and Roadways. These road segments are not adjacent to the Project site. The TIA evaluated the intersection of SR-91 Westbound Off Ramp and Mission Inn Avenue and determined it would operate at an acceptable level of service. Therefore the Project will have **no impact** in this regard.

| | | | | |
|---|---|---|---|---|
| c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks? | ☐ | ☐ | ☐ | ☒ |

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

**No Impact.** The Project 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, **no impact** will occur.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| 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 Specific Traffic Impact Analysis prepared by Fehr & Peers, April 2015. )***

**Less than Significant with Mitigation Incorporated.** The Project does not propose any design features that would increase traffic hazards. Although the Project includes a GPA, SPA, and change of zone, implementation of the Project will not introduce incompatible uses to the Project Area. To provide safe access to the Project site from the University Avenue, a striping plan will be prepared and implemented as required by mitigation measure **MM Trans 1** (see response 16a). **Impacts will be less than significant with mitigation**.

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

**16e. Response:** ***(Source: Municipal Code, Fire Code and Project Specific Traffic Impact Analysis prepared by Fehr & Peers, April 2015)***

**Less than Significant Impact.** The Project has been reviewed by the City of Riverside and is in compliance with applicable sections of the Municipal Code (such as Chapter 18.210, Development Standards and Section 13.32.080, Fire Apparatus Access Roads) regarding emergency access. The Project has also been reviewed by the City Fire Department to ensure compliance with the Fire Code. As such, the Project provides adequate emergency access in accordance with City regulations and requirements. Therefore, a **less than significant impact** will occur.

| | | | | |
|---|---|---|---|---|
| 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, and Project Specific Traffic Impact Analysis prepared by Fehr & Peers, April 2015)***

**Less Than Significant Impact**. The proposed Project as designed is not in conflict with adopted policies, plans, or programs supporting alternative transportation. The Project area is currently served by the Riverside Transit Agency (RTA). Currently, RTA Routes 1 (UCR to W. Corona Metrolink Station), Route 10 (Big Springs and Watkins to Galleria at Tyler), Route 14 (Galleria at Tyler to Loma Linda VA Hospital), Route 16 (Riverside Downtown Terminal to Moreno Valley Mall), Route 22, (Riverside Downtown Terminal to Lake Elsinore Outlet Center), Route 208, Route 210/Sunline 220 (Riverside Downtown Terminal to Palm Desert), and Route 212 serve roadways within the vicinity of the Project area.

In addition, the Project site is located directly to the east of the Riverside Downtown Metrolink Station, just across 9$^{th}$ Street. This station is served by the Los Angeles Union Station and San Bernardino Lines of the Metrolink commuter rail which as well as Los Angeles Union Station and San Bernardino Lines of the Amtrak rail. Headways for each line range from 30 to 120 minutes. Given that the Project will be immediately adjacent to the transit center, it can be considered a transit oriented development (TOD).

Transit service is reviewed and updated by RTA and Metrolink periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate. However roadway improvements are anticipated to provide safe and efficient pedestrian connections between the proposed Project and surrounding area through construction of sidewalks along the Project frontage. Therefore impacts are **less than significant**.

| ISSUES (AND SUPPORTING INFORMATION SOURCES): | Potentially Significant Impact | Less Than Significant With Mitigation Incorporated | Less Than Significant Impact | No Impact |
|---|---|---|---|---|
| **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 and Table 5.16-K - Estimated Future Wastewater Generation for the City of Riverside's Sewer Service Area)***

**Less Than Significant Impact**. The City is within the Santa Ana Regional Water Quality Control Board. Wastewater conveyance and treatment for the proposed Project will be provided by the Riverside Public Works Department. Project-generated wastewater will be treated at the Riverside Water Quality Control Plant (RWQCP). The RWQCP is currently undergoing a plant wide expansion to increase the treatment capacity from 40 million gallons per day (MGD) to 46 MGD. The RWQCP Phase 1 expansion is expected to be completed in summer, 2016. The RWQCP is operated in compliance with State and federal requirements governing the treatment and discharge of wastewater. Although the proposed Project includes a GPA, SPA and change of zone to develop 212 apartment units, there will be adequate capacity at the RWQCP to treat the Project's wastewater. For these reasons, the proposed Project is not anticipated to exceed wastewater treatment requirements of the applicable Santa Ana Regional Water Quality Control Board and impacts will be **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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, RPU, FPEIR Table 5.16-G – General Plan Projected Water Demand for RPU Including Water Reliability for 2025,, 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 to the proposed Project will be provided by RPU. As discussed in response 9b, RPU's water is sourced from local area wells in the Bunker Hill, San Bernardino, and Riverside Basins and RPU has sufficient supply to serve the Project. As discussed in response 17a, Project-generated wastewater will be conveyed in existing sewer pipelines to the RWQCP for treatment. The RWQCP will have adequate treatment capacity to serve the proposed Project. Because no new or expanded water or wastewater treatment facilities will be required, impacts will be **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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)***

**Less Than Significant Impact**. Implementation of the Project will require construction of an on-site storm water drainage system to carry flows away from the Project site into the area's storm drain system. 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.

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

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, impacts are **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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, Table 5.16-H – Current and Projected Domestic Water Supply (acre-ft/year)***

**Less Than Significant Impact.** Water service to the project site will be provided by Riverside Public Utilities (RPU) from existing water supplies. **Impacts will be less than significant**.

| | | | | |
|---|---|---|---|---|
| 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? | ☐ | ☐ | ☒ | ☐ |

**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)***

**Less Than Significant Impact.** Please see 17b above.

| | | | | |
|---|---|---|---|---|
| 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)***

**Less Than Significant Impact.** The proposed Project would provide for the development of 212 residential dwelling units. The Project site is located within the jurisdiction of the Riverside County Waste Management Department and is serviced by the City of Riverside Public Works Department, which collects the solid waste with option of hauling waste to El Sobrante, Badlands Landfills, or Lamb Canyon Landfill after being sorted at the Robert A. Nelson transfer station. The **Landfill Capacity** table**,** below, reflects the amount of capacity remaining and maximum tonnage accepted at each facility.

**Landfill Capacity**

| Landfill | Remaining Capacity (Tons) | Maximum Daily Throughput (Tons/Day) |
|---|---|---|
| El Sobrante | 145,530,000 | 16,054 |
| Badlands | 14,730,025 | 4,000 |
| Lamb Canyon | 18,955,000 | 5,000 |

As shown in the **Solid Waste Generation** table below, the Project is estimated to generate 1,484 pounds of solid waste per day or 0.74 tons per day which is approximately one-tenth of one percent of the maximum daily capacity of El Sobrante Landfill, Badlands Landfill, or Lamb Canyon Landfill.

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

**Solid Waste Generation**

| *Land Use* | *Units* | *Pounds Per Day Solid Waste* | |
|---|---|---|---|
| | | ***Per Unit*** | ***Total*** |
| *Multi-Family Residential* | *212* | *7* | *1,484* |
| | | ***Solid Generation Tons Per Day*** | |
| | | | *0.74* |

In addition, Public Resources Code 41780 requires every city and county to divert from landfills at least 60% of the quantity of waste generated within their jurisdiction in 2004. Because the Project will be regulated by waste reduction and diversion from landfill programs the proposed Project would not result in a substantial increase in demand for local solid waste disposal facilities and regional landfill capacity. Therefore impacts are **less than significant**.

| | | | | |
|---|---|---|---|---|
| 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 EPA)***

**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 nonhazardous 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, 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, and Cultural Resources Survey prepared by JM Research and Consulting, June 2015; Citywide Design Guidelines and Sign Guidelines [CDGSG]), )***

Potential impacts related to habitat of fish or wildlife species were discussed in the Biological Resources Section of this Initial Study, and were all found to be **less than significant**. Potential impacts to cultural, archaeological and paleontological

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

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.** Because the Project will not result in a considerable contribution to cumulative impacts, there will be no cumulative impact beyond those previously considered in the GP 2015 FPEIR.

| | | | | |
|---|---|---|---|---|
| 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)***

Effects on human beings were evaluated as part of the aesthetics, air quality, hydrology & water quality, noise population and housing, hazards and hazardous materials, and traffic sections of this initial study and found to be less than significant for each of the above sections. Based on the analysis and conclusions in this initial study, the proposed Project 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 **considered 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).

## References

The following documents were referenced as general information sources during the preparation of this document. They are available for public review at the locations listed for each reference. These documents may also be available at public libraries and at other public agency offices.


| | |
|---|---|
| AQ/GHG | Albert A. WEBB Associates, *Air Quality/Greenhouse Gas Analysis for the Mission Lofts Project*, May 27, 2015. (Appendix A) |
| AQMP | South Coast Air Quality Management District, *Air Quality Management Plan 2012*, February 2013. (Available at http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan, accessed May 27, 2015.) |
| BlueRiverside.com | Riverside Public Utilities, *BlueRiverside.com* website. (Available at http://www.riversideca.gov/utilities/water-faqs.asp, accessed July 20, 2015) |

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

| | |
|---|---|
| California Building Code | California Building Standards Commission, California Building Code, California Code of Regulations Title 24, Part 2, Volume 1 of 2, 2013. (Available at http://www.ecodes.biz/ecodes_support/Free_Resources/2013California/13Building/13Building_main.html, accessed July 17, 2015.) |
| CDGSG | Citywide Design Guidelines and Sign Guidelines for the City of Riverside, adopted November 2007. (Available at **http://www.riversideca.gov/planning/2008-0909/DG/Citywide_Design_and_Sign_Guidelines-OK.pdf**, accessed July 17, 2015.) |
| DTSC | Department of Toxic Substance Control, Envirostor database website. (Available at http://www.envirostor.dtsc.ca.gov/public/, July 17, 2015.) |
| EPA | California Environmental Protection Agency. Integrated Waste Management Board, Landfill Facility Compliance Study, April 2007. (Available at Webb) |
| FPEIR | Final Program Environmental Impact Report for City of Riverside General Plan and Supporting Documents, certified November 2007. (Available at http://www.riversideca.gov/planning/gp2025program/FPEIR_V2.asp, accessed July 17, 2015.) |
| Google Earth 2015 | Google Earth.33 58'42.78" N and 117 21'48.51" W. Accessed July 17, 2015.) |
| GP 2025 | City of Riverside, General Plan 2025, adopted November 2007. (Available at http://www.riversideca.gov/planning/gp2025program/general-plan.asp, accessed July 17, 2015.) |
| GPI | Geotechnical Professionals, Inc. *Geotechnical Investigation Proposed Mission Lofts Sec Mission Inn Avenue and Commerce Street Riverside, California*, February 17, 2015. (Appendix D) |
| Health and Safety Code | California Health and Safety Code. (Available at http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc, accessed July 17, 2015.) |
| HRA | Urban *Crossroads, Air Toxic and Criteria Pollutant Health Rise Assessment*, May 26, 2015. |
| JMRC | JM Research and Consulting. *Cultural Resources Survey for Mission Lofts*, June 2015. (Appendix C) |
| KHR | KHR Associates. Project Specific Water Quality Management Plan for Mission Lofts, February 23, 2016. (Appendix E) |
| Kunzman | Kunzman Associates, Inc. *Mission Lofts Project Noise Impact Analysis*, May 31, 2015. (Appendix F) |
| MSHCP | Riverside County, *Western Riverside County Multiple Species Habitat Conservation Plan*, adopted June 2003. (Available at http://rctlma.org/Portals/0/mshcp/volume1/index.html, accessed March 25, 2015.) |
| Public Resources Code | California Public Resources Codes. (Available at http://www.leginfo.ca.gov/.html/prc_table_of_contents.html, accessed January 5 through February 9, 2015.) |

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

| | |
|---|---|
| RCIP | County of Riverside, Transportation and Land Management Agency, RCIP Conservation Summary Report Generator. (Available at: http://onlineservices.rctlma.org/content/rcip_report_generator.aspx, accessed May 20, 2015 |
| RCALUCP | Riverside County Airport Land Use Commission, *March Air Reserve Base / Inland Port Airport Land Use Compatibility Plan*, adopted November 13, 2014. (Available at http://www.rcaluc.org/plan_new.asp, accessed November 20, 2015.) |
| RCTC CMP | Riverside County Transportation Commission, *2011 Riverside County Congestion Management Program*, December 14, 2011. (Available at http://www.rctc.org/uploads/media_items/congestionmanagementprogram.original.pdf, accessed March 30, 2015.) |
| RMC | City of Riverside, *Municipal Code*. (Available at http://www.riversideca.gov/municode/, accessed December 12 through March 26, 2015.) |
| RTA | Riverside Transit Agency, System Map, January 2015. (Available at http://www.riversidetransit.com/index.php/riding-the-bus/maps-schedules, accessed July 17, 2015.) |
| TIA | Fehr & Peers, *Traffic Impact Analysis for Mission Lofts*, April 2015. (Appendix G) |
| Title 49 Code of Federal Regulations | Code of Federal Regulations, Title 49 Transportation. (Available at http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title49/49tab_02.tpl, accessed March 26, 2015.) |
| UFPM | City of Riverside, Urban Forestry Policy Manual, revised November 2007. (Available at **https://www.riversideca.gov/publicworks/trees/pdf/UrbanForestry-TOC.pdf**, accessed July 17, 2015.) |
| Zoning Map | City of Riverside, *Zoning Map*, December 16, 2013. (Available at http://www.riversideca.gov/planning/pdf/maps/zoning.pdf, accessed December 12, 2014 through March 26, 2015.) |

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## Mitigation, Monitoring, and Reporting Program

| Impact Category | Mitigation Measures | Implementation Timing | Responsible Monitoring Party[2] | Monitoring/Reporting Method |
|---|---|---|---|---|
| **Cultural Resources** | **MM CR 1:** Prior to initiation of ground-disturbing activities, construction personnel shall be alerted to possibility of buried historic-period cultural deposits. Should any cultural and/or archaeological resources be inadvertently discovered during construction, construction activities in the vicinity of the discovery shall immediately halt and shall be moved to other parts of the Project site and a qualified archaeologist shall be contacted to determine the significance of the resource(s). If the find is determined to be a historical or unique archaeological resource, as defined in Section 15064.5 of the California Code of Regulations (State *CEQA Guidelines*), avoidance or other appropriate measures shall be implemented. | During construction | Qualified Archaeologist<br><br>Project Applicant | If any resources are discovered, a qualified archaeologist shall submit a report documenting the significance of the find and mitigation to the Planning Division. |
| | **MM CR 2:** If any paleontological resources are exposed during Project related excavation, ground disturbance activities in the vicinity of the discovery shall be moved and a qualified paleontological resources specialist will be retained by the Project Applicant to evaluate the resources. If the find is determined to be significant, avoidance or other appropriate measures as identified by the paleontological resources specialist shall be implemented. Appropriate measures include a qualified paleontologist to be permitted to recover, evaluate, and curate the finds in accordance with the standards and guidelines of the City of Riverside and the Society of Vertebrate Paleontology. | During construction | Qualified Paleontological Resources Specialist<br><br>Project Applicant | If any resources are discovered, a qualified paleontologist shall submit a report documenting the significance of the find and curation to the Planning Division. |
| **Noise** | **MM Noise 1:** Prior to building issuance of building permit, the Project proponent shall demonstrate to the City that all exposed residential exterior window/wall assemblies facing Mission Inn Avenue provide a Sound Transmission Class (STC) rating of a least 28 dB; window/wall assemblies facing Commerce Street and the Railroad provide an STC rating of at least 25 dB; and window/wall assemblies facing University Avenue provide an STC rating of at least 23.4 dB. The building plans submitted to the City for review and approval shall identify the STC rating of the materials used to construct the exterior windows/wall assemblies. | Prior to issuance of building permits | Planning Division<br><br>Building & Safety Division | Review of building plans |

[2] All agencies are City of Riverside Departments/Divisions unless otherwise noted.

| Impact Category | Mitigation Measures | Implementation Timing | Responsible Monitoring Party[2] | Monitoring/Reporting Method |
|---|---|---|---|---|
| | **MM Noise 2:** All future property managers at the project site shall be required to disclose to potential residents the number of trains that pass by per day and at what time of day they pass. They should also be required to inform potential residents that the train horn noise will be audible in most of the proposed residential dwelling units. Relatively current train inventory data can be found on the Federal Railroad Administration's website. More specifically, data can currently be found at http://safetydata.fra.dot.gov/officeofsafety/publicsite/crossing/crossing.aspx. | Prior to final inspection | Planning Division<br><br>Property Manager(s) | Disclosure details shall be submitted to the Planning Division. |
| | **MM Noise 3:** Two weeks prior to the commencement of construction, notification must be provided to surrounding land uses disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period. For the duration of construction activities, the construction manager shall serve as the contact person should noise levels become disruptive to local residents. A sign shall be posted at the Project site with the contact phone number. | Two weeks prior to construction | Construction manager/Project Applicant | Evidence of notification shall be submitted to Planning Division. |
| | **MM Noise 4:** Prior to and during construction activities, the Project contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturer standards. | Prior to and during construction activities | Project contractor<br><br>Building & Safety Division | Construction Inspection |
| | **MM Noise 5:** The construction contractor shall locate noise generating construction equipment and construction staging in areas that will create the greatest distance between construction related noise sources and noise sensitive receptors (nearby residences)that are nearest the Project site. The location of the construction staging areas shall be shown on the construction specifications and shall be reviewed by the City prior to the issuance of grading permit. | Prior to issuance of grading permit and during construction activities | Construction contractor<br><br>Planning Division<br><br>Building & Safety Division | Review of construction plans and specifications<br><br>Construction Inspection |
| **Transportation** | **MM Trans 1:** To provide adequate and safe access to the Project site from University Avenue, the Project Applicant shall coordinate with the City Public Works Department and provide a striping plan in substantial conformance to the University Avenue Driveway Access Striping Exhibit shown on Figure 9-1 of the TIA unless the City Public Works Department determines that an alternate plan would provide acceptable access to the Project site. | Prior to construction activities | Project Applicant<br><br>Public Works Department | Approval of Striping Plans |

# Appendix A

# Air Quality/Greenhouse Gas Analysis

ALBERT A. WEBB ASSOCIATES

# Technical Memorandum

To: Todd Cadwell, Mission Lofts LLC.

From: Eliza Laws, Senior Environmental Analyst

Date: May 27, 205

Re: Air Quality/Greenhouse Gas Analysis for the Mission Lofts Project, City of Riverside

The following air quality assessment was prepared to evaluate whether the expected criteria air pollutant emissions generated as a result of construction and operation of the proposed Project would cause exceedances of the South Coast Air Quality Management District's (SCAQMD) thresholds for air quality in the Project area. The greenhouse gas (GHG) assessment was prepared to evaluate whether the expected criteria GHG emissions generated as a result of construction and operation of the proposed Project would exceed the SCAQMD draft screening significance thresholds. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000 et seq.). The methodology follows the *CEQA Air Quality Handbook* prepared by the SCAQMD for quantification of emissions and evaluation of potential impacts to air resources. As recommended by SCAQMD staff, the **Cal**ifornia **E**missions **E**stimator **Mod**el® version 2013.2.2 (CalEEMod) was used to quantify Project-related emissions.

The Project proposes development of a multi-family residential development consisting of 212 units on approximately 4.69 acres on the southeast corner of Mission Inn Avenue and Commerce Street, in the City of Riverside, California. Additional parking is provided south of University Avenue and is accessed via an existing pedestrian bridge.

## Regional Significance Thresholds

The thresholds contained in the *SCAQMD CEQA Air Quality Handbook*[1] (SCAQMD 1993) are considered regional thresholds and are shown in **Table 1 – SCAQMD CEQA Daily Regional Significance Thresholds**, below. These regional thresholds were developed based on the SCAQMD's treatment of a major stationary source.

**Table 1 – SCAQMD CEQA Daily Regional Significance Thresholds**

| Emission Threshold | Units | VOC | $NO_X$ | CO | $SO_X$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|
| Construction | lbs/day | 75 | 100 | 550 | 150 | 150 | 55 |
| Operation[1] | lbs/day | 55 | 55 | 550 | 150 | 150 | 55 |

[1] South Coast Air Quality Management District, *CEQA Air Quality Handbook*, November 1993. (Available at SCAQMD.)

Air quality impacts can be described in a short- and long-term perspective. Short-term impacts occur during site grading and Project construction and consist of fugitive dust and other particulate matter, as well as exhaust emissions generated by construction-related vehicles. Long-term air quality impacts occur once the Project is in operation.

The Project will be required to comply with existing SCAQMD rules for the reduction of fugitive dust emissions. SCAQMD Rule 403 establishes these procedures. Compliance with this rule is achieved through application of standard best management practices in construction and operation activities, such as application of water or chemical stabilizers to disturbed soils, managing haul road dust by application of water, covering haul vehicles, restricting vehicle speeds on unpaved roads to 15 mph, sweeping loose dirt from paved site access roadways, cessation of construction activity when winds exceed 25 mph and establishing a permanent, stabilizing ground cover on finished sites. In addition, projects that disturb 50 or more acres or more of soil or move 5,000 cubic yards of materials per day are required to submit a Fugitive Dust Control Plan or a Large Operation Notification Form to SCAQMD. Based on the size of this Project's disturbance area (less than five acres), a Fugitive Dust Control Plan or a Large Operation Notification Form would not be required.

## Short-Term Analysis

Short-term emissions from Project construction were evaluated using the CalEEMod version 2013.2.2 program. The estimated construction period for the proposed Project is approximately one year, beginning no sooner than October 2015. The default parameters within CalEEMod were used and these default values reflect a worst-case scenario, which means that Project emissions are expected to be equal to or less than the estimated emissions. In addition to the default values used, assumptions relevant to model inputs for short-term construction emission estimates used are:

- Construction is anticipated to begin in October 2015 with grading and end with architectural coatings (painting):

| Construction Activity | Start Date | End Date | Total Working Days |
|---|---|---|---|
| Grading | October 1, 2015 | October 31, 2015 | 22 days |
| Building Construction | November 1, 2015 | September 16, 2016 | 230 days |
| Paving | September 1, 2016 | September 30, 2016 | 22 days |
| Architectural Coatings | August 15, 2016 | September 30, 2016 | 35 days |

- The equipment to be used for each activity is shown below and represents program defaults. Each piece of equipment is assumed to operate 8 hours per day:

| Construction Activity | Off-Road Equipment | Unit Amount |
|---|---|---|
| Grading | Excavators | 1 |
| | Graders | 1 |
| | Rubber Tired Dozers | 1 |
| | Tractors/Loaders/Backhoes | 3 |
| Building Construction | Cranes | 1 |
| | Forklifts | 3 |
| | Generator Sets | 1 |
| | Tractors/Loaders/Backhoes | 3 |
| | Welders | 1 |
| Paving | Pavers | 1 |
| | Cement and Mortar Mixer | 2 |
| | Paving Equipment | 2 |
| | Rollers | 2 |
| | Tractors/Loaders/Backhoes | 1 |
| Architectural Coatings | Air Compressors | 1 |

- To evaluate Project compliance with SCAQMD Rule 403 for fugitive dust control, the Project utilized the mitigation option of watering the Project site three times daily which achieves a control efficiency of 61 percent for PM-10 and PM-2.5 emissions. Two (2) one-way vendor trips were added to the grading and paving activity to account for water truck trips.

- Approximately 3,600 cubic yards of soil will be imported during grading operations. CalEEMod defaults assumptions were used related to truck trips.

The results of this analysis are summarized below.

**Table 2 – Estimated Maximum Daily Construction Emissions**

| Activity | Peak Daily Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | VOC | $NO_X$ | CO | $SO_2$ | PM-10 | PM-2.5 |
| **SCAQMD Daily Construction Thresholds** | **75** | **100** | **550** | **150** | **150** | **55** |
| Grading | 4.27 | 47.10 | 31.72 | 0.05 | 5.42 | 3.70 |
| Building Construction-2015 | 4.96 | 36.72 | 34.67 | 0.06 | 4.59 | 2.80 |
| Building Construction-2016 | 4.58 | 34.59 | 33.03 | 0.06 | 4.42 | 2.64 |
| Architectural Coatings | 49.33 | 3.33 | 4.55 | 0.01 | 0.66 | 0.37 |
| Paving | 2.42 | 22.14 | 16.30 | 0.02 | 1.56 | 1.28 |
| **Maximum[1]** | **56.33** | **60.06** | **53.88** | **0.09** | **6.64** | **4.29** |
| **Exceeds Threshold?** | **No** | **No** | **No** | **No** | **No** | **No** |

Note: [1] Maximum emissions are the greater of grading alone or building construction in 2016 and architectural coating and paving since these activities overlap.

As shown in the table above, the emissions from construction of the Project are below the SCAQMD daily construction thresholds for all the criteria pollutants.

## Long-Term Analysis

Long-term emissions are evaluated at build-out of a project. The Project is assumed to be operational in 2016. Mobile source emissions refer to on-road motor vehicle emissions generated from the Project's traffic and based on the trip generation provided in the Project-specific Traffic Impact Analysis.[2] Area source emissions from the Project include stationary combustion emissions of natural gas used for space and water heating (shown in a separate row as energy), yard and landscape maintenance, consumer use of solvents and personal care products, and an average building square footage to be repainted each year. CalEEMod computes area source emissions based upon default factors and land use assumptions. CalEEMod defaults were utilized with the exception of fireplaces, which were assumed to be absent from the Project. In addition, the Project's energy emissions were adjusted to account for the increased efficiency related to the 2013 Title 24 standards.[3] Separate emissions were computed for both the summer and winter.

[2] Fehr & Peers, *Mission Lofts Transportation Impact Analysis*, April 2015.

[3] The 2013 Title 24 standards are 25 percent more efficient for residential uses than the previous 2008 standards in CalEEMod. http://www.energy.ca.gov/releases/2012_releases/2012-05-31_energy_commission_approves_more_efficient_buildings_nr.html

**Table 3 – Estimated Daily Project Operation Emissions (Summer)**

| Source | Peak Daily Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | VOC | $NO_X$ | CO | $SO_2$ | PM-10 | PM-2.5 |
| **SCAQMD Daily Thresholds** | **55** | **55** | **550** | **150** | **150** | **55** |
| Area | 6.54 | 0.21 | 17.73 | 0.00 | 0.10 | 0.10 |
| Energy | 0.06 | 0.51 | 0.22 | 0.00 | 0.04 | 0.04 |
| Mobile | 5.88 | 18.55 | 66.19 | 0.16 | 11.26 | 3.18 |
| **Total** | **12.48** | **19.27** | **84.14** | **0.16** | **11.40** | **3.32** |
| **Exceeds Threshold?** | **No** | **No** | **No** | **No** | **No** | **No** |

Note: Emissions reported as zero are rounded and not necessarily equal to zero.

**Table 4 – Estimated Daily Project Operation Emissions (Winter)**

| Source | Peak Daily Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | VOC | $NO_X$ | CO | $SO_2$ | PM-10 | PM-2.5 |
| **SCAQMD Daily Thresholds** | **55** | **55** | **550** | **150** | **150** | **55** |
| Area | 6.54 | 0.21 | 17.73 | 0.00 | 0.10 | 0.10 |
| Energy | 0.06 | 0.51 | 0.22 | 0.00 | 0.04 | 0.04 |
| Mobile | 5.74 | 19.34 | 61.55 | 0.15 | 11.26 | 3.18 |
| **Total** | **12.34** | **20.06** | **79.50** | **0.15** | **11.40** | **3.32** |
| **Exceeds Threshold?** | **No** | **No** | **No** | **No** | **No** | **No** |

Note: Emissions reported as zero are rounded and not necessarily equal to zero.

Evaluation of the data presented on the above tables indicates that criteria pollutant emissions from operation of this Project will not exceed the SCAQMD regional daily thresholds for any pollutant during summer or winter.

## ▪ Localized Significance Threshold Analysis

### Background

As part of the SCAQMD's environmental justice program, attention has been focused on localized effects of air quality. Staff at SCAQMD has developed localized significance threshold (LST) methodology[4] that can be used by public agencies to determine whether or not a project may generate significant adverse localized air quality impacts (both short- and long-term). LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area (SRA). The Project is located near the border of SRA 23.

### Short-Term Analysis

According to the LST methodology, only on-site emissions need to be analyzed. Emissions associated with vendor and worker trips are mobile source emissions that occur off site. The emissions analyzed under the LST methodology are $NO_2$, CO, PM-10, and PM-2.5. SCAQMD has provided LST lookup tables and sample construction scenarios[5] to allow users to readily determine if the daily emissions for proposed construction or operational activities could result in significant localized air quality impacts for projects five acres or smaller. Although the Project site is almost five acres, it is anticipated that an area of approximately three acres would be disturbed per day during construction.[6] Therefore, the sample construction scenario for the three-acre site was modified using Project-specific information such as the construction equipment usage information.

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[4] South Coast Air Quality Management District, *Final Localized Significance Threshold Methodology*, Revised July 2008. (Available at http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds, accessed May 27, 2015.)

[5] http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds

[6] http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/caleemod-guidance.pdf?sfvrsn=2

The LST thresholds are estimated using the maximum daily disturbed area (in acres) and the distance of the Project to the nearest sensitive receptors (in meters). The closest sensitive receptors are the existing residences adjacent to the Project site off of Mission Inn Avenue and 9th Street. The closest receptor on the LST look-up tables is 25 meters. According to LST methodology, projects with boundaries closer than 25 meters to the nearest receptor should use the LSTs for receptors located at 25 meters. Therefore, a receptor distance of 25 meters (85 feet) was used. The results are summarized below.

**Table 5 – LST Results for Daily Construction Emissions**

| Pollutant | Peak Daily Emissions (lb/day) | | | |
|---|---|---|---|---|
| | $NO_X$ | CO | PM-10 | PM-2.5 |
| **LST Threshold for 3 acre at 25 meters** | **203** | **1,114** | **9** | **5** |
| Grading | 43.6 | 26.5 | 8.2 | 3.3 |
| Building Construction | 31.7 | 20.5 | 1.7 | 1.6 |
| Paving | 21.3 | 31.8 | 2.1 | 2.0 |
| **Exceeds Threshold?** | **No** | **No** | **No** | **No** |

Note: SCAQMD LST for 3-acre site predicted using Appendix K of SCAQMD LST Methodology.

Emissions from construction of the Project will be below the LST established by SCAQMD for the Project.

## Long-Term Analysis

This Project involves the construction of a multi-family residential development. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site; such as warehouse/transfer facilities. The proposed Project does not include such uses. Therefore, due to the lack of stationary source emissions, no long-term LST analysis is needed.

## CO Hot Spots Analysis

A carbon monoxide (CO) "hot spot" is a localized concentration of CO that is above the state or federal 1-hour or 8-hour ambient air quality standards (AAQS). Localized high levels of CO are associated with traffic congestion and idling or slow-moving vehicles.

Based on the information presented below, a CO "hot spot" analysis is not needed to determine whether the addition of Project related traffic will contribute to an exceedance of either the state or federal AAQS for CO emissions in the Project area.

The analysis prepared for CO attainment in the South Coast Air Basin by the SCAQMD can be used to assist in evaluating the potential for CO exceedances in the South Coast Air Basin. CO attainment was thoroughly analyzed as part of the SCAQMD's 2003 Air Quality Management Plan (2003 AQMP)[7] and the Revised 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan). [8] As discussed in the 1992 CO Plan, peak carbon monoxide concentrations in the South Coast Air Basin are due to unusual meteorological and topographical conditions, and not due to the impact of particular intersections (2003 AQMP Appendix V, p. V-4-32). Considering the region's unique meteorological conditions and the increasingly stringent CO emissions standards, CO modeling was performed as part of the 1992 CO Plan and subsequent plan updates and air quality management plans.

[7] SCAQMD, *2003 Air Quality Management Plan, August 1, 2003.* (Available at http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/2003-aqmp, accessed March 24, 2015.)

[8] SCAQMD, *Revision to the 1992 Carbon Monoxide Attainment Plan*, September 1994. (Available at SCAQMD.)

In the 1992 CO Plan, a CO hot spot analysis was conducted for four busy intersections in Los Angeles at the peak morning and afternoon time periods. The intersections evaluated included: Long Beach Blvd. and Imperial Highway (Lynwood); Wilshire Blvd. and Veteran Ave. (Westwood); Sunset Blvd. and Highland Ave. (Hollywood); and La Cienega Blvd. and Century Blvd. (Inglewood). These analyses did not predict a violation of CO standards. The busiest intersection evaluated in the 1992 CO Plan and subsequent 2003 AQMP was that at Wilshire Blvd. and Veteran Ave., which has a daily traffic volume of approximately 100,000 vehicles per day (2003 AQMP Appendix V, Table 4-7). The Los Angeles County Metropolitan Transportation Authority (MTA)[9] evaluated the LOS in the vicinity of the Wilshire Blvd./Veteran Ave. intersection and found it to be level E at peak morning traffic and Level F at peak afternoon traffic (MTA, Exhibit 2-5 and 2-6). Considering Project-related traffic as well as 2025 Build-out conditions, the highest average daily trips would be 26,889 on University Avenue between Santa Fe Street and Commerce Street,[10] which is lower than the values studied by SCAQMD. Therefore, none of the roadway segments in the vicinity of the proposed Project site would have daily traffic volumes exceeding those at the intersections modeled in the 2003 AQMP, nor would there be any reason unique to the meteorology to conclude that this intersection would yield higher CO concentrations if modeled in detail. Thus, the Project would not result in CO hot spots.

## ▪ Greenhouse Gas Analysis

Greenhouse gases (GHG) are not presented in lbs/day like criteria pollutants; they are typically evaluated on an annual basis using the metric system. Additionally, unlike the criteria pollutants, GHG do not have adopted significance thresholds associated with them at this time. Several agencies, at various levels, have proposed draft GHG significance thresholds for use in CEQA documents. SCAQMD has been working on GHG thresholds for development projects. In December 2008, the SCAQMD adopted a threshold of 10,000 metric tonnes per year of carbon dioxide equivalents ($MTCO_2E$/yr) for stationary source projects where SCAQMD is the lead agency. The most recent draft proposal was in September 2010[11] and included significance thresholds for residential, commercial, and mixed-use projects at 3,500, 1,400, and 3,000 $MTCO_2E$/yr, respectively. Alternatively, a lead agency has the option to use 3,000 $MTCO_2E$/yr as a threshold for all non-industrial projects. Although both options are recommended by SCAQMD, a lead agency is advised to use only one option and to use it consistently. The SCAQMD significance thresholds also evaluate construction emissions by amortizing them over an expected project life of 30 years.

The CalEEMod output results for construction-related GHG emissions present the GHG emissions estimates for the Project for $CO_2$, methane ($CH_4$), nitrous oxide ($N_2O$), and $CO_2E$.[12]

### Short-Term Analysis

#### Construction-Related Emissions

The CalEEMod model calculates GHG emissions from fuel usage by construction equipment and construction-related activities, like construction worker trips, for the Project. The CalEEMod estimate does not analyze emissions from construction-related electricity or natural gas. Construction-related electricity and natural gas emissions vary based on the amount of electric power used during construction and other unknown factors which make them too speculative to quantify.

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[9] Metropolitan Transportation Authority, *2004 Congestion Management Plan for Los Angeles County*, Adopted July 22, 2004. (Available at http://www.metro.net/images/cmp_2004.pdf, accessed March 24, 2015.)

[10] Fehr & Peers, *Mission Lofts Transportation Impact Analysis*, April 2015.

[11] http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-15/ghg-meeting-15-main-presentation.pdf?sfvrsn=2

[12] $CO_2E$ is the sum of $CO_2$ emissions estimated plus the sum of $CH_4$ and $N_2O$ emissions estimated multiplied by their respective global warming potential (GWP).

**Table 6 – Project Construction Equipment GHG Emissions**

| Year | Metric Tons per year (MT/yr) | | | |
|---|---|---|---|---|
| | Total $CO_2$ | Total $CH_4$ | Total $N_2O$ | Total $CO_2E$ |
| 2015 | 158.66 | 0.03 | 0.00 | 159.21 |
| 2016 | 495.94 | 0.08 | 0.00 | 487.54 |
| Total | 654.60 | 0.10 | 0.00 | 656.85 |
| | | | **Amortized** | **21.89** |

Evaluation of the table above indicates that an estimated 656.85 $MTCO_2E$ will occur from Project construction equipment over the course of the estimated construction period. Since the draft SCAQMD GHG threshold Guidance document released in October 2008[13] recommends that construction emissions be amortized for a project lifetime of 30 years to ensure that GHG reduction measures address construction GHG emissions as part of the operational reduction strategies. Therefore, the total GHG emissions from Project construction were amortized and are included in **Table 8**, below.

## Long-Term Analysis

### Area Source Emissions

CalEEMod estimates the GHG emissions associated with area sources which include landscape equipment emissions, architectural coating, consumer products, and hearths. Landscape equipment servicing the Project site create $CO_2$ resulting from fuel combustion based on the Project's land uses. Consumer products consist of consumer use of solvents and personal care products and architectural coatings consist of an average building square footage to be repainted each year. Hearth emissions are not included because, as stated above, the Project is not anticipated to include fireplaces. **Table 8** summarizes the Project's area source emissions.

### Energy-Related Emissions

CalEEMod estimates the GHG emissions associated with building electricity and natural gas usage (non-hearth) for each land use type. Electricity and natural gas used in buildings is typically generated at an off-site power plant which indirectly generates GHG emissions. The default energy usage values used in CalEEMod are based on the CEC sponsored California Commercial End Use Survey and Residential Appliance Saturation Survey studies and reflect 2008 Title 24 improvements (CalEEMod User's Guide, p. 30.). As stated above, the Project's emissions were adjusted to account for the new 2013 Title 24 standards which are 25 percent more efficient than the 2008 standards. The following table summarizes the GHG emissions estimates reported by CalEEMod for the Project.

**Table 7 – Energy-Related GHG Emissions**

| Source | Metric Tons per year (MT/yr) | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | Total $CO_2E$ |
| Electricity | 508.84 | 0.01 | 0.00 | 509.78 |
| Natural Gas | 106.80 | 0.00 | 0.00 | 107.45 |
| **Total** | **615.64** | **0.01** | **0.00** | **617.23** |

Note: Emissions reported as zero are rounded and not necessarily equal to zero.

### Mobile Source Emissions

CalEEMod estimates the annual GHG emissions from Project-related vehicle usage based on trip generation data contained in defaults or in a project-specific traffic analyses. The weekday trip generation provided in the Project-specific Traffic Study was used and the remaining trip generation data contained in CalEEMod defaults was used herein. **Table 8** shows the mobile source emissions from the Project.

[13] http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-6/ghg-meeting-6-guidance-document-discussion.pdf?sfvrsn=2

### Solid Waste Emissions

CalEEMod also calculates the GHG emissions associated with the disposal of solid waste into landfills based on default data contained within the model for waste disposal rates, composition, and the characteristics of landfills throughout the state. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. This analysis assumes a solid waste diversion from the landfills consistent with data provided by the state. Conservatively, this was assumed as 64 percent for the City of Riverside[14], the waste diversion rate reported for the year 2006. **Table 8** shows the solid waste emissions from the Project.

### Water-Related Energy Usage

Electricity is also indirectly used in water supply, treatment, and distribution, as well as wastewater treatment in Southern California and plays a large role in GHG production.

There are three processes necessary to supply potable water to urban users (i.e., residential, commercial, and industrial): (1) supply and conveyance of the water from the source; (2) treatment of the water to potable standards; and (3) distribution of the water to individual users. After use, the wastewater is treated and either reused as reclaimed/recycled water or returned to the environment. CalEEMod calculates the GHG emissions from these processes based on default emissions factors and water/wastewater generation rates for a project's location. Default values were used for electricity intensity factor associated with the supply and conveyance of water from its source which assumes that the water is being imported from Northern California. The Project's emissions were adjusted to account for the CalGreen building code which requires a 20 percent reduction in indoor water use. **Table 8** shows the GHG emissions from water-related energy usage for the Project.

### Total Project GHG Emissions

As shown on **Table 8 – Total Project-Related GHG Emissions**, using all the emissions quantified above, the total GHG emissions generated from the Project is approximately 2,862.42 $MTCO_2E$/yr which includes construction-related emissions amortized over a typical project life of 30 years.

**Table 8 – Total Project-Related GHG Emissions**

| Source | Metric Tons per year (MT/yr) | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | Total $CO_2E$ |
| Amortized Construction | -- | -- | -- | 21.89 |
| Area | 3.57 | 0.00 | 0.00 | 3.65 |
| Energy | 615.64 | 0.01 | 0.00 | 617.23 |
| Mobile | 2,046.55 | 0.07 | 0.00 | 2,048.02 |
| Solid Waste | 7.12 | 0.42 | 0.00 | 15.97 |
| Water | 145.19 | 0.36 | 0.01 | 155.66 |
| **Total** | **2,818.07** | **0.86** | **0.01** | **2,862.42** |

Note: Emissions reported as zero are rounded and not necessarily equal to zero.

The total GHG emissions from the Project are below the SCAQMD recommended screening level of 3,000 $MTCO_2E$/yr for non-industrial projects under Option 2. Therefore, the proposed Project will not exceed the draft GHG screening threshold provided by SCAQMD.

## ▪ Conclusion

The conclusion of this analysis indicates that construction and operation of the proposed Project will not exceed criteria pollutant thresholds established by SCAQMD on a regional or localized level. In addition, the Project will not create a CO hot spot. The Project will also not exceed the draft GHG screening threshold recommended by SCAQMD. Should you have any questions, please contact me at (951) 686-1070.

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[14] CalRecycle, *Riverside Jurisdiction Diversion / Disposal Rate Detail*, 2006. Available at: http://www.calrecycle.ca.gov/LGCentral/reports/diversionprogram/JurisdictionDiversion.aspx, accessed May 27, 2015.

# CALEEMOD OUTPUT FILES

# Mission Lofts

**Riverside-South Coast County, Summer**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Parking Lot | 1.53 | Acre | 1.53 | 66,646.80 | 0 |
| Apartments Mid Rise | 212.00 | Dwelling Unit | 3.16 | 212,000.00 | 606 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.4 | **Precipitation Freq (Days)** | 28 |
| **Climate Zone** | 10 | | | **Operational Year** | 2016 |
| **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 - based on site plan; north parcel includes some parking; south parcel includes additional parking

Construction Phase - see table

Off-road Equipment - see table

Off-road Equipment - see table

Off-road Equipment - see table

Trips and VMT - water truck trips added

Vehicle Trips - weekday trip rate per traffic study

Woodstoves - no fireplaces or woodstoves

Construction Off-road Equipment Mitigation - water 3x daily for 61% reduction in PM

Mobile Land Use Mitigation -

Energy Mitigation -

Water Mitigation -

Waste Mitigation - city waste diversion rate in 2006

Grading - import per plans

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblConstructionPhase | NumDays | 18.00 | 35.00 |
| tblConstructionPhase | NumDays | 8.00 | 22.00 |
| tblConstructionPhase | NumDays | 18.00 | 22.00 |
| tblConstructionPhase | PhaseEndDate | 11/4/2016 | 9/30/2016 |
| tblConstructionPhase | PhaseEndDate | 10/30/2015 | 10/31/2015 |
| tblConstructionPhase | PhaseEndDate | 11/1/2016 | 9/30/2016 |
| tblConstructionPhase | PhaseStartDate | 9/17/2016 | 8/15/2016 |
| tblConstructionPhase | PhaseStartDate | 10/1/2016 | 9/1/2016 |
| tblFireplaces | NumberGas | 180.20 | 0.00 |
| tblFireplaces | NumberNoFireplace | 21.20 | 212.00 |
| tblFireplaces | NumberWood | 10.60 | 0.00 |
| tblGrading | AcresOfGrading | 11.00 | 4.00 |
| tblGrading | MaterialImported | 0.00 | 3,600.00 |
| tblLandUse | LotAcreage | 5.58 | 3.16 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 8.00 |
| tblProjectCharacteristics | OperationalYear | 2014 | 2016 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 2.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 2.00 |
| tblVehicleTrips | WD_TR | 6.59 | 6.65 |
| tblWoodstoves | NumberCatalytic | 10.60 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 10.60 | 0.00 |

# 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 | 4.9562 | 46.8526 | 34.6710 | 0.0601 | 6.7727 | 2.4548 | 9.2275 | 3.4800 | 2.2584 | 5.7384 | 0.0000 | 5,697.5144 | 5,697.5144 | 0.9528 | 0.0000 | 5,717.5230 |
| 2016 | 56.3327 | 59.9160 | 53.8951 | 0.0943 | 2.8756 | 3.7641 | 6.6397 | 0.7673 | 3.5248 | 4.2920 | 0.0000 | 8,901.5862 | 8,901.5862 | 1.5487 | 0.0000 | 8,934.1090 |
| **Total** | **61.2889** | **106.7686** | **88.5660** | **0.1545** | **9.6483** | **6.2189** | **15.8672** | **4.2472** | **5.7832** | **10.0304** | **0.0000** | **14,599.1006** | **14,599.1006** | **2.5015** | **0.0000** | **14,651.6320** |

### 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 | 4.9562 | 46.8526 | 34.6710 | 0.0601 | 2.9689 | 2.4548 | 5.4237 | 1.4461 | 2.2584 | 3.7045 | 0.0000 | 5,697.5144 | 5,697.5144 | 0.9528 | 0.0000 | 5,717.5230 |
| 2016 | 56.3327 | 59.9160 | 53.8951 | 0.0943 | 2.8756 | 3.7641 | 6.6397 | 0.7673 | 3.5248 | 4.2920 | 0.0000 | 8,901.5862 | 8,901.5862 | 1.5487 | 0.0000 | 8,934.1090 |
| **Total** | **61.2889** | **106.7686** | **88.5660** | **0.1545** | **5.8445** | **6.2189** | **12.0635** | **2.2134** | **5.7832** | **7.9965** | **0.0000** | **14,599.1006** | **14,599.1006** | **2.5015** | **0.0000** | **14,651.6320** |

| | 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** | **39.42** | **0.00** | **23.97** | **47.89** | **0.00** | **20.28** | **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 | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |
| Energy | 0.0751 | 0.6420 | 0.2732 | 4.1000e-003 | | 0.0519 | 0.0519 | | 0.0519 | 0.0519 | | 819.5568 | 819.5568 | 0.0157 | 0.0150 | 824.5445 |
| Mobile | 5.8800 | 18.5485 | 66.1894 | 0.1616 | 10.9894 | 0.2695 | 11.2589 | 2.9327 | 0.2478 | 3.1805 | | 14,154.3995 | 14,154.3995 | 0.4598 | | 14,164.0545 |
| **Total** | **12.4978** | **19.3980** | **84.1967** | **0.1667** | **10.9894** | **0.4171** | **11.4065** | **2.9327** | **0.3954** | **3.3281** | **0.0000** | **15,005.4497** | **15,005.4497** | **0.5076** | **0.0150** | **15,020.7664** |

### 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 | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |
| Energy | 0.0591 | 0.5053 | 0.2150 | 3.2300e-003 | | 0.0409 | 0.0409 | | 0.0409 | 0.0409 | | 645.0607 | 645.0607 | 0.0124 | 0.0118 | 648.9864 |
| Mobile | 5.8800 | 18.5485 | 66.1894 | 0.1616 | 10.9894 | 0.2695 | 11.2589 | 2.9327 | 0.2478 | 3.1805 | | 14,154.3995 | 14,154.3995 | 0.4598 | | 14,164.0545 |
| **Total** | **12.4818** | **19.2613** | **84.1385** | **0.1658** | **10.9894** | **0.4060** | **11.3954** | **2.9327** | **0.3844** | **3.3170** | **0.0000** | **14,830.9536** | **14,830.9536** | **0.5042** | **0.0118** | **14,845.2083** |

| | 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** | **0.13** | **0.70** | **0.07** | **0.52** | **0.00** | **2.65** | **0.10** | **0.00** | **2.80** | **0.33** | **0.00** | **1.16** | **1.16** | **0.66** | **21.29** | **1.17** |

## 3.0 Construction Detail

**Construction Phase**

| Phase Number | Phase Name | Phase Type | Start Date | End Date | Num Days Week | Num Days | Phase Description |
|---|---|---|---|---|---|---|---|
| 1 | Grading | Grading | 10/1/2015 | 10/31/2015 | 5 | 22 | |
| 2 | Building Construction | Building Construction | 11/1/2015 | 9/16/2016 | 5 | 230 | |
| 3 | Architectural Coating | Architectural Coating | 8/15/2016 | 9/30/2016 | 5 | 35 | |
| 4 | Paving | Paving | 9/1/2016 | 9/30/2016 | 5 | 22 | |

**Acres of Grading (Site Preparation Phase): 0**

**Acres of Grading (Grading Phase): 4**

**Acres of Paving: 0**

**Residential Indoor: 429,300; Residential Outdoor: 143,100; Non-Residential Indoor: 2,999; Non-Residential Outdoor: 1,000 (Architectural Coating – sqft)**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Grading | Excavators | 1 | 8.00 | 162 | 0.38 |
| Grading | Graders | 1 | 8.00 | 174 | 0.41 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 3 | 8.00 | 97 | 0.37 |
| Building Construction | Cranes | 1 | 8.00 | 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 | 8.00 | 97 | 0.37 |
| Building Construction | Welders | 1 | 8.00 | 46 | 0.45 |
| Architectural Coating | Air Compressors | 1 | 8.00 | 78 | 0.48 |
| Paving | Cement and Mortar Mixers | 2 | 8.00 | 9 | 0.56 |
| Paving | Pavers | 1 | 8.00 | 125 | 0.42 |
| Paving | Paving Equipment | 2 | 8.00 | 130 | 0.36 |
| Paving | Rollers | 2 | 8.00 | 80 | 0.38 |
| Paving | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |

**Trips and VMT**

| Phase Name | Offroad Equipment Count | Worker Trip Number | Vendor Trip Number | Hauling Trip Number | Worker Trip Length | Vendor Trip Length | Hauling Trip Length | Worker Vehicle Class | Vendor Vehicle Class | Hauling Vehicle Class |
|---|---|---|---|---|---|---|---|---|---|---|
| Grading | 6 | 15.00 | 2.00 | 450.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 9 | 181.00 | 34.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 36.00 | 0.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 8 | 20.00 | 2.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

## 3.2 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 | | | | | 6.2356 | 0.0000 | 6.2356 | 3.3342 | 0.0000 | 3.3342 | | | 0.0000 | | | 0.0000 |
| Off-Road | 3.8327 | 40.4161 | 26.6731 | 0.0298 | | 2.3284 | 2.3284 | | 2.1421 | 2.1421 | | 3,129.0158 | 3,129.0158 | 0.9341 | | 3,148.6328 |
| **Total** | **3.8327** | **40.4161** | **26.6731** | **0.0298** | **6.2356** | **2.3284** | **8.5640** | **3.3342** | **2.1421** | **5.4763** | | **3,129.0158** | **3,129.0158** | **0.9341** | | **3,148.6328** |

### 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 | 0.3470 | 6.1699 | 3.6844 | 0.0146 | 0.3568 | 0.1215 | 0.4783 | 0.0977 | 0.1118 | 0.2095 | | 1,486.0808 | 1,486.0808 | 0.0105 | | 1,486.3009 |
| Vendor | 0.0176 | 0.1909 | 0.1888 | 4.2000e-004 | 0.0126 | 3.8600e-003 | 0.0164 | 3.5900e-003 | 3.5500e-003 | 7.1400e-003 | | 42.7537 | 42.7537 | 3.1000e-004 | | 42.7602 |
| Worker | 0.0639 | 0.0758 | 0.9467 | 2.0100e-003 | 0.1677 | 1.0900e-003 | 0.1688 | 0.0445 | 1.0000e-003 | 0.0455 | | 172.7297 | 172.7297 | 7.8600e-003 | | 172.8947 |
| **Total** | **0.4284** | **6.4366** | **4.8199** | **0.0170** | **0.5370** | **0.1265** | **0.6635** | **0.1458** | **0.1163** | **0.2621** | | **1,701.5642** | **1,701.5642** | **0.0187** | | **1,701.9558** |

## 3.2 Grading - 2015

### Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | lb/day | | | | | | | | | | lb/day | | | | | |
| Fugitive Dust | | | | | 2.4319 | 0.0000 | 2.4319 | 1.3003 | 0.0000 | 1.3003 | | | 0.0000 | | | 0.0000 |
| Off-Road | 3.8327 | 40.4161 | 26.6731 | 0.0298 | | 2.3284 | 2.3284 | | 2.1421 | 2.1421 | 0.0000 | 3,129.0158 | 3,129.0158 | 0.9341 | | 3,148.6328 |
| **Total** | **3.8327** | **40.4161** | **26.6731** | **0.0298** | **2.4319** | **2.3284** | **4.7602** | **1.3003** | **2.1421** | **3.4424** | **0.0000** | **3,129.0158** | **3,129.0158** | **0.9341** | | **3,148.6328** |

### 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 | 0.3470 | 6.1699 | 3.6844 | 0.0146 | 0.3568 | 0.1215 | 0.4783 | 0.0977 | 0.1118 | 0.2095 | | 1,486.0808 | 1,486.0808 | 0.0105 | | 1,486.3009 |
| Vendor | 0.0176 | 0.1909 | 0.1888 | 4.2000e-004 | 0.0126 | 3.8600e-003 | 0.0164 | 3.5900e-003 | 3.5500e-003 | 7.1400e-003 | | 42.7537 | 42.7537 | 3.1000e-004 | | 42.7602 |
| Worker | 0.0639 | 0.0758 | 0.9467 | 2.0100e-003 | 0.1677 | 1.0900e-003 | 0.1688 | 0.0445 | 1.0000e-003 | 0.0455 | | 172.7297 | 172.7297 | 7.8600e-003 | | 172.8947 |
| **Total** | **0.4284** | **6.4366** | **4.8199** | **0.0170** | **0.5370** | **0.1265** | **0.6635** | **0.1458** | **0.1163** | **0.2621** | | **1,701.5642** | **1,701.5642** | **0.0187** | | **1,701.9558** |

## 3.3 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 | 3.8870 | 32.4182 | 20.0375 | 0.0287 | | 2.2678 | 2.2678 | | 2.1293 | 2.1293 | | 2,886.4292 | 2,886.4292 | 0.7336 | | 2,901.8345 |
| **Total** | **3.8870** | **32.4182** | **20.0375** | **0.0287** | | **2.2678** | **2.2678** | | **2.1293** | **2.1293** | | **2,886.4292** | **2,886.4292** | **0.7336** | | **2,901.8345** |

### 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 | 0.2984 | 3.2454 | 3.2103 | 7.1700e-003 | 0.2139 | 0.0656 | 0.2795 | 0.0611 | 0.0603 | 0.1214 | | 726.8133 | 726.8133 | 5.2300e-003 | | 726.9231 |
| Worker | 0.7708 | 0.9141 | 11.4231 | 0.0243 | 2.0232 | 0.0132 | 2.0364 | 0.5366 | 0.0121 | 0.5486 | | 2,084.2719 | 2,084.2719 | 0.0948 | | 2,086.2629 |
| **Total** | **1.0692** | **4.1595** | **14.6334** | **0.0315** | **2.2371** | **0.0787** | **2.3158** | **0.5977** | **0.0724** | **0.6700** | | **2,811.0852** | **2,811.0852** | **0.1000** | | **2,813.1860** |

## 3.3 Building Construction - 2015

### 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 | 3.8870 | 32.4182 | 20.0375 | 0.0287 | | 2.2678 | 2.2678 | | 2.1293 | 2.1293 | 0.0000 | 2,886.4292 | 2,886.4292 | 0.7336 | | 2,901.8345 |
| **Total** | **3.8870** | **32.4182** | **20.0375** | **0.0287** | | **2.2678** | **2.2678** | | **2.1293** | **2.1293** | **0.0000** | **2,886.4292** | **2,886.4292** | **0.7336** | | **2,901.8345** |

### 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 | 0.2984 | 3.2454 | 3.2103 | 7.1700e-003 | 0.2139 | 0.0656 | 0.2795 | 0.0611 | 0.0603 | 0.1214 | | 726.8133 | 726.8133 | 5.2300e-003 | | 726.9231 |
| Worker | 0.7708 | 0.9141 | 11.4231 | 0.0243 | 2.0232 | 0.0132 | 2.0364 | 0.5366 | 0.0121 | 0.5486 | | 2,084.2719 | 2,084.2719 | 0.0948 | | 2,086.2629 |
| **Total** | **1.0692** | **4.1595** | **14.6334** | **0.0315** | **2.2371** | **0.0787** | **2.3158** | **0.5977** | **0.0724** | **0.6700** | | **2,811.0852** | **2,811.0852** | **0.1000** | | **2,813.1860** |

## 3.3 Building Construction - 2016

### 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 | 3.6240 | 30.7934 | 19.7845 | 0.0287 | | 2.1098 | 2.1098 | | 1.9794 | 1.9794 | | 2,863.9447 | 2,863.9447 | 0.7208 | | 2,879.0804 |
| **Total** | **3.6240** | **30.7934** | **19.7845** | **0.0287** | | **2.1098** | **2.1098** | | **1.9794** | **1.9794** | | **2,863.9447** | **2,863.9447** | **0.7208** | | **2,879.0804** |

### 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 | 0.2644 | 2.8531 | 2.9877 | 7.1500e-003 | 0.2139 | 0.0554 | 0.2693 | 0.0611 | 0.0509 | 0.1120 | | 718.3526 | 718.3526 | 4.6700e-003 | | 718.4508 |
| Worker | 0.6935 | 0.8189 | 10.2646 | 0.0243 | 2.0232 | 0.0127 | 2.0358 | 0.5366 | 0.0116 | 0.5482 | | 2,008.3427 | 2,008.3427 | 0.0866 | | 2,010.1618 |
| **Total** | **0.9579** | **3.6721** | **13.2523** | **0.0314** | **2.2371** | **0.0680** | **2.3051** | **0.5977** | **0.0626** | **0.6602** | | **2,726.6953** | **2,726.6953** | **0.0913** | | **2,728.6126** |

## 3.3 Building Construction - 2016

### 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 | 3.6240 | 30.7934 | 19.7845 | 0.0287 | | 2.1098 | 2.1098 | | 1.9794 | 1.9794 | 0.0000 | 2,863.9447 | 2,863.9447 | 0.7208 | | 2,879.0804 |
| **Total** | **3.6240** | **30.7934** | **19.7845** | **0.0287** | | **2.1098** | **2.1098** | | **1.9794** | **1.9794** | **0.0000** | **2,863.9447** | **2,863.9447** | **0.7208** | | **2,879.0804** |

### 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 | 0.2644 | 2.8531 | 2.9877 | 7.1500e-003 | 0.2139 | 0.0554 | 0.2693 | 0.0611 | 0.0509 | 0.1120 | | 718.3526 | 718.3526 | 4.6700e-003 | | 718.4508 |
| Worker | 0.6935 | 0.8189 | 10.2646 | 0.0243 | 2.0232 | 0.0127 | 2.0358 | 0.5366 | 0.0116 | 0.5482 | | 2,008.3427 | 2,008.3427 | 0.0866 | | 2,010.1618 |
| **Total** | **0.9579** | **3.6721** | **13.2523** | **0.0314** | **2.2371** | **0.0680** | **2.3051** | **0.5977** | **0.0626** | **0.6602** | | **2,726.6953** | **2,726.6953** | **0.0913** | | **2,728.6126** |

## 3.4 Architectural Coating - 2016

### 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 | 48.7003 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.4913 | 3.1630 | 2.5119 | 3.9600e-003 | | 0.2622 | 0.2622 | | 0.2622 | 0.2622 | | 375.2641 | 375.2641 | 0.0442 | | 376.1932 |
| **Total** | **49.1916** | **3.1630** | **2.5119** | **3.9600e-003** | | **0.2622** | **0.2622** | | **0.2622** | **0.2622** | | **375.2641** | **375.2641** | **0.0442** | | **376.1932** |

### 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 | 0.1379 | 0.1629 | 2.0416 | 4.8300e-003 | 0.4024 | 2.5200e-003 | 0.4049 | 0.1067 | 2.3100e-003 | 0.1090 | | 399.4494 | 399.4494 | 0.0172 | | 399.8112 |
| **Total** | **0.1379** | **0.1629** | **2.0416** | **4.8300e-003** | **0.4024** | **2.5200e-003** | **0.4049** | **0.1067** | **2.3100e-003** | **0.1090** | | **399.4494** | **399.4494** | **0.0172** | | **399.8112** |

## 3.4 Architectural Coating - 2016

### 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 | 48.7003 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.4913 | 3.1630 | 2.5119 | 3.9600e-003 | | 0.2622 | 0.2622 | | 0.2622 | 0.2622 | 0.0000 | 375.2641 | 375.2641 | 0.0442 | | 376.1932 |
| **Total** | **49.1916** | **3.1630** | **2.5119** | **3.9600e-003** | | **0.2622** | **0.2622** | | **0.2622** | **0.2622** | **0.0000** | **375.2641** | **375.2641** | **0.0442** | | **376.1932** |

### 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 | 0.1379 | 0.1629 | 2.0416 | 4.8300e-003 | 0.4024 | 2.5200e-003 | 0.4049 | 0.1067 | 2.3100e-003 | 0.1090 | | 399.4494 | 399.4494 | 0.0172 | | 399.8112 |
| **Total** | **0.1379** | **0.1629** | **2.0416** | **4.8300e-003** | **0.4024** | **2.5200e-003** | **0.4049** | **0.1067** | **2.3100e-003** | **0.1090** | | **399.4494** | **399.4494** | **0.0172** | | **399.8112** |

## 3.5 Paving - 2016

### 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 | 2.1469 | 21.8663 | 14.9949 | 0.0223 | | 1.3170 | 1.3170 | | 1.2140 | 1.2140 | | 2,272.0603 | 2,272.0603 | 0.6654 | | 2,286.0326 |
| Paving | 0.1822 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **2.3291** | **21.8663** | **14.9949** | **0.0223** | | **1.3170** | **1.3170** | | **1.2140** | **1.2140** | | **2,272.0603** | **2,272.0603** | **0.6654** | | **2,286.0326** |

### 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 | 0.0156 | 0.1678 | 0.1758 | 4.2000e-004 | 0.0126 | 3.2600e-003 | 0.0158 | 3.5900e-003 | 3.0000e-003 | 6.5900e-003 | | 42.2560 | 42.2560 | 2.7000e-004 | | 42.2618 |
| Worker | 0.0766 | 0.0905 | 1.1342 | 2.6800e-003 | 0.2236 | 1.4000e-003 | 0.2250 | 0.0593 | 1.2800e-003 | 0.0606 | | 221.9163 | 221.9163 | 9.5700e-003 | | 222.1173 |
| **Total** | **0.0922** | **0.2583** | **1.3100** | **3.1000e-003** | **0.2361** | **4.6600e-003** | **0.2408** | **0.0629** | **4.2800e-003** | **0.0672** | | **264.1724** | **264.1724** | **9.8400e-003** | | **264.3791** |

## 3.5 Paving - 2016

**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 | 2.1469 | 21.8663 | 14.9949 | 0.0223 | | 1.3170 | 1.3170 | | 1.2140 | 1.2140 | 0.0000 | 2,272.0603 | 2,272.0603 | 0.6654 | | 2,286.0326 |
| Paving | 0.1822 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **2.3291** | **21.8663** | **14.9949** | **0.0223** | | **1.3170** | **1.3170** | | **1.2140** | **1.2140** | **0.0000** | **2,272.0603** | **2,272.0603** | **0.6654** | | **2,286.0326** |

**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 | 0.0156 | 0.1678 | 0.1758 | 4.2000e-004 | 0.0126 | 3.2600e-003 | 0.0158 | 3.5900e-003 | 3.0000e-003 | 6.5900e-003 | | 42.2560 | 42.2560 | 2.7000e-004 | | 42.2618 |
| Worker | 0.0766 | 0.0905 | 1.1342 | 2.6800e-003 | 0.2236 | 1.4000e-003 | 0.2250 | 0.0593 | 1.2800e-003 | 0.0606 | | 221.9163 | 221.9163 | 9.5700e-003 | | 222.1173 |
| **Total** | **0.0922** | **0.2583** | **1.3100** | **3.1000e-003** | **0.2361** | **4.6600e-003** | **0.2408** | **0.0629** | **4.2800e-003** | **0.0672** | | **264.1724** | **264.1724** | **9.8400e-003** | | **264.3791** |

## 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 | 5.8800 | 18.5485 | 66.1894 | 0.1616 | 10.9894 | 0.2695 | 11.2589 | 2.9327 | 0.2478 | 3.1805 | | 14,154.3995 | 14,154.3995 | 0.4598 | | 14,164.0545 |
| Unmitigated | 5.8800 | 18.5485 | 66.1894 | 0.1616 | 10.9894 | 0.2695 | 11.2589 | 2.9327 | 0.2478 | 3.1805 | | 14,154.3995 | 14,154.3995 | 0.4598 | | 14,164.0545 |

## 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Apartments Mid Rise | 1,409.80 | 1,517.92 | 1286.84 | 4,810,256 | 4,810,256 |
| Parking Lot | 0.00 | 0.00 | 0.00 | | |
| Total | 1,409.80 | 1,517.92 | 1,286.84 | 4,810,256 | 4,810,256 |

## 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 |
| Apartments Mid Rise | 14.70 | 5.90 | 8.70 | 40.20 | 19.20 | 40.60 | 86 | 11 | 3 |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.462438 | 0.069856 | 0.176572 | 0.170752 | 0.045136 | 0.007399 | 0.012745 | 0.042494 | 0.000970 | 0.001060 | 0.006446 | 0.000893 | 0.003237 |

## 5.0 Energy Detail

Historical Energy Use: N

### 5.1 Mitigation Measures Energy

Exceed Title 24

| | 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 | 0.0591 | 0.5053 | 0.2150 | 3.2300e-003 | | 0.0409 | 0.0409 | | 0.0409 | 0.0409 | | 645.0607 | 645.0607 | 0.0124 | 0.0118 | 648.9864 |
| NaturalGas Unmitigated | 0.0751 | 0.6420 | 0.2732 | 4.1000e-003 | | 0.0519 | 0.0519 | | 0.0519 | 0.0519 | | 819.5568 | 819.5568 | 0.0157 | 0.0150 | 824.5445 |

### 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 | | | | | |
| Apartments Mid Rise | 6966.23 | 0.0751 | 0.6420 | 0.2732 | 4.1000e-003 | | 0.0519 | 0.0519 | | 0.0519 | 0.0519 | | 819.5568 | 819.5568 | 0.0157 | 0.0150 | 824.5445 |
| 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** | | **0.0751** | **0.6420** | **0.2732** | **4.1000e-003** | | **0.0519** | **0.0519** | | **0.0519** | **0.0519** | | **819.5568** | **819.5568** | **0.0157** | **0.0150** | **824.5445** |

## 5.2 Energy by Land Use - NaturalGas

**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 | | | | | |
| 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 |
| Apartments Mid Rise | 5.48302 | 0.0591 | 0.5053 | 0.2150 | 3.2300e-003 | | 0.0409 | 0.0409 | | 0.0409 | 0.0409 | | 645.0607 | 645.0607 | 0.0124 | 0.0118 | 648.9864 |
| **Total** | | **0.0591** | **0.5053** | **0.2150** | **3.2300e-003** | | **0.0409** | **0.0409** | | **0.0409** | **0.0409** | | **645.0607** | **645.0607** | **0.0124** | **0.0118** | **648.9864** |

# 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 | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |
| Unmitigated | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |

## 6.2 Area by SubCategory

**Unmitigated**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SubCategory | lb/day | | | | | | | | | | lb/day | | | | | |
| Architectural Coating | 0.4670 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 5.5172 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Landscaping | 0.5585 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | | 31.4934 | 31.4934 | 0.0321 | | 32.1674 |
| **Total** | **6.5427** | **0.2075** | **17.7341** | **9.2000e-004** | | **0.0957** | **0.0957** | | **0.0957** | **0.0957** | **0.0000** | **31.4934** | **31.4934** | **0.0321** | **0.0000** | **32.1674** |

## 6.2 Area by SubCategory

**Mitigated**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SubCategory | lb/day | | | | | | | | | | lb/day | | | | | |
| Architectural Coating | 0.4670 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 5.5172 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Landscaping | 0.5585 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | | 31.4934 | 31.4934 | 0.0321 | | 32.1674 |
| **Total** | **6.5427** | **0.2075** | **17.7341** | **9.2000e-004** | | **0.0957** | **0.0957** | | **0.0957** | **0.0957** | **0.0000** | **31.4934** | **31.4934** | **0.0321** | **0.0000** | **32.1674** |

# 7.0 Water Detail

## 7.1 Mitigation Measures Water

Apply Water Conservation Strategy

# 8.0 Waste Detail

## 8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

# 9.0 Operational Offroad

| Equipment Type | Number | Hours/Day | Days/Year | Horse Power | Load Factor | Fuel Type |
|---|---|---|---|---|---|---|

## 10.0 Vegetation

# Mission Lofts

**Riverside-South Coast County, Winter**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Parking Lot | 1.53 | Acre | 1.53 | 66,646.80 | 0 |
| Apartments Mid Rise | 212.00 | Dwelling Unit | 3.16 | 212,000.00 | 606 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.4 | **Precipitation Freq (Days)** | 28 |
| **Climate Zone** | 10 | | | **Operational Year** | 2016 |
| **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 - based on site plan; north parcel includes some parking; south parcel includes additional parking

Construction Phase - see table

Off-road Equipment - see table

Off-road Equipment - see table

Off-road Equipment - see table

Trips and VMT - water truck trips added

Vehicle Trips - weekday trip rate per traffic study

Woodstoves - no fireplaces or woodstoves

Construction Off-road Equipment Mitigation - water 3x daily for 61% reduction in PM

Mobile Land Use Mitigation -

Energy Mitigation -

Water Mitigation -

Waste Mitigation - city waste diversion rate in 2006

Grading - import per plans

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblConstructionPhase | NumDays | 18.00 | 35.00 |
| tblConstructionPhase | NumDays | 8.00 | 22.00 |
| tblConstructionPhase | NumDays | 18.00 | 22.00 |
| tblConstructionPhase | PhaseEndDate | 11/4/2016 | 9/30/2016 |
| tblConstructionPhase | PhaseEndDate | 10/30/2015 | 10/31/2015 |
| tblConstructionPhase | PhaseEndDate | 11/1/2016 | 9/30/2016 |
| tblConstructionPhase | PhaseStartDate | 9/17/2016 | 8/15/2016 |
| tblConstructionPhase | PhaseStartDate | 10/1/2016 | 9/1/2016 |
| tblFireplaces | NumberGas | 180.20 | 0.00 |
| tblFireplaces | NumberNoFireplace | 21.20 | 212.00 |
| tblFireplaces | NumberWood | 10.60 | 0.00 |
| tblGrading | AcresOfGrading | 11.00 | 4.00 |
| tblGrading | MaterialImported | 0.00 | 3,600.00 |
| tblLandUse | LotAcreage | 5.58 | 3.16 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 8.00 |
| tblProjectCharacteristics | OperationalYear | 2014 | 2016 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 2.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 2.00 |
| tblVehicleTrips | WD_TR | 6.59 | 6.65 |
| tblWoodstoves | NumberCatalytic | 10.60 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 10.60 | 0.00 |

# 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 | 4.9420 | 47.0989 | 33.5215 | 0.0580 | 6.7727 | 2.4552 | 9.2279 | 3.4800 | 2.2588 | 5.7387 | 0.0000 | 5,511.8921 | 5,511.8921 | 0.9530 | 0.0000 | 5,531.9041 |
| 2016 | 56.3093 | 60.0618 | 52.4690 | 0.0915 | 2.8756 | 3.7647 | 6.6403 | 0.7673 | 3.5253 | 4.2925 | 0.0000 | 8,668.4441 | 8,668.4441 | 1.5489 | 0.0000 | 8,700.9705 |
| **Total** | **61.2513** | **107.1607** | **85.9905** | **0.1495** | **9.6483** | **6.2199** | **15.8681** | **4.2472** | **5.7840** | **10.0313** | **0.0000** | **14,180.3362** | **14,180.3362** | **2.5018** | **0.0000** | **14,232.8746** |

### 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 | 4.9420 | 47.0989 | 33.5215 | 0.0580 | 2.9689 | 2.4552 | 5.4241 | 1.4461 | 2.2588 | 3.7049 | 0.0000 | 5,511.8921 | 5,511.8921 | 0.9530 | 0.0000 | 5,531.9041 |
| 2016 | 56.3093 | 60.0618 | 52.4690 | 0.0915 | 2.8756 | 3.7647 | 6.6403 | 0.7673 | 3.5253 | 4.2925 | 0.0000 | 8,668.4441 | 8,668.4441 | 1.5489 | 0.0000 | 8,700.9705 |
| **Total** | **61.2513** | **107.1607** | **85.9905** | **0.1495** | **5.8445** | **6.2199** | **12.0644** | **2.2134** | **5.7840** | **7.9974** | **0.0000** | **14,180.3362** | **14,180.3362** | **2.5018** | **0.0000** | **14,232.8746** |

| | 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** | **39.42** | **0.00** | **23.97** | **47.89** | **0.00** | **20.28** | **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 | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |
| Energy | 0.0751 | 0.6420 | 0.2732 | 4.1000e-003 | | 0.0519 | 0.0519 | | 0.0519 | 0.0519 | | 819.5568 | 819.5568 | 0.0157 | 0.0150 | 824.5445 |
| Mobile | 5.7424 | 19.3422 | 61.5454 | 0.1507 | 10.9894 | 0.2706 | 11.2600 | 2.9327 | 0.2488 | 3.1815 | | 13,243.3043 | 13,243.3043 | 0.4603 | | 13,252.9700 |
| **Total** | **12.3603** | **20.1917** | **79.5527** | **0.1558** | **10.9894** | **0.4182** | **11.4075** | **2.9327** | **0.3964** | **3.3291** | **0.0000** | **14,094.3545** | **14,094.3545** | **0.5081** | **0.0150** | **14,109.6819** |

### 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 | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |
| Energy | 0.0591 | 0.5053 | 0.2150 | 3.2300e-003 | | 0.0409 | 0.0409 | | 0.0409 | 0.0409 | | 645.0607 | 645.0607 | 0.0124 | 0.0118 | 648.9864 |
| Mobile | 5.7424 | 19.3422 | 61.5454 | 0.1507 | 10.9894 | 0.2706 | 11.2600 | 2.9327 | 0.2488 | 3.1815 | | 13,243.3043 | 13,243.3043 | 0.4603 | | 13,252.9700 |
| **Total** | **12.3443** | **20.0550** | **79.4945** | **0.1549** | **10.9894** | **0.4071** | **11.3965** | **2.9327** | **0.3853** | **3.3180** | **0.0000** | **13,919.8584** | **13,919.8584** | **0.5047** | **0.0118** | **13,934.1238** |

| | 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** | **0.13** | **0.68** | **0.07** | **0.56** | **0.00** | **2.64** | **0.10** | **0.00** | **2.79** | **0.33** | **0.00** | **1.24** | **1.24** | **0.66** | **21.29** | **1.24** |

## 3.0 Construction Detail

**Construction Phase**

| Phase Number | Phase Name | Phase Type | Start Date | End Date | Num Days Week | Num Days | Phase Description |
|---|---|---|---|---|---|---|---|
| 1 | Grading | Grading | 10/1/2015 | 10/31/2015 | 5 | 22 | |
| 2 | Building Construction | Building Construction | 11/1/2015 | 9/16/2016 | 5 | 230 | |
| 3 | Architectural Coating | Architectural Coating | 8/15/2016 | 9/30/2016 | 5 | 35 | |
| 4 | Paving | Paving | 9/1/2016 | 9/30/2016 | 5 | 22 | |

**Acres of Grading (Site Preparation Phase): 0**

**Acres of Grading (Grading Phase): 4**

**Acres of Paving: 0**

**Residential Indoor: 429,300; Residential Outdoor: 143,100; Non-Residential Indoor: 2,999; Non-Residential Outdoor: 1,000 (Architectural Coating – sqft)**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Grading | Excavators | 1 | 8.00 | 162 | 0.38 |
| Grading | Graders | 1 | 8.00 | 174 | 0.41 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 3 | 8.00 | 97 | 0.37 |
| Building Construction | Cranes | 1 | 8.00 | 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 | 8.00 | 97 | 0.37 |
| Building Construction | Welders | 1 | 8.00 | 46 | 0.45 |
| Architectural Coating | Air Compressors | 1 | 8.00 | 78 | 0.48 |
| Paving | Cement and Mortar Mixers | 2 | 8.00 | 9 | 0.56 |
| Paving | Pavers | 1 | 8.00 | 125 | 0.42 |
| Paving | Paving Equipment | 2 | 8.00 | 130 | 0.36 |
| Paving | Rollers | 2 | 8.00 | 80 | 0.38 |
| Paving | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |

**Trips and VMT**

| Phase Name | Offroad Equipment Count | Worker Trip Number | Vendor Trip Number | Hauling Trip Number | Worker Trip Length | Vendor Trip Length | Hauling Trip Length | Worker Vehicle Class | Vendor Vehicle Class | Hauling Vehicle Class |
|---|---|---|---|---|---|---|---|---|---|---|
| Grading | 6 | 15.00 | 2.00 | 450.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 9 | 181.00 | 34.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 36.00 | 0.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 8 | 20.00 | 2.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

## 3.2 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 | | | | | 6.2356 | 0.0000 | 6.2356 | 3.3342 | 0.0000 | 3.3342 | | | 0.0000 | | | 0.0000 |
| Off-Road | 3.8327 | 40.4161 | 26.6731 | 0.0298 | | 2.3284 | 2.3284 | | 2.1421 | 2.1421 | | 3,129.0158 | 3,129.0158 | 0.9341 | | 3,148.6328 |
| **Total** | **3.8327** | **40.4161** | **26.6731** | **0.0298** | **6.2356** | **2.3284** | **8.5640** | **3.3342** | **2.1421** | **5.4763** | | **3,129.0158** | **3,129.0158** | **0.9341** | | **3,148.6328** |

### 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 | 0.3610 | 6.4061 | 4.0218 | 0.0146 | 0.3568 | 0.1219 | 0.4787 | 0.0977 | 0.1121 | 0.2098 | | 1,482.4364 | 1,482.4364 | 0.0106 | | 1,482.6597 |
| Vendor | 0.0187 | 0.1959 | 0.2127 | 4.2000e-004 | 0.0126 | 3.9000e-003 | 0.0165 | 3.5900e-003 | 3.5800e-003 | 7.1800e-003 | | 42.3857 | 42.3857 | 3.2000e-004 | | 42.3923 |
| Worker | 0.0611 | 0.0808 | 0.8178 | 1.8400e-003 | 0.1677 | 1.0900e-003 | 0.1688 | 0.0445 | 1.0000e-003 | 0.0455 | | 157.8652 | 157.8652 | 7.8600e-003 | | 158.0302 |
| **Total** | **0.4408** | **6.6828** | **5.0523** | **0.0168** | **0.5370** | **0.1269** | **0.6639** | **0.1458** | **0.1167** | **0.2625** | | **1,682.6872** | **1,682.6872** | **0.0188** | | **1,683.0822** |

## 3.2 Grading - 2015

### Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | lb/day | | | | | | | | | | lb/day | | | | | |
| Fugitive Dust | | | | | 2.4319 | 0.0000 | 2.4319 | 1.3003 | 0.0000 | 1.3003 | | | 0.0000 | | | 0.0000 |
| Off-Road | 3.8327 | 40.4161 | 26.6731 | 0.0298 | | 2.3284 | 2.3284 | | 2.1421 | 2.1421 | 0.0000 | 3,129.0158 | 3,129.0158 | 0.9341 | | 3,148.6328 |
| **Total** | **3.8327** | **40.4161** | **26.6731** | **0.0298** | **2.4319** | **2.3284** | **4.7602** | **1.3003** | **2.1421** | **3.4424** | **0.0000** | **3,129.0158** | **3,129.0158** | **0.9341** | | **3,148.6328** |

### 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 | 0.3610 | 6.4061 | 4.0218 | 0.0146 | 0.3568 | 0.1219 | 0.4787 | 0.0977 | 0.1121 | 0.2098 | | 1,482.4364 | 1,482.4364 | 0.0106 | | 1,482.6597 |
| Vendor | 0.0187 | 0.1959 | 0.2127 | 4.2000e-004 | 0.0126 | 3.9000e-003 | 0.0165 | 3.5900e-003 | 3.5800e-003 | 7.1800e-003 | | 42.3857 | 42.3857 | 3.2000e-004 | | 42.3923 |
| Worker | 0.0611 | 0.0808 | 0.8178 | 1.8400e-003 | 0.1677 | 1.0900e-003 | 0.1688 | 0.0445 | 1.0000e-003 | 0.0455 | | 157.8652 | 157.8652 | 7.8600e-003 | | 158.0302 |
| **Total** | **0.4408** | **6.6828** | **5.0523** | **0.0168** | **0.5370** | **0.1269** | **0.6639** | **0.1458** | **0.1167** | **0.2625** | | **1,682.6872** | **1,682.6872** | **0.0188** | | **1,683.0822** |

## 3.3 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 | 3.8870 | 32.4182 | 20.0375 | 0.0287 | | 2.2678 | 2.2678 | | 2.1293 | 2.1293 | | 2,886.4292 | 2,886.4292 | 0.7336 | | 2,901.8345 |
| **Total** | **3.8870** | **32.4182** | **20.0375** | **0.0287** | | **2.2678** | **2.2678** | | **2.1293** | **2.1293** | | **2,886.4292** | **2,886.4292** | **0.7336** | | **2,901.8345** |

### 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 | 0.3180 | 3.3300 | 3.6154 | 7.1100e-003 | 0.2139 | 0.0663 | 0.2802 | 0.0611 | 0.0609 | 0.1220 | | 720.5562 | 720.5562 | 5.3900e-003 | | 720.6694 |
| Worker | 0.7370 | 0.9746 | 9.8686 | 0.0222 | 2.0232 | 0.0132 | 2.0364 | 0.5366 | 0.0121 | 0.5486 | | 1,904.9068 | 1,904.9068 | 0.0948 | | 1,906.8977 |
| **Total** | **1.0551** | **4.3046** | **13.4840** | **0.0293** | **2.2371** | **0.0795** | **2.3165** | **0.5977** | **0.0730** | **0.6707** | | **2,625.4629** | **2,625.4629** | **0.1002** | | **2,627.5672** |

## 3.3 Building Construction - 2015

### 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 | 3.8870 | 32.4182 | 20.0375 | 0.0287 | | 2.2678 | 2.2678 | | 2.1293 | 2.1293 | 0.0000 | 2,886.4292 | 2,886.4292 | 0.7336 | | 2,901.8345 |
| **Total** | **3.8870** | **32.4182** | **20.0375** | **0.0287** | | **2.2678** | **2.2678** | | **2.1293** | **2.1293** | **0.0000** | **2,886.4292** | **2,886.4292** | **0.7336** | | **2,901.8345** |

### 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 | 0.3180 | 3.3300 | 3.6154 | 7.1100e-003 | 0.2139 | 0.0663 | 0.2802 | 0.0611 | 0.0609 | 0.1220 | | 720.5562 | 720.5562 | 5.3900e-003 | | 720.6694 |
| Worker | 0.7370 | 0.9746 | 9.8686 | 0.0222 | 2.0232 | 0.0132 | 2.0364 | 0.5366 | 0.0121 | 0.5486 | | 1,904.9068 | 1,904.9068 | 0.0948 | | 1,906.8977 |
| **Total** | **1.0551** | **4.3046** | **13.4840** | **0.0293** | **2.2371** | **0.0795** | **2.3165** | **0.5977** | **0.0730** | **0.6707** | | **2,625.4629** | **2,625.4629** | **0.1002** | | **2,627.5672** |

## 3.3 Building Construction - 2016

### 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 | 3.6240 | 30.7934 | 19.7845 | 0.0287 | | 2.1098 | 2.1098 | | 1.9794 | 1.9794 | | 2,863.9447 | 2,863.9447 | 0.7208 | | 2,879.0804 |
| **Total** | **3.6240** | **30.7934** | **19.7845** | **0.0287** | | **2.1098** | **2.1098** | | **1.9794** | **1.9794** | | **2,863.9447** | **2,863.9447** | **0.7208** | | **2,879.0804** |

### 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 | 0.2818 | 2.9248 | 3.3970 | 7.1000e-003 | 0.2139 | 0.0559 | 0.2698 | 0.0611 | 0.0514 | 0.1125 | | 712.1357 | 712.1357 | 4.8300e-003 | | 712.2372 |
| Worker | 0.6616 | 0.8724 | 8.8445 | 0.0222 | 2.0232 | 0.0127 | 2.0358 | 0.5366 | 0.0116 | 0.5482 | | 1,835.3163 | 1,835.3163 | 0.0866 | | 1,837.1354 |
| **Total** | **0.9434** | **3.7972** | **12.2415** | **0.0293** | **2.2371** | **0.0685** | **2.3056** | **0.5977** | **0.0630** | **0.6607** | | **2,547.4520** | **2,547.4520** | **0.0915** | | **2,549.3725** |

## 3.3 Building Construction - 2016

### 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 | 3.6240 | 30.7934 | 19.7845 | 0.0287 | | 2.1098 | 2.1098 | | 1.9794 | 1.9794 | 0.0000 | 2,863.9447 | 2,863.9447 | 0.7208 | | 2,879.0804 |
| **Total** | **3.6240** | **30.7934** | **19.7845** | **0.0287** | | **2.1098** | **2.1098** | | **1.9794** | **1.9794** | **0.0000** | **2,863.9447** | **2,863.9447** | **0.7208** | | **2,879.0804** |

### 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 | 0.2818 | 2.9248 | 3.3970 | 7.1000e-003 | 0.2139 | 0.0559 | 0.2698 | 0.0611 | 0.0514 | 0.1125 | | 712.1357 | 712.1357 | 4.8300e-003 | | 712.2372 |
| Worker | 0.6616 | 0.8724 | 8.8445 | 0.0222 | 2.0232 | 0.0127 | 2.0358 | 0.5366 | 0.0116 | 0.5482 | | 1,835.3163 | 1,835.3163 | 0.0866 | | 1,837.1354 |
| **Total** | **0.9434** | **3.7972** | **12.2415** | **0.0293** | **2.2371** | **0.0685** | **2.3056** | **0.5977** | **0.0630** | **0.6607** | | **2,547.4520** | **2,547.4520** | **0.0915** | | **2,549.3725** |

## 3.4 Architectural Coating - 2016

### 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 | 48.7003 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.4913 | 3.1630 | 2.5119 | 3.9600e-003 | | 0.2622 | 0.2622 | | 0.2622 | 0.2622 | | 375.2641 | 375.2641 | 0.0442 | | 376.1932 |
| **Total** | **49.1916** | **3.1630** | **2.5119** | **3.9600e-003** | | **0.2622** | **0.2622** | | **0.2622** | **0.2622** | | **375.2641** | **375.2641** | **0.0442** | | **376.1932** |

### 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 | 0.1316 | 0.1735 | 1.7591 | 4.4100e-003 | 0.4024 | 2.5200e-003 | 0.4049 | 0.1067 | 2.3100e-003 | 0.1090 | | 365.0353 | 365.0353 | 0.0172 | | 365.3971 |
| **Total** | **0.1316** | **0.1735** | **1.7591** | **4.4100e-003** | **0.4024** | **2.5200e-003** | **0.4049** | **0.1067** | **2.3100e-003** | **0.1090** | | **365.0353** | **365.0353** | **0.0172** | | **365.3971** |

## 3.4 Architectural Coating - 2016

### 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 | 48.7003 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.4913 | 3.1630 | 2.5119 | 3.9600e-003 | | 0.2622 | 0.2622 | | 0.2622 | 0.2622 | 0.0000 | 375.2641 | 375.2641 | 0.0442 | | 376.1932 |
| **Total** | **49.1916** | **3.1630** | **2.5119** | **3.9600e-003** | | **0.2622** | **0.2622** | | **0.2622** | **0.2622** | **0.0000** | **375.2641** | **375.2641** | **0.0442** | | **376.1932** |

### 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 | 0.1316 | 0.1735 | 1.7591 | 4.4100e-003 | 0.4024 | 2.5200e-003 | 0.4049 | 0.1067 | 2.3100e-003 | 0.1090 | | 365.0353 | 365.0353 | 0.0172 | | 365.3971 |
| **Total** | **0.1316** | **0.1735** | **1.7591** | **4.4100e-003** | **0.4024** | **2.5200e-003** | **0.4049** | **0.1067** | **2.3100e-003** | **0.1090** | | **365.0353** | **365.0353** | **0.0172** | | **365.3971** |

## 3.5 Paving - 2016

### 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 | 2.1469 | 21.8663 | 14.9949 | 0.0223 | | 1.3170 | 1.3170 | | 1.2140 | 1.2140 | | 2,272.0603 | 2,272.0603 | 0.6654 | | 2,286.0326 |
| Paving | 0.1822 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **2.3291** | **21.8663** | **14.9949** | **0.0223** | | **1.3170** | **1.3170** | | **1.2140** | **1.2140** | | **2,272.0603** | **2,272.0603** | **0.6654** | | **2,286.0326** |

### 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 | 0.0166 | 0.1721 | 0.1998 | 4.2000e-004 | 0.0126 | 3.2900e-003 | 0.0159 | 3.5900e-003 | 3.0200e-003 | 6.6200e-003 | | 41.8903 | 41.8903 | 2.8000e-004 | | 41.8963 |
| Worker | 0.0731 | 0.0964 | 0.9773 | 2.4500e-003 | 0.2236 | 1.4000e-003 | 0.2250 | 0.0593 | 1.2800e-003 | 0.0606 | | 202.7974 | 202.7974 | 9.5700e-003 | | 202.9984 |
| **Total** | **0.0897** | **0.2685** | **1.1771** | **2.8700e-003** | **0.2361** | **4.6900e-003** | **0.2408** | **0.0629** | **4.3000e-003** | **0.0672** | | **244.6877** | **244.6877** | **9.8500e-003** | | **244.8947** |

## 3.5 Paving - 2016

**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 | 2.1469 | 21.8663 | 14.9949 | 0.0223 | | 1.3170 | 1.3170 | | 1.2140 | 1.2140 | 0.0000 | 2,272.0603 | 2,272.0603 | 0.6654 | | 2,286.0326 |
| Paving | 0.1822 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **2.3291** | **21.8663** | **14.9949** | **0.0223** | | **1.3170** | **1.3170** | | **1.2140** | **1.2140** | **0.0000** | **2,272.0603** | **2,272.0603** | **0.6654** | | **2,286.0326** |

**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 | 0.0166 | 0.1721 | 0.1998 | 4.2000e-004 | 0.0126 | 3.2900e-003 | 0.0159 | 3.5900e-003 | 3.0200e-003 | 6.6200e-003 | | 41.8903 | 41.8903 | 2.8000e-004 | | 41.8963 |
| Worker | 0.0731 | 0.0964 | 0.9773 | 2.4500e-003 | 0.2236 | 1.4000e-003 | 0.2250 | 0.0593 | 1.2800e-003 | 0.0606 | | 202.7974 | 202.7974 | 9.5700e-003 | | 202.9984 |
| **Total** | **0.0897** | **0.2685** | **1.1771** | **2.8700e-003** | **0.2361** | **4.6900e-003** | **0.2408** | **0.0629** | **4.3000e-003** | **0.0672** | | **244.6877** | **244.6877** | **9.8500e-003** | | **244.8947** |

## 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 | 5.7424 | 19.3422 | 61.5454 | 0.1507 | 10.9894 | 0.2706 | 11.2600 | 2.9327 | 0.2488 | 3.1815 | | 13,243.3043 | 13,243.3043 | 0.4603 | | 13,252.9700 |
| Unmitigated | 5.7424 | 19.3422 | 61.5454 | 0.1507 | 10.9894 | 0.2706 | 11.2600 | 2.9327 | 0.2488 | 3.1815 | | 13,243.3043 | 13,243.3043 | 0.4603 | | 13,252.9700 |

## 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Apartments Mid Rise | 1,409.80 | 1,517.92 | 1286.84 | 4,810,256 | 4,810,256 |
| Parking Lot | 0.00 | 0.00 | 0.00 | | |
| Total | 1,409.80 | 1,517.92 | 1,286.84 | 4,810,256 | 4,810,256 |

## 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 |
| Apartments Mid Rise | 14.70 | 5.90 | 8.70 | 40.20 | 19.20 | 40.60 | 86 | 11 | 3 |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.462438 | 0.069856 | 0.176572 | 0.170752 | 0.045136 | 0.007399 | 0.012745 | 0.042494 | 0.000970 | 0.001060 | 0.006446 | 0.000893 | 0.003237 |

## 5.0 Energy Detail

Historical Energy Use: N

### 5.1 Mitigation Measures Energy

Exceed Title 24

| | 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 | 0.0591 | 0.5053 | 0.2150 | 3.2300e-003 | | 0.0409 | 0.0409 | | 0.0409 | 0.0409 | | 645.0607 | 645.0607 | 0.0124 | 0.0118 | 648.9864 |
| NaturalGas Unmitigated | 0.0751 | 0.6420 | 0.2732 | 4.1000e-003 | | 0.0519 | 0.0519 | | 0.0519 | 0.0519 | | 819.5568 | 819.5568 | 0.0157 | 0.0150 | 824.5445 |

### 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 | | | | | |
| Apartments Mid Rise | 6966.23 | 0.0751 | 0.6420 | 0.2732 | 4.1000e-003 | | 0.0519 | 0.0519 | | 0.0519 | 0.0519 | | 819.5568 | 819.5568 | 0.0157 | 0.0150 | 824.5445 |
| 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** | | **0.0751** | **0.6420** | **0.2732** | **4.1000e-003** | | **0.0519** | **0.0519** | | **0.0519** | **0.0519** | | **819.5568** | **819.5568** | **0.0157** | **0.0150** | **824.5445** |

## 5.2 Energy by Land Use - NaturalGas

**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 | | | | | |
| Apartments Mid Rise | 5.48302 | 0.0591 | 0.5053 | 0.2150 | 3.2300e-003 | | 0.0409 | 0.0409 | | 0.0409 | 0.0409 | | 645.0607 | 645.0607 | 0.0124 | 0.0118 | 648.9864 |
| 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** | | **0.0591** | **0.5053** | **0.2150** | **3.2300e-003** | | **0.0409** | **0.0409** | | **0.0409** | **0.0409** | | **645.0607** | **645.0607** | **0.0124** | **0.0118** | **648.9864** |

# 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 | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |
| Unmitigated | 6.5427 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | 0.0000 | 31.4934 | 31.4934 | 0.0321 | 0.0000 | 32.1674 |

## 6.2 Area by SubCategory

**Unmitigated**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SubCategory | lb/day | | | | | | | | | | lb/day | | | | | |
| Architectural Coating | 0.4670 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 5.5172 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Landscaping | 0.5585 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | | 31.4934 | 31.4934 | 0.0321 | | 32.1674 |
| **Total** | **6.5427** | **0.2075** | **17.7341** | **9.2000e-004** | | **0.0957** | **0.0957** | | **0.0957** | **0.0957** | **0.0000** | **31.4934** | **31.4934** | **0.0321** | **0.0000** | **32.1674** |

## 6.2 Area by SubCategory

**Mitigated**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SubCategory | lb/day | | | | | | | | | | lb/day | | | | | |
| Architectural Coating | 0.4670 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 5.5172 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Landscaping | 0.5585 | 0.2075 | 17.7341 | 9.2000e-004 | | 0.0957 | 0.0957 | | 0.0957 | 0.0957 | | 31.4934 | 31.4934 | 0.0321 | | 32.1674 |
| **Total** | **6.5427** | **0.2075** | **17.7341** | **9.2000e-004** | | **0.0957** | **0.0957** | | **0.0957** | **0.0957** | **0.0000** | **31.4934** | **31.4934** | **0.0321** | **0.0000** | **32.1674** |

# 7.0 Water Detail

## 7.1 Mitigation Measures Water

Apply Water Conservation Strategy

# 8.0 Waste Detail

## 8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

# 9.0 Operational Offroad

| Equipment Type | Number | Hours/Day | Days/Year | Horse Power | Load Factor | Fuel Type |
|---|---|---|---|---|---|---|

## 10.0 Vegetation

# Mission Lofts

**Riverside-South Coast County, Annual**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Parking Lot | 1.53 | Acre | 1.53 | 66,646.80 | 0 |
| Apartments Mid Rise | 212.00 | Dwelling Unit | 3.16 | 212,000.00 | 606 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.4 | **Precipitation Freq (Days)** | 28 |
| **Climate Zone** | 10 | | | **Operational Year** | 2016 |
| **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 - based on site plan; north parcel includes some parking; south parcel includes additional parking

Construction Phase - see table

Off-road Equipment - see table

Off-road Equipment - see table

Off-road Equipment - see table

Trips and VMT - water truck trips added

Vehicle Trips - weekday trip rate per traffic study

Woodstoves - no fireplaces or woodstoves

Construction Off-road Equipment Mitigation - water 3x daily for 61% reduction in PM

Mobile Land Use Mitigation -

Energy Mitigation -

Water Mitigation -

Waste Mitigation - city waste diversion rate in 2006

Grading - import per plans

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblConstructionPhase | NumDays | 18.00 | 35.00 |
| tblConstructionPhase | NumDays | 8.00 | 22.00 |
| tblConstructionPhase | NumDays | 18.00 | 22.00 |
| tblConstructionPhase | PhaseEndDate | 11/4/2016 | 9/30/2016 |
| tblConstructionPhase | PhaseEndDate | 10/30/2015 | 10/31/2015 |
| tblConstructionPhase | PhaseEndDate | 11/1/2016 | 9/30/2016 |
| tblConstructionPhase | PhaseStartDate | 9/17/2016 | 8/15/2016 |
| tblConstructionPhase | PhaseStartDate | 10/1/2016 | 9/1/2016 |
| tblFireplaces | NumberGas | 180.20 | 0.00 |
| tblFireplaces | NumberNoFireplace | 21.20 | 212.00 |
| tblFireplaces | NumberWood | 10.60 | 0.00 |
| tblGrading | AcresOfGrading | 11.00 | 4.00 |
| tblGrading | MaterialImported | 0.00 | 3,600.00 |
| tblLandUse | LotAcreage | 5.58 | 3.16 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 8.00 |
| tblProjectCharacteristics | OperationalYear | 2014 | 2016 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 2.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 2.00 |
| tblVehicleTrips | WD_TR | 6.59 | 6.65 |
| tblWoodstoves | NumberCatalytic | 10.60 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 10.60 | 0.00 |

# 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 | 0.1547 | 1.3295 | 1.0981 | 1.8000e-003 | 0.1228 | 0.0786 | 0.2015 | 0.0512 | 0.0733 | 0.1245 | 0.0000 | 158.6577 | 158.6577 | 0.0262 | 0.0000 | 159.2068 |
| 2016 | 1.3104 | 3.5278 | 3.2713 | 5.8500e-003 | 0.2141 | 0.2217 | 0.4358 | 0.0573 | 0.2080 | 0.2652 | 0.0000 | 495.9414 | 495.9414 | 0.0762 | 0.0000 | 497.5422 |
| **Total** | **1.4651** | **4.8573** | **4.3694** | **7.6500e-003** | **0.3369** | **0.3004** | **0.6373** | **0.1085** | **0.2812** | **0.3897** | **0.0000** | **654.5991** | **654.5991** | **0.1024** | **0.0000** | **656.7490** |

### 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 | 0.1547 | 1.3295 | 1.0981 | 1.8000e-003 | 0.0810 | 0.0786 | 0.1596 | 0.0288 | 0.0733 | 0.1021 | 0.0000 | 158.6576 | 158.6576 | 0.0262 | 0.0000 | 159.2067 |
| 2016 | 1.3104 | 3.5278 | 3.2713 | 5.8500e-003 | 0.2141 | 0.2217 | 0.4358 | 0.0573 | 0.2080 | 0.2652 | 0.0000 | 495.9411 | 495.9411 | 0.0762 | 0.0000 | 497.5419 |
| **Total** | **1.4651** | **4.8573** | **4.3694** | **7.6500e-003** | **0.2951** | **0.3004** | **0.5955** | **0.0861** | **0.2812** | **0.3673** | **0.0000** | **654.5987** | **654.5987** | **0.1024** | **0.0000** | **656.7486** |

| | 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** | **12.42** | **0.00** | **6.57** | **20.62** | **0.00** | **5.74** | **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 | 1.1619 | 0.0259 | 2.2168 | 1.2000e-004 | | 0.0120 | 0.0120 | | 0.0120 | 0.0120 | 0.0000 | 3.5713 | 3.5713 | 3.6400e-003 | 0.0000 | 3.6477 |
| Energy | 0.0137 | 0.1172 | 0.0499 | 7.5000e-004 | | 9.4700e-003 | 9.4700e-003 | | 9.4700e-003 | 9.4700e-003 | 0.0000 | 662.3548 | 662.3548 | 0.0141 | 4.8700e-003 | 664.1614 |
| Mobile | 0.9271 | 3.3359 | 10.7229 | 0.0257 | 1.8243 | 0.0455 | 1.8698 | 0.4875 | 0.0419 | 0.5294 | 0.0000 | 2,046.5451 | 2,046.5451 | 0.0704 | 0.0000 | 2,048.0223 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 19.7957 | 0.0000 | 19.7957 | 1.1699 | 0.0000 | 44.3634 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 4.3821 | 166.3210 | 170.7031 | 0.4537 | 0.0114 | 183.7592 |
| **Total** | **2.1027** | **3.4790** | **12.9895** | **0.0266** | **1.8243** | **0.0669** | **1.8913** | **0.4875** | **0.0633** | **0.5508** | **24.1778** | **2,878.7921** | **2,902.9699** | **1.7117** | **0.0163** | **2,943.9541** |

## 2.2 Overall Operational

**Mitigated Operational**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Area | 1.1619 | 0.0259 | 2.2168 | 1.2000e-004 | | 0.0120 | 0.0120 | | 0.0120 | 0.0120 | 0.0000 | 3.5713 | 3.5713 | 3.6400e-003 | 0.0000 | 3.6477 |
| Energy | 0.0108 | 0.0922 | 0.0392 | 5.9000e-004 | | 7.4600e-003 | 7.4600e-003 | | 7.4600e-003 | 7.4600e-003 | 0.0000 | 615.6329 | 615.6329 | 0.0132 | 4.2600e-003 | 617.2305 |
| Mobile | 0.9271 | 3.3359 | 10.7229 | 0.0257 | 1.8243 | 0.0455 | 1.8698 | 0.4875 | 0.0419 | 0.5294 | 0.0000 | 2,046.5451 | 2,046.5451 | 0.0704 | 0.0000 | 2,048.0223 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 7.1264 | 0.0000 | 7.1264 | 0.4212 | 0.0000 | 15.9708 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 3.5057 | 141.6886 | 145.1943 | 0.3632 | 9.1400e-003 | 155.6553 |
| **Total** | **2.0998** | **3.4541** | **12.9789** | **0.0264** | **1.8243** | **0.0649** | **1.8893** | **0.4875** | **0.0613** | **0.5488** | **10.6321** | **2,807.4379** | **2,818.0700** | **0.8715** | **0.0134** | **2,840.5267** |

| | 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** | **0.14** | **0.72** | **0.08** | **0.60** | **0.00** | **3.00** | **0.11** | **0.00** | **3.18** | **0.36** | **56.03** | **2.48** | **2.92** | **49.09** | **17.54** | **3.51** |

## 3.0 Construction Detail

**Construction Phase**

| Phase Number | Phase Name | Phase Type | Start Date | End Date | Num Days Week | Num Days | Phase Description |
|---|---|---|---|---|---|---|---|
| 1 | Grading | Grading | 10/1/2015 | 10/31/2015 | 5 | 22 | |
| 2 | Building Construction | Building Construction | 11/1/2015 | 9/16/2016 | 5 | 230 | |
| 3 | Architectural Coating | Architectural Coating | 8/15/2016 | 9/30/2016 | 5 | 35 | |
| 4 | Paving | Paving | 9/1/2016 | 9/30/2016 | 5 | 22 | |

**Acres of Grading (Site Preparation Phase): 0**

**Acres of Grading (Grading Phase): 4**

**Acres of Paving: 0**

**Residential Indoor: 429,300; Residential Outdoor: 143,100; Non-Residential Indoor: 2,999; Non-Residential Outdoor: 1,000 (Architectural Coating – sqft)**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Grading | Excavators | 1 | 8.00 | 162 | 0.38 |
| Grading | Graders | 1 | 8.00 | 174 | 0.41 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 3 | 8.00 | 97 | 0.37 |
| Building Construction | Cranes | 1 | 8.00 | 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 | 8.00 | 97 | 0.37 |
| Building Construction | Welders | 1 | 8.00 | 46 | 0.45 |
| Architectural Coating | Air Compressors | 1 | 8.00 | 78 | 0.48 |
| Paving | Cement and Mortar Mixers | 2 | 8.00 | 9 | 0.56 |
| Paving | Pavers | 1 | 8.00 | 125 | 0.42 |
| Paving | Paving Equipment | 2 | 8.00 | 130 | 0.36 |
| Paving | Rollers | 2 | 8.00 | 80 | 0.38 |
| Paving | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |

**Trips and VMT**

| Phase Name | Offroad Equipment Count | Worker Trip Number | Vendor Trip Number | Hauling Trip Number | Worker Trip Length | Vendor Trip Length | Hauling Trip Length | Worker Vehicle Class | Vendor Vehicle Class | Hauling Vehicle Class |
|---|---|---|---|---|---|---|---|---|---|---|
| Grading | 6 | 15.00 | 2.00 | 450.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 9 | 181.00 | 34.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 36.00 | 0.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 8 | 20.00 | 2.00 | 0.00 | 14.70 | 6.90 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

## 3.2 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 | | | | | 0.0686 | 0.0000 | 0.0686 | 0.0367 | 0.0000 | 0.0367 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0422 | 0.4446 | 0.2934 | 3.3000e-004 | | 0.0256 | 0.0256 | | 0.0236 | 0.0236 | 0.0000 | 31.2246 | 31.2246 | 9.3200e-003 | 0.0000 | 31.4203 |
| **Total** | **0.0422** | **0.4446** | **0.2934** | **3.3000e-004** | **0.0686** | **0.0256** | **0.0942** | **0.0367** | **0.0236** | **0.0602** | **0.0000** | **31.2246** | **31.2246** | **9.3200e-003** | **0.0000** | **31.4203** |

### 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 | 3.9600e-003 | 0.0716 | 0.0453 | 1.6000e-004 | 3.8700e-003 | 1.3400e-003 | 5.2100e-003 | 1.0600e-003 | 1.2300e-003 | 2.2900e-003 | 0.0000 | 14.8144 | 14.8144 | 1.1000e-004 | 0.0000 | 14.8166 |
| Vendor | 2.0000e-004 | 2.2000e-003 | 2.4000e-003 | 0.0000 | 1.4000e-004 | 4.0000e-005 | 1.8000e-004 | 4.0000e-005 | 4.0000e-005 | 8.0000e-005 | 0.0000 | 0.4251 | 0.4251 | 0.0000 | 0.0000 | 0.4252 |
| Worker | 6.3000e-004 | 9.3000e-004 | 9.3300e-003 | 2.0000e-005 | 1.8100e-003 | 1.0000e-005 | 1.8300e-003 | 4.8000e-004 | 1.0000e-005 | 4.9000e-004 | 0.0000 | 1.5968 | 1.5968 | 8.0000e-005 | 0.0000 | 1.5984 |
| **Total** | **4.7900e-003** | **0.0747** | **0.0570** | **1.8000e-004** | **5.8200e-003** | **1.3900e-003** | **7.2200e-003** | **1.5800e-003** | **1.2800e-003** | **2.8600e-003** | **0.0000** | **16.8363** | **16.8363** | **1.9000e-004** | **0.0000** | **16.8402** |

## 3.2 Grading - 2015

### 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 | | | | | 0.0268 | 0.0000 | 0.0268 | 0.0143 | 0.0000 | 0.0143 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0422 | 0.4446 | 0.2934 | 3.3000e-004 | | 0.0256 | 0.0256 | | 0.0236 | 0.0236 | 0.0000 | 31.2245 | 31.2245 | 9.3200e-003 | 0.0000 | 31.4203 |
| **Total** | **0.0422** | **0.4446** | **0.2934** | **3.3000e-004** | **0.0268** | **0.0256** | **0.0524** | **0.0143** | **0.0236** | **0.0379** | **0.0000** | **31.2245** | **31.2245** | **9.3200e-003** | **0.0000** | **31.4203** |

### 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 | 3.9600e-003 | 0.0716 | 0.0453 | 1.6000e-004 | 3.8700e-003 | 1.3400e-003 | 5.2100e-003 | 1.0600e-003 | 1.2300e-003 | 2.2900e-003 | 0.0000 | 14.8144 | 14.8144 | 1.1000e-004 | 0.0000 | 14.8166 |
| Vendor | 2.0000e-004 | 2.2000e-003 | 2.4000e-003 | 0.0000 | 1.4000e-004 | 4.0000e-005 | 1.8000e-004 | 4.0000e-005 | 4.0000e-005 | 8.0000e-005 | 0.0000 | 0.4251 | 0.4251 | 0.0000 | 0.0000 | 0.4252 |
| Worker | 6.3000e-004 | 9.3000e-004 | 9.3300e-003 | 2.0000e-005 | 1.8100e-003 | 1.0000e-005 | 1.8300e-003 | 4.8000e-004 | 1.0000e-005 | 4.9000e-004 | 0.0000 | 1.5968 | 1.5968 | 8.0000e-005 | 0.0000 | 1.5984 |
| **Total** | **4.7900e-003** | **0.0747** | **0.0570** | **1.8000e-004** | **5.8200e-003** | **1.3900e-003** | **7.2200e-003** | **1.5800e-003** | **1.2800e-003** | **2.8600e-003** | **0.0000** | **16.8363** | **16.8363** | **1.9000e-004** | **0.0000** | **16.8402** |

## 3.3 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 | 0.0855 | 0.7132 | 0.4408 | 6.3000e-004 | | 0.0499 | 0.0499 | | 0.0469 | 0.0469 | 0.0000 | 57.6075 | 57.6075 | 0.0146 | 0.0000 | 57.9150 |
| **Total** | **0.0855** | **0.7132** | **0.4408** | **6.3000e-004** | | **0.0499** | **0.0499** | | **0.0469** | **0.0469** | **0.0000** | **57.6075** | **57.6075** | **0.0146** | **0.0000** | **57.9150** |

### Unmitigated Construction Off-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 6.9300e-003 | 0.0747 | 0.0817 | 1.6000e-004 | 4.6400e-003 | 1.4500e-003 | 6.0900e-003 | 1.3300e-003 | 1.3300e-003 | 2.6600e-003 | 0.0000 | 14.4533 | 14.4533 | 1.1000e-004 | 0.0000 | 14.4556 |
| Worker | 0.0153 | 0.0224 | 0.2251 | 4.9000e-004 | 0.0438 | 2.9000e-004 | 0.0441 | 0.0116 | 2.7000e-004 | 0.0119 | 0.0000 | 38.5360 | 38.5360 | 1.8900e-003 | 0.0000 | 38.5757 |
| **Total** | **0.0222** | **0.0970** | **0.3068** | **6.5000e-004** | **0.0484** | **1.7400e-003** | **0.0502** | **0.0130** | **1.6000e-003** | **0.0146** | **0.0000** | **52.9893** | **52.9893** | **2.0000e-003** | **0.0000** | **53.0313** |

## 3.3 Building Construction - 2015

### 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 | 0.0855 | 0.7132 | 0.4408 | 6.3000e-004 | | 0.0499 | 0.0499 | | 0.0469 | 0.0469 | 0.0000 | 57.6075 | 57.6075 | 0.0146 | 0.0000 | 57.9149 |
| **Total** | **0.0855** | **0.7132** | **0.4408** | **6.3000e-004** | | **0.0499** | **0.0499** | | **0.0469** | **0.0469** | **0.0000** | **57.6075** | **57.6075** | **0.0146** | **0.0000** | **57.9149** |

### Mitigated Construction Off-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 6.9300e-003 | 0.0747 | 0.0817 | 1.6000e-004 | 4.6400e-003 | 1.4500e-003 | 6.0900e-003 | 1.3300e-003 | 1.3300e-003 | 2.6600e-003 | 0.0000 | 14.4533 | 14.4533 | 1.1000e-004 | 0.0000 | 14.4556 |
| Worker | 0.0153 | 0.0224 | 0.2251 | 4.9000e-004 | 0.0438 | 2.9000e-004 | 0.0441 | 0.0116 | 2.7000e-004 | 0.0119 | 0.0000 | 38.5360 | 38.5360 | 1.8900e-003 | 0.0000 | 38.5757 |
| **Total** | **0.0222** | **0.0970** | **0.3068** | **6.5000e-004** | **0.0484** | **1.7400e-003** | **0.0502** | **0.0130** | **1.6000e-003** | **0.0146** | **0.0000** | **52.9893** | **52.9893** | **2.0000e-003** | **0.0000** | **53.0313** |

## 3.3 Building Construction - 2016

### 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 | 0.3370 | 2.8638 | 1.8400 | 2.6700e-003 | | 0.1962 | 0.1962 | | 0.1841 | 0.1841 | 0.0000 | 241.6258 | 241.6258 | 0.0608 | 0.0000 | 242.9028 |
| **Total** | **0.3370** | **2.8638** | **1.8400** | **2.6700e-003** | | **0.1962** | **0.1962** | | **0.1841** | **0.1841** | **0.0000** | **241.6258** | **241.6258** | **0.0608** | **0.0000** | **242.9028** |

### 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 | 0.0259 | 0.2773 | 0.3246 | 6.6000e-004 | 0.0196 | 5.1700e-003 | 0.0248 | 5.6100e-003 | 4.7500e-003 | 0.0104 | 0.0000 | 60.3858 | 60.3858 | 4.0000e-004 | 0.0000 | 60.3942 |
| Worker | 0.0579 | 0.0846 | 0.8526 | 2.0900e-003 | 0.1850 | 1.1800e-003 | 0.1862 | 0.0491 | 1.0800e-003 | 0.0502 | 0.0000 | 156.9536 | 156.9536 | 7.3100e-003 | 0.0000 | 157.1070 |
| **Total** | **0.0838** | **0.3619** | **1.1772** | **2.7500e-003** | **0.2046** | **6.3500e-003** | **0.2110** | **0.0547** | **5.8300e-003** | **0.0606** | **0.0000** | **217.3394** | **217.3394** | **7.7100e-003** | **0.0000** | **217.5013** |

## 3.3 Building Construction - 2016

### 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 | 0.3370 | 2.8638 | 1.8400 | 2.6700e-003 | | 0.1962 | 0.1962 | | 0.1841 | 0.1841 | 0.0000 | 241.6255 | 241.6255 | 0.0608 | 0.0000 | 242.9025 |
| **Total** | **0.3370** | **2.8638** | **1.8400** | **2.6700e-003** | | **0.1962** | **0.1962** | | **0.1841** | **0.1841** | **0.0000** | **241.6255** | **241.6255** | **0.0608** | **0.0000** | **242.9025** |

### 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 | 0.0259 | 0.2773 | 0.3246 | 6.6000e-004 | 0.0196 | 5.1700e-003 | 0.0248 | 5.6100e-003 | 4.7500e-003 | 0.0104 | 0.0000 | 60.3858 | 60.3858 | 4.0000e-004 | 0.0000 | 60.3942 |
| Worker | 0.0579 | 0.0846 | 0.8526 | 2.0900e-003 | 0.1850 | 1.1800e-003 | 0.1862 | 0.0491 | 1.0800e-003 | 0.0502 | 0.0000 | 156.9536 | 156.9536 | 7.3100e-003 | 0.0000 | 157.1070 |
| **Total** | **0.0838** | **0.3619** | **1.1772** | **2.7500e-003** | **0.2046** | **6.3500e-003** | **0.2110** | **0.0547** | **5.8300e-003** | **0.0606** | **0.0000** | **217.3394** | **217.3394** | **7.7100e-003** | **0.0000** | **217.5013** |

## 3.4 Architectural Coating - 2016

### Unmitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Archit. Coating | 0.8523 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 8.6000e-003 | 0.0554 | 0.0440 | 7.0000e-005 | | 4.5900e-003 | 4.5900e-003 | | 4.5900e-003 | 4.5900e-003 | 0.0000 | 5.9576 | 5.9576 | 7.0000e-004 | 0.0000 | 5.9723 |
| **Total** | **0.8609** | **0.0554** | **0.0440** | **7.0000e-005** | | **4.5900e-003** | **4.5900e-003** | | **4.5900e-003** | **4.5900e-003** | **0.0000** | **5.9576** | **5.9576** | **7.0000e-004** | **0.0000** | **5.9723** |

### 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 | 2.1700e-003 | 3.1700e-003 | 0.0319 | 8.0000e-005 | 6.9200e-003 | 4.0000e-005 | 6.9700e-003 | 1.8400e-003 | 4.0000e-005 | 1.8800e-003 | 0.0000 | 5.8742 | 5.8742 | 2.7000e-004 | 0.0000 | 5.8800 |
| **Total** | **2.1700e-003** | **3.1700e-003** | **0.0319** | **8.0000e-005** | **6.9200e-003** | **4.0000e-005** | **6.9700e-003** | **1.8400e-003** | **4.0000e-005** | **1.8800e-003** | **0.0000** | **5.8742** | **5.8742** | **2.7000e-004** | **0.0000** | **5.8800** |

## 3.4 Architectural Coating - 2016

### Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Archit. Coating | 0.8523 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 8.6000e-003 | 0.0554 | 0.0440 | 7.0000e-005 | | 4.5900e-003 | 4.5900e-003 | | 4.5900e-003 | 4.5900e-003 | 0.0000 | 5.9576 | 5.9576 | 7.0000e-004 | 0.0000 | 5.9723 |
| **Total** | **0.8609** | **0.0554** | **0.0440** | **7.0000e-005** | | **4.5900e-003** | **4.5900e-003** | | **4.5900e-003** | **4.5900e-003** | **0.0000** | **5.9576** | **5.9576** | **7.0000e-004** | **0.0000** | **5.9723** |

### 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 | 2.1700e-003 | 3.1700e-003 | 0.0319 | 8.0000e-005 | 6.9200e-003 | 4.0000e-005 | 6.9700e-003 | 1.8400e-003 | 4.0000e-005 | 1.8800e-003 | 0.0000 | 5.8742 | 5.8742 | 2.7000e-004 | 0.0000 | 5.8800 |
| **Total** | **2.1700e-003** | **3.1700e-003** | **0.0319** | **8.0000e-005** | **6.9200e-003** | **4.0000e-005** | **6.9700e-003** | **1.8400e-003** | **4.0000e-005** | **1.8800e-003** | **0.0000** | **5.8742** | **5.8742** | **2.7000e-004** | **0.0000** | **5.8800** |

## 3.5 Paving - 2016

### 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 | 0.0236 | 0.2405 | 0.1649 | 2.5000e-004 | | 0.0145 | 0.0145 | | 0.0134 | 0.0134 | 0.0000 | 22.6730 | 22.6730 | 6.6400e-003 | 0.0000 | 22.8124 |
| Paving | 2.0000e-003 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.0256** | **0.2405** | **0.1649** | **2.5000e-004** | | **0.0145** | **0.0145** | | **0.0134** | **0.0134** | **0.0000** | **22.6730** | **22.6730** | **6.6400e-003** | **0.0000** | **22.8124** |

### 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 | 1.8000e-004 | 1.9300e-003 | 2.2600e-003 | 0.0000 | 1.4000e-004 | 4.0000e-005 | 1.7000e-004 | 4.0000e-005 | 3.0000e-005 | 7.0000e-005 | 0.0000 | 0.4201 | 0.4201 | 0.0000 | 0.0000 | 0.4202 |
| Worker | 7.6000e-004 | 1.1100e-003 | 0.0111 | 3.0000e-005 | 2.4200e-003 | 2.0000e-005 | 2.4300e-003 | 6.4000e-004 | 1.0000e-005 | 6.6000e-004 | 0.0000 | 2.0513 | 2.0513 | 1.0000e-004 | 0.0000 | 2.0533 |
| **Total** | **9.4000e-004** | **3.0400e-003** | **0.0134** | **3.0000e-005** | **2.5600e-003** | **6.0000e-005** | **2.6000e-003** | **6.8000e-004** | **4.0000e-005** | **7.3000e-004** | **0.0000** | **2.4715** | **2.4715** | **1.0000e-004** | **0.0000** | **2.4735** |

## 3.5 Paving - 2016

**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 | 0.0236 | 0.2405 | 0.1649 | 2.5000e-004 | | 0.0145 | 0.0145 | | 0.0134 | 0.0134 | 0.0000 | 22.6729 | 22.6729 | 6.6400e-003 | 0.0000 | 22.8124 |
| Paving | 2.0000e-003 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.0256** | **0.2405** | **0.1649** | **2.5000e-004** | | **0.0145** | **0.0145** | | **0.0134** | **0.0134** | **0.0000** | **22.6729** | **22.6729** | **6.6400e-003** | **0.0000** | **22.8124** |

**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 | 1.8000e-004 | 1.9300e-003 | 2.2600e-003 | 0.0000 | 1.4000e-004 | 4.0000e-005 | 1.7000e-004 | 4.0000e-005 | 3.0000e-005 | 7.0000e-005 | 0.0000 | 0.4201 | 0.4201 | 0.0000 | 0.0000 | 0.4202 |
| Worker | 7.6000e-004 | 1.1100e-003 | 0.0111 | 3.0000e-005 | 2.4200e-003 | 2.0000e-005 | 2.4300e-003 | 6.4000e-004 | 1.0000e-005 | 6.6000e-004 | 0.0000 | 2.0513 | 2.0513 | 1.0000e-004 | 0.0000 | 2.0533 |
| **Total** | **9.4000e-004** | **3.0400e-003** | **0.0134** | **3.0000e-005** | **2.5600e-003** | **6.0000e-005** | **2.6000e-003** | **6.8000e-004** | **4.0000e-005** | **7.3000e-004** | **0.0000** | **2.4715** | **2.4715** | **1.0000e-004** | **0.0000** | **2.4735** |

## 4.0 Operational Detail - Mobile

## 4.1 Mitigation Measures Mobile

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Mitigated | 0.9271 | 3.3359 | 10.7229 | 0.0257 | 1.8243 | 0.0455 | 1.8698 | 0.4875 | 0.0419 | 0.5294 | 0.0000 | 2,046.5451 | 2,046.5451 | 0.0704 | 0.0000 | 2,048.0223 |
| Unmitigated | 0.9271 | 3.3359 | 10.7229 | 0.0257 | 1.8243 | 0.0455 | 1.8698 | 0.4875 | 0.0419 | 0.5294 | 0.0000 | 2,046.5451 | 2,046.5451 | 0.0704 | 0.0000 | 2,048.0223 |

## 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Apartments Mid Rise | 1,409.80 | 1,517.92 | 1286.84 | 4,810,256 | 4,810,256 |
| Parking Lot | 0.00 | 0.00 | 0.00 | | |
| Total | 1,409.80 | 1,517.92 | 1,286.84 | 4,810,256 | 4,810,256 |

## 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 |
| Apartments Mid Rise | 14.70 | 5.90 | 8.70 | 40.20 | 19.20 | 40.60 | 86 | 11 | 3 |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.462438 | 0.069856 | 0.176572 | 0.170752 | 0.045136 | 0.007399 | 0.012745 | 0.042494 | 0.000970 | 0.001060 | 0.006446 | 0.000893 | 0.003237 |

## 5.0 Energy Detail

Historical Energy Use: N

### 5.1 Mitigation Measures Energy

Exceed Title 24

| | 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 | 508.8359 | 508.8359 | 0.0111 | 2.3000e-003 | 509.7836 |
| Electricity Unmitigated | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 526.6679 | 526.6679 | 0.0115 | 2.3800e-003 | 527.6488 |
| NaturalGas Mitigated | 0.0108 | 0.0922 | 0.0392 | 5.9000e-004 | | 7.4600e-003 | 7.4600e-003 | | 7.4600e-003 | 7.4600e-003 | 0.0000 | 106.7970 | 106.7970 | 2.0500e-003 | 1.9600e-003 | 107.4470 |
| NaturalGas Unmitigated | 0.0137 | 0.1172 | 0.0499 | 7.5000e-004 | | 9.4700e-003 | 9.4700e-003 | | 9.4700e-003 | 9.4700e-003 | 0.0000 | 135.6868 | 135.6868 | 2.6000e-003 | 2.4900e-003 | 136.5126 |

## 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 | | | | | |
| Apartments Mid Rise | 2.54268e+006 | 0.0137 | 0.1172 | 0.0499 | 7.5000e-004 | | 9.4700e-003 | 9.4700e-003 | | 9.4700e-003 | 9.4700e-003 | 0.0000 | 135.6868 | 135.6868 | 2.6000e-003 | 2.4900e-003 | 136.5126 |
| 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** | | **0.0137** | **0.1172** | **0.0499** | **7.5000e-004** | | **9.4700e-003** | **9.4700e-003** | | **9.4700e-003** | **9.4700e-003** | **0.0000** | **135.6868** | **135.6868** | **2.6000e-003** | **2.4900e-003** | **136.5126** |

### 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 | | | | | |
| 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 |
| Apartments Mid Rise | 2.0013e+006 | 0.0108 | 0.0922 | 0.0392 | 5.9000e-004 | | 7.4600e-003 | 7.4600e-003 | | 7.4600e-003 | 7.4600e-003 | 0.0000 | 106.7970 | 106.7970 | 2.0500e-003 | 1.9600e-003 | 107.4470 |
| **Total** | | **0.0108** | **0.0922** | **0.0392** | **5.9000e-004** | | **7.4600e-003** | **7.4600e-003** | | **7.4600e-003** | **7.4600e-003** | **0.0000** | **106.7970** | **106.7970** | **2.0500e-003** | **1.9600e-003** | **107.4470** |

## 5.3 Energy by Land Use - Electricity

**Unmitigated**

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Apartments Mid Rise | 817226 | 491.4019 | 0.0108 | 2.2200e-003 | 492.3171 |
| Parking Lot | 58649.2 | 35.2660 | 7.7000e-004 | 1.6000e-004 | 35.3317 |
| **Total** | | **526.6679** | **0.0115** | **2.3800e-003** | **527.6488** |

**Mitigated**

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Apartments Mid Rise | 787570 | 473.5698 | 0.0104 | 2.1400e-003 | 474.4519 |
| Parking Lot | 58649.2 | 35.2660 | 7.7000e-004 | 1.6000e-004 | 35.3317 |
| **Total** | | **508.8359** | **0.0111** | **2.3000e-003** | **509.7836** |

# 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 | 1.1619 | 0.0259 | 2.2168 | 1.2000e-004 | | 0.0120 | 0.0120 | | 0.0120 | 0.0120 | 0.0000 | 3.5713 | 3.5713 | 3.6400e-003 | 0.0000 | 3.6477 |
| Unmitigated | 1.1619 | 0.0259 | 2.2168 | 1.2000e-004 | | 0.0120 | 0.0120 | | 0.0120 | 0.0120 | 0.0000 | 3.5713 | 3.5713 | 3.6400e-003 | 0.0000 | 3.6477 |

## 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 | 0.0852 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Consumer Products | 1.0069 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Landscaping | 0.0698 | 0.0259 | 2.2168 | 1.2000e-004 | | 0.0120 | 0.0120 | | 0.0120 | 0.0120 | 0.0000 | 3.5713 | 3.5713 | 3.6400e-003 | 0.0000 | 3.6477 |
| **Total** | **1.1619** | **0.0259** | **2.2168** | **1.2000e-004** | | **0.0120** | **0.0120** | | **0.0120** | **0.0120** | **0.0000** | **3.5713** | **3.5713** | **3.6400e-003** | **0.0000** | **3.6477** |

## 6.2 Area by SubCategory

**Mitigated**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SubCategory | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Architectural Coating | 0.0852 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Consumer Products | 1.0069 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Landscaping | 0.0698 | 0.0259 | 2.2168 | 1.2000e-004 | | 0.0120 | 0.0120 | | 0.0120 | 0.0120 | 0.0000 | 3.5713 | 3.5713 | 3.6400e-003 | 0.0000 | 3.6477 |
| **Total** | **1.1619** | **0.0259** | **2.2168** | **1.2000e-004** | | **0.0120** | **0.0120** | | **0.0120** | **0.0120** | **0.0000** | **3.5713** | **3.5713** | **3.6400e-003** | **0.0000** | **3.6477** |

# 7.0 Water Detail

## 7.1 Mitigation Measures Water

Apply Water Conservation Strategy

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| Category | MT/yr | | | |
| Mitigated | 145.1943 | 0.3632 | 9.1400e-003 | 155.6553 |
| Unmitigated | 170.7031 | 0.4537 | 0.0114 | 183.7592 |

## 7.2 Water by Land Use

**Unmitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | Mgal | MT/yr | | | |
| Apartments Mid Rise | 13.8127 / 8.70798 | 170.7031 | 0.4537 | 0.0114 | 183.7592 |
| Parking Lot | 0 / 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **170.7031** | **0.4537** | **0.0114** | **183.7592** |

### 7.2 Water by Land Use

**Mitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | Mgal | MT/yr | | | |
| Apartments Mid Rise | 11.0501 / 8.70798 | 145.1943 | 0.3632 | 9.1400e-003 | 155.6553 |
| Parking Lot | 0 / 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **145.1943** | **0.3632** | **9.1400e-003** | **155.6553** |

## 8.0 Waste Detail

### 8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

**Category/Year**

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| | MT/yr | | | |
| Mitigated | 7.1264 | 0.4212 | 0.0000 | 15.9708 |
| Unmitigated | 19.7957 | 1.1699 | 0.0000 | 44.3634 |

## 8.2 Waste by Land Use

**Unmitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | tons | MT/yr | | | |
| Apartments Mid Rise | 97.52 | 19.7957 | 1.1699 | 0.0000 | 44.3634 |
| Parking Lot | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **19.7957** | **1.1699** | **0.0000** | **44.3634** |

**Mitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | tons | MT/yr | | | |
| Apartments Mid Rise | 35.1072 | 7.1264 | 0.4212 | 0.0000 | 15.9708 |
| Parking Lot | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **7.1264** | **0.4212** | **0.0000** | **15.9708** |

## 9.0 Operational Offroad

| Equipment Type | Number | Hours/Day | Days/Year | Horse Power | Load Factor | Fuel Type |
|---|---|---|---|---|---|---|

## 10.0 Vegetation

# Mission Lofts

## Riverside-South Coast County, Mitigation Report

## Construction Mitigation Summary

| Phase | ROG | NOx | CO | SO2 | Exhaust PM10 | Exhaust PM2.5 | Bio- CO2 | NBio-CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percent Reduction | | | | | | | | | | | | |
| Architectural Coating | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Building Construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Grading | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paving | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## OFFROAD Equipment Mitigation

| Equipment Type | Fuel Type | Tier | Number Mitigated | Total Number of Equipment | DPF | Oxidation Catalyst |
|---|---|---|---|---|---|---|
| Air Compressors | Diesel | No Change | 0 | 1 | No Change | 0.00 |
| Cement and Mortar Mixers | Diesel | No Change | 0 | 2 | No Change | 0.00 |
| Cranes | Diesel | No Change | 0 | 1 | No Change | 0.00 |
| Excavators | Diesel | No Change | 0 | 1 | No Change | 0.00 |
| Forklifts | Diesel | No Change | 0 | 3 | No Change | 0.00 |
| Generator Sets | Diesel | No Change | 0 | 1 | No Change | 0.00 |
| Graders | Diesel | No Change | 0 | 1 | No Change | 0.00 |
| Pavers | Diesel | No Change | 0 | 1 | No Change | 0.00 |
| Paving Equipment | Diesel | No Change | 0 | 2 | No Change | 0.00 |
| Rollers | Diesel | No Change | 0 | 2 | No Change | 0.00 |
| Rubber Tired Dozers | Diesel | No Change | 0 | 1 | No Change | 0.00 |
| Tractors/Loaders/Backhoes | Diesel | No Change | 0 | 7 | No Change | 0.00 |
| Welders | Diesel | No Change | 0 | 1 | No Change | 0.00 |

| Equipment Type | ROG | NOx | CO | SO2 | Exhaust PM10 | Exhaust PM2.5 | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unmitigated tons/yr | | | | | | Unmitigated mt/yr | | | | | |
| Air Compressors | 8.60000E-003 | 5.53500E-002 | 4.39600E-002 | 7.00000E-005 | 4.59000E-003 | 4.59000E-003 | 0.00000E+000 | 5.95759E+000 | 5.95759E+000 | 7.00000E-004 | 0.00000E+000 | 5.97234E+000 |
| Cement and Mortar Mixers | 1.29000E-003 | 8.12000E-003 | 6.78000E-003 | 2.00000E-005 | 3.30000E-004 | 3.30000E-004 | 0.00000E+000 | 1.00821E+000 | 1.00821E+000 | 1.00000E-004 | 0.00000E+000 | 1.01041E+000 |
| Cranes | 8.32900E-002 | 9.87250E-001 | 3.45070E-001 | 6.50000E-004 | 4.48500E-002 | 4.12600E-002 | 0.00000E+000 | 6.12818E+001 | 6.12818E+001 | 1.84500E-002 | 0.00000E+000 | 6.16692E+001 |
| Excavators | 4.58000E-003 | 5.35100E-002 | 3.78300E-002 | 6.00000E-005 | 2.64000E-003 | 2.43000E-003 | 0.00000E+000 | 5.54390E+000 | 5.54390E+000 | 1.66000E-003 | 0.00000E+000 | 5.57866E+000 |
| Forklifts | 7.92400E-002 | 6.81740E-001 | 4.36570E-001 | 5.30000E-004 | 5.70600E-002 | 5.24900E-002 | 0.00000E+000 | 4.97751E+001 | 4.97751E+001 | 1.49800E-002 | 0.00000E+000 | 5.00897E+001 |
| Generator Sets | 7.51400E-002 | 5.64650E-001 | 4.38080E-001 | 7.60000E-004 | 3.98700E-002 | 3.98700E-002 | 0.00000E+000 | 6.49989E+001 | 6.49989E+001 | 6.08000E-003 | 0.00000E+000 | 6.51265E+001 |
| Graders | 1.16800E-002 | 1.19550E-001 | 5.47900E-002 | 7.00000E-005 | 6.72000E-003 | 6.18000E-003 | 0.00000E+000 | 6.55689E+000 | 6.55689E+000 | 1.96000E-003 | 0.00000E+000 | 6.59800E+000 |
| Pavers | 4.41000E-003 | 4.96400E-002 | 3.13700E-002 | 5.00000E-005 | 2.47000E-003 | 2.27000E-003 | 0.00000E+000 | 4.68043E+000 | 4.68043E+000 | 1.41000E-003 | 0.00000E+000 | 4.71008E+000 |
| Paving Equipment | 6.75000E-003 | 7.84800E-002 | 5.59500E-002 | 9.00000E-005 | 3.89000E-003 | 3.58000E-003 | 0.00000E+000 | 8.31620E+000 | 8.31620E+000 | 2.51000E-003 | 0.00000E+000 | 8.36888E+000 |
| Rollers | 7.41000E-003 | 6.84800E-002 | 4.43000E-002 | 6.00000E-005 | 5.04000E-003 | 4.64000E-003 | 0.00000E+000 | 5.43813E+000 | 5.43813E+000 | 1.64000E-003 | 0.00000E+000 | 5.47258E+000 |
| Rubber Tired Dozers | 1.40000E-002 | 1.58260E-001 | 1.20740E-001 | 1.00000E-004 | 7.38000E-003 | 6.79000E-003 | 0.00000E+000 | 9.31973E+000 | 9.31973E+000 | 2.78000E-003 | 0.00000E+000 | 9.37816E+000 |
| Tractors/Loaders/ Backhoes | 1.34440E-001 | 1.28375E+000 | 9.39800E-001 | 1.21000E-003 | 9.92700E-002 | 9.13300E-002 | 0.00000E+000 | 1.14566E+002 | 1.14566E+002 | 3.44700E-002 | 0.00000E+000 | 1.15290E+002 |
| Welders | 6.60600E-002 | 2.08660E-001 | 2.27850E-001 | 2.90000E-004 | 1.66600E-002 | 1.66600E-002 | 0.00000E+000 | 2.16454E+001 | 2.16454E+001 | 5.37000E-003 | 0.00000E+000 | 2.17582E+001 |

| Equipment Type | ROG | NOx | CO | SO2 | Exhaust PM10 | Exhaust PM2.5 | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mitigated tons/yr | | | | | | Mitigated mt/yr | | | | | |
| Air Compressors | 8.60000E-003 | 5.53500E-002 | 4.39600E-002 | 7.00000E-005 | 4.59000E-003 | 4.59000E-003 | 0.00000E+000 | 5.95758E+000 | 5.95758E+000 | 7.00000E-004 | 0.00000E+000 | 5.97233E+000 |
| Cement and Mortar Mixers | 1.29000E-003 | 8.12000E-003 | 6.78000E-003 | 2.00000E-005 | 3.30000E-004 | 3.30000E-004 | 0.00000E+000 | 1.00821E+000 | 1.00821E+000 | 1.00000E-004 | 0.00000E+000 | 1.01041E+000 |
| Cranes | 8.32900E-002 | 9.87250E-001 | 3.45060E-001 | 6.50000E-004 | 4.48500E-002 | 4.12600E-002 | 0.00000E+000 | 6.12817E+001 | 6.12817E+001 | 1.84500E-002 | 0.00000E+000 | 6.16691E+001 |
| Excavators | 4.58000E-003 | 5.35100E-002 | 3.78300E-002 | 6.00000E-005 | 2.64000E-003 | 2.43000E-003 | 0.00000E+000 | 5.54390E+000 | 5.54390E+000 | 1.66000E-003 | 0.00000E+000 | 5.57865E+000 |
| Forklifts | 7.92400E-002 | 6.81740E-001 | 4.36570E-001 | 5.30000E-004 | 5.70600E-002 | 5.24900E-002 | 0.00000E+000 | 4.97750E+001 | 4.97750E+001 | 1.49800E-002 | 0.00000E+000 | 5.00897E+001 |
| Generator Sets | 7.51400E-002 | 5.64650E-001 | 4.38080E-001 | 7.60000E-004 | 3.98700E-002 | 3.98700E-002 | 0.00000E+000 | 6.49988E+001 | 6.49988E+001 | 6.08000E-003 | 0.00000E+000 | 6.51264E+001 |
| Graders | 1.16800E-002 | 1.19550E-001 | 5.47900E-002 | 7.00000E-005 | 6.72000E-003 | 6.18000E-003 | 0.00000E+000 | 6.55688E+000 | 6.55688E+000 | 1.96000E-003 | 0.00000E+000 | 6.59799E+000 |
| Pavers | 4.41000E-003 | 4.96400E-002 | 3.13700E-002 | 5.00000E-005 | 2.47000E-003 | 2.27000E-003 | 0.00000E+000 | 4.68042E+000 | 4.68042E+000 | 1.41000E-003 | 0.00000E+000 | 4.71007E+000 |
| Paving Equipment | 6.75000E-003 | 7.84800E-002 | 5.59500E-002 | 9.00000E-005 | 3.89000E-003 | 3.58000E-003 | 0.00000E+000 | 8.31619E+000 | 8.31619E+000 | 2.51000E-003 | 0.00000E+000 | 8.36887E+000 |
| Rollers | 7.41000E-003 | 6.84800E-002 | 4.43000E-002 | 6.00000E-005 | 5.04000E-003 | 4.64000E-003 | 0.00000E+000 | 5.43813E+000 | 5.43813E+000 | 1.64000E-003 | 0.00000E+000 | 5.47257E+000 |
| Rubber Tired Dozers | 1.40000E-002 | 1.58260E-001 | 1.20740E-001 | 1.00000E-004 | 7.38000E-003 | 6.79000E-003 | 0.00000E+000 | 9.31972E+000 | 9.31972E+000 | 2.78000E-003 | 0.00000E+000 | 9.37815E+000 |
| Tractors/Loaders/Backhoes | 1.34440E-001 | 1.28375E+000 | 9.39790E-001 | 1.21000E-003 | 9.92700E-002 | 9.13300E-002 | 0.00000E+000 | 1.14566E+002 | 1.14566E+002 | 3.44700E-002 | 0.00000E+000 | 1.15290E+002 |
| Welders | 6.60600E-002 | 2.08660E-001 | 2.27850E-001 | 2.90000E-004 | 1.66600E-002 | 1.66600E-002 | 0.00000E+000 | 2.16454E+001 | 2.16454E+001 | 5.37000E-003 | 0.00000E+000 | 2.17582E+001 |

| Equipment Type | ROG | NOx | CO | SO2 | Exhaust PM10 | Exhaust PM2.5 | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percent Reduction | | | | | | | | | | | | |
| Air Compressors | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.67853E-006 | 1.67853E-006 | 0.00000E+000 | 0.00000E+000 | 1.67439E-006 |
| Cement and Mortar Mixers | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 |
| Cranes | 0.00000E+000 | 0.00000E+000 | 2.89796E-005 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.30544E-006 | 1.30544E-006 | 0.00000E+000 | 0.00000E+000 | 1.29724E-006 |
| Excavators | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.79255E-006 |
| Forklifts | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.00452E-006 | 1.00452E-006 | 0.00000E+000 | 0.00000E+000 | 1.19785E-006 |
| Generator Sets | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.23079E-006 | 1.23079E-006 | 0.00000E+000 | 0.00000E+000 | 1.22838E-006 |
| Graders | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.52511E-006 | 1.52511E-006 | 0.00000E+000 | 0.00000E+000 | 1.51561E-006 |
| Pavers | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 2.13656E-006 | 2.13656E-006 | 0.00000E+000 | 0.00000E+000 | 2.12311E-006 |
| Paving Equipment | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.20247E-006 | 1.20247E-006 | 0.00000E+000 | 0.00000E+000 | 1.19490E-006 |
| Rollers | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.82729E-006 |
| Rubber Tired Dozers | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.07299E-006 | 1.07299E-006 | 0.00000E+000 | 0.00000E+000 | 1.06631E-006 |
| Tractors/Loaders/Backhoes | 0.00000E+000 | 0.00000E+000 | 1.06406E-005 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.13471E-006 | 1.13471E-006 | 0.00000E+000 | 0.00000E+000 | 1.21433E-006 |
| Welders | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 0.00000E+000 | 1.38598E-006 | 1.38598E-006 | 0.00000E+000 | 0.00000E+000 | 1.37879E-006 |

## Fugitive Dust Mitigation

| Yes/No | Mitigation Measure | Mitigation Input | | Mitigation Input | | Mitigation Input | |
|---|---|---|---|---|---|---|---|
| No | Soil Stabilizer for unpaved Roads | PM10 Reduction | 0.00 | PM2.5 Reduction | 0.00 | | |
| No | Replace Ground Cover of Area Disturbed | PM10 Reduction | 0.00 | PM2.5 Reduction | 0.00 | | |
| Yes | Water Exposed Area | PM10 Reduction | 61.00 | PM2.5 Reduction | 61.00 | Frequency (per day) | 3.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| No | Unpaved Road Mitigation | Moisture Content % | 0.00 | Vehicle Speed (mph) | 0.00 | | |
| Yes | Clean Paved Road | % PM Reduction | 0.00 | | | | |

| | | Unmitigated | | Mitigated | | Percent Reduction | |
|---|---|---|---|---|---|---|---|
| Phase | Source | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Architectural Coating | Fugitive Dust | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Architectural Coating | Roads | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Building Construction | Fugitive Dust | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Building Construction | Roads | 0.25 | 0.07 | 0.25 | 0.07 | 0.00 | 0.00 |
| Grading | Fugitive Dust | 0.07 | 0.04 | 0.03 | 0.01 | 0.61 | 0.61 |
| Grading | Roads | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Paving | Fugitive Dust | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paving | Roads | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## Operational Percent Reduction Summary

| Category | ROG | NOx | CO | SO2 | Exhaust PM10 | Exhaust PM2.5 | Bio- CO2 | NBio-CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percent Reduction | | | | | | | | | | | | |
| Architectural Coating | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Consumer Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Electricity | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.39 | 3.39 | 3.39 | 3.36 | 3.39 |
| Hearth | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Landscaping | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Natural Gas | 21.30 | 21.29 | 21.30 | 21.33 | 21.22 | 21.22 | 0.00 | 21.29 | 21.29 | 21.15 | 21.29 | 21.29 |
| Water Indoor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 20.00 | 14.81 | 14.94 | 19.96 | 19.68 | 15.29 |
| Water Outdoor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## Operational Mobile Mitigation

Project Setting:

| Mitigation | Category | Measure | % Reduction | Input Value 1 | Input Value 2 | Input Value |
|---|---|---|---|---|---|---|
| No | Land Use | Increase Density | 0.00 | | | |
| No | Land Use | Increase Diversity | 0.06 | 0.24 | | |
| No | Land Use | Improve Walkability Design | 0.00 | | | |
| No | Land Use | Improve Destination Accessibility | 0.00 | | | |
| No | Land Use | Increase Transit Accessibility | 0.25 | | | |
| No | Land Use | Integrate Below Market Rate Housing | 0.00 | | | |
| | Land Use | Land Use SubTotal | 0.00 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| No | Neighborhood Enhancements | Improve Pedestrian Network | | | | |
| No | Neighborhood Enhancements | Provide Traffic Calming Measures | | | | |
| No | Neighborhood Enhancements | Implement NEV Network | 0.00 | | | |
| | Neighborhood Enhancements | Neighborhood Enhancements Subtotal | 0.00 | | | |
| No | Parking Policy Pricing | Limit Parking Supply | 0.00 | | | |
| No | Parking Policy Pricing | Unbundle Parking Costs | 0.00 | | | |
| No | Parking Policy Pricing | On-street Market Pricing | 0.00 | | | |
| | Parking Policy Pricing | Parking Policy Pricing Subtotal | 0.00 | | | |
| No | Transit Improvements | Provide BRT System | 0.00 | | | |
| No | Transit Improvements | Expand Transit Network | 0.00 | | | |
| No | Transit Improvements | Increase Transit Frequency | 0.00 | | | |
| | Transit Improvements | Transit Improvements Subtotal | 0.00 | | | |
| | | Land Use and Site Enhancement Subtotal | 0.00 | | | |
| No | Commute | Implement Trip Reduction Program | | | | |
| No | Commute | Transit Subsidy | | | | |
| No | Commute | Implement Employee Parking "Cash Out" | | | | |
| No | Commute | Workplace Parking Charge | | | | |
| No | Commute | Encourage Telecommuting and Alternative Work Schedules | 0.00 | | | |
| No | Commute | Market Commute Trip Reduction Option | 0.00 | | | |
| No | Commute | Employee Vanpool/Shuttle | 0.00 | | 2.00 | |
| No | Commute | Provide Ride Sharing Program | | | | |
| | Commute | Commute Subtotal | 0.00 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| No | School Trip | Implement School Bus Program | 0.00 | | | |
| | | Total VMT Reduction | 0.00 | | | |

## Area Mitigation

| Measure Implemented | Mitigation Measure | Input Value |
|---|---|---|
| No | Only Natural Gas Hearth | |
| No | No Hearth | |
| No | Use Low VOC Cleaning Supplies | |
| No | Use Low VOC Paint (Residential Interior) | 50.00 |
| No | Use Low VOC Paint (Residential Exterior) | 100.00 |
| No | Use Low VOC Paint (Non-residential Interior) | 250.00 |
| No | Use Low VOC Paint (Non-residential Exterior) | 250.00 |
| No | % Electric Lawnmower | |
| No | % Electric Leafblower | |
| No | % Electric Chainsaw | |

## Energy Mitigation Measures

| Measure Implemented | Mitigation Measure | Input Value 1 | Input Value 2 |
|---|---|---|---|
| Yes | Exceed Title 24 | 25.00 | |
| No | Install High Efficiency Lighting | | |
| No | On-site Renewable | | |

| Appliance Type | Land Use Subtype | % Improvement |
|---|---|---|
| ClothWasher | | 30.00 |

| | | |
|---|---|---|
| DishWasher | | 15.00 |
| Fan | | 50.00 |
| Refrigerator | | 15.00 |

## Water Mitigation Measures

| Measure Implemented | Mitigation Measure | Input Value 1 | Input Value 2 |
|---|---|---|---|
| Yes | Apply Water Conservation on Strategy | 20.00 | 0.00 |
| No | Use Reclaimed Water | 0.00 | 0.00 |
| No | Use Grey Water | 0.00 | |
| No | Install low-flow bathroom faucet | 32.00 | |
| No | Install low-flow Kitchen faucet | 18.00 | |
| No | Install low-flow Toilet | 20.00 | |
| No | Install low-flow Shower | 20.00 | |
| No | Turf Reduction | 0.00 | |
| No | Use Water Efficient Irrigation Systems | 6.10 | |
| No | Water Efficient Landscape | 0.00 | 0.00 |

## Solid Waste Mitigation

| Mitigation Measures | Input Value |
|---|---|
| Institute Recycling and Composting Services<br>Percent Reduction in Waste Disposed | 64.00 |

# Appendix B

# Air Toxic and Criteria Pollutant Health Risk Assessment

# Mission Lofts

**AIR TOXIC AND CRITERIA POLLUTANT HEALTH RISK ASSESSMENT**
**CITY OF RIVERSIDE**

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MAY 26, 2015

# TABLE OF CONTENTS

**TABLE OF CONTENTS** ..... **I**
**APPENDICES** ..... **II**
**LIST OF EXHIBITS** ..... **III**
**LIST OF TABLES** ..... **III**
**LIST OF ABBREVIATED TERMS** ..... **IV**
**EXECUTIVE SUMMARY** ..... **5**
**1 INTRODUCTION** ..... **8**
1.1 Site Location ..... 8
1.2 Project Description ..... 8
**2 SOURCE IDENTIFICATION** ..... **10**
**3 SOURCE CHARACTERIZATION** ..... **12**
**4 EXPOSURE QUANTIFICATION** ..... **17**
**5 RISK CHARACTERIZATION** ..... **20**
5.1 Carcinogenic Chemical Risk ..... 20
5.2 Non-Carcinogenic Exposures ..... 21
2.6 Potential Cancer and Non-Cancer Risks ..... 22
5.3 Criteria Pollutant Exposures ..... 22
**6 FINDINGS & CONCLUSIONS** ..... **26**
**7 REFERENCES** ..... **28**
**8 CERTIFICATION** ..... **30**

# APPENDICES

**APPENDIX 3.1: EMISSION RATE CALCULATION WORKSHEETS**
**APPENDIX 3.2: RISK CALCULATION WORKSHEETS**
**APPENDIX 3.3: AERMOD MODEL OUTPUT SUMMARY FILE**
**APPENDIX 3.4: AERMOD MODEL INPUT/OUTPUT FILES (ELECTRONIC FORMAT, AVAILABLE ON REQUEST)**

# LIST OF EXHIBITS

EXHIBIT 1-A: PRELIMINARY SITE PLAN .....9
EXHIBIT 4-A: SOURCE RECEPTOR GRID NETWORK .....19

# LIST OF TABLES

TABLE 2-1 FREEWAY TRAFFIC VOLUMES .....10
TABLE 3-1: VEHICLE FLEET MIX PROFILE .....13
TABLE 3-2: HOURLY FREEWAY TRAFFIC VOLUMES.....14
TABLE 3-3: COMPOUNDS EMITTED FROM ON ROAD MOBILE SOURCE ACTIVITY .....15
TABLE 2-3: EXPOSURE ASSUMPTIONS FOR INDIVIDUAL CANCER RISK.....18
TABLE 5-1: CALIFORNIA AMBIENT AIR QUALITY STANDARDS.....23
TABLE 5-2: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2012-2014.....23
TABLE 5-3: SCAQMD AIR QUALITY SIGNIFICANCE THRESHOLDS .....24

# LIST OF ABBREVIATED TERMS

| | |
|---|---|
| (1) | Reference |
| AADT | Annual Average Daily Traffic Volumes |
| ARB | Air Resources Board |
| CAAQS | California Ambient Air Quality Standards |
| Caltrans | California Department of Transportation |
| CEQA | California Environmental Quality Act |
| CO | Carbon Monoxide |
| CPF | Cancer Potency Factor |
| EPA | Environmental Protection Agency |
| HRA | Health Risk Assessment |
| LDA | Light Duty Auto |
| LDT | Light Duty Truck |
| LHD | Light Heavy Duty |
| MCY | Motorcycle |
| MDV | Medium Duty Vehicle |
| NO2 | Nitrogen Dioxide |
| OBUS | Other Bus |
| OLM | Ozone Limiting |
| PM10 | Particulate Matter 10 microns in diameter or less |
| PM2.5 | Particulate Matter 2.5 microns in diameter or less |
| PPM | Parts per Million |
| Project | Mission Lofts |
| PVMRM | Plume Volume Molar Ratio Methods |
| REL | Reference Exposure Level |
| RME | Reasonable Maximum Exposure |
| SBUS | School Bus |
| SCAQMD | South Coast Air Quality management District |
| TACs | Toxic Air Contaminants |
| UBUS | Urban Bus |
| URF | Unit Risk Factor |
| UTM | Universal Traverse Mercator |

# EXECUTIVE SUMMARY

In 2005, the California Air Resources Board (ARB) promulgated an advisory recommendation to avoid setting sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day, or rural roads with 50,000 vehicles per day. The ARB indicates that due to traffic-generated pollutants, there is an estimated increased cancer risk incidence of 300 to 1,700 per million in within this domain. At some point however, the increased cancer risk incidence due the effects of freeway/roadway corridor pollutants become indistinguishable from the ambient air quality condition. In this regard, the effects of freeway/roadway-source pollutants that may impact the Project site are already acknowledged and accounted for within the ambient air quality discussions presented within this Section. More specifically, the MATES-IV Study data for the Project site comprehensively reflects increased TAC-source cancer risks affecting the City and Project site, inclusive of increased cancer risks due to freeway, roadway, and rail line pollutant sources. It is however recognized that the effects of freeway traffic and rail road pollutants on the Project site would likely be more acute and discernible in those areas nearer freeway/roadway and rail line corridors.

The Project proposes Multi-Family land uses that would be located approximately 875 feet / 265 meters east of the Route 91. Additionally, the Project is approximately 150 feet / 45 meters to the east of an existing rail line utilized by Riverside Amtrak and the Riverside Transit Agency Metrolink.

The 2005 ARB guidance noted previously, information made available through the MATES-IV Study, and configuration and design of the Project would suggest that further assessment of freeway-source pollutant impacts is not warranted. Notwithstanding, this Off-Site Freeway-Source Air Toxic and Criteria Pollutant Health Risk Assessment has been prepared for the Project and is intended to:

- Comply with and support CEQA Section 15003 (i) policies addressing adequacy, completeness, and a good-faith effort at full disclosure;
- Disaggregate potential freeway-source air pollutant health effects from other background conditions identified in the MATES IV Study; and
- Identify means to reduce the specific effects of freeway-source pollutants at the Project site.

Findings and conclusions of this Assessment are summarized below.

### SUMMARY OF FINDINGS

For carcinogenic exposures resulting from exposure to toxics from the freeway and diesel particulates from the rail line, the summation of risk for the maximum exposed residential receptor totaled 7.6 in one million and will not exceed the SCAQMD significance threshold of 10 in one million.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one for both the 30 year and 9 year exposure scenarios. For acute exposures, the hazard indices for the identified averaging times did not exceed unity. Therefore,

noncarcinogenic hazards are calculated to be within acceptable limits and a less than significant impact would occur.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.11 μg/m3 and 0.06 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.04 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.06 parts per million (ppm) (68.98 μg/m3), when added to an existing background concentration of 2.4 ppm, would equal a total Project concentration of 2.46 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.05 ppm (57.56 μg/m3), when added to an existing background level of 1.9 ppm, would equal a total Project concentration of 1.95 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one hour concentration of 0.008 ppm (14.97 μg/m3) was predicted. This concentration, when added to a background concentration of 0.06 ppm, would equal a total Project concentration of 0.068 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

As noted, short duration (i.e., 1 and 8-hour) exposures associated with both toxic and criteria pollutants are within acceptable limits. As such, less than significant impacts are anticipated to residents who would access and utilize outdoor amenities.

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# 1 INTRODUCTION

In 2005, the California Air Resources Board (ARB) promulgated an advisory recommendation to avoid setting sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day or rural roads with 50,000 vehicles per day. According to the ARB, the increased cancer risk is 300 to 1,700 per million within this domain. The strongest association of traffic related emissions with adverse health outcomes was seen within 300 feet of roadways with high truck densities. Notwithstanding, the ARB notes that a site specific analysis would be required to determine the actual risk near a particular land use and should consider factors such as prevailing wind direction, local topography and climate. The Project proposes Multi-Family land uses that would be located approximately 875 feet / 265 meters east of the Route 91. Additionally, the Project is approximately 150 feet / 45 meters to the east of an existing rail line utilized by Riverside Amtrak and the Riverside Transit Agency Metrolink.

Additionally, the California Code of Regulations, Title 14, Section 15126.2(a) recommends that significant environmental effects of a project be assessed when a project brings development and people into an affected area (1). For the proposed project, adjoining freeway emissions and an existing railroad line are a potential concern and relevant thresholds and standards exist to determine the impact of vehicular and freight emissions on an exposed population. As such, a health risk assessment was prepared to assess the impact of these emissions on individuals residing at the proposed project site.

In consideration of the above referenced requirement, the assessment and dispersion modeling methodologies used in the preparation of this report were composed of all relevant and appropriate procedures presented by the U.S. Environmental Protection Agency, California Environmental Protection Agency and South Coast Air Quality Management District (SCAQMD). The methodologies and assumptions offered under this regulatory guidance were used to ensure that the assessment effectively quantified residential exposures associated with the generation of contaminant emissions from adjacent mobile source activity.

This report summarizes the protocol used to evaluate contaminant exposures and presents the results of the health risk assessment (HRA) prepared by Urban Crossroads, Inc., for the proposed Mission Lofts development (referred to as "Project).

## 1.1 SITE LOCATION

The proposed Mission Lofts development is located in downtown Riverside at the southeast corner of Commerce Street and Mission Inn Avenue in the City of Riverside.

## 1.2 PROJECT DESCRIPTION

The Mission Lofts Project proposes a 212 dwelling unit Multi-Family residential development on 4.69 acres of land as shown on Exhibit 1-A. As part of the project design, the Project applicant has agreed to installing and maintaining air filtration systems with efficiencies equal to or exceeding a Minimum Efficiency Reporting Value (MERV) 16 as defined by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 52.2. (2)[1].

1 The use of MERV filtration systems to reduce DPM and particulates has been successfully implemented by several lead agencies, including, but not limited to: City of Los Angeles, City of Claremont, City of Irvine, City of Glendale, City of Berkley, City of Oakland, and the Los Angeles Unified School District (LAUSD).

The average particle size efficiency (PSE) removal based on ASHRAE Standard 52.2 for MERV 16 is approximately 95% for 0.3 to 1.0 $\mu g/m^3$(DPM) and 95% for 1.0 to 10 $\mu g/m^3$($PM_{10}$ and $PM_{2.5}$) (2).

**EXHIBIT 1-A: PRELIMINARY SITE PLAN**

Source: Mission Lofts Architectural Site Plan (KTGY Group, Inc. Architecture + Planning)

# 2 SOURCE IDENTIFICATION

The California Department of Transportation (Caltrans), Traffic and Vehicle Data Systems Unit collects and maintains traffic volume counts for vehicles traversing the California state highway system. Discrete data sets are available for main highway segments and adjoining freeway ramp volumes. Table 2-1 presents the annual average daily traffic volumes (AADT) for the roadway segments considered in the assessment. Data fir AADTs for the SR-91 Freeway mainline were derived from the Caltrans Performance Measurement System (PeMS). Data for AADTs for eastbound and westbound on/off ramps were obtained from Caltrans District 8 Ramp Volumes (2013).

**TABLE 2-1 FREEWAY TRAFFIC VOLUMES**

| Roadway Segment | Postmile | Annual Average Daily Traffic (AADT) |
|---|---|---|
| SR-91Freeway | 3.03 | 118,800 |
| EB Off / 10th | 020.270 | 11,000 |
| WB On / 9th | 020.289 | 11,000 |
| WB Off / 7th | 020.675 | 7,000 |
| EB On / 7th | 020.694 | 7,000 |

The United States Department of Transportation (U.S. DOT) provides crossing information for the Mission Inn Avenue crossing adjacent to the Project. Based on the latest available data from U.S. DOT, there are approximately 105 daily thru trains that traverse the rail line adjacent to the Project.

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# 3 SOURCE CHARACTERIZATION

In urban communities, vehicle emissions contribute significantly to localized concentrations of air contaminants. Typically, emissions generated from these sources are characterized by vehicle mix, the rate pollutants are generated during the course of travel and the number of vehicles traversing the roadway network.

Currently, emission factors are generated from a series of computer based programs to produce a composite emission rate for vehicles traveling at various speeds within a defined geographical area or along a discrete roadway segment. To account for the emission standards imposed on the California fleet, the ARB has developed the EMFAC2014 emission factor model. EMFAC2014 was utilized to identify pollutant emission rates for total organic gases (TOG), diesel particulates, particulates (PM10 and PM2.5), carbon monoxide (CO) and nitrogen oxide (NOx) compounds (3). To produce a representative vehicle fleet distribution, the assessment utilized ARB's Riverside County population estimates for the 2016 calendar year. This approach provides an estimate of vehicle mix associated with operational profiles at the link or intersection level. Table 3-1 lists the identified fleet mix considered in the assessment.

Based upon the freeway traffic volumes and population profiles noted above, discrete traffic counts were identified for each roadway segment. Diesel vehicles account for 5.01 percent of the total on-road mobile fleet. For chronic (long term) and acute (e.g., 1-hour) exposures, AADT values were averaged to produce representative hourly traffic volumes. Table 3-2 presents the hourly traffic volumes considered in the assessment.

For rail activity, emissions of diesel particulate matter (DPM) were estimated based on composite fleet characteristics for locomotives operating at throttle notch 6 arriving and departing the BNSF Railway San Bernardino Railyard. The hourly volume of trains was determined by dividing the total number of through trains by twenty-four hours. As such, the hourly trains were determined to be 4.375 (105 total daily thru trains ÷ 24 hours).

**TABLE 3-1: VEHICLE FLEET MIX PROFILE**

| Vehicle class | Riverside County | | |
|---|---|---|---|
| | Fuel | Population | Percent |
| LDA | Diesel | 3,849 | 0.38 |
| LDA | Gas | 523,219 | 51.88 |
| LDT1 | Diesel | 55 | 0.01 |
| LDT1 | Gas | 50,756 | 5.03 |
| LDT2 | Diesel | 180 | 0.02 |
| LDT2 | Gas | 173,071 | 17.16 |
| LHD1 | Diesel | 14,346 | 1.42 |
| LHD1 | Gas | 16,157 | 1.60 |
| LHD2 | Diesel | 4,970 | 0.49 |
| LHD2 | Gas | 2,204 | 0.22 |
| MCY | Gas | 26,529 | 2.63 |
| MDV | Diesel | 1,103 | 0.11 |
| MDV | Gas | 157,248 | 15.59 |
| MH | Diesel | 1,744 | 0.17 |
| MH | Gas | 6,501 | 0.64 |
| T6 | Diesel | 11,137 | 1.10 |
| T6 | Gas | 1,159 | 0.11 |
| T7 | Diesel | 11,934 | 1.18 |
| T7 | Gas | 69 | 0.01 |
| OBUS | Diesel | 203 | 0.02 |
| OBUS | Gas | 571 | 0.06 |
| SBUS | Diesel | 815 | 0.08 |
| SBUS | Gas | 347 | 0.03 |
| UBUS | Diesel | 147 | 0.01 |
| UBUS | Gas | 184 | 0.02 |

Note: Vehicle category descriptions can be found on the California Air Resources Board website at http://www.arb.ca.gov/msei/modeling.htm.

**TABLE 3-2: HOURLY FREEWAY TRAFFIC VOLUMES**

| Roadway Segment | Average Traffic Volume | | |
|---|---|---|---|
| | All | Gas | Diesel |
| SR-91 Freeway Eastbound | 3,235 | 3,073 | 162 |
| SR-91 Freeway Westbound | 1,715 | 1,629 | 86 |
| EB Off / 10th | 458 | 435 | 23 |
| WB On / 9th | 458 | 435 | 23 |
| WB Off / 7th | 292 | 277 | 15 |
| EB On / 7th | 292 | 277 | 15 |

Average observed route speeds from PeMS were assumed for vehicles traversing the main highway link (SR-91). Emissions associated with acceleration and deceleration (i.e., on/off ramps) were based upon vehicle speeds of 45 and 5 miles per hour, respectively. These values were subsequently adjusted utilizing the modal algorithms presented in the California Line Source Dispersion Model (4).

For particulates (PM10 and PM2.5), emissions were quantified through the reentrainment of paved roadway dust. The predictive emission equation developed by the U.S. Environmental Protection Agency (AP-42, Section 13.2.1) was utilized to generate particulate source strength (5). To account for the mass rate of emissions entrained from the roadway surface, the contribution from exhaust, break and tire wear were added to the AP-42 emission factor equation.

A list of compounds associated with mobile source emissions is presented in Table 3-3. Appendix 3.1 presents the on-road emission rate calculation worksheets for the freeway segments considered in the assessment.

**TABLE 3-3: COMPOUNDS EMITTED FROM ON ROAD MOBILE SOURCE ACTIVITY**

| Source | Pollutant |
|---|---|
| State Route 91 | Benzene<br>Formaldehyde<br>1,3-Butadiene<br>Acetaldehyde<br>Acrolein<br>Diesel Particulates<br>Reentrained Particulates (PM10, PM2.5)<br>Carbon Monoxide<br>Nitrogen Dioxide |
| BNFS Rail Line | Diesel Particulates |

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# 4 EXPOSURE QUANTIFICATION

In order to assess the impact of emitted compounds on individuals who reside at the proposed apartment complex, air quality modeling utilizing the AMS/EPA Regulatory Model AERMOD was performed to assess the downwind extent of mobile source emissions located within a ¼ mile radius of the project site. AERMOD's air dispersion algorithms are based upon a planetary boundary layer turbulence structure and scaling concepts, including the treatment of surface and elevated sources in simple and complex terrain.

The model offers additional flexibility by allowing the user to assign initial vertical and lateral dispersion parameters for sources representative of a localized mobile fleet. For this assessment, the volume source algorithm was utilized to model the emissions generated from on-road mobile source activity. Although the freeway and rail line are located predominantly below grade, the assessment followed guidance promulgated by the U.S. Environmental Protection Agency (U.S. EPA, 2009) whereby the model was programmed to assume flat, level terrain (6). This was done to avoid underestimating pollutant concentrations for conditions involving low-level, non-buoyant sources in up-sloping terrain. Notwithstanding, to account for the discrepancy in terrain elevation, vertical (sigma z) dispersion parameters were developed for each source location by approximating mixing zone residence time and quantifying the initial vertical term as performed in the California Line Source Dispersion Model Caline3 (4). The horizontal (sigma y) parameters were generated by dividing the source separation distance by a standard deviation of 2.15.

The model incorporates two methodologies to perform the NOx to NO2 conversion. In a recent clarification memorandum (U.S. EPA, 2011), the Office of Air Quality Planning and Standards provides guidance on the use and performance of the two algorithms referred to as the ozone limiting (OLM) and plume volume molar ratio (PVMRM) methods. Based upon this guidance, the OLM algorithm with the OLMGROUP ALL option was identified as the preferred method to perform the analysis (7).

Air dispersion models require additional input parameters including pollutant emission data and local meteorology. Due to the their sensitivity to individual meteorological parameters such as wind speed and direction, the U.S. Environmental Protection Agency recommends that meteorological data used as input into dispersion models be selected on the basis of relative spatial and temporal conditions that exist in the area of concern. In response to this recommendation, the nearest meteorological data available from the SCAQMD Riverside Meteorological Data Station (Source Receptor Area 23), which is located approximately 3 miles northwest of the project site, was used to represent local weather conditions and prevailing winds. Five years (2008-2012) of available AERMOD meteorological data was utilized in the modeling.

The modeling analysis also considered the spatial distribution of mobile source activity traversing the freeway in relation to the proposed site. To accommodate a Cartesian grid format, direction dependent calculations were obtained by identifying the universal transverse mercator (UTM) coordinates for each volume source location. On-site receptors were placed to

provide coverage across the identified project boundary. A ground level receptor height was assumed as a conservative measure. A graphical representation of the source-receptor grid network is presented in Exhibit 4-A.

Discrete variants for daily breathing rates, exposure frequency, and exposure duration were obtained from relevant distribution profiles presented in the OEHHA guidance document entitled Air Toxic Hot Spots Program Risk Assessment Guidelines, Part IV: Technical Support Document for Exposure Assessment and Stochastic Analysis (8) and guidance from SCAQMD. Table 2-3 summarizes the Exposure Parameters for Residents. Appendix "5.2" includes the detailed emissions and risk calculation outputs. (9)

**TABLE 2-3: EXPOSURE ASSUMPTIONS FOR INDIVIDUAL CANCER RISK**

| Exposure Parameter | Units | Residential |
|---|---|---|
| Exposure Frequency | days/year | 350 |
| Exposure Duration | years | 70 |
| Inhalation Rate [a] | L/kg-day | 302 |
| Exposure Duration | Years | 70 |
| Exposure Time | hours/day | 24 |

[b] The residential breathing rate of 302 L/kg-day represents the 80th percentile breathing rate per ARB and consistent with SCAQMD Risk Assessment Procedures for Rules 1401 and 212, the worker breathing rate of 149 L/kg-day is also consistent with SCAQMD Risk Assessment Procedures for Rules 1401 and 212, the school child breathing rate of 581 L/kg-day represents the high end 95th percentile breathing rate.

A dispersion model input summary table is provided in Appendix 3.3. A complete listing of model input/output files are provided in electronic format in Appendix 3.4.

**EXHIBIT 4-A: SOURCE RECEPTOR GRID NETWORK**

# 5 RISK CHARACTERIZATION

## 5.1 CARCINOGENIC CHEMICAL RISK

The SCAQMD CEQA Air Quality Handbook (1993) states that emissions of toxic air contaminants (TACs) are considered significant if a HRA shows an increased risk of greater than ten in one million. Based on guidance from the SCAQMD in the document Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis ((10), for purposes of this analysis, ten (10) in one million is used as the cancer risk threshold for the proposed Project.

Excess cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens over a specified exposure duration. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF). A risk level of 1 in a million implies a likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the levels of toxic air contaminants over a specified duration of time. This risk would be an excess cancer risk that is in addition to any cancer risk borne by a person not exposed to these air toxics.

Guidance from CARB and the U.S. EPA recommends a refinement to the standard point estimate approach when alternate human body weights and breathing rates are utilized to assess risk for susceptible subpopulations such as children. For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose. Once determined, contaminant dose is multiplied by the cancer potency factor (CPF) in units of inverse dose expressed in milligrams per kilogram per day (mg/kg/day)-1 to derive the cancer risk estimate. Therefore, to assess exposures, the following dose algorithm was utilized.

$$DOSEair = (Cair \times [BR/BW] \times A \times EF) \times (1 \times 10^{-6})$$

Where:

| | | |
|---|---|---|
| DOSEair | = | chronic daily intake (mg/kg/day) |
| Cair | = | concentration of contaminant in air (ug/m3) |
| [BR/BW] | = | daily breathing rate normalized to body weight (L/kg BW-day) |
| A | = | inhalation absorption factor |
| EF | = | exposure frequency (days/365 days) |
| BW | = | body weight (kg) |
| $1 \times 10^{-6}$ | = | conversion factors (ug to mg, L to m3) |

RISKair = DOSEair x CPF x ED/AT

Where:

| | | |
|---|---|---|
| DOSEair | = | chronic daily intake (mg/kg/day) |
| CPF | = | cancer potency factor |
| ED | = | number of years within particular age group |
| AT | = | averaging time |

## 5.2 NON-CARCINOGENIC EXPOSURES

An evaluation of the potential noncancerous effects of contaminant exposures was also conducted. Under the point estimate approach, adverse health effects are evaluated by comparing the concentration of each compound with the appropriate Reference Exposure Level (REL). Available REL's presented in the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values were considered in the assessment.*

To quantify noncarcinogenic impacts, the hazard index approach was used. The hazard index assumes that subthreshold exposures adversely affect a specific organ or organ system (i.e., toxicological endpoint). For each discrete pollutant exposure, target organs presented in regulatory guidance were utilized.

To calculate the hazard index, the pollutant concentration or dose is divided by the appropriate toxicity value. For compounds affecting the same toxicological endpoint, this ratio is summed. Where the total equals or exceeds one (i.e., unity), a health hazard is presumed to exist. For chronic exposures, REL's were converted to units expressed in mg/kg/day to accommodate the above referenced intake algorithm. To assess acute noncancer impacts, the maximum pollutant concentration is divided by the REL for the corresponding averaging time (e.g., 1-hour). No exposure adjustments are considered for short duration exposures.

Appendix 3.2, summarizes the REL's and corresponding reference dose values used in the evaluation of chronic noncarcinogenic and acute exposures. The noncancer hazard quotient for identified compounds generated from each source and a summation for each toxicological endpoint are presented on this table.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than the threshold of 1.0 for all exposure scenarios. For acute exposures, the hazard indices for the identified averaging times did not exceed the threshold of 1.0. Therefore, acute and chronic non-carcinogenic hazards were predicted to be within acceptable limits and are less than significant.

## 2.6 POTENTIAL CANCER AND NON-CANCER RISKS[2]

For carcinogenic exposures the summation of risk for the maximum exposed residential receptor totaled 7.6 in one million, which does not exceed the threshold of 10 in one million. At this same location, non-cancer risks were estimated to be less than 1.0 for all toxicological endpoints.

## 5.3 CRITERIA POLLUTANT EXPOSURES

The State of California has promulgated strict ambient air quality standards for various pollutants. These standards were established to safeguard the public's health and welfare with specific emphasis on protecting those individuals susceptible to respiratory distress, such as asthmatics, the young, the elderly and those with existing conditions which may be affected by increased pollutant concentrations. However, recent research has shown that unhealthful respiratory responses occur with exposures to pollutants at levels that only marginally exceed clean air standards. Table 5-1 presents the CAAQS for the criteria pollutants considered in the assessment.

Pollutant emissions are considered to have a significant effect on the environment if they result in concentrations that create either a violation of an ambient air quality standard, contribute to an existing air quality violation or expose sensitive receptors to substantive pollutant concentrations. Should ambient air quality already exceed existing standards, the SCAQMD has established significance criteria for selected compounds to account for the continued degradation of local air quality. Background concentrations are based upon the highest observed value for the most recent three year period.

For $PM_{10}$ emissions, background concentrations representative of the project area exceed the CAAQS for the 24-hour and annual averaging times. As a result, a significant impact is achieved when pollutant concentrations produce a measurable change over existing background levels. Although background concentrations exceed the CAAQS annual averaging time for fine particulates, no measurable change criteria currently exists. As a result, the SCAQMD significance threshold of 2.5 $\mu g/m^3$ for the 24-hour averaging time is used to assess $PM_{2.5}$ impacts.

For the CO 1 and 8-hour averaging times and $NO_2$ 1-hour averaging time, background concentrations are below the current air quality standards. As such, significance is achieved when pollutant concentrations add to existing levels and create an exceedance of the CAAQS. Table 5-2 shows the pollutant concentrations collected at the nearest available monitoring site to the Project for the last three years of available data. Table 5-3 outlines the relevant significance thresholds considered to affect local air quality.

2 SCAQMD guidance does not require assessment of the potential health risk to on-site workers. Excerpts from the document OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines—The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2003), also indicate that it is not necessary to examine the health effects to on-site workers unless required by RCRA (Resource Conservation and Recovery Act) / CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) or the worker resides on-site.

**TABLE 5-1: CALIFORNIA AMBIENT AIR QUALITY STANDARDS**

| Pollutant | Standard | Health Effects |
|---|---|---|
| Particulates (PM10) | >50 μg/m3 (24 hr avg.)<br>>20 μg/m3 (Annual) | 1) Excess deaths from short-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory disease.<br>2) Excess seasonal declines in pulmonary function especially in children. |
| Particulates (PM2.5) | >12 μg/m3 (Annual) | 1) Excess deaths and illness from long-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory and cardio pulmonary disease. |
| Carbon Monoxide (CO) | >9.0 ppm (8 hr avg.)<br>>20.0 ppm (1 hr avg.) | 1) Aggravation of angina pectoris and other aspects of coronary heart disease.<br>2) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease.<br>3) Impairment of central nervous system functions.<br>4) Possible increased risk to fetuses. |
| Nitrogen Dioxide (NO2) | >0.18 ppm (1 hr avg.) | 1) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups.<br>2) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes. |

Abbreviations: ppm: parts per million; μg/m3: micrograms per cubic meter.
Source: California Code of Regulations, Title 17, Section 70200.

**TABLE 5-2: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2012-2014[3]**

| Pollutant/ Averaging Time | Year | | | |
|---|---|---|---|---|
| | 2012 | 2013 | 2014 | Maximum |
| Particulates ($PM_{10}$)<br>24-Hour | 67 | 135 | 100 | 135 |
| Particulates ($PM_{2.5}$)<br>24-Hour | 38.5 | 60.3 | 48.9 | 60.3 |
| Carbon Monoxide (CO)<br>1-Hour<br>8-Hour | 2.1<br>1.6 | 2.5<br>2.0 | 2.4<br>1.9 | 2.5<br>2.0 |
| Nitrogen Dioxide ($NO_2$)<br>1-Hour | 0.062 | 0.060 | 0.060 | 0.062 |

Note: $PM_{10}$ concentrations are expressed in micrograms per cubic meter ($\mu g/m^3$). All others are expressed in parts per million (ppm).
Source: U.S. Environmental Protection Agency http://www.epa.gov/airdata/ad_rep_mon.html

[3] PM10, PM2.5, CO, and NO2 data obtained from the Metropolitan Riverside County 1 (SRA 23) monitoring station.

**TABLE 5-3: SCAQMD AIR QUALITY SIGNIFICANCE THRESHOLDS**

| Pollutant | Averaging Time | Pollutant Concentration |
|---|---|---|
| Particulates (PM10)<br>Particulates (PM2.5) | 24-Hours | 2.5 μg/m3 (operation) |
| Particulates (PM10) | Annual | 1.0 μg/m3 |
| Carbon Monoxide (CO) | 1/8-Hours | SCAQMD is in attainment; impacts are significant if they cause or contribute to an exceedance of the following attainment standards 20 ppm (1-hour) and 9 ppm (8-hour). |
| Nitrogen Dioxide (NO2) | 1-Hour | SCAQMD is in attainment; impacts are significant if they cause or contribute to an exceedance of the following attainment standard 0.18 ppm. |

Abbreviations: ppm: parts per million; μg/m3: micrograms per cubic meter
Source: South Coast Air Quality Management District.

Results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.11 μg/m3 and 0.06 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.04 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.06 parts per million (ppm) (68.98 μg/m3), when added to an existing background concentration of 2.4 ppm, would equal a total Project concentration of 2.46 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.05 ppm (57.56 μg/m3), when added to an existing background level of 1.9 ppm, would equal a total Project concentration of 1.95 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one hour concentration of 0.008 ppm (14.97 μg/m3) was predicted. This concentration, when added to a background concentration of 0.06 ppm, would equal a total Project concentration of 0.068 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

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# 6 FINDINGS & CONCLUSIONS

For carcinogenic exposures resulting from exposure to toxics from the freeway and diesel particulates from the rail line, the summation of risk for the maximum exposed residential receptor totaled 7.6 in one million and will not exceed the SCAQMD significance threshold of 10 in one million.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one for both the 30 year and 9 year exposure scenarios. For acute exposures, the hazard indices for the identified averaging times did not exceed unity. Therefore, noncarcinogenic hazards are calculated to be within acceptable limits and a less than significant impact would occur.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.11 μg/m3 and 0.06 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.04 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.06 parts per million (ppm) (68.98 μg/m3), when added to an existing background concentration of 2.4 ppm, would equal a total Project concentration of 2.46 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.05 ppm (57.56 μg/m3), when added to an existing background level of 1.9 ppm, would equal a total Project concentration of 1.95 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one hour concentration of 0.008 ppm (14.97 μg/m3) was predicted. This concentration, when added to a background concentration of 0.06 ppm, would equal a total Project concentration of 0.068 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

As noted, short duration (i.e., 1 and 8-hour) exposures associated with both toxic and criteria pollutants are within acceptable limits. As such, less than significant impacts are anticipated to residents who would access and utilize outdoor amenities.

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# 8 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Mission Lofts Project. The information contained in this health risk assessment is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 217.

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Master of Science in Environmental Studies
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AEP – Association of Environmental Planners
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ASTM – American Society for Testing and Materials

### PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June, 2013
Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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# APPENDIX 3.1:

# EMISSION RATE CALCULATION WORKSHEETS

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# APPENDIX 3.2:

# RISK CALCULATION WORKSHEETS

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# APPENDIX 3.3:

# AERMOD MODEL OUTPUT SUMMARY FILE

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# APPENDIX 3.4:

# AERMOD MODEL INPUT/OUTPUT FILES
# (ELECTRONIC FORMAT, AVAILABLE ON REQUEST)

# Appendix C

# Cultural Resources Survey

## CULTURAL RESOURCES SURVEY

# MISSION LOFTS

**Riverside, Riverside County, California**

**Graphic Credit: KTGY Group, Inc.**

Research & Consulting

# CULTURAL RESOURCES SURVEY

# MISSION LOFTS

**Riverside, Riverside County, California**

**Planning Cases: P14-0045, P14-0046,**
**P14-0047, P14-0048, & P14-0049**

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David Brunzell, M.A., RPA
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USGS Quadrangle*:* 7.5-minute *Riverside East, California*, 1980
Por. Sections 23 & 24, Township 2 South, Range 5 West, San Bernardino Base and Meridian

June 2015

## MANAGEMENT SUMMARY

JM Research & Consulting (JMRC) is under contract to Albert A. WEBB Associates to complete a Cultural Resources Survey for the proposed Mission Lofts project in the City of Riverside, Riverside County, California. The Project Area straddles University Avenue and is bounded by Mission Inn Avenue on the north, Ninth Street on the south, and Commerce Street on the west in the Eastside area of Riverside, Sections 23 & 24, Township 2 South, Range 5 West, San Bernardino Base and Meridian as depicted on the U.S. Geological Survey (USGS) *Riverside East, California* 7.5-minute quadrangle (1980; Figure 1). The City of Riverside Community Development Department, Planning Division requested the study as part of their environmental review process in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.)

The survey, which included a cultural resources record search, field study, and extensive additional research, was intended to identify, document, and evaluate potential cultural resources, analyze potential project impacts, and recommend mitigation measures, if applicable. Potential resources were recorded on State of California Department of Recreation (DPR) forms and evaluated according to designation criteria established for listing in the National Register of Historic Places (NR), the California Register of Historical Resources (CR) and for local designation under the City's recently revised Cultural Resources Ordinance (Title 20; Ord. 7108 §1, 2010). This work has been completed pursuant to the California Environmental Quality Act (CEQA; PRC §21000, et seq.), the City's Cultural Resources Ordinance, Title 20 of the Municipal Code (Title 20; Ord. 6263 (1996), as amended), and in full compliance with the City of Riverside Consultant Requirements.

Development in the Project Area began in the late-19th century and continued throughout the first half of the 20th century with the construction of the nearby Riverside Freeway (1957) and the grade separation project (1960) that lowered University Avenue below crossing streets, three railroad company tracks, and the Riverside Upper Canal. Development once included houses, auto sales, a warehouse, a citrus packing house, a Southern Pacific Railroad (SPRR) freight house, and multiple railroad tracks, none of which is still extant. Two potential historic resources - a SPRR concrete loading platform and an abandoned, steel SPRR railroad bridge - remain within the Project Area, as well as multiple concrete pads and some construction debris; no potential or previously recorded archaeological resources were identified. The Project Area is immediately adjacent to the Ninth Street Potential Neighborhood Conservation Area (NCA), and portions of the Project Area are within the boundaries of the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District.

JMRC found that the loading platform (ca. 1930-1947) and bridge (1960) are later remnant components of a larger, more extensive, and no longer extant SPRR property that lack the level of architectural distinction, strength of historic association, and sufficient integrity to merit individual listing in the NR, CR, or for local designation. While currently within the boundaries of the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District, neither falls within the period of significance nor contributes to the significance of these districts and should be considered non-contributors. Therefore, JMRC recommends that the SPRR loading platform and SPRR bridge are each assigned a CHR Status Code of ***6L – Determined ineligible for local listing or designation through local government review process; may warrant special consideration in local planning.***

No previously recorded or potential archaeological resources were revealed; therefore, no impacts to archaeological resources are anticipated. As the loading platform and railroad bridge appear ineligible for designation, they are not considered "historical resources" under CEQA. However, a portion of the Project Area is within the locally designated Seventh Street East Historic District and the locally eligible Citrus Thematic Industrial Potential Historic District, and is immediately adjacent to the locally eligible Ninth Street Potential NCA, which are "historical resources" under CEQA. JMRC evaluated the proposed project according to CEQA and CEQA Guidelines for potential impacts to these historic resources and found them to be less that significant (see Project Review, Impact Analysis, and Recommendations).

**Recommendations**

As potential project impacts have been thoroughly analyzed and, at their greatest, are less than significant under CEQA, **JMRC recommends that no further investigation or treatment under CEQA is required** unless the proposed project is redesigned to include additional construction or areas not subject to this study or unless project activities reveal the presence of cultural materials.

Although as designed, the proposed project does not cause a substantial adverse effect and mitigation is not required in order to reduce impacts to less than significant, JMRC recommends the following measures to further enhance compatibility of design with existing historic resources and surroundings, most notably the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District, and incorporate greater historic character and appeal:

- Utilize smooth-faced rather than split-faced concrete block.
- Retain, protect during construction activity, and reincorporate the one (1) remaining historic palm street tree, located near the Commerce Street bridge, into the new proposed line of palm street trees on Commerce Street, the species and planting distance of which should seek to match those extant historic palms on the westerly side of Commerce Street, and the height of which should be maximized (approximately 20' trunk).
- Replace just one (1) of the lighter gray shades proposed (Body 3, 4, or 5) with a gray/tan color like Frazee KNAPWEED CL 2893M, or similar, to incorporate greater warmth and variation in the color palette and achieve compatibility with not only the Citrus Industrial Thematic Potential Historic District but also the residential quality of the Seventh Street East Historic District.
- Consider the merits and possibility with City staff, and implement if feasible, the repainting of the concrete SPRR bridge abutment in the red and gray colors of the proposed color palette in order to more fully visually associate it with its north-south historic alignment and the northerly and southerly portions of the Project Area rather than with the street and railroad bridges to the west.
- Investigate the onsite reuse potential of the cut pieces of steel railroad rails framing the loading platform or in use as upright posts in the Project Area. If feasible, repurpose as part of a design feature or amenity such a pedestrian entry, the "M" structure at the main corner entry, a rail system for poolside furniture, planter, bike rack, hand rail, or signage. If not feasible, donate for reconditioning or salvage, as practicable.
- Design and display a brief commemorative history and significance of the project site for both public pedestrian and resident viewing in up to three locations, including near the main entry at Mission Inn Avenue and Commerce Street, the resident courtyard, and near the Ninth Street amenities structures.

Archaeological Considerations

Ground-disturbing activities in native soils have the potential to reveal buried deposits. As a result of tribal consultations under AB 52 and the fact that the project site has a significant amount of undocumented fill according to the applicant, the project is not expected to impact any prehistoric resources within native soils. However, the identification of a historic period clay pipe indicates a slight possibility that unanticipated historic period resources may be encountered. Although not required as a mitigation measure based on the analysis and findings of this report, the City should include a standard condition with procedures in the event that unanticipated historic period resources are encountered:

"Prior to the initiation of ground-disturbing activities, construction personnel should be alerted to the possibility of buried historic-period cultural deposits. In the event that field personnel encounter buried cultural materials, work in the immediate vicinity of the find should cease and a qualified archaeologist should be retained to assess the significance of the find. The qualified archaeologist shall have the authority to stop or divert construction excavation as necessary. If the qualified archaeologist finds that any cultural resources present meet eligibility requirements for listing on the California Register of Historical Resources or the National Register of Historic Places, plans for the treatment, evaluation, and mitigation of impacts to the find will need to be developed. If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC."

## TABLE OF CONTENTS

MANAGEMENT SUMMARY ..... i
TABLE OF CONTENTS ..... iv
INTRODUCTION ..... 1
PROJECT AREA AND DESCRIPTION ..... 1
NATURAL SETTING ..... 3
CULTURAL SETTING ..... 4
HISTORIC CONTEXT ..... 5
PROJECT METHODOLOGY ..... 25
RESULTS ..... 26
FINDINGS ..... 30
CRITERIA FOR SIGNIFICANCE ..... 30
SURVEY FINDINGS & ASSIGNEMENT OF STATUS CODES ..... 32
PROJECT EFFECTS, IMPACT ANALYSIS & RECOMMENDATIONS ..... 33
CEQA ANALYSIS ..... 33
RECOMMENDATIONS ..... 36
REFERENCES ..... 38

## FIGURES

Figure 1. Project Location and Regional (inset) Map
Figure 2. The Eastside within the City of Riverside, courtesy City of Riverside
Figure 3. A portion of the Riverside Upper Canal located outside the Project Area
Figure 4. Brow Drainage Ditch (ca. 1960) in the Project Area
Figure 5. White's Addition Plat map
Figure 6. Broken Clay Sewer Pipe within Project Area
Figure 7. Palm-lined AT&SF Rail Line and Depot (1885-86) just outside Project Area
Figure 8. SPRR Freight House (1896-1967) and Five Rail Lines across Project Area
Figure 9. Riverside SPRR Freight Station with Extended Loading Platform in 1947
Figure 10. Pacific Motor Transport, an SPRR Subsidiary for Store-Door Service
Figure 11. SPRR Loading Platform Framed with Scrap Railroad Track
Figure 12. Location of Extant SPRR Loading Platform
Figure 13. South End of SPRR Loading Platform Showing Former Adjacent Construction
Figure 14. Former SPRR Track in Use as Bollard Posts
Figure 15. The Independent Fruit Company Packing House (1898) in the Project Area
Figure 16. Southern Pacific Railroad Bridge (1960) in the Project Area
Figure 17. Historic Districts and NCAs in the Eastside

## APPENDICES

A: DPR 523 FORMS
B: Proposed Project Exhibits
C: Professional Qualifications
D: Photographs

# INTRODUCTION

JM Research & Consulting (JMRC) is under contract to Albert A. WEBB Associates to complete a Cultural Resources Survey for the proposed Mission Lofts project in the City of Riverside, Riverside County, California. The proposed project includes a General Plan Amendment (P14-0045), Specific Plan Amendment (P14-0046), Zoning Code Amendment (P14-0047), Design Review (P14-0048), and Site Plan Review (P14-0049). The study has been completed pursuant to the California Environmental Quality Act (CEQA; PRC §21000, et seq.), the City's Cultural Resources Ordinance, Title 20 of the Municipal Code (Title 20; Ord. 6263 (1996), as amended), and in full compliance with the City of Riverside Consultant Requirements.

## Project Area and Description

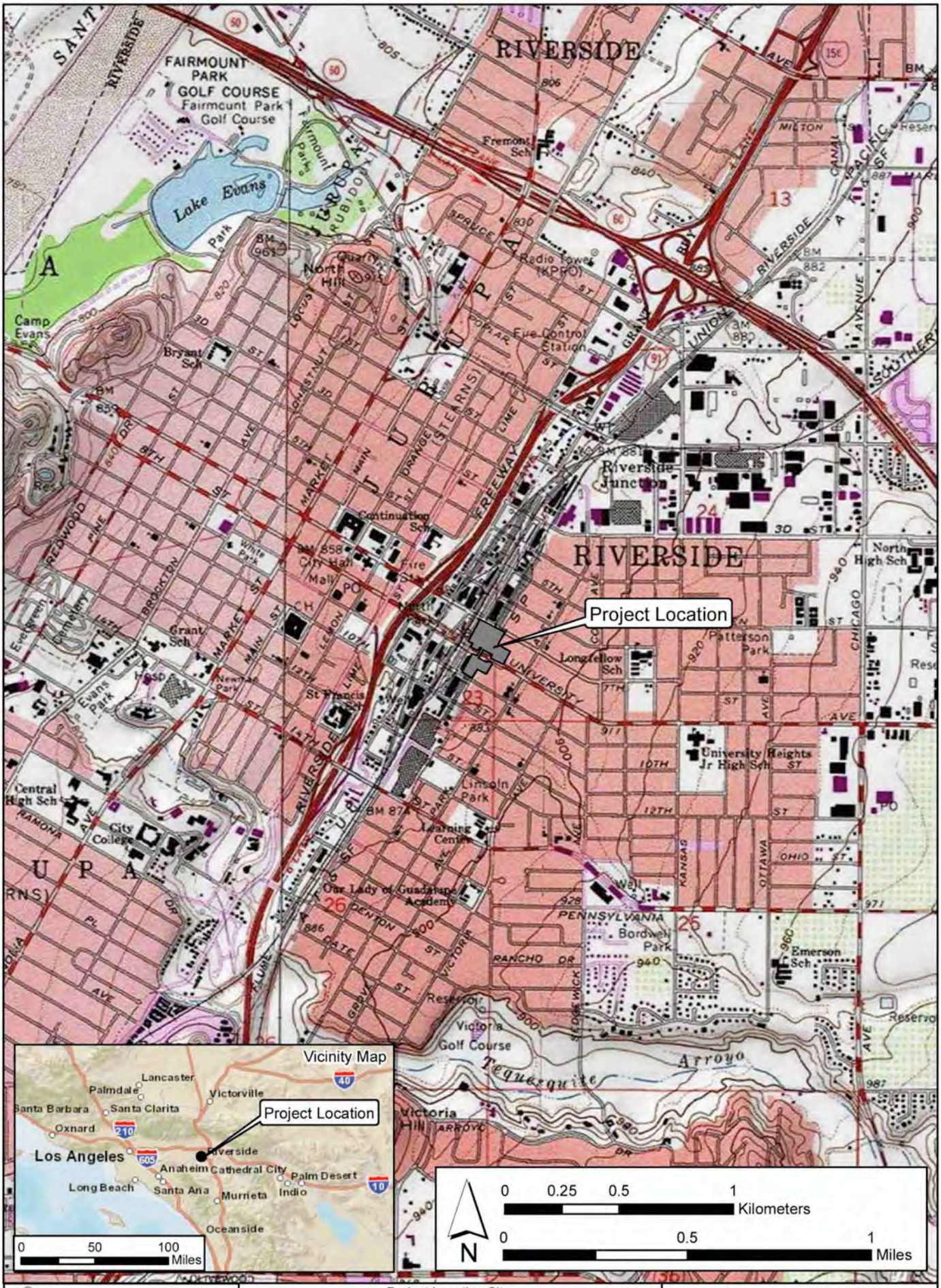
The Project Area includes multiple vacant parcels on 4.69 gross acres in the Eastside area of Riverside, bounded by Mission Inn Avenue (north), Ninth Street (south), and Commerce Street (west), Sections 23 & 24, Township 2 South, Range 5 West, San Bernardino Base and Meridian as depicted on U.S. Geological Survey (USGS) *Riverside East, California* 7.5-minute quadrangle (1980; Figure 1). The Project Area is bisected by University Avenue but connected by an existing vacated Southern Pacific Railroad (SPRR) railroad bridge. Primary access will be provided from Mission Inn and University Avenues with secondary access from Ninth Street. Immediately adjacent to the Ninth Street Potential Neighborhood Conservation Area (NCA), a portion of the Project Area is within the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District.

The multi-family residential development proposes demolition of a loading platform and several concrete pads north of University Avenue, the pedestrian reuse of the railroad bridge, and the construction of one 2-story and one 4-story building totaling 212 studios, one-, and two-bedroom apartment units along with 320 surface parking spaces in 191 covered and 129 open stalls. The approximately 3.11-net acre area north of University Avenue (211-121-002, -020, -024, -032, -033) will support the apartment units and approximately 46% of the on-site parking while the 1.50-net acre area south of University Avenue (211-122-004, -022, -023, and -024) will provide remaining parking and amenity structures. The project also includes approximately 1.20 acres of common open space and other amenities, including a courtyard with pool and spa, cabanas, and dining terrace.

## Personnel

Jennifer Mermilliod, M.A., Historian/Architectural Historian, JM Research & Consulting (JMRC), who meets the Secretary of the Interior's Standards for Professional Qualifications, acted as Principal Investigator and managed and completed the cultural resources survey. Ms. Mermilliod conducted the field survey, completed research, evaluated the property for eligibility, prepared Department of Recreation (DPR) forms, analyzed potential impacts, provided mitigation and recommendations, and compiled the technical report (Appendix C).

David Brunzell, M.A., RPA, BCR Consulting, who meets the Secretary of the Interior's Standards for Professional Qualifications, acted as Principal Archaeologist for the project. Mr. Brunzell performed the records search and field survey, and contributed to archaeology-related report sections (Appendix C).




BCRCONSULTING LLC
Claremont Napa Tehachapi
www.bcrconsulting.net
909-525-7078

Project Location Site
Mission Lofts Project
Reference: ESRI; USGS Quad: Riverside East (1980)

Figure 1

JM Research and Consulting
5110 Magnolia Avenue
Riverside, California 92506

## NATURAL SETTING

Approximately 50 miles east, southeast of Los Angeles, the City of Riverside lies on a plain that is interrupted by the Santa Ana River to the west, crossed by an east-west arroyo system, and partially defined by a series of foothills known as Rubidoux Mountain, Box Springs Mountain, Jurupa Mountains, Pedley Hills, Pachappa Hill, and Victoria Hill. The Project Area is situated in the Upper Sonoran Life Zone, which is locally present between approximately 500 and 5,000 feet AMSL. The site is heavily disturbed due to previous development and contains a limited amount of seasonal grasses and palm trees.

### Geology

The elevation of the Project Area is approximately 870 feet above mean sea level (AMSL). It is located in the Peninsular Range geologic province of California that encompasses western Riverside County. It occupies a portion of the Perris Block (Kenney 1999), which is bounded on the east by the San Jacinto Fault and on the west by the Elsinore Fault (Morton 1972, 1977). Locally crystalline rocks in the vicinity include late Jurassic and Cretaceous granitic rocks of the southern California Batholith. These resistant rocks weather to form gray- or tan-colored, boulder-covered conical buttes and hills. When exposed on the surface, many of these rocks have been locally utilized as milling slicks for prehistoric seed processing.

### Hydrology

Local rainfall ranges from 5 to 15 inches annually (Jaeger and Smith 1971: 36-37). The project site is currently flat, and local runoff is conveyed via channelized drainages in a southerly direction. Historically, water was naturally conveyed from east to west towards the Tequesquite Arroyo approximately one mile to the west (United States Geological Survey 1980).

## CULTURAL SETTING

### Prehistoric Context

Two primary regional syntheses are commonly utilized in the archaeological literature for southern California. Wallace defined the first of these syntheses in 1955, comprising four successive cultural horizons: Early Man, Milling Stone, Intermediate, and Late Prehistoric. In 1986 Warren devised a new synthesis containing five culturally-defined periods, which represented the region's first attempt at an ecologically based and comprehensive approach. These include the Lake Mojave, Pinto, Gypsum, Saratoga Springs, and Protohistoric Periods. Environmental shifts defined their parameters, and Warren viewed changes in settlement patterns and subsistence focus as cultural adaptations to these shifts. The most obvious indications of the changing environment are derived from paleo-ecological data which revealed the following trends: warming during the late Pleistocene, drying of desert lakes and subsequent (and brief) return to pluvial conditions during the Holocene and middle Holocene, and a general warming and drying trend (with occasional reversals) that continue into the modern era (Warren 1986).

## Ethnography

The Project Area is located within the traditional boundaries of the Cahuilla (Bean and Smith 1978; Kroeber 1925). The territory of the Cahuilla ranges from the area near the Salton Sea up into the San Bernardino Mountains and San Gorgonio Pass (Bean and Smith 1978; Kroeber 1925). The Cahuilla are generally divided into three groups: Desert Cahuilla, Mountain Cahuilla, and Western (or Pass) Cahuilla (Kroeber 1925). Cahuilla territory lies within the geographic center of Southern California and the Cocopa-Maricopa Trail, a major prehistoric trade route, ran through it. The Cahuilla share a common tradition with Gabrileno, Serrano, and Luiseño, with whom they shared tribal boundaries to the west, north, and southwest respectively (Bean and Smith 1978:575). Like their neighbors, the Cahuilla situated their villages in close proximity to reliable water sources (ibid.).

## History

In California, the historic era is generally divided into three periods: the Spanish or Mission Period (1769 to 1821), the Mexican or Rancho Period (1821 to 1848), and the American Period (1848 to present). Exploration of the Riverside County area began in 1772 when Lieutenant Pedro Fages (Military Governor of San Diego) crossed the San Jacinto Valley.

## HISTORIC CONTEXT

Located just beyond the eastern edge of the original Mile Square townsite and current downtown Riverside, the Project Area is situated east of Commerce Street (formerly Pachappa Avenue) and straddles University Avenue in an area characterized by late-19th century railroad and citrus industrial development within the western edge of Riverside's Eastside neighborhood (Figure 2).

**Figure 2. The Eastside within the City of Riverside, courtesy City of Riverside**

SETTLEMENT & DEVELOPMENT OF RIVERSIDE, 1870-1960

Founded in 1870 by John W. North's Southern California Colony Association, the Mile Square was carved from a portion of Juan Bandini's 1838 Jurupa Rancho. Soon after, the Village of Arlington was independently born to the southwest in 1874 as the New England Colony under investors, Sayward and Evans (Gunther 1984:30-31). Similarly platted but separately irrigated, Arlington was centered at the intersection of Magnolia Avenue and Van Buren Boulevard. Between the two colony settlements remained a much-reduced, mile-wide strip of land known as the Government Tract, where streets were laid out on a strict north-south grid and intersect at odd angels with Magnolia Avenue,

the main 1876 tree-lined arterial that strung the three areas together and continues as Market Street through downtown, the northern gateway to the City. Tremendous early growth inspired by the proximity of the railroad and the development of citrus led to early expansion into the Eastside.

Amid a land boom that swept through southern California during the 1870s and 1880s, the town of Riverside incorporated in 1883 and included Arlington, the Government Tract, and the Eastside, which was soon eyed for town lot development beyond the Mile Square. The much enlarged, budding City of Riverside grew rapidly, launched in large part by the local success of the navel orange through canal irrigation and the introduction of rail transportation into the region and the City (McWilliams 1973: 113-122). Riverside soon became a thriving, irrigated cooperative that specialized in citriculture.

**Canal Irrigation**

By the end of 1870, civil engineers Goldsworthy and Higbie had platted the holdings of the Southern California Colony Association on an orthogonal plan with 10-acre parcels to the north and south of a one-mile square townsite known as the "Mile Square," from 1st to 14th Street and Olive to Pine Streets. At the same time, using techniques borrowed from hydraulic mining, Goldsworthy and Higbie began construction on Riverside's irrigation system to serve the Mile Square, soon known as the Upper Canal, which tapped the Santa Ana River as a water source. Chinese laborers who were familiar with mining techniques and possibly Cahuilla Indians (Lawton 1989:10) constructed much of the canal, which "marked the beginning of modern water distribution techniques in the region" (Phillips 1995:3).

From the headgates, the mainline of the canal followed a curvilinear, southwest path and crossed the Mile Square entangled amid the AT&SF tracks along the edge of the Eastside between Olive and Commerce Streets. Water was conveyed to the highest point of each 10-acre lot by a network of pipelines and cement and earthen ditches (Lippencott 1902a:67). From there, individual water users dug smaller-scaled lateral ditches and flumes to feed their grooves and fields (Riverside Water Company n.d.).

By 1875, the tax on the river supply was already becoming insufficient for the growing community and did not serve Arlington to the south. In that year, Evans and Sayward began construction of another canal, known as the Lower Canal, which began diversion downriver from and ran parallel to the Upper Canal before traversing the Mile Square on its way to Arlington. Both canals soon became known collectively as the Riverside Canal (CA-RIV-4495H), and the Gage Canal was constructed in the 1880s, which would bring water to the Eastside. The upper end of the main canal system was reconstructed in 1886, which added the Warm Creek Canal to the head of the Upper Canal at a higher intake and necessitated the construction of the Highgrove Drop, now a City Landmark, which redirected water flow and supplied hydroelectric power to Colton and Riverside. Constant increase in demand for water prompted the lining of the dirt ditch in concrete to avoid the loss of water through seepage, but by 1902, increased usage and a nine-year drought had diminished the water level of the Santa Ana River and compromised the usability of the canal (Lippencott 1902b:113). In 1914, the original canal headgates were abandoned due to maintenance costs, and portions of the system were modified to accommodate storm water drainage. In 1938, the City of Riverside rebuilt much of the Upper Canal, but decreases in the dependency on citrus as the supporting economy curtailed the need for canal irrigation.

**Figure 3. A portion of the Riverside Upper Canal located outside the Project Area**

Diversion from the river was replaced by downtown well water in 1959 (EDAW 2001). Canal segments and associated bridges and culverts in the vicinity of the Project Area have experienced extensive alteration in the accommodation of street and rail improvements over time. The nearest segment to the Project Area is aligned between the AT&SF tracks and has been covered with concrete and enclosed in 1960 within a concrete beam to travel over University Avenues as part of one of the AT&SF railroad bridge (Figure 3). The canal system was condemned in 1961. Today, parts of the Riverside Canal system are still used for irrigation and for storm water run-off. Much has deteriorated and portions of the Lower Canal are tied to the privately owned parcels on which its segments are situated (City of Riverside 2003). An asphalt-lined, brow drainage ditch with concrete culverts (1960) is found at the top of the slope on both the northern and southern sides of University Avenue within the Project Area, but is distinct from and unassociated with the canal system (Figure 4).

**Figure 4. Brow Drainage Ditch (ca. 1960) in the Project Area**

**Early Settlement on the Eastside**

The construction of the 20-mile Gage Canal (1882-87) brought water to the eastern Riverside plain, a 2.25 square mile area that is now roughly bounded by Third Street on the north, the Tequesquite Arroyo and Victoria Club golf course on the south, State Route 91 on the west, and Chicago Avenue on the east (City of Riverside 2009:16; Figure 3). In March 1882, Matthew Gage filed a claim for one square mile of once barren land beyond the Eastside under the Desert Irrigation Act, which allowed him full title if he brought adequate irrigation to the area within three (Patterson 1996:94). With the promise of water assured, new tracts were surveyed and officially recorded on the Eastside, readying these lands for real estate speculation (JMRC 2003). The irrigation of the Eastside made possible the first town-lot expansions of the Mile Square, beginning with White's Addition (1886) and followed quickly by other subdivisions, including Cox's Addition (1886), Castleman's Addition (1886), Garfield Place (1887), Madison Square (1887), Hall's Additions (1888-1890), and the H.P. Kyes Tract (1889) (City of Riverside 1886-1889; PCR 2001:17). These tracks carved tree-lined streets from hundreds of acres of former federal land.

White's Addition, a triangular subdivision from Pachappa Avenue, the original western boundary of the Eastside (now Commerce Street), between Third and Tenth Streets recorded by Albert S. White in May 1886, launched the subdivision of the area to the east (City of Riverside 1886-1889:MB 6/48SB)**.** This oldest part of the Eastside neighborhood was purchased from the land holdings of John W. North by Albert S. White, a prominent local horticulturist, county supervisor, and city trustee (Bynon 1893-4; Figure 5).

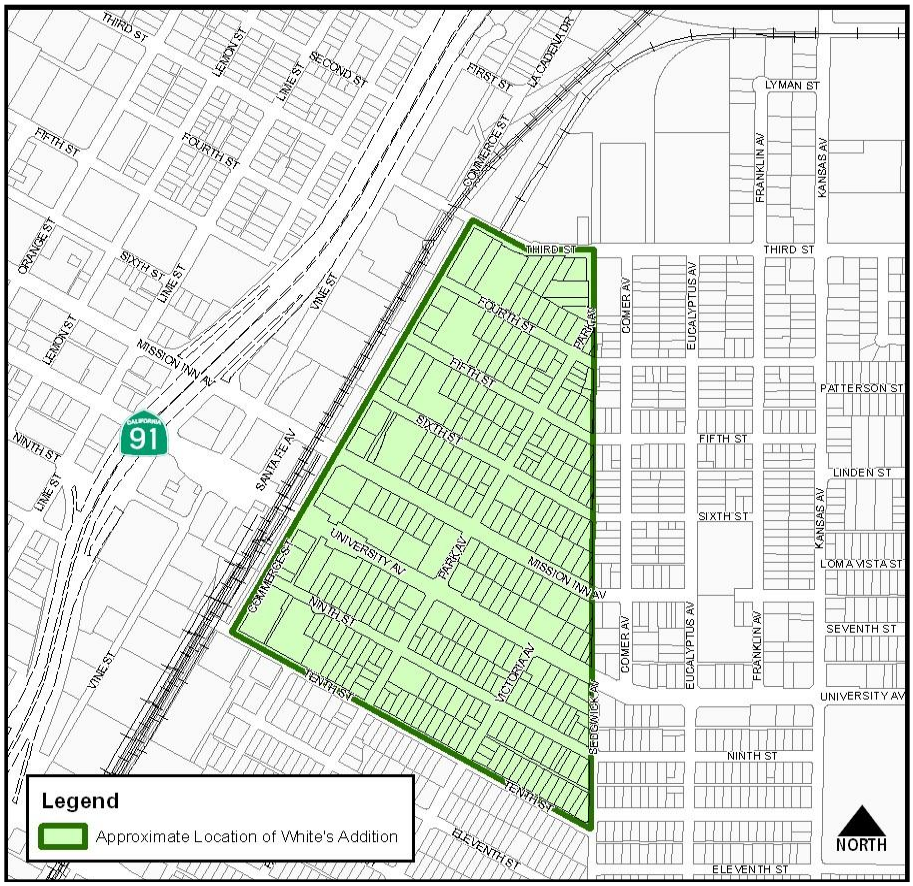



**Figure 5. White's Addition (City of Riverside 2009:17)**

With the new subdivision, Eighth Street (now University Avenue) was given the identifier "East" and address numbering was restarted at "100." This distinction for streets running west-east beyond Pachappa Avenue was discarded with the 1930 city-wide renumbering plan. White's Addition continued the orthogonal alignment of streets begun in the Mile Square, which were oriented on a northeast-southwest axis along the Jurupa Rancho boundary line. Water was piped from the Gage Canal to every lot in the tract, although canal remnants were not identified within the Project Area, and the streets were improved with sidewalks and planted with street trees in parkway strips. These privately-funded amenities were in advance of an official policy on the planting and care of street trees later adopted by the City in 1907 (Patterson 1996:352). With the exception of the approximately 25 x 100' lots on Pachappa Avenue, lot frontages within White's Addition ranged from 50-60 feet, and extended a depth of 131-150 feet (City of Riverside 1870-1956:1886).

Further subdivision marched east along the axis of its main arterial, Eighth Street, a 99-foot-wide road that bisected the Mile Square and continued through the Eastside. Eighth Street was improved piecemeal over time, with surfacing, sidewalks, curbs and gutters added sporadically as part of private tract development or City projects. A sewer system was installed along Eighth Street from Sedgewick Street to Kansas Avenue in 1902, and the thoroughfare was paved by 1915 when a lighting system was installed from Pachappa to Chicago Avenues (City of Riverside 1902-1915). Other streets, like Seventh Street (now Mission Inn Avenue), were similarly improved. Some features like curb, gutter,

and sidewalk, were never extant in portions of the Project Area due to railroad track construction or are no longer extant due to later alterations to Eighth Street. Several historic and modern remnants related to infrastructure construction were found in the Project Area, including a broken *in situ* piece of clay sewer pipe (Figure 6) and a railroad spike of unknown age were found perpendicular to Mission Inn Avenue near a billboard sign (1971), and a later standard cast iron manhole cover (ca. 1950s-1960s) was found above the north side of University Avenue. Several wood creosote utility poles (one tagged 1935 and 1949) were also found in the Project Area, which may have been part of the 9.55-mile telegraph line noted under the ownership pf the AT&SF but without specific location in the Riverside School District (Riverside County 1907-1936).

**Figure 6. Broken Clay Sewer Pipe within Project Area**

Settlement on the Eastside coincided with the boom years of the 1880s when the completion of the transcontinental railroad and extension of regional lines as well as the success of the Washington navel orange launched Southern California and Riverside into a period of tremendous growth (PCR 2011:20). While much of the Mile Square was sold as whole blocks and developed first as orchards with large grove homes before eventual reduction to smaller town lots, development on the now-irrigated Eastside moved directly to small subdivided lots and was related to the provision of workforce housing for Riverside's booming citrus industry, which was served by many African-Americans and Mexican-Americans (City of Riverside 2009:17).

Historic Sanborn maps show that, in general, development coalesced along Eighth Street, with modest one- and one-and-a-half-story houses while single-family residences were scattered to the north and denser, two-story, middle-class dwellings were found to the south. Five dwellings, a barber

shop and meat market storefront with a baker and oven in rear, and a blacksmith were constructed in the Project Area along Eighth Street, but no remnants are extant (Sanborn 1895:8, 1908:18, 30).

**Railroad Development**

Though often overshadowed by the pivotal role that canal irrigation played in the early prosperity and enduring stability of Riverside, the success of citriculture, local tourism, and settlement through the introduction of rail transportation into the region and the City cannot be overstated. The railroad more than threaded the two original colony settlements and the Government Tract together; it offered a connection to the southern California region and far beyond and allowed Riverside to quickly lead the nation's citrus industry and participate in the real estate boom of the late 1880s that was felt throughout southern California.

With the decision to construct a transcontinental railroad in the 1860s and generous government loans and land grants for railway construction, a new era in the settlement of the west began that was characterized by the strategic location of townsites based on the actual or anticipated path of the western rail network. Many temporary and surprisingly moveable end-of-track towns sprang up as the rail lines of the Union Pacific, Burlington, Kansas Pacific, Atchison, Topeka, & Santa Fe (AT&SF), Northern Pacific, and Great Northern railroads were extended west of the Mississippi River, across the plains and into the Pacific Northwest, the Southwest, and California (Reps 1981:80-86). Hundreds of western towns were born by the railroads while as many fell victim to the poor urban planning inherent in boom-to-bust townsite promotion. Some established cities, like Omaha, Nebraska (1868) and Las Vegas, New Mexico (1882), were boosted by the arrival of the railroad, while others suffered when bypassed in favor of nearby locations, like Phoenix, which resorted to building its own rail line in 1887 when skirted by the Southern Pacific. Some railroad companies demanded subsidies to enter existing towns or easily resisted control by running lines outside of town limits or otherwise manipulating settlement (Reps 1981:89-91).

With the completion of the transcontinental railroad in 1869, through the joining of the Central Pacific from the west with the Union Pacific from the east at Promontory, Utah, tourists, boomers and boosters flowed into California at an estimated rate of 70,000 per year, a stream that was soon diffused into the southern region (McWilliams 1973:115). Railroad-related town planning and promotion in the greater Los Angeles area began in earnest with the connection of Los Angeles to San Francisco in 1876 (Reps 1981:89, 95). The initial boom soon waned in the brief national depression of the late 1870s, in which the region experienced a period of quiet but substantial growth, with improvements in water supply and agricultural production, particularly grapes and citrus, that would critically broaden the focus of urban development efforts after the depression to include not only the proximity of the railroad, but also the accessibility of water (McWilliams 1973:117).

The arrival of the Santa Fe line into California in 1886 rejuvenated earlier expectations and marked the beginning of a real estate explosion. Competition between the Santa Fe and Southern Pacific railroads, which shortly reduced the passenger rate from Missouri Valley to southern California to $1, facilitated unprecedented migration from the East and Midwest. The Santa Fe delivered several passenger trains a day, and the Southern Pacific reported transporting 120,000 people to Los Angeles in 1887. Among serious investors, veteran townsite "sharks" of the Midwest descended upon southern California in what became a short-lived frenzy of speculation. At the height of the railroad town boom between 1887 and 1889, more than 60 new towns totaling 79,350 acres were laid out in southern California (McWilliams 1973: 113-122). Thirteen of these were platted along the Santa Fe

line in the three short months of spring 1887, and by the end of the year, 25 cities and towns had sprung up in the 36 miles between Los Angeles and San Bernardino County. Along the line of the Southern Pacific, eight more had been surveyed, and between the two rights-of-way, three other towns were platted (Reps 1981:100-101). Most of these towns were more populated by empty subdivided lots than by residents and vanished when the boom collapsed by 1889, but in general, the 1880s contributed a considerable increase in wealth and approximately 137,000 tourists-turned-residents to the region (JMRC 2010).

By the time Riverside incorporated as a city, the first rail line had just arrived in the young town. The California Southern, part of the AT&SF system after 1884, expanded its Box Springs, East Riverside/Highgrove line (1882-3) west in 1885-86 with the assistance of local communities and citizens who donated right-of-way land, adding a branch line through Riverside and a station on the eastern edge of the Mile Square, just outside the Project Area. The new AT&SF line through downtown was Riverside's first direct rail link to Los Angeles via Corona (Figure 7; Hammond 1995:5 and Patterson 1996:161, 184).

**Figure 7. Palm-lined AT&SF Rail Line and Depot (1885-86) just outside Project Area**

In 1888, the Southern California Motor Road (1886) extended their San-Bernardino-Colton line into Riverside, which was soon purchased by the competitive Southern Pacific Company (SPRR; (Patterson 1996:167). The line came in from the northeast and branched in two different directions – south to run parallel with the AT&SF line along the citrus packinghouses on Pachappa Avenue (Commerce Street; Figure 8), and west across Main Street. Over Main Street, the line split again, with two bridges, one heading north and the other curving south from First Street down the middle of Market Street, where it was used by the Pacific Electric Railway (Sanborn Map 1895, 1908, 1931) and continued south of downtown along the prominent Magnolia Avenue, through the Government Tract, to Arlington, providing trolley car access and facilitating development and connectivity between the settlements.

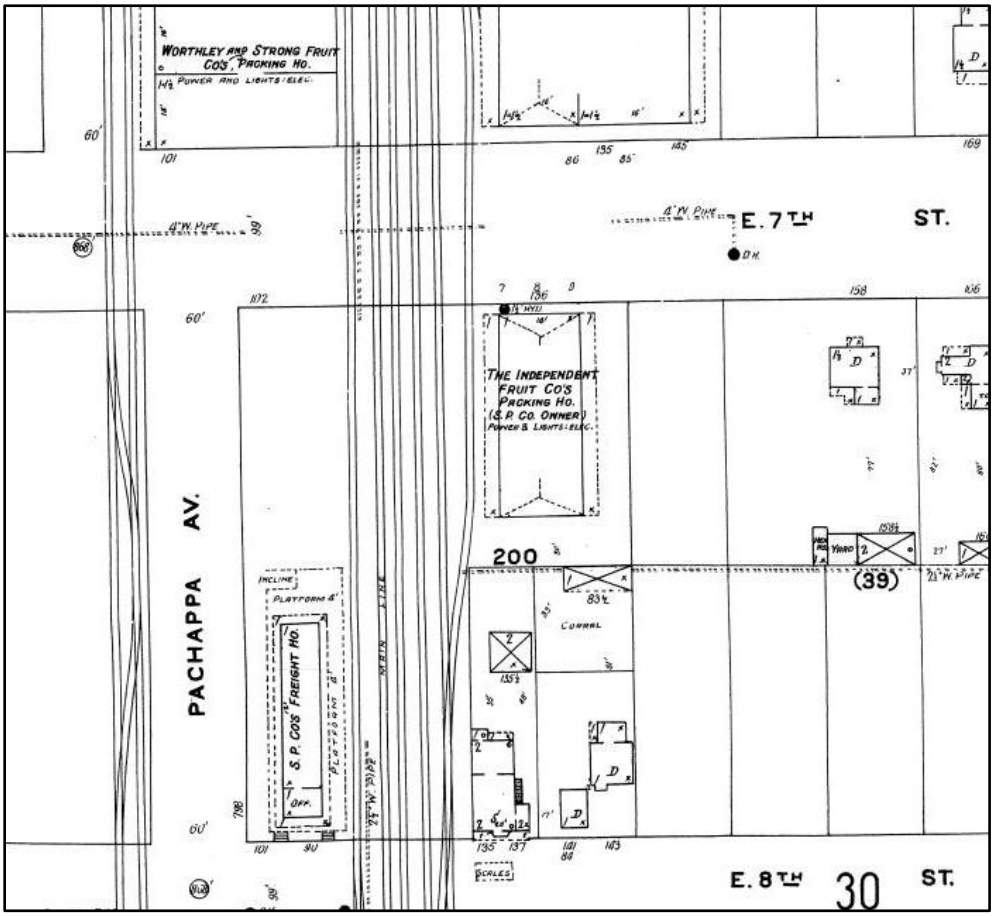



**Figure 8. SPRR Freight House (1896-1967) and Five Rail Lines across Project Area (Sanborn 1908:18)**

The Southern Pacific had been founded in 1865 by Timothy Phelps and a group of businessmen (American Public University 2014), but was purchased by the Central Pacific in 1868. The two railroads merged in 1870, and while legally known as the Pacific Improvement Company (Riverside County 1892-1899), the rail giant retained the Southern Pacific name and essential business plan, and soon spread tracks across Southern California and the country. Unlike other railroads, the company employed increasingly elaborate, settlement-oriented marketing and community investment, like their involvement in Riverside's local citriculture, which masked a focused, aggressive strategy. From

simple flyers to detailed brochures and maps, the SP encouraged the development of small family farms on its lands, promoted settlement and development, and contributed to the establishment of local hotels, hospitals, churches, schools, parks, and more, thereby playing a comprehensive role in the settlement and development of numerous communities, like Riverside, along its routes (Orsi 2005:109, 111; Tibbet 2011:19).

**Figure 9. Riverside SPRR Freight Station with Extended Loading Platform in 1947 (SPHTS 2014)**

The alignment of this southern branch of the SPRR right-of-way crossed the Project Area and became a critical center of local freight shipping in the late-19th century. In 1896, the company constructed a freight station edged by a 4' platform (Figure 9; demolished 1967) and main line track, and by 1908, the line had increased to five sets of tracks (Figure 8; most removed in 1960, final removal ca. 2000), from which it served the varied shipping needs of the young town, particularly the perishable goods and other industrial exports from the nearby citrus packing houses and other industrial plants and warehouses within the corridor that had emerged on this western edge of the Eastside.

Shipping to eastern markets came second to a heightened role during WWI, but like other railroads, the SP began the task of recovery in 1920 after 26 long months of government control and operation. Thus, as part of a comprehensive long-range program of acquisition, rehabilitation, and development, the 1920s launched the purchase of many millions of dollars of new equipment and the major repair of existing equipment, continued the heavier loading and swift unloading policies established during the war, and refined cooperation with shippers. From 1922-1930, the SP expended an unprecedented $387,000,000 for the construction of stations, repair shops, yards, bridges, and miles of mainline track additions, extensions, and improvements giving the SP additional transcontinental and regional access. In conjunction with rail, the SP began to offer water ferry transport for vehicles and motor coach transportation for passengers under a newly formed Southern Pacific Motor Transport Company in 1927, which would ultimately become part of the Pacific Greyhound Corporation (1936; Heath 1945).

The all-time high revenues of the last years of the 1920s suddenly reversed as the depression era swept the nation with freight hitting bottom in 1932 and passenger travel at its lowest point in 1933. To survive the lean years, the company instituted comprehensive changes, including restricting construction and acquisition expenditures to strategic operational and safety necessities, consolidating operating divisions and accounting activities, abandoning and removing some branch lines, reducing unprofitable services, discontinuing dividend payments to investors, and laying off over half of its employees, from a total of 89,304 in 1929 to 41,863 by March 1933. But these drastic cuts allowed the SP to pioneer a new era in modernized equipment, discount and economy services as well as enhancements such as the introduction of air-conditioning to the travelling public, and creative ways of meeting competition (Heath 1945).

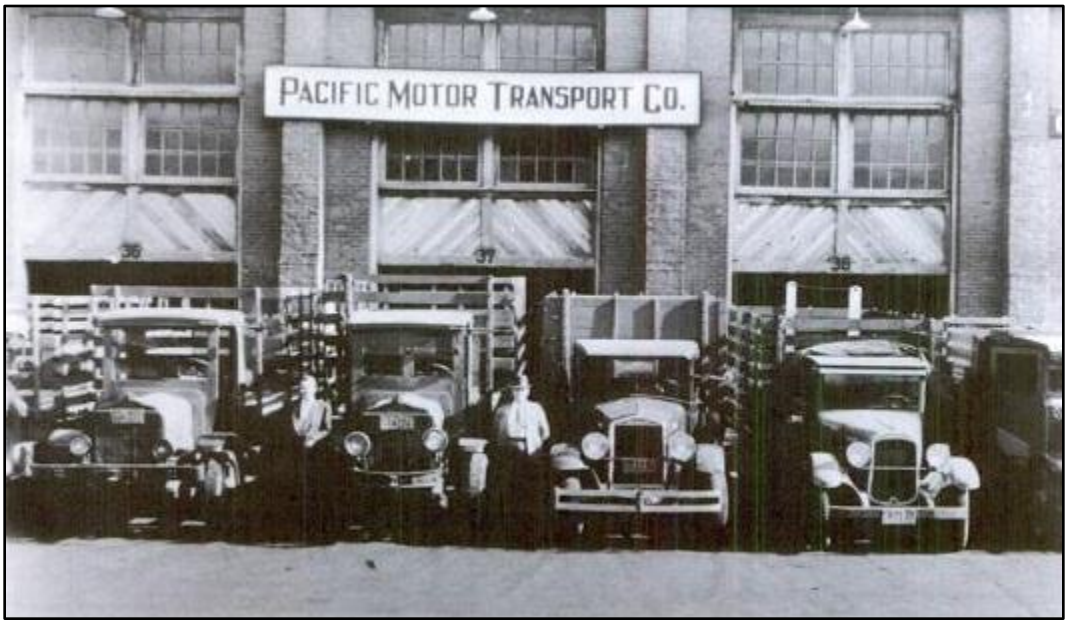



**Figure 10. Pacific Motor Transport, an SPRR Subsidiary for Store-Door Service (Hofsommer 1986:131)**

It was during the 1930s that the SP firmly established a motor truck "store-door" service, which met the competition of highway truckers by employing motor trucks in conjunction with freight trains in the delivery of less than a carload of freight from shipper to receiver. A contract local drayman picked up the freight packages from the shippers, took them to the freight station for train haul to a destination station where the freight was retrieved by another local drayman for delivery to the receiver. Begun as an experimental service in 1929 with the SP's electric line subsidiary, the Pacific Electric, between Los Angeles and twenty stations in southern California, the immediate popularity of the store-door service prompted its expansion first over Pacific Electric lines and then into further territory on SP lines by February 1930. The service was formalized with the establishment of the Pacific Motor Transport (PMT) Company (Figure 10), based out of San Francisco by the following April, and soon spread across California and Oregon (Heath 1945). The Riverside freight station became an early store-door destination station, with the PMT providing local truck delivery, and the Arlington area was soon added to the areas served in the vicinity (RDP 1929a).

The service developed rapidly, soon offering overnight delivery to metropolitan distributing centers to reach the most outlying towns and keep fully-loaded freight trains moving swiftly past smaller towns.

By June 1931, the SP linked passenger train service with direct overnight merchandise freight delivery between San Francisco, Los Angeles and other southern California points, which increased more than 43% and was made available to most California communities by 1932 and other SP lines in Texas and Louisiana. Finally, the SP introduced the "Overnight," the first exclusive merchandise train operating on a fast passenger train schedule, which made its debut on October 22, 1935 in a dusk-to-dawn run over the 470-miles between San Francisco and Los Angeles, which led to similar speedy merchandise trains that would later provide modernized overnight freight deliveries to principal SP metropolitan distributing centers. "Break-bulk" points were established at strategically located stations for the swift transfer of freight to line-haul trucks, which then delivered to regular stations for pick up and local store-door deliveries. Freight was loaded and unloaded with cranes and forklifts by the pallet or by the item into and out of general purpose boxcars onto platforms or directly into trucks. By the end of 1939, over 7,745 highway miles were coordinated with rail freight service and reached 12,491 miles by the end of 1944 (Heath 1945).

The outbreak of war in Europe in September 1939 and the looming threat of American involvement, the SP shifted focus to meet the all-encompassing transportation needs of a nation at war again, which were particularly acute on the west coast where 290 military and naval establishments were located, compared with only 15 before Pearl Harbor, as well as about half of the nation's wartime aircraft and cargo ships were produced. In a massive and unprecedented home front transportation of America's men and materials of war and industry, railroad companies across the country, combined, also handled approximately 97% of all organized troop movements and about 90% of all Army and Navy freight and express, moving ever-mounting volumes of traffic through a variety of established and newly formed railroad and governmental organizations. These defense activities poured a ceaseless flow of traffic into plants and ports, especially the Army's busy Ports of Embarkation in Los Angeles and San Francisco Bay, which sent major support to the entire Pacific offensive (Heath 1945).

Increased defense era earnings were funneled back into improvements, funding terminal yard and roundhouse expansions, facilities improvements, main line siding extensions, trackage to serve new military and industrial establishments, about 650 miles of new heavier rail, improvements to shops, communication lines and other facilities throughout the system, and an extensive repair and reconditioning program for every piece of serviceable equipment. The increased length of freight trains required the extension of yard trackage and numerous main line sidings at several terminals. In addition, the SP took a leading part in the national wartime scrap drive, collecting scrap for reuse in the war effort and reclaiming millions of pounds of second hand rail and like tonnage of other track materials for reuse in track layouts at military and naval establishments (Heath 1945).

**Figure 11. SPRR Loading Platform Framed with Scrap Railroad Track**

The extant, ramped loading platform (Figure 11), which is now a free-standing structure, also evidences an effort at recycling and repurposing rail. Approximately 138 feet long, 18 feet wide, and 4 feet high, the loading platform is framed and trimmed by cut and welded steel railroad rails likely removed from the site or nearby. Rails are marked with several different labels, including three most complete and visible: "T.C.I. Co. 901 OPEN HEARTH 608 D53049," "COLORADO S.E.C. 90 ARA-A IIIIII 1924 O.H," and "BSCO MARYLAND O.H. IIIIIII 1926." These markings provide information on the steel mill, rail type, and location and date they were rolled (AREA 1917:1190-91), which when coupled with historic aerial and photographic evidence as well as the history of the Southern Pacific Company, assist in dating the construction of the loading platform to ca. 1930-1947. Although detailed Sanborn Maps fail to show this structure, it is visible in historic photos (Figure 9) and faintly visible on a 1949 aerial photograph, although the realignment of Pachappa Avenue between Seventh and Eighth Streets to the west in 1927 (Riverside County 1926-32, 1954-58; Sanborn Map 1952) may erroneously cause it to appear more deeply set back from bordering streets than the earlier freight house and surrounding platform (Figure 12).

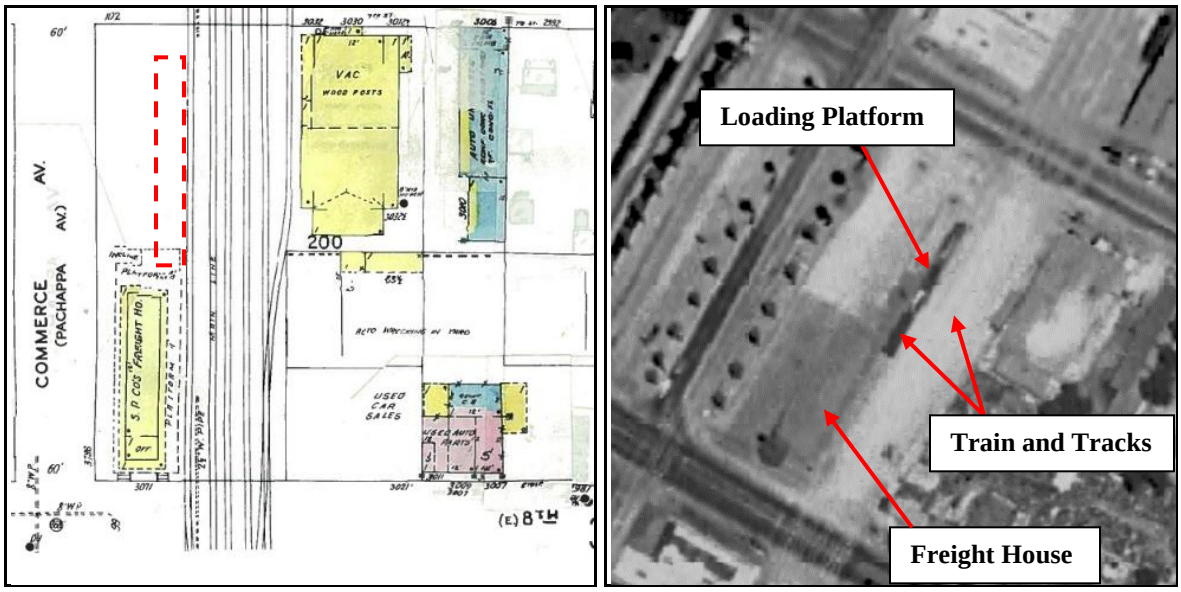



**Figure 12. Location of Extant SPRR Loading Platform (Sanborn Map 1952 & NETR 1949)**

Thus, this platform addition to the original freight station (demolished 1967) was constructed either during the store-door service era in the depressed 1930s to facilitate the platform loading and unloading of freight to and from motor trucks that could drive directly on top of the platform from the ramp, or during the 1940s to accommodate longer trains and the motor transfer of greater quantities of military-related freight during the material-shortage war years. This was the case with the nearby Food Machinery Corporation (FMC), which constructed a concrete loading ramp in 1942 beside a Santa Fe spur track along Pachappa Avenue near Twelfth Street in order to transfer the war equipment it built onto trains (RDP 1942). The FMC ramp was to be removed after the war.

**Figure 13. South End of SPRR Loading Platform Showing Former Adjacent Construction**

The southerly end of the loading platform shows the imprint of adjacent construction where it was poured against the northerly edge of the former freight station platform (Figure 13). Clay (date unknown) and concrete (ca. 2000) roof tiles were found in a small debris pile adjacent (south) to the loading platform during the first field visit, but were missing upon return to the field; however, these cannot be clearly associated with the former freight house. Cut rail segments are also in use on the property as upright, painted bollards embedded in concrete near Commerce Street (Figure 14).

**Figure 14. Former SPRR Track in Use as Bollard Posts**

The retention of the concrete loading platform as a freestanding structure after the demolition of most of the track in 1960 and the former freight house in 1967 supported the continued, but reduced, movement of rail freight in a forever changed local industrial economy and the diminished role of the Southern Pacific and other railroad companies, which began a slow decline in the face of the rising dominance of automobile and air transportation for both passengers and freight in the latter half of the 20th century.

**Late-19th to Early-20th Century Citrus Industrial Development**

The development of transcontinental and local rail systems served to greatly advance Riverside's agro-economy, and by 1895, Riverside was a thriving, irrigated cooperative that specialized in citriculture. Development in the Mile Square had begun immediately, concurrently, with the support of canal-irrigated agriculture, which soon became the supporting economy of young Riverside, supporting the growth of vegetables, melons, raisin grapes, berries, walnuts, honey, beans, grain, and hay, and livestock ranches and dairy farms were also found in Riverside. While agriculture in general supported Riverside, no crop was as pursued or as successful as citrus. Few in southern California had been engaged in the production of citrus before the late 1870s when "Orange Fever" erupted due to the introduction of the navel orange and the potential for large profits, and new communities from Pasadena to Redlands were founded on orange agriculture. Before 1862, there had been only about 25,000 orange trees in the state, but by 1882, there were approximately 500,000 orange trees in California – half of them growing in Riverside (Lawton 1989:9).

Along with agriculture and citrus production, the growing town saw the increase in commercial and residential development, which moved apace on a reciprocal ascent, and many more residents than not were employed in activities unassociated with the land. By the early 1890s, when Riverside finally felt the effects of the general regional recession that had come on the heels of the 1887-88 recession, the commercial core of the town had expanded within the Mile Square and was already well established, offering a huge variety of goods and services from wallpaper supplies to printing services, as well as community gathering places such as banquet, society, and billiards halls and lawn tennis recreation facilities. Residential development necessarily surrounded this core and supplied much of its labor and patronage. Homes for the approximately 6,000 residents dotted the landscape, largely scattered among the many orange groves, as well as small- or large-scale urban dwellings.

In addition to success in the growth of citrus, early Riversiders made great and innovative advances in all areas associated witth getting their product to market, including picking, handling, packing, shipping, and even technological and organizational achievements. The Wright Brothers, pioneers J. Harrison and Benjamin Bakewell, were well-known English-born Arlington horticulturists and inventors (Barry 1965:117; Patterson 1984) who became widely known for their patented fruit washing machines, which were manufactured at El Adobe, J. Harrison's famous Victorian-era adobe grove home (no longer extant), and used by approximately two-thirds of all packinghouses in Riverside and shipped overseas (Klotz 1989:3; Halsted 1961; Wright Brothers ca. 1899:n.p.). S.H. Herrick and Herrick and A.J. Twogood, both early pioners who had organized the East Riverside Land Company, which commissioned the construction of the Gage Canal and owned most of the Eastside, became some of the most prosperous citrus growers and packers in the area. Herrick, who became one of the founders and first president of Citizen's National Trust and Savings Bank, and Twogood, a nurseryman and dealer in orange and lemon trees, were among the founding members of the Southern California Fruit Growers Association that formed in 1893 among attempts to organize the market for the benefit of the growers, which quickly became standard practice (1903; Patterson 1996:176-77).

Although the Eastside was developed for its residential potential, the early foothold of the railroads prompted citrus industrial development here, and a corridor along its western edge coalesced to become Riverside's leading packing and shipping center. With the Southern Pacific a presence on the Pachappa Avenue edge of Block 10 of White's Addition and other rail lines to the west, packing houses, storage warehouses, feed mills, and more stretched out to the north and south. At corner of Eighth Street and Pachappa Avenue, in the southerly portion of the Project Area, R.B. Devine, one of the largest packers and shippers in Riverside, maintained a commission and storage warehouse as well as a raisin and orange packing house, which was used as a feed mill and for wood and coal storage after the turn of the century. Other vacant warehouses filled these lots facing Pachappa Avenue, and at the corner of Ninth Street, was W.V. Wiley's Wood, Hay, and Coal Yard as well as a warehouse for baled hay and guano, which became an orange crate box nailing warehouse owned by H.K. Small and Sons (Sanborn Map 1895:8, 1908:18, 30). The Riverside Heights Orange Growers Association Packing House and the Blue Goose Growers Fruit Packing House with box nailing and storage just south of Ninth Street are no longer extant.

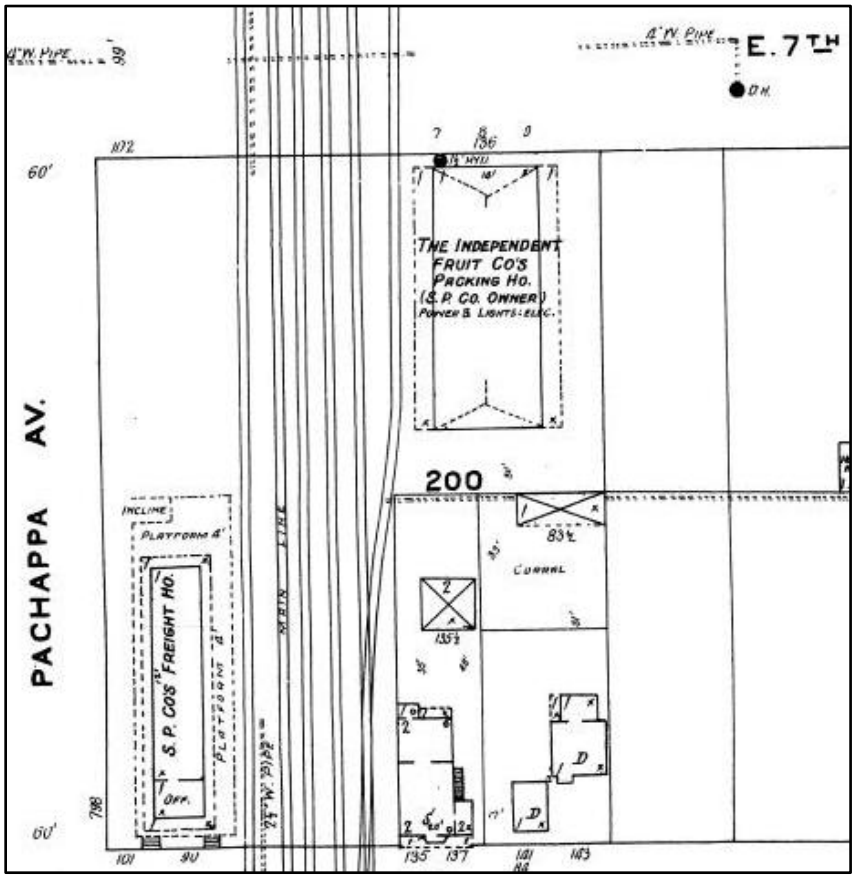



**Figure 15. The Independent Fruit Company Packing House (1898) in the Project Area**

True to the Southern Pacific's tendency to invest in local development, the SP participated more deeply in the local citrus market. A small number of privately owned cars whisked the relatively small tonnage of perishables to eastern markets before the Southern Pacific and Union Pacific railroads jointly organized the Pacific Fruit Express Company (PFE) in 1906 to provide refrigerator cars for the swift movement of fresh fruits and vegetables. The PFE began operations with 6,000 refrigerator cars and by 1944 became the largest refrigerator car line in the world, offering over 36,000 cold cars across United States and Mexico. In addition, unlike other citrus-related or other industrial developments in the corridor, the Independent Fruit Company was owned by the SP (Figure 15). The Independent Fruit Company Packing House (1898) once faced Mission Inn Avenue on the other side of the railroad tracks from Lot 4 of White's Addition within the Project Area (Riverside County 1896-1899; Sanborn Map 1908:18). No remains of this earlier citrus industrial-related development are now evident in the Project Area.

**Decline of Citrus in the Changing 20th Century**

Amid the post-WWI population-driven demand for housing in the second decade of the 20th century, Riverside's economic landscape was also changing. While grove and agricultural lands, particularly to the south, were converted to tree-lined streets of single-family dwellings, scattered lots and strips of property on the edges of the original townsite were the target of infill residential construction, and vacant lots, particularly along the arterials in the downtown core, were eyed for commercial

development. Thus, population increases and the resultant suburban development, which both increased the number of local workers and effectively decreased the view of citriculture as a panoramic staple, both visually and perceptually, were aided by the earlier devastating four-night 1913 freeze in shifting the local economic position toward one of diversification in the early-20th century.

While economic interests became broader, commercial and industrial enterprise seemed to consolidate geographically as some areas became increasingly associated with these uses, and emerging strips of concentrated commercial zones appeared such as Magnolia Center to the south, Eighth Street (University Avenue) on the Eastside, the Magnolia Avenue/Van Buren Business District, and the expanding Main Street Industrial Corridor. This geographic concentration of commercial enterprise in Riverside was linear as it was associated with major arterials or highways and generally focused first on the streetcar, and later motoring, patron in addition to the neighborhood pedestrian, and eventually use shifted to mainly auto- or travel-related uses like auto courts, motels, service stations or related auto services, and roadside eateries.

The suburbanization of areas more distant from downtowns and streetcar lines was made possible by a nation on the move. With nine million cars on American roads by 1920, attention was given to the improvement of transportation infrastructure. The use of automobiles by working class Americans rose steadily throughout the first half of the 20th century. Not just an important local arterial, Eighth Street became part of the California highway system in the 1930s and was signed Highway 19. In the Project Area, a 1925 false front warehouse and garage was added facing Mission Inn Avenue, which was later converted to an auto trim store, and a spray booth was added to the rear in 1947 (City of Riverside 2015). Concrete pads are all that remain of this no longer extant property (Appendix D). Two auto-related commercial storefronts were added to the Project Area north of University Avenue by 1952 with a used car sales lot to the west and an auto wrecking yard to the rear, and later concrete pads dating to the 1970s are found in the vicinity of the auto sales lot (Appendix D). By the mid-20th century, while many buildings remained in the industrial corridor on the western edge of the Eastside, fewer were dedicated to citrus-packing and shipping or had become vacant, like the Independent Fruit Company's Packing House in the Project Area (Sanborn Map 1952:18, 30).

The close of WWII marked the beginning of lasting change on many levels. Advances in land use and planning coupled with the rising importance of the automobile forever altered the urban landscape. In Riverside, the economic shift and population growth reflected regional trends. Characteristically, post-war development vied for proximity to growing suburban commercial centers. By the early 1950s, Eighth Street functioned as a vital regional transportation link. Increased traffic along the corridor prompted the conversion from residential to roadside commercial uses that catered to the needs of travelers and also served the residents of the neighborhoods to the north and south. In addition, the completion of the University of California, Riverside in the mid-1950s caused a dramatic increase in traffic patterns on Eighth Street (renamed University Avenue in 1966) and the Eastside.

In response to yet more population-driven demands for housing, subdivision reached record heights as did traffic congestion, prompting the professionalization of city planning and the building of the Riverside Freeway (1957) and the Pomona Freeway (1960-63) through Riverside. These freeways supplanted the local corridors as regional arterials, and forever altered a wide swath of adjacent streets and lots. The loss of direct contact with motorists began to be evinced on the local economy,

and the financial decline continued through the 1970s, and ’80s. The City’s agricultural economy slowly gave way to the rising force of industry as well-known industrial giants, such as Rohr Corporation, Bourns Incorporated, and the Lily-Tulip Cup Corporation arrived in Riverside, and the increasing diversification of Riverside's economic livelihood saw the destruction of much of Riverside's once vast citrus and agricultural acreage.

**Figure 16. Southern Pacific Railroad Bridge (1960) in the Project Area**

Thus, it was the construction of the Riverside Freeway, State Route 91 on the eastern edge of downtown that prompted the grade separation of University Avenue and the subsequent construction of numerous bridges to accommodate the through path of Commerce Street, Santa Fe Avenue, the Riverside Canal, and the Union Pacific, AT&SF, and Southern Pacific tracks across the arterial street (Figure 16). The construction of the SPRR bridge, which was completed in 1960, prompted the removal of most of the track, including the original main line. The last lines were removed ca. 2000, and a curved vehicular asphalt drive was constructed from Commerce Street to the abandoned railroad bridge. State Route 91 was widened in 2008, further segregating the Eastside. The redevelopment of the downtown area and the expansion of the University of California, Riverside campus have provided impetus for the revitalization of University Avenue. And in recent years, the Marketplace corridor has been identified for strategic revitalization and redevelopment to establish a visual and functional identity and experience that embraces its heritage and redefines a relationship with both the downtown and the Eastside.

## PROJECT METHODOLOGY

The cultural resources survey was intended to identify and document previously recorded, new, or potential future cultural resources, including prehistoric, historic archaeological, and historic resources through intensive-level study of the Project Area. A cultural resources records search, field survey, and research were included as part of the survey. According to communication with Associate Planner Brian Norton, as the City of Riverside has already initiated Native American consultation under Senate Bill 18 for the proposed project, further contact or consultation was not included the scope of this Cultural Resources Survey.

In order to structure the survey process, guide fieldwork, and establish a framework for evaluating the significance of potential cultural resources, research on historic land uses, railroad development, and citrus economy was conducted. Research materials, including historic maps, previous surveys, and published local and regional historical accounts were collected and reviewed. Intensive property ownership and construction history was researched. Based on these efforts, a focused historic context was developed.

This work was completed pursuant to the California Environmental Quality Act (CEQA; PRC §21000, et seq.), the City of Riverside Cultural Resources Ordinance, recently revised Title 20 of the Municipal Code (Title 20; Ord. 7108 §1, 2010), and in full compliance with the City of Riverside's Consultant Requirements.

### Research

**Records Search**. Prior to fieldwork, a records search was conducted at the Eastern Information Center (EIC), the local clearinghouse for cultural resource records located at the University of California, Riverside (UCR). This archival research reviewed the status of all recorded historic and prehistoric cultural resources, and survey and excavation reports completed within one mile of the project site. Additional resources reviewed included the National Register of Historic Places, the California Register of Historical Resources, and documents and inventories published by the California Office of Historic Preservation. These include the lists of California Historical Landmarks, California Points of Historical Interest, Listing of National Register Properties, and the Inventory of Historic Structures.

**Additional Research**. Extensive additional research was also conducted in March and April 2015. Historic maps and aerial images online and Sanborn Maps in the JMRC professional collection were examined for evidence of historic period activities within and in the vicinity of the Project Area. Intensive research through newspaper sources at the Riverside Public Library main branch and online provided information on historic development and use. Additional land use history, previous surveys, permits, and planning case information were collected from research conducted at the City of Riverside Community Development Department, Planning Division. The Riverside County Robert J. Fitch Archive was accessed for Assessor's record research which provided historic land use, ownership, and use information, and Kevin Halloran, Archivist for the Riverside Metropolitan Museum was contacted for assistance with archival material and historic photographs. As ownership, occupancy, and use history for the extant resources within the Project Area were made clear by other sources, city directories were not examined.

### Field Survey

An intensive-level, historical and archaeological survey of the subject property was conducted on March 16, 2015, and a return visit was made in early June. The survey was conducted by walking parallel transects spaced approximately 15 meters apart across 100 percent of the Project Area. The site and soil exposures were carefully inspected for evidence of historic resources or archaeological activities. Current condition and architectural features were noted in the field and architectural quality and integrity were assessed. Potential cultural resources were recorded in the field using detailed note taking for documentation on DPR Forms (Appendix A), and digital photography was taken for contextual overviews and detail images architectural features (Appendix D).

## RESULTS

### Research

**Records Search.** Research completed through the EIC revealed that 29 cultural resource studies have taken place resulting in the recording of 25 cultural resources within one mile of the project site. None of the 29 listed previous studies has assessed the project site, although one unlisted study did assess a portion of the project site resulting in the recording of P-33-11902 (Curl and Flippen 1980). A summary of the records search is included below.

| USGS | Archaeological Sites | Built Environment Resources | Reports |
|---|---|---|---|
| *Riverside East, CA* (1980) 7.5 Minute USGS Quadrangle | P-33-4495H, 4791H, 6238H, 6239H, 6646H, 7616H, 7631, 10128 | P-33-8163, 8164, 9272, 9546, 9690, 10973, 11521, 11624, 11784, 11879, 11902*, 12186, 12190, 12191, 12195, 21086, 23958 | RI-1657, 3605, 4048, 4212, 4215, 4404, 4412, 4487, 4799, 5376, 5748, 5893, 5996, 5997, 6284, 6423, 6597, 6832, 6838, 7062, 7169, 7924, 7925, 8412, 8545, 8598, 8959, 9118, 9126 |

P-33-11902 includes P-33-11903 through P-33-11990, and was recorded as "Eastside Historic District." This appears to have been partially recognized by the City of Riverside as the Ninth Street Potential NCA (1980), a local designation which ultimately excluded the Project Area (Figure 17). Associated reports for P-33-4495H, the Riverside Upper Canal, included a map that indicated the canal may be aligned immediately adjacent to the Project Area, however further investigation with the Riverside Metropolitan Museum clarified that this canal segment is located further west within the AT&SF railroad tracks.

**Additional Research**. Focused research at the City of Riverside Community Development Department, Planning Division and on the City's webpage identified previous survey efforts, designations, and information pertaining to the citrus packing and shipping industry in the vicinity. Shelved Cultural Heritage Board (CHB) Resolution records and planning materials identified that portions of the Project Area are within the geographic boundaries of the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District, and the southern portion of the Project Area is adjacent to the Ninth Street Potential Neighborhood Conservation Area (Figure 17).

Few building permits were on file, but research confirmed the construction of a 1925 warehouse (no longer extant) for Hoagland & Son at 3008 Seventh Street and the later 1947 addition of a rear spray booth for the California Metal Awning Company as well as the construction of a 30'-high Foster & Kleister vertical sign in 1971 on the adjacent (west) parcel (211-121-024; 3030 or 3032 Mission Inn Avenue). Building permits further identified a 1988 industrial building (no longer extant) constructed for Royal Citrus on parcel 211-122-023; 3025 Ninth Street) in the southerly portion of the Project Area.

Aerial images and historic maps, including Sanborn Maps, contributed to an understanding of construction and development over time, including the evolution of railroad development, alignment, and related features. A recent aerial photograph on the City of Riverside website showed the remains of four sets of rails stretching from the former railroad right-of-way across Mission Inn Avenue, which are no longer extant.

Assessor's research revealed that the Project Area is located within Blocks 10 and 12 of White's Addition (1886), an unevenly bound and early subdivision that stretched from 3rd to 10th Streets and spread into Riverside's Eastside from Colton Avenue almost to Comer Avenue. Records and maps in Assessor's Eastside Book 3 identified land use, improvements, and long time or important owners from 1892-1970 and showed lot adjustments, the renaming and relocation of streets, early residences that are no longer extant, citrus-related development, and location and evolution of rail lines over time within and adjacent (west) to the Project Area, including Southern Pacific Railroad and California Southern Railroad (later Atchison Topeka & Santa Fe Railroad). Assessor's research also identified the construction of the 91 Freeway in the late-1950s and the extent of related grade and lot line alteration. Most notably, Assessor's records revealed the dominance of the Southern Pacific Company with the loading platform and bridge and their ownership of a no longer extant citrus packing house in the northern portion of the Project Area.

Previous survey work in Riverside by JMRC had identified White's Addition as the first town lot addition after the original Mile Square as well as Riverside's railroad history and the course and nature of development, including citrus, on the Eastside. This understanding was further augmented by the Marketplace Specific Plan Context Statement (Gudis 2012), which identified and developed the historic theme, Commercial Industrial Developments, 1870s-1970s.

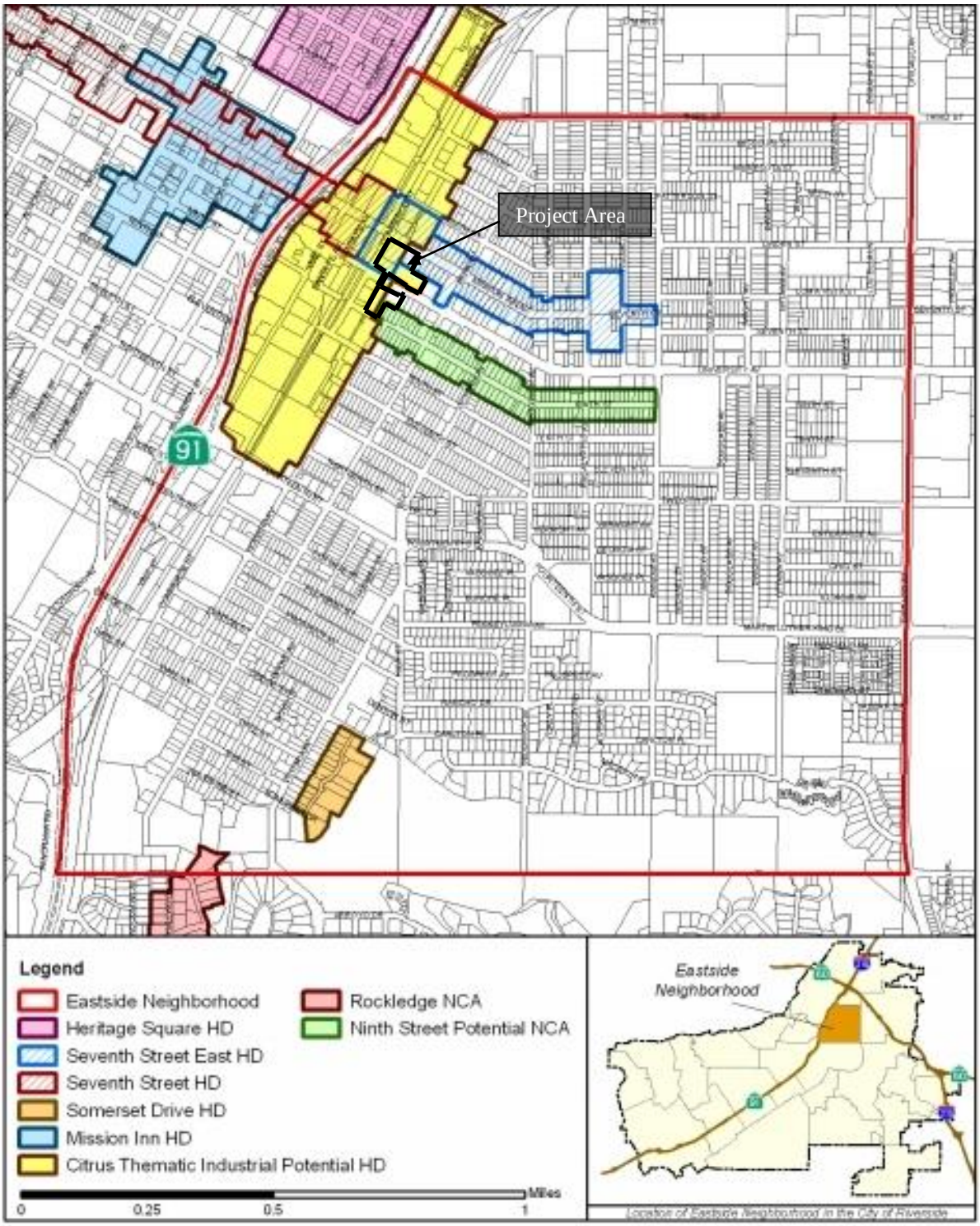



**Figure 17. Historic Districts and NCAs in the Eastside (City of Riverside 2009:27)**

**Field Survey**

During the field survey, it was noted that the Project Area is currently vacant, although it appears to be used by area transients. Adjacent to rail commerce, industrial, and residential development, abandoned rails are extant in the center of Commerce Street, beyond which active rails are lined with palm trees. A few trees form a line near Mission Inn Avenue, including two small orange trees, and a cluster of palms are found north of University Avenue. The ground is partially covered with gravel, asphalt, concrete, debris, and vegetation. Rock and concrete driveways without curb and gutter, similar to adjacent residential curb & gutter, are found along Mission Inn Avenue, and chain link fences with rolling gates surround the entire property and separate some parcels. An asphalt- and concrete-lined storm drainage channels line the top of slope and railed concrete steps access the lots from both sides of lowered University Avenue, where a mid-century cobra light may indicate the date of approximate late-1950s date of the grade separation project.

Jennifer Mermilliod carefully inspected the Project Area and identified two potential cultural resources, a long, rectangular concrete loading platform framed by steel railroad rails near the corner of Mission Inn Avenue and Commerce Street and an abandoned railroad bridge over University Avenue. Several historic and modern remnants and features of limited diagnostic value were also found within the project boundaries, including concrete pads of various age (1925 and 1970s), various broken, clay (date unknown) and concrete (ca. 2000) roof tiles in a small debris pile adjacent (south) to the loading platform (missing upon return field visit), a curved vehicular asphalt drive (ca. 2000) from Commerce Street to the abandoned railroad bridge, asphalt brow ditches (ca. 1960) above University Avenue, several wood creosote utility poles (one tagged by 1935), a billboard pole sign (1971), a broken, *in situ* piece of clay sewer pipe of unknown date perpendicular to Mission Inn Avenue and a standard cast iron manhole cover (ca. 1950s-1960s) above the north side of University Avenue, a green glass bottle fragment (ca. 1983), and two out of context railroad spikes of unknown date near the sewer pipe and by the northern brow ditch. It appears that rather than buried, all railroad tracks have been removed (1960 and ca. 2000) or cut and reused in the construction of the loading platform and as upright posts within the Project Area. No remains of earlier citrus industrial-related or residential construction were evident (Appendix D).

David Brunzell inspected the project site and identified no archaeological resources within its boundaries. Ground disturbances were severe and resulted from a variety of natural and artificial factors, including grading related to historic-period and modern development of the project site and vegetation growth. Sediments within the project site included sandy silts and imported gravels affording approximately 60 percent surface visibility. Vegetation consisted of seasonal grasses and palm trees.

**Surveyed Properties**

The project Area was formally surveyed, and the two identified potential cultural resources are described below.

**SPRR Loading Platform.** This reinforced concrete loading platform (ca. 1930-1947) is located at the southeasterly corner of Mission Inn Avenue and Commerce Street on Riverside's Eastside. Rectangular in shape, the platform is approximately 138 feet long, 18 feet wide, and 4 feet high and is framed and trimmed by cut and welded steel railroad rails likely recycled from the site. Rails are marked with several different labels, including "T.C.I. Co. 901 OPEN HEARTH 608 D53049,"

"BSCO MARYLAND O.H. IIIIIII 1926," and "COLORADO S.E.C. 90 ARA-A IIIIII 1924 O.H." The long sides are finished with a thin layer of cement plaster, and the platform is accessed by the tapered north end ramp. The south end shows the imprint of adjacent construction (freight station and platform to south demolished ca. 1967). The concrete is in poor condition, a large crack crosses the width of the platform, which may indicate two-phase construction, and the base of a creosote utility pole is embedded in the southerly portion. The otherwise vacant lot is partially covered with weeds and surrounded with chain link fencing.

**SPRR Bridge.** This functionally obsolete Southern Pacific Railroad Bridge 56C0059 (1960) is located approximately 0.25 mile east of Route 91 Freeway, easterly of Commerce Street and extends 65 feet across and 15.1 feet above University Avenue, a four-lane, below-grade arterial street on Riverside's Eastside. The single-span, steel girder-and-floor beam system is 70.9 feet in total length with a 19.4-foot-wide steel plate deck and bituminous surface supported by conventional precast concrete, seat-type tall abutments and railed with a low, rectangular metal barrier and taller, wrought iron fencing. Signed "SOUTHERN PACIFIC" in black letters on the east side only, the bridge once carried a single mainline freight track, which has been removed and the deck covered with asphalt (ca. 2000). The abandoned bridge is now accessed for transient pedestrian use and is in good condition.

## FINDINGS

In accordance with the Scope of Work, potentially significant cultural resources within the Project Area were evaluated for eligibility for listing in the NR, the CR, and under Riverside's Cultural Resources Ordinance, Title 20 of the Riverside Municipal Code (Ord. 7108 §1, 2010).

### Criteria for Significance

The following criteria were used to determine eligibility at each level.

#### National Register of Historic Places

Eligibility for inclusion in the NRHP is determined by applying the criteria established by the National Park Service under the National Historic Preservation Act (NHPA), as follows:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
(b) that are associated with the lives of significant persons in or past; or
(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
(d) that have yielded or may be likely to yield, information important in history or prehistory (36 CFR 60.4).

**California Register of Historical Resources**

Eligibility for inclusion in the CRHR is determined by applying the following criteria:

(1) it is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
(2) it is associated with the lives of persons important in California's past;
(3) it embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic value; or
(4) it has yielded or is likely to yield information important in prehistory or history. The Register includes properties which are listed or have been formally determined to be eligible for listing in the National Register, State Historical Landmarks, and eligible Points of Historical Interest (PRC §5024.1(c)).

In addition to meeting one or more of the above criteria, the California Register requires that sufficient time has passed since a resource's period of significance to "obtain a scholarly perspective on the events or individuals associated with the resources." (CCR 4852 [d][2]). The California Register also requires that a resource possess integrity. This is defined as the ability for the resource to convey its significance through seven aspects: location, setting, design, materials, workmanship, feeling, and association.

**City of Riverside Local Ordinance and Designation Program**

The City of Riverside's Cultural Resources Ordinance (Title 20; Ord. 7108 §1, 2010) provides two categories of designation criteria for the evaluation of individual resources (Landmark; Structure or Resource of Merit).

An individual resource may be locally designated as a Landmark if it is an exceptional example of a historical, archaeological, cultural, architectural, community, aesthetic, or artistic heritage of the City, retains a high degree of integrity, and meets one or more of the following criteria:

1. exemplifies or reflects special elements of the City's cultural, social, economic, political, aesthetic, engineering, architectural, or natural history;
2. is identified with persons or events significant in local, state, or national history;
3. embodies distinctive characteristics of a style, type, period, or method of construction, or is a valuable example of the use of indigenous materials or craftsmanship;
4. represents the work of a notable builder, designer, or architect, or important creative individual;
5. embodies elements that possess high artistic values or represents a significant structural or architectural achievement or innovation;
6. reflects significant geographical patterns, including those associated with different eras of settlement and growth, particular transportation modes, or distinctive examples of park or community planning, or cultural landscape;
7. is one of the last remaining examples in the City, region, State, or nation possessing distinguishing characteristics of an architectural or historical type or specimen; or
8. has yielded, or may be likely to yield, information important in history or prehistory (RMC §20.50.010(U)).

An individual resource may be locally designated as a Structure or Resource of Merit if it contributes to the broader understanding of the historical, archaeological, cultural, architectural, community, aesthetic, or artistic heritage of the City, retains sufficient integrity, and meets one of the following criteria:

1. has a unique location or singular physical characteristics or is a view or vista representing an established and familiar visual feature of a neighborhood, community or of the City;
2. is an example of a type of building which was once common but is now rare in its neighborhood, community or area;
3. is connected with a business or use which was once common but is now rare;
4. A Cultural Resource that could be eligible under Landmark Criteria no longer exhibiting a high level of integrity, however, retaining sufficient integrity to convey significance under one or more of the Landmark Criteria;
5. Has yielded, or may be likely to yield, information important in history or prehistory; or
6. An Improvement or resource that no longer exhibits the high degree of integrity sufficient for Landmark designation, yet still retains sufficient integrity under one or more Landmark criteria to convey cultural resource significance as a Structure or Resource of Merit (RMC §20.50.010(EE)).

**Survey Findings & Assignment of Status Codes**

In accordance with local and state historic preservation guidelines, a lesser threshold for integrity was applied in determining eligibility at the local and state level. In general, CR and local individual resources possess a lower degree of architectural distinction than merits listing in the NR and/or are found in comparable quantity and quality within contemporaneous areas of the city, state, or region.

Historic period remnants and features noted during the field survey, including concrete pads, utility poles, broken clay sewer pipe and manhole cover, broken clay roof tile, drainage brow ditches, and railroad spikes were examined, partially researched, and ultimately not considered potential cultural resources; these were not documented on DPR Forms. The SPRR Loading Platform and Bridge properties were documented on DPR Forms (Appendix A) and each assigned a California Historical Resources (CHR) Status Code, which reflect eligibility according to the above criteria and the findings of this current Intensive-level Survey for CEQA compliance, which also serves to update any previous survey findings.

**SPRR Loading Platform and SPRR Bridge.** The loading platform (ca. 1930-1947) and bridge (1960) are associated with the Southern Pacific Railroad Company, a giant in the transcontinental and local rail era of western town settlement that played an active role in the settlement and development of Riverside and the early success of its citrus driven agro-economy. The loading platform and bridge are later remnant components of a larger, more extensive, and no longer extant SPRR property that lack the level of architectural distinction, strength of historic association, and sufficient integrity to merit individual listing in the NR, CR, or for local designation. While currently within the boundaries of the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District, neither falls within the period of significance nor contributes to the significance of these districts and should be considered non-contributors. Therefore, JMRC recommends that the SPRR loading platform and SPRR bridge are each assigned a CHR Status Code of ***6L – Determined***

***ineligible for local listing or designation through local government review process; may warrant special consideration in local planning.***

## PROJECT EFFECTS, IMPACT ANALYSIS & RECOMMENDATIONS

The Mission Lofts project proposes the demolition of the SPRR loading platform, pedestrian reuse of the existing vacated SPRR bridge over University Avenue, and the construction of one 2-story and one 4-story building totaling 212 studios, one- and two-bedroom apartment units as well as 320 surface parking spaces in 191 covered and 129 open stalls. The Project also includes approximately 1.20 acres of common open space and other amenities, including an indoor fitness room and a courtyard with pool, spa, cabanas, showers, sunning beds, fire pit, barbecue area, and dining terrace.

### CEQA Analysis

CEQA establishes that "a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (PRC §21084.1), and the California Public Resources Code further defines substantial adverse change as “demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired" (PRC §5020.1(q)).

The records search and field survey of the project site did not reveal the presence of any previously recorded or potential archaeological resources. Therefore, no impacts to archaeological resources are anticipated. As the loading platform and railroad bridge appear ineligible for designation at any level, they are not considered “historical resources” under CEQA. However, a large portion of the Project Area is within the boundaries of the locally designated Seventh Street East Historic District and the locally eligible Citrus Thematic Industrial Potential Historic District, and the Project Area is immediately adjacent to the locally eligible Ninth Street Potential NCA, which are considered “historical resources” under CEQA. JMRC evaluated the proposed project according to CEQA and CEQA Guidelines for potential impacts to these historic resources.

<u>Ninth Street Potential NCA</u>
Characterized by residential architecture (1895-1929), this deteriorating potential NCA represents the historic heart of Riverside's black community where black pioneers settled and where income and segregation kept them for decades on the Eastside. The edge of this NCA, which is currently lined with an existing block wall, has always been clearly demarcated. Although the lots within the Project Area that lie to the rear of the potential NCA once supported similar housing stock, the parcels adjacent to the west were never developed or functioned as part of the adjacent historic residential neighborhood along Ninth Street. The large parcel across Ninth Street once supported a citrus packing house, and is now a parking lot. The Mission Lofts project proposes to construct surface parking in this southerly portion of the Project Area as well as add small-scale amenities structures fronting Ninth Street. Proposed plans show the use of railroad freight shipping containers which may support retail shops or cafes open to residents and the public. The pedestrian-friendly size and scale of these proposed improvements, which will blend with the neighboring residences, are appropriate as is the use of railroad-related features as functional design elements, which is a familiar historic neighbor to the Ninth Street properties. **Therefore, as currently proposed, the Mission Lofts project constitutes a less than significant impact to the adjacent residential Ninth Street Potential NCA**.

Seventh Street East Historic District

The Seventh Street East Historic District includes both White's and Castlemans' Additions to the city and reflects a diverse collection of architectural styles in residences (1880-1945) compatible in scale, age and tone that reflect the lives of average citizens. While a portion of the Project Area is within the district, it never supported housing stock and contains no contributing features. The potential for project-related impacts exists near Building B at the northeasterly project boundary, which is closest to the historic neighborhood development. However, the three residences adjacent to this project boundary are modern, non-contributing compatible infill of slightly larger size and it appears slightly less setback than the 25-foot setback of earlier historic construction further east and are separated from the Project Area by an existing block wall. This infill buffer is further enhanced by several proposed design components, including the reduction of Building B to two stories in height, the use of 5-foot patios for Building B to soften the effect of a more shallow, 11'2" front setback from the back of sidewalk to the building elevation, the approximately 20-foot open space side setback, which will be planted with a specimen tree, and the placement of rear carports and surface parking, which maximizes the distance between the modest-scale historic neighborhood and the four-story Building A. **Therefore, as currently proposed, the Mission Lofts project constitutes a less than significant impact to the residential Seventh Street East Historic District**.

Citrus Thematic Industrial Potential Historic District

The Citrus Thematic Industrial Potential Historic District is located at the west end of the Eastside adjacent to residential neighborhoods and is characterized by the combination of rail transportation, water infrastructure, citrus industrial, and light industrial development that together formed the basis of Riverside's early economy and catalyst for prosperity in the late-19$^{th}$ and early-20$^{th}$ centuries. Historic development is scattered throughout this wide corridor, including rail stations, tracks, loading platforms, packing houses, warehouses, mills, and canal segments.

Design components of the proposed Mission Lofts project evidence an intent to integrate historic rail and citrus industrial uses in the Project Area and the historic character of the Citrus Thematic Industrial Potential Historic District into the new design. In keeping with the industrial uses of the area, the proposed project incorporates large, functional, full-height continuous masses that appear segmented or linked by articulated columns of perforated metal balconies reminiscent of railway gangways or couplings between passenger and freight cars. Although the four-story height of the main Building A is higher than any other historic period industrial or current development in the area, the size and scale of citrus packinghouses, warehouses, and mills were larger, more imposing buildings compared to their contemporary property types with high, open raftered ceiling space for added storage. Thus, the size and scale of the proposed improvements may be viewed as acceptable, particularly as they are distant from other construction and historic buildings such as the AT&SF train station across Commerce Street and the AT&SF right-of-way, and packing house and warehouse industrial buildings across Mission Inn Avenue and the lowered University Avenue.

The proposed development utilizes railroad-related features as functional design elements, which mimic the historic use and look of this SPRR right-of-way area and is a familiar and longtime neighbor in this location. The cutaway corner at Mission Inn Avenue and Commerce Street makes focal a corner freight-inspired cantilever that is clad in corrugated metal siding painted red and signed with bold, block letters. The metal square arch entry to the interior leasing office suggests a railroad signal bridge. The project proposes the use of corrugated metal siding as well as stucco, cementitous plaster, exterior metal systems, and concrete block, which both incorporates and modernizes

functional, historic industrial materials. While brick is not proposed, the color scheme includes deep red and various shades of gray, which invokes brick and metal. Although utilized as part of the project, the SPRR bridge, which will be cleaned of graffiti and repaved for ADA compliance, will remain as visible as it is currently to the motoring public on University Avenue and Commerce Street.

A tree planting scheme will further screen the Ninth Street surface parking above the slope on the south side of University Avenue. A street tree planting scheme would add palms along Mission Inn Avenue and replace palms along Commerce Street, which were once extant and matched those across Commerce Street along the AT&SF right-of-way. The site, building, and architectural design components proposed for this large, nearly vacant Project Area have the potential to visually improve internal cohesion, and strengthen the existing boundary, of the Citrus Thematic Industrial Potential Historic District. **Therefore, as currently proposed, the Mission Lofts project constitutes a less than significant impact to the Citrus Thematic Industrial Potential Historic District**.

**Design Quality**

The proposed project incorporates design guidance from City planning and development staff and the community, which has been communicated over the course of two years, since April 2013. Design intent and effort toward compatibility with the historic use and character of the area are apparent in proposed plans, and select elements are critical to maintaining potential impacts to less than significant under CEQA:

- Site planning that works with existing buffers (block wall and three modern, non-contributing compatible infill residences) to soften the Mission Inn Avenue transition from Mission Lofts to the residential character of the Seventh Street East Historic District, including the 20-foot open space side setback with specimen tree; two-story height reduction, 11.2” setback to façade, and 5-foot residential patios for Building B; and rear placement of carports and surface parking, which maximizes the distance between the modest-scale historic neighborhood and four-story Building A.
- Design of large, functional, full-height continuous masses that appear segmented or linked by articulated columns of perforated metal balconies, which are reminiscent of railway gangways or couplings between passenger and freight cars.
- Addition of railroad freight shipping containers on Ninth Street as functional design elements, which are aesthetically appropriate, pedestrian friendly, and a familiar historic neighbor to the Ninth Street properties.
- Inclusion of railroad inspired features as functional design elements, which mimic the historic use and look of this SPRR right-of-way area, such as the freight car-inspired corner cantilever at height of main entry, signed with bold, block letters and the metal square arch entry to the interior leasing office, which suggests a railroad signal bridge.
- Selective use of corrugated metal siding as well as stucco, cementitous plaster, exterior metal systems, and concrete block, which both incorporate and modernize functional, historic industrial materials.
- A color palette that includes deep red and various shades of gray, which invoke former historic and industrial materials on the project site and in the Citrus Industrial Thematic Potential Historic District such as brick, clay roof tile, and metal.
- Retention of the SPRR bridge, which will remain as visible as it is currently to the motoring and pedestrian public on University Avenue and Commerce Street.

- Replacement of palms as the street tree along Commerce Street, which were once extant and matched those across Commerce Street along the AT&SF right-of-way.

**Recommendations**

As potential project impacts have been thoroughly analyzed and, at their greatest, are less than significant under CEQA, **JMRC recommends that no further investigation or treatment under CEQA is required** unless the proposed project is redesigned to include additional construction or areas not subject to this study or unless project activities reveal the presence of cultural materials.

Although as designed, the proposed project does not cause a substantial adverse effect and mitigation is not required in order to reduce impacts to less than significant, JMRC recommends the following measures to further enhance compatibility of design with existing historic resources and surroundings, most notably the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District, and incorporate greater historic character and appeal:

- Utilize smooth-faced rather than split-faced concrete block.
- Retain, protect during construction activity, and reincorporate the one (1) remaining historic palm street tree, located near the Commerce Street bridge, into the new proposed line of palm street trees on Commerce Street, the species and planting distance of which should seek to match those extant historic palms on the westerly side of Commerce Street, and the height of which should be maximized (approximately 20’ trunk).
- Replace just one (1) of the lighter gray shades proposed (Body 3, 4, or 5) with a gray/tan color like Frazee KNAPWEED CL 2893M, or similar, to incorporate greater warmth and variation in the color palette and achieve compatibility with not only the Citrus Industrial Thematic Potential Historic District but also the residential quality of the Seventh Street East Historic District.
- Consider the merits and possibility with City staff, and implement if feasible, the repainting of the concrete SPRR bridge abutment in the red and gray colors of the proposed color palette in order to more fully visually associate it with its north-south historic alignment and the northerly and southerly portions of the Project Area rather than with the street and railroad bridges to the west.
- Investigate the onsite reuse potential of the cut pieces of steel railroad rails framing the loading platform or in use as upright posts in the Project Area. If feasible, repurpose as part of a design feature or amenity such a pedestrian entry, the “M” structure at the main corner entry, a rail system for poolside furniture, planter, bike rack, hand rail, or signage. If not feasible, donate for reconditioning or salvage, as practicable.
- Design and display a brief commemorative history and significance of the project site for both public pedestrian and resident viewing in up to three locations, including near the main entry at Mission Inn Avenue and Commerce Street, the resident courtyard, and near the Ninth Street amenities structures.

<u>Archaeological Considerations</u>
Ground-disturbing activities in native soils have the potential to reveal buried deposits. As a result of tribal consultations under AB 52 and the fact that the project site has a significant amount of undocumented fill according to the applicant, the project is not expected to impact any prehistoric resources within native soils. However, the identification of a historic period clay pipe indicates a slight possibility that unanticipated historic period resources may be encountered. Although not

required as a mitigation measure based on the analysis and findings of this report, the City should include a standard condition with procedures in the event that unanticipated historic period resources are encountered:

"Prior to the initiation of ground-disturbing activities, construction personnel should be alerted to the possibility of buried historic-period cultural deposits. In the event that field personnel encounter buried cultural materials, work in the immediate vicinity of the find should cease and a qualified archaeologist should be retained to assess the significance of the find. The qualified archaeologist shall have the authority to stop or divert construction excavation as necessary. If the qualified archaeologist finds that any cultural resources present meet eligibility requirements for listing on the California Register of Historical Resources or the National Register of Historic Places, plans for the treatment, evaluation, and mitigation of impacts to the find will need to be developed. If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC."

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# Appendix A
## Historic Resources Inventory Forms

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

# PRIMARY RECORD

Primary #
HRI#
Trinomial
CHR Status Code 6L
Other Listings
Review Code | Reviewer | Date

*Resource Name or # (Assigned by recorder) Southern Pacific Railroad Loading Platform

P1. Other Identifier:

*P2. Location: ☐ Not for Publication ☒ Unrestricted *a. County Riverside

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

*b. USGS 7.5' Quad Riverside East Date 1980 T 2S ; R 5W ; ¼ of ¼ of Sec 23,24 ; S.B. B.M.

c. Address City Riverside Zip Code

d. UTM: (give more than one for large and/or linear resources) Zone ; mE/ mN/

e. Other Locational Data: (e.g., parcel#, directions to resource, elevation, etc. as appropriate) APN: 211-121-032

Southeasterly corner of Mission Inn Avenue and Commerce Street

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

This reinforced concrete loading platform (ca. 1930-1947) is located at the southeasterly corner of Mission Inn Avenue and Commerce Street on Riverside's Eastside. Rectangular in shape, the dock is approximately 138 feet long, 18 feet wide, and 4 feet high and is framed and trimmed by cut and welded steel railroad rails likely recycled from the site. These rails are marked with several different labels, including "T.C.I. Co. 901 OPEN HEARTH 608 D53049," "BSCO MARYLAND O.H. IIIIIIIII 1926," and "COLORADO S.E.C. 90 ARA-A IIIIII 1924 O.H,"." The long sides are finished with a thin layer of cement plaster, and the dock is accessed by the tapered north end. The south end shows the imprint of adjacent construction (freight station and platform to south demolished ca. 1967). The concrete is in poor condition, a large crack crosses the width of the dock, which may indicate two-phase construction, and the base of a creosote utility pole is embedded in the southerly portion. The otherwise vacant lot is partially covered with annual grasses and surrounded with chain link fencing.

P3b. Resource Attributes: (List attributes and codes) HP11 Engineering Structure – Railroad loading platform

P4. Resources Present: ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5b. Description of Photo: (view, date, Acession #) View to southwest
Photo taken on March 16, 2015

*P6. Date Constructed / Age and Sources:
☒ Historic ☐ Prehistoric ☐ Both
ca. 1930-1947 (historic photos & aerials, rail markings)

*P7. Owner and Address:
Mission Lofts LLC
1201 Dove Street, Suite 250
Newport Beach, CA 92660

*P8. Recorded by: (Name, org., and addr.)
Jennifer Mermilliod
JM Research & Consulting (JMRC)
5110 Magnolia Avenue
Riverside, CA 92506

*P9. Date Recorded: March 16, 2015

*P10. Survey Type
Intensive-Level for CEQA Compliance

*P11 – Report Citation (Cite survey report and other sources, or enter "none.") Mermilliod, Jennifer (JMRC). 2015. Cultural Resources Survey: Mission Lofts (P14-0045; -046; -047; -048; -049), Riverside, Riverside County, CA.

Attachments: ☐ None ☒ Location Map ☐ Sketch Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record
☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other Other (List)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

Primary #
HRI#

# BUILDING, STRUCTURE, AND OBJECT RECORD



*CHR Satus Code 6L

*Resource Name or # (Assigned by recorder) Southern Pacific Railroad Loading Plaform

B1. Historic Name:

B2. Common Name:

B3. Original Use: Loading platform

B4. Present Use: Functionally obsolete/abandoned

*B5. Architectural Style: N/A

*B6. Construction History: (Construction date, alterations and date of alterations)

ca. 1967 - original construction

*B7. Moved? ☒ No ☐ Yes ☐ Unknown Date: Original Location:

*B8. Related Features:

Railroad bridge

B9a. Architect: None

B9b. Builder: Southern Pacific Railroad

*B10. Significance: Theme Settlement & Railroad Development Area City of Riverside/Eastside

Period of Significance 1896-1957 Property Type Loading Platform Applicable Criteria N/A

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

See Continuation Sheet.

B11. Additional Resource Attributes: (List attributes and codes)

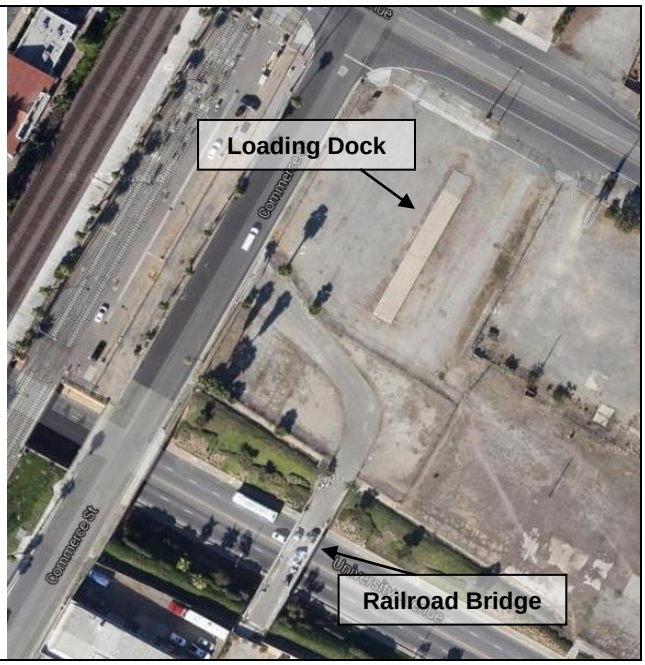
*B12. References:

See Ccontinuation Sheet.

B13. Remarks:

*B14. Evaluator: Jennifer Mermilliod

*Date of Evaluation: April 30, 2015






*Required information

***B10. Significance:**

Located just beyond the eastern edge of the original Mile Square townsite and current downtown Riverside, the SPRR loading platform is situated on parcel 211-121-032 on the originally consolidated lots 1, 2, 25-35 owned by the Southern Pacific Railroad Company (1896) within Block 10 of White's Addition, on the southeast corner of Commerce Street (formerly Pachappa Avenue) and Mission Inn Avenue (formerly Seventh Street) in an area characterized by late-19th century railroad and citrus industrial development within the western edge of Riverside's Eastside neighborhood.

Founded in 1870 by John W. North's Southern California Colony Association, the Mile Square was carved from a portion of Juan Bandini's 1838 Jurupa Rancho. By the end of 1870, civil engineers Goldsworthy and Higbie had platted the holdings of the Southern California Colony Association on an orthogonal plan had begun construction on Riverside's irrigation system to serve the Mile Square, soon known as the Upper Canal, which tapped the Santa Ana River as a water source and "marked the beginning of modern water distribution techniques in the region" (Phillips 1995:3). By 1875, the tax on the river supply was already becoming insufficient for the growing community and did not serve Arlington to the south. In that year, Evans and Sayward began construction of another canal, known as the Lower Canal, which began diversion downriver from and ran parallel to the Upper Canal before traversing the Mile Square on its way to Arlington. Both canals soon became known collectively as the Riverside Canal (CA-RIV-4495H),

Amid a land boom that swept through southern California during the 1870s and 1880s, the town of Riverside incorporated in 1883 to include Arlington and the Government Tract to the south as well as lands to the east, which were soon eyed for town lot development beyond the Mile Square. The much enlarged, budding City of Riverside grew rapidly, launched in large part by the local success of the navel orange through canal irrigation and the introduction of rail transportation into the region and the City (McWilliams 1973: 113-122). Tremendous early growth inspired by the proximity of the railroad and the development of canal-irrigated citrus led to early expansion into the Eastside. The construction of the 20-mile Gage Canal (1882-87) brought water to the eastern Riverside plain, a 2.25 square mile area that is now roughly bounded by Third Street on the north, the Tequesquite Arroyo and Victoria Club golf course on the south, State Route 91 on the west, and Chicago Avenue on the east (City of Riverside 2009:16). With the promise of water assured, new tracts were surveyed and officially recorded on the Eastside, readying these lands for real estate speculation (JMRC 2003). The irrigation of the Eastside made possible the first town-lot expansions of the Mile Square, beginning with White's Addition (1886) and followed quickly by other subdivisions, including Cox's Addition (1886), Castleman's Addition (1886), Garfield Place (1887), Madison Square (1887), Hall's Additions (1888-1890), and the H.P. Kyes Tract (1889) (City of Riverside 1886-1889; PCR 2001:17). These tracks carved tree-lined streets from hundreds of acres of former federal land.

White's Addition, a triangular subdivision from Pachappa Avenue, the original western boundary of the Eastside (now Commerce Street), between Third and Tenth Streets recorded by Albert S. White in May 1886, launched the subdivision of the area to the east (City of Riverside 1886-1889:MB 6/48SB). This oldest part of the Eastside neighborhood was purchased from the land holdings of John W. North by Albert S. White, a prominent local horticulturist, county supervisor, and city trustee (Bynon 1893-4). With the new subdivision, Eighth Street (now University Avenue) was given the identifier "East" and address numbering was restarted at "100." White's Addition continued the orthogonal alignment of streets begun in the Mile Square, which were oriented on a northeast-southwest axis along the Jurupa Rancho boundary line. Water was piped from the Gage Canal to every lot in the tract, and the streets were improved with sidewalks and planted with street trees in parkway strips.

Though often overshadowed by the pivotal role that canal irrigation played in the early prosperity and enduring stability of Riverside, the success of citriculture, local tourism, and settlement through the introduction of rail transportation into the region and the City cannot be overstated. The railroad more than threaded the two original colony settlements and the Government Tract together; it offered a connection to the southern California region and far beyond and allowed Riverside to quickly lead the nation's citrus industry and participate in the real estate boom of the late 1880s that was felt throughout southern California.

With the decision to construct a transcontinental railroad in the 1860s, a new era in the settlement of the west began that was characterized by the strategic location of townsites based on the actual or anticipated path of the western rail network. Its completion in 1869, through the joining of the Central Pacific from the west with the Union Pacific from the east at Promontory, Utah, brought tourists, boomers and boosters flowing into California at an estimated rate of 70,000 per year, a stream that was soon diffused into the southern region (McWilliams 1973:115). Railroad-related town planning and promotion in the greater Los Angeles area began in earnest with the connection of Los Angeles to San Francisco in 1876 (Reps 1981:89, 95), and the arrival of the Santa Fe line into California in 1886 rejuvenated earlier expectations and marked the beginning of a real estate explosion. Competition between the Santa Fe and Southern Pacific railroads, which shortly reduced the passenger rate from Missouri Valley to southern California to $1, facilitated unprecedented migration from the East and Midwest. The Santa Fe delivered several passenger trains a day, and the Southern Pacific reported transporting 120,000 people to Los Angeles in 1887. Among serious investors, veteran townsite "sharks" of the Midwest descended upon southern California in what became a short-lived frenzy of speculation. At the height of the railroad town boom between 1887 and 1889, more than 60 new towns totaling 79,350 acres were laid out in southern California (McWilliams 1973: 113-122). Thirteen of these were platted along the Santa Fe line in the three short months of spring 1887, and by the end of the year, 25 cities and towns had sprung up in the 36 miles between Los Angeles and San Bernardino County. Along the line of the Southern Pacific, eight more had been surveyed, and between the two rights-of-way, three other towns were platted (Reps 1981:100-101). Most of these

towns were more populated by empty subdivided lots than by residents and vanished when the boom collapsed by 1889, but in general, the 1880s contributed a considerable increase in wealth and approximately 137,000 tourists-turned-residents to the region (JMRC 2010).

By the time Riverside incorporated as a city, the first rail line had just arrived in the young town, the California Southern, part of the AT&SF system after 1884, with a branch line through Riverside and a station on the eastern edge of the Mile Square (Hammond 1995:5 and Patterson 1996:161, 184), and in 1888, the Southern California Motor Road (1886) extended their San-Bernardino-Colton line into Riverside, which was soon purchased by the competitive Southern Pacific Company (SPRR; (Patterson 1996:167). The line came in from the northeast and branched in two different directions – south to run parallel with the AT&SF line along the citrus packinghouses on Pachappa Avenue (Commerce Street) and west across Main Street (Sanborn Map 1895, 1908, 1931).

The Southern Pacific had been founded in 1865 by Timothy Phelps and a group of businessmen (American Public University 2014), but was purchased by the Central Pacific in 1868. The two railroads merged in 1870, and while legally known as the Pacific Improvement Company (Riverside County 1892-1899), the rail giant retained the Southern Pacific name and essential business plan, and soon spread tracks across Southern California and the country. Unlike other railroads, the company employed increasingly elaborate, settlement-oriented marketing and community investment, like their involvement in Riverside's local citriculture, which masked a focused, aggressive strategy. From simple flyers to detailed brochures and maps, the SP encouraged the development of small family farms on its lands, promoted settlement and development, and contributed to the establishment of local hotels, hospitals, churches, schools, parks, and more, thereby playing a comprehensive role in the settlement and development of numerous communities, like Riverside, along its routes (Orsi 2005:109, 111; Tibbet 2011:19).

The alignment of this southern branch of the SPRR right-of-way became a critical center of local freight shipping in the late-19th century. In 1896, the company constructed a freight station edged by a 4' platform (demolished 1967) and main line track, and by 1908, the line had increased to five sets of tracks (most removed in 1960, final removal ca. 2000), from which it served the varied shipping needs of the young town, particularly the perishable goods and other industrial exports from the nearby citrus packing houses and other industrial plants and warehouses within the corridor that had emerged on this western edge of the Eastside.

The development of transcontinental and local rail systems served to greatly advance Riverside's agro-economy, and by 1895, Riverside was a thriving, irrigated cooperative that specialized in citriculture. Development in the Mile Square had begun immediately, concurrently, with the support of canal-irrigated agriculture, which soon became the supporting economy of young Riverside, supporting the growth of vegetables, melons, raisin grapes, berries, walnuts, honey, beans, grain, and hay, and livestock ranches and dairy farms were also found in Riverside. While agriculture in general supported Riverside, no crop was as pursued or as successful as citrus. Few in southern California had been engaged in the production of citrus before the late 1870s when "Orange Fever" erupted due to the introduction of the navel orange and the potential for large profits, and new communities from Pasadena to Redlands were founded on orange agriculture. Before 1862, there had been only about 25,000 orange trees in the state, but by 1882, there were approximately 500,000 orange trees in California – half of them growing in Riverside (Lawton 1989:9).

In addition to success in the growth of citrus, early Riversiders made great and innovative advances in all areas associated witth getting their product to market, including picking, handling, packing, shipping, and even technological and organizational achievements. Although the Eastside was developed for its residential potential, the early foothold of the railroads prompted citrus industrial development here, and a corridor along its western edge coalesced to become Riverside's leading packing and shipping center. With the Southern Pacific a presence on the Pachappa Avenue edge of Block 10 of White's Addition and other rail lines to the west, packing houses, storage warehouses, feed mills, and more stretched out to the north and south. At corner of Eighth Street and Pachappa Avenue, R.B. Devine, one of the largest packers and shippers in Riverside, maintained a commission and storage warehouse as well as a raisin and orange packing house, which was used as a feed mill and for wood and coal storage after the turn of the century. Other vacant warehouses filled these lots facing Pachappa Avenue, and at the corner of Ninth Street, was W.V. Wiley's Wood, Hay, and Coal Yard as well as a warehouse for baled hay and guano, which became an orange crate box nailing warehouse owned by H.K. Small and Sons (Sanborn Map 1895:8, 1908:18, 30). The Riverside Heights Orange Growers Association Packing House and the Blue Goose Growers Fruit Packing House with box nailing and storage just south of Ninth Street are no longer extant.

True to the Southern Pacific's tendency to invest in local development, the SP participated deeply in the local citrus market. A small number of privately owned cars whisked the relatively small tonnage of perishables to eastern markets before the Southern Pacific and Union Pacific railroads jointly organized the Pacific Fruit Express Company (PFE) in 1906 to provide refrigerator cars for the swift movement of fresh fruits and vegetables. The PFE began operations with 6,000 refrigerator cars and by 1944 became the largest refrigerator car line in the world, offering over 36,000 cold cars across United States and Mexico. In addition, unlike other citrus-related or other industrial developments in the corridor, the Independent Fruit Company was owned by the SP. The Independent Fruit Company Packing House (1898) once faced Mission Inn Avenue on the other side of the railroad tracks from Lot 4 of White's Addition (Riverside County 1896-1899; Sanborn Map 1908:18).

The extant, ramped loading platform (ca. 1930-1947), which is now a free-standing structure, was added to the original freight station (demolished 1967) after the development and heyday of the local rail-dependent citrus industrial economy to facilitate automobile-related loading and unloading either as part of the SP's store-door motor truck service era in the depressed 1930s or to accommodate longer trains and

the motor transfer of greater quantities of military-related freight during the material-shortage war years of the 1940s, which also saw a nationwide effort to recycle and repurpose rail.

The challenging lean years of the depressed 1930s had prompted comprehensive strategic and operational change that ultimately allowed the SP to pioneer a new era in modernized equipment, discount and economy services as well as enhancements such as the introduction of air-conditioning to the travelling public, and creative ways of meeting competition (Heath 1945). It was during the 1930s that the SP firmly established a motor truck "store-door" service, which met the competition of highway truckers by employing motor trucks in conjunction with freight trains in the delivery of less than a carload of freight from shipper to receiver. A contract local drayman picked up the freight packages from the shippers, took them to the freight station for train haul to a destination station where the freight was retrieved by another local drayman for delivery to the receiver. Begun as an experimental service in 1929 with the SP's electric line subsidiary, the Pacific Electric, between Los Angeles and twenty stations in southern California, the immediate popularity of the store-door service prompted its expansion first over Pacific Electric lines and then into further territory on SP lines by February 1930. The service was formalized with the establishment of the Pacific Motor Transport (PMT) Company, based out of San Francisco by the following April, and soon spread across California and Oregon (Heath 1945). The Riverside freight station became an early store-door destination station, with the PMT providing local truck delivery, and nearby Arlington was soon added to the areas served in the vicinity (RDP 1929a).

The service expanded rapidly, soon offering overnight delivery to metropolitan distributing centers to reach the most outlying towns and keep fully-loaded freight trains moving swiftly past smaller towns. Service increased more than 43% and spread to most California communities by 1932 and was also initiated on other SP lines in Texas and Louisiana. Finally, the SP introduced the "Overnight," the first exclusive merchandise train operating on a fast passenger train schedule, which made its debut on October 22, 1935 in a dusk-to-dawn run over the 470-miles between San Francisco and Los Angeles, which led to similar speedy merchandise trains that would later provide modernized overnight freight deliveries to principal SP metropolitan distributing centers. "Break-bulk" points were established at strategically located stations for the swift transfer of freight to line-haul trucks, which then delivered to regular stations for pick up and local store-door deliveries. Freight was loaded and unloaded with cranes and forklifts by the pallet or by the item into and out of general purpose boxcars onto platforms or directly into trucks. By the end of 1939, over 7,745 highway miles were coordinated with rail freight service and reached 12,491 miles by the end of 1944 (Heath 1945).

The outbreak of war in Europe in September 1939 and the looming threat of American involvement, the SP shifted focus to meet the all-encompassing transportation needs of a nation at war again, which were particularly acute on the west coast where 290 military and naval establishments were located, compared with only 15 before Pearl Harbor, as well as about half of the nation's wartime aircraft and cargo ships were produced. In a massive and unprecedented home front transportation of America's men and materials of war and industry, railroad companies across the country, combined, also handled approximately 97% of all organized troop movements and about 90% of all Army and Navy freight and express, moving ever-mounting volumes of traffic through a variety of established and newly formed railroad and governmental organizations. These defense activities poured a ceaseless flow of traffic into plants and ports, especially the Army's busy Ports of Embarkation in Los Angeles and San Francisco Bay, which sent major support to the entire Pacific offensive (Heath 1945).

Increased defense era earnings were funneled back into improvements, funding terminal yard and roundhouse expansions, facilities improvements, main line siding extensions, trackage to serve new military and industrial establishments, about 650 miles of new heavier rail, improvements to shops, communication lines and other facilities throughout the system, and an extensive repair and reconditioning program for every piece of serviceable equipment. The increased length of freight trains required the extension of yard trackage and numerous main line sidings at several terminals. In addition, the SP took a leading part in the national wartime scrap drive, collecting scrap for reuse in the war effort and reclaiming millions of pounds of second hand rail and like tonnage of other track materials for reuse in track layouts at military and naval establishments (Heath 1945).

The repurpose of old rail as framing members of the loading platform is in keeping with both the depressed 1930s and the material shortage war years of the 1940s which saw little new manufacture and creative reuse of existing resources. The cut and welded pieces of rail were likely removed from the site or nearby and exhibit many portions of markings and at least three complete, readable labels which provide information on the steel mill, rail type, and location and date they were rolled. "T.C.I. Co. 901 OPEN HEARTH 608 D53049" refers to the Tennessee Coal, Iron, and Railroad Company (TCI) Ensley Steel Works, which operated from 1888-1976. TCI became a part of U.S. Steel, the largest steel producer in the United States, in 1907 and thus associated with J.P. Morgan and Andrew Carnegie. TCI was the first to roll rail using the open hearth furnace method, and is likely the oldest of the rail framing members around the loading platform, although it is not date stamped. "COLORADO S.E.C. 90 ARA-A IIIIII 1924 O.H," refers to the Colorado Fuel and Iron Company, a large steel concern organized by several western railroads in Pueblo, Colorado that was largely owned and controlled by John D. Rockefeller and the heirs of Jay Gould after 1903. This rail was manufactured, as stamped, in June 1924 using the open hearth method. "BSCO MARYLAND O.H. IIIIIII 1926" refers to the Bethlehem Steel Company, the second largest steel producer in the United States, which opened in 1886 and bankrupted in 2007. This rail was manufactured, as stamped, at their secondary mill in Sparrows Point Maryland in July 1926 using the open hearth method. An important year for rail manufacture is 1937, when the controlled cooling (CC) method was introduced and became a universal standard almost immediately (ATTC no date). No marked CC rails were identified among the framing members, but may exist.

Riverside's economic landscape slowly changed slowly throughout the first half of the 20th century, accelerating rapidly in the postwar period and second half decades. A devastating, four-night freeze in 1913 began to shift the local economic position toward one of diversification in the early-20th century, and population increases and the resultant suburban development between the world wars, which both increased the number of local workers and decreased vast tracts of agricultural acreage, effectively altered the view of citriculture as a panoramic staple, both visually and perceptually. While grove and agricultural lands, particularly to the south, were converted to tree-lined streets of single-family dwellings, scattered lots and strips of property on the edges of the original townsite were the target of infill residential construction, and vacant lots, particularly along the arterials in the downtown core, were eyed for commercial development.

While economic interests became broader, commercial and industrial enterprise seemed to consolidate geographically as some areas became increasingly associated with these uses, and emerging strips of concentrated commercial zones appeared such as Magnolia Center to the south, Eighth Street (University Avenue) on the Eastside, the Magnolia Avenue/Van Buren Business District, and the expanding Main Street Industrial Corridor. This geographic concentration of commercial enterprise in Riverside was linear as it was associated with major arterials or highways and generally focused first on the streetcar, and later motoring, patron in addition to the neighborhood pedestrian, and eventually use shifted to mainly auto- or travel-related uses like auto courts, motels, service stations or related auto services, and roadside eateries. The suburbanization of areas more distant from downtowns and streetcar lines was made possible by a nation on the move. With nine million cars on American roads by 1920, attention was given to the improvement of transportation infrastructure. The use of automobiles by working class Americans rose steadily throughout the first half of the 20th century. Not just an important local arterial, Eighth Street became part of the California highway system in the 1930s and was signed Highway 19. By the mid-20th century, while many buildings remained in the industrial corridor on the western edge of the Eastside, fewer were dedicated to citrus-packing and shipping or had become vacant, like the SP's Independent Fruit Company's Packing House (Sanborn Map 1952:18, 30).

The close of WWII marked the beginning of lasting change on many levels. Advances in land use and planning coupled with the rising importance of the automobile forever altered the urban landscape. In Riverside, the economic shift and population growth reflected regional trends. Characteristically, post-war development vied for proximity to growing suburban commercial centers. By the early 1950s, Eighth Street functioned as a vital regional transportation link. Increased traffic along the corridor prompted the conversion from residential to roadside commercial uses that catered to the needs of travelers and also served the residents of the neighborhoods to the north and south. Subdivision reached record heights as did traffic congestion, and the completion of the University of California, Riverside in the mid-1950s caused a dramatic increase in traffic patterns on Eighth Street (renamed University Avenue in 1966) and the Eastside. These challenges prompted the professionalization of city planning and the building of the Riverside Freeway (1957) and the Pomona Freeway (1960-63) through Riverside, which supplanted the local corridors as regional arterials, and forever altered a wide swath of adjacent streets and lots. The loss of direct contact with motorists began to be evinced on the local economy, and the financial decline continued through the 1970s, and '80s. The City's agricultural economy slowly gave way to the rising force of industry as well-known industrial giants, such as Rohr Corporation, Bourns Incorporated, and the Lily-Tulip Cup Corporation arrived in Riverside, and the increasing diversification of Riverside's economic livelihood saw the destruction of much of Riverside's once vast citrus and agricultural acreage.

Thus, it was the construction of the Riverside Freeway, State Route 91 (1957) on the eastern edge of downtown that prompted the grade separation of University Avenue (1957-1960), the subsequent construction of numerous bridges (ca. 1960) to accommodate the through path of Commerce Street, Santa Fe Avenue, the Riverside Canal, and the Union Pacific, AT&SF, and Southern Pacific tracks across the arterial street, and the demolition of the SP freight station (1967). The construction of the SPRR bridge, which was completed in 1960, prompted the removal of most of the track, including the original main line. The last lines were removed ca. 2000, and a curved vehicular asphalt drive was constructed from Commerce Street to the abandoned railroad bridge. State Route 91 was widened in 2008, further segregating the Eastside and the citrus-rail-industrial corridor on its western edge from the downtown core. The retention of the concrete loading platform as a freestanding structure after the demolition of most of the track in 1960 and the former freight house in 1967 supported the continued, but reduced, movement of rail freight in a forever changed local industrial economy and the diminished role of the Southern Pacific and other railroad companies, which began a slow decline in the face of the rising dominance of automobile and air transportation for both passengers and freight in the latter half of the 20th century.

The loading platform (ca. 1930-1947) is associated with the Southern Pacific Railroad Company, a giant in the transcontinental and local rail era of western town settlement that played an active role in the settlement and development of Riverside and the early success of its citrus driven agro-economy. As a later remnant addition to the freight station (demolished 1967) and component of a much larger, more extensive, and no longer extant SPRR property, the loading platform lacks the level of architectural distinction, strength of historic association, and sufficient integrity to merit individual listing in the NR, CR, or for local designation. While currently within the boundaries of the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District, the loading platform does not fall within the period of significance nor does it contribute to the significance of these districts and should be considered a non-contributor. Therefore, JMRC recommends that the SPRR loading platform and SPRR bridge are each assigned a CHR Status Code of ***6L – Determined ineligible for local listing or designation through local government review process; may warrant special consideration in local planning***.

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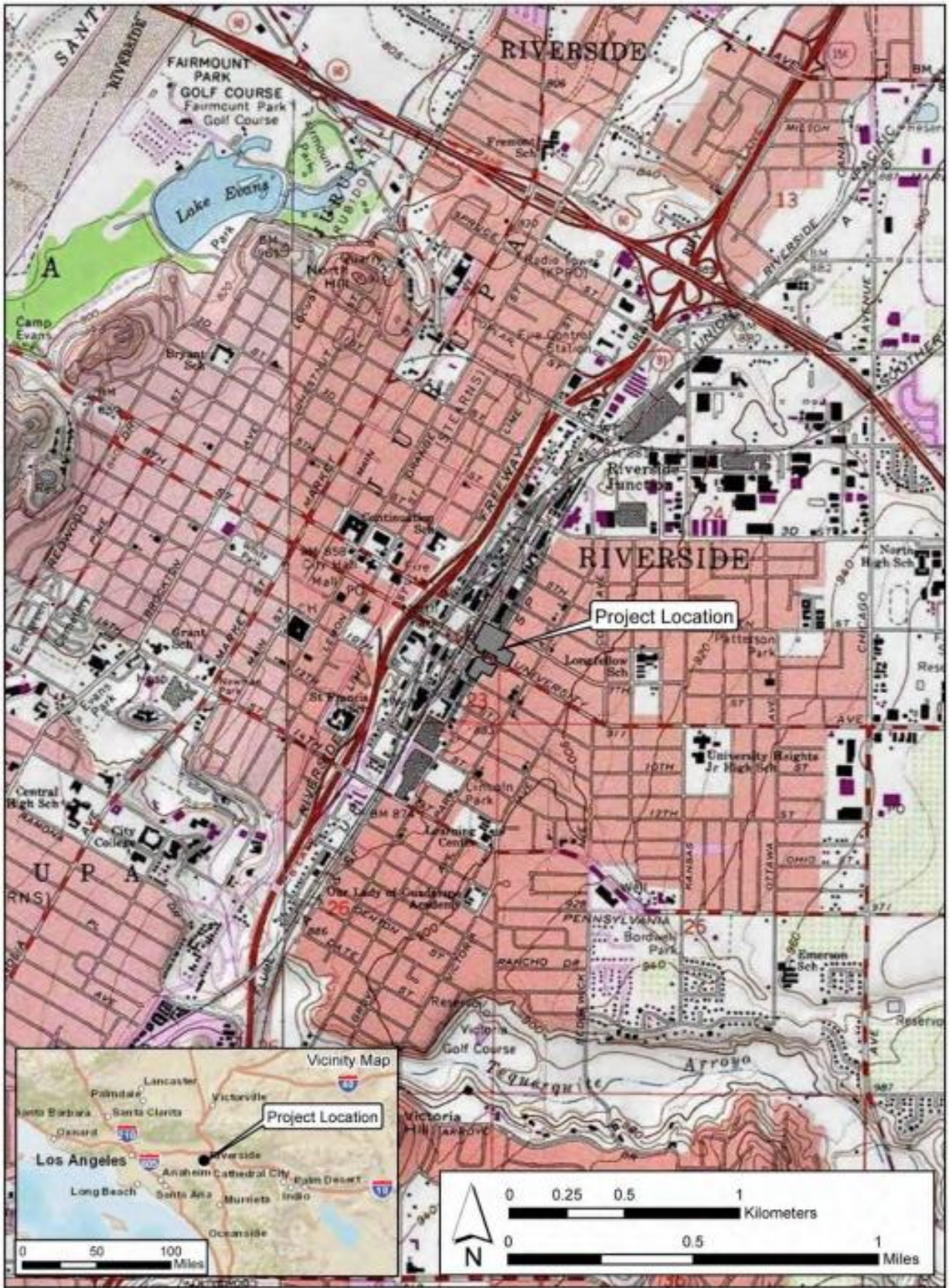
| State of California — The Resources Agency<br>DEPARTMENT OF PARKS AND RECREATION<br>**CONTINUATION SHEET** | Primary #<br>HRI#<br>Trinomial |
|---|---|

**Page** 8 **of** 8 ***Resource Name or #** (Assigned by recorder) Southern Pacific Railroad Loading Platform

*** Recorded by** Jennifer Mermilliod ***Date** March 16, 2015 ☒ Continuation ☐ Update




BCRCONSULTING LLC

Project Location Site
Mission Lofts Project

Figure 1

JM Research and Consulting
5110 Magnolia Avenue
Riverside, California 92506

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

# PRIMARY RECORD

Primary #
HRI#
Trinomial
CHR Status Code 6L
Other Listings
Review Code | Reviewer | Date

*Resource Name or # (Assigned by recorder) Southern Pacific Railroad Bridge 56C0059

P1. Other Identifier: "Freight House Road over University Avenue

*P2. Location: ☐ Not for Publication ☒ Unrestricted *a. County Riverside

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

*b. USGS 7.5' Quad Riverside East Date 1980 T 2S ; R 5W ; ¼ of ¼ of Sec 23,24 ; S.B. B.M.

c. Address City Riverside Zip Code

d. UTM: (give more than one for large and/or linear resources) Zone ; mE/ mN/

e. Other Locational Data: (e.g., parcel#, directions to resource, elevation, etc. as appropriate) APN:

Approximately 0.25 mile east of Rte. 91 Fwy , east of Commerce Street

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

This functionally obsolete Southern Pacific Railroad Bridge 56C0059 (1960) is located approximately 0.25 mile east of Route 91 Freeway, easterly of Commerce Street and extends 65 feet across and 15.1 feet above University Avenue, a four-lane, below-grade arterial street on Riverside's Eastside. The single-span, steel girder-and-floorbeam system is 70.9 feet in total length with a 19.4-foot-wide steel plate deck and bituminous surface supported by conventional precast concrete, seat-type tall abutments and railed with a low, rectangular metal barrier and taller, wrought iron fencing. Signed "SOUTHERN PACIFIC" in black letters on the east side only, the bridge once carried a single mainline freight track, which has been removed and the deck covered with asphalt (ca. 2000). The abandoned bridge is now accessed for transient pedestrian use and is in good condition.

P3b. Resource Attributes: (List attributes and codes) HP19 Railroad bridge

P4. Resources Present: ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5b. Description of Photo: (view, date, Acession #) View to west
Photo taken on March 16, 2015

*P6. Date Constructed / Age and Sources:
☒ Historic ☐ Prehistoric ☐ Both
1960

*P7. Owner and Address:
City of Riverside
3900 Main Sreet
Riverside, CA 92522

*P8. Recorded by: (Name, org., and addr.)
Jennifer Mermilliod
JM Research & Consulting (JMRC)
5110 Magnolia Avenue
Riverside, CA 92506

*P9. Date Recorded: March 16, 2015

*P10. Survey Type
Intensive-Level for CEQA Compliance

*P11 – Report Citation (Cite survey report and other sources, or enter "none.") Mermilliod, Jennifer (JMRC). 2015. Cultural Resources Survey: Mission Lofts (P14-0045; -046; -047; -048; -049), Riverside, Riverside County, CA.

Attachments: ☐ None ☒ Location Map ☐ Sketch Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record
☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other Other (List)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

Primary #
HRI#

# BUILDING, STRUCTURE, AND OBJECT RECORD



*CHR Satus Code 6L

*Resource Name or # (Assigned by recorder) Southern Pacific Railroad Bridge 56C0059

B1. Historic Name:

B2. Common Name:

B3. Original Use: Railroad freight bridge

B4. Present Use: Functionally obsolete/abandoned

*B5. Architectural Style: N/A

*B6. Construction History: (Construction date, alterations and date of alterations)

1960 - original construction; multiple rail lines removed, one crossing bridge
ca. 2000 – last rail line removed, bridge deck covered with asphalt and incorporated into vehicular pavement alignment to northwest

*B7. Moved? ☒ No ☐ Yes ☐ Unknown Date: Original Location:

*B8. Related Features:
loading platform

B9a. Architect: unknown

B9b. Builder: Southern Pacific Company

*B10. Significance: Theme Settlement & Railroad Development Area City of Riverside/Eastside

Period of Significance 1896-1957 Property Type Bridge Applicable Criteria N/A

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

See Continuation Sheet.

B11. Additional Resource Attributes: (List attributes and codes)

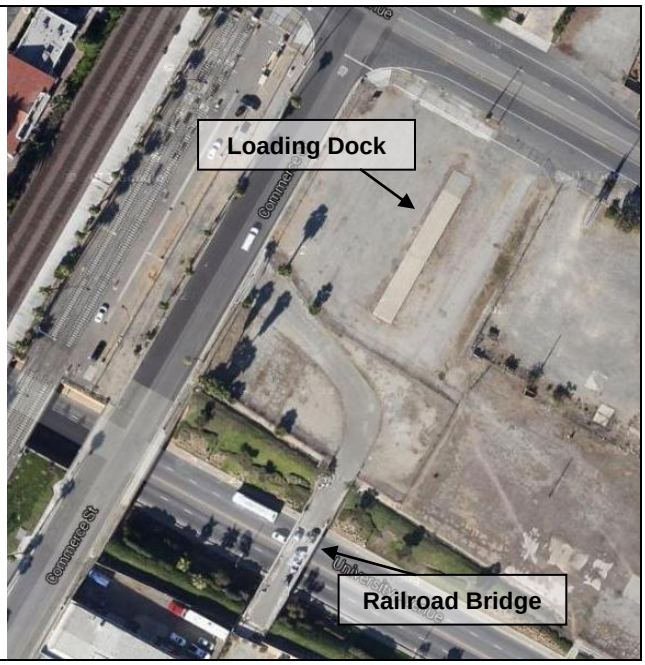
*B12. References:

See Ccontinuation Sheet.

B13. Remarks:

*B14. Evaluator: Jennifer Mermilliod

*Date of Evaluation: April 30, 2015






*Required information

***B10. Significance:**

Located just beyond the eastern edge of the original Mile Square townsite and current downtown Riverside, the SPRR bridge spans University Avenue (formerly Eighth Street) between Block 10 and 12 of White's Addition, easterly of Commerce Street (formerly Pachappa Avenue) in an area characterized by late-19th century railroad and citrus industrial development within the western edge of Riverside's Eastside neighborhood.

Founded in 1870 by John W. North's Southern California Colony Association, the Mile Square was carved from a portion of Juan Bandini's 1838 Jurupa Rancho. By the end of 1870, civil engineers Goldsworthy and Higbie had platted the holdings of the Southern California Colony Association on an orthogonal plan had begun construction on Riverside's irrigation system to serve the Mile Square, soon known as the Upper Canal, which tapped the Santa Ana River as a water source and "marked the beginning of modern water distribution techniques in the region" (Phillips 1995:3). By 1875, the tax on the river supply was already becoming insufficient for the growing community and did not serve Arlington to the south. In that year, Evans and Sayward began construction of another canal, known as the Lower Canal, which began diversion downriver from and ran parallel to the Upper Canal before traversing the Mile Square on its way to Arlington. Both canals soon became known collectively as the Riverside Canal (CA-RIV-4495H),

Amid a land boom that swept through southern California during the 1870s and 1880s, the town of Riverside incorporated in 1883 to include Arlington and the Government Tract to the south as well as lands to the east, which were soon eyed for town lot development beyond the Mile Square. The much enlarged, budding City of Riverside grew rapidly, launched in large part by the local success of the navel orange through canal irrigation and the introduction of rail transportation into the region and the City (McWilliams 1973: 113-122). Tremendous early growth inspired by the proximity of the railroad and the development of canal-irrigated citrus led to early expansion into the Eastside. The construction of the 20-mile Gage Canal (1882-87) brought water to the eastern Riverside plain, a 2.25 square mile area that is now roughly bounded by Third Street on the north, the Tequesquite Arroyo and Victoria Club golf course on the south, State Route 91 on the west, and Chicago Avenue on the east (City of Riverside 2009:16). With the promise of water assured, new tracts were surveyed and officially recorded on the Eastside, readying these lands for real estate speculation (JMRC 2003). The irrigation of the Eastside made possible the first town-lot expansions of the Mile Square, beginning with White's Addition (1886) and followed quickly by other subdivisions, including Cox's Addition (1886), Castleman's Addition (1886), Garfield Place (1887), Madison Square (1887), Hall's Additions (1888-1890), and the H.P. Kyes Tract (1889) (City of Riverside 1886-1889; PCR 2001:17). These tracks carved tree-lined streets from hundreds of acres of former federal land.

White's Addition, a triangular subdivision from Pachappa Avenue, the original western boundary of the Eastside (now Commerce Street), between Third and Tenth Streets recorded by Albert S. White in May 1886, launched the subdivision of the area to the east (City of Riverside 1886-1889:MB 6/48SB). This oldest part of the Eastside neighborhood was purchased from the land holdings of John W. North by Albert S. White, a prominent local horticulturist, county supervisor, and city trustee (Bynon 1893-4). With the new subdivision, Eighth Street (now University Avenue) was given the identifier "East" and address numbering was restarted at "100." White's Addition continued the orthogonal alignment of streets begun in the Mile Square, which were oriented on a northeast-southwest axis along the Jurupa Rancho boundary line. Water was piped from the Gage Canal to every lot in the tract, and the streets were improved with sidewalks and planted with street trees in parkway strips.

Though often overshadowed by the pivotal role that canal irrigation played in the early prosperity and enduring stability of Riverside, the success of citriculture, local tourism, and settlement through the introduction of rail transportation into the region and the City cannot be overstated. The railroad more than threaded the two original colony settlements and the Government Tract together; it offered a connection to the southern California region and far beyond and allowed Riverside to quickly lead the nation's citrus industry and participate in the real estate boom of the late 1880s that was felt throughout southern California.

With the decision to construct a transcontinental railroad in the 1860s, a new era in the settlement of the west began that was characterized by the strategic location of townsites based on the actual or anticipated path of the western rail network. Its completion in 1869, through the joining of the Central Pacific from the west with the Union Pacific from the east at Promontory, Utah, brought tourists, boomers and boosters flowing into California at an estimated rate of 70,000 per year, a stream that was soon diffused into the southern region (McWilliams 1973:115). Railroad-related town planning and promotion in the greater Los Angeles area began in earnest with the connection of Los Angeles to San Francisco in 1876 (Reps 1981:89, 95), and the arrival of the Santa Fe line into California in 1886 rejuvenated earlier expectations and marked the beginning of a real estate explosion. Competition between the Santa Fe and Southern Pacific railroads, which shortly reduced the passenger rate from Missouri Valley to southern California to $1, facilitated unprecedented migration from the East and Midwest. The Santa Fe delivered several passenger trains a day, and the Southern Pacific reported transporting 120,000 people to Los Angeles in 1887. Among serious investors, veteran townsite "sharks" of the Midwest descended upon southern California in what became a short-lived frenzy of speculation. At the height of the railroad town boom between 1887 and 1889, more than 60 new towns totaling 79,350 acres were laid out in southern California (McWilliams 1973: 113-122). Thirteen of these were platted along the Santa Fe line in the three short months of spring 1887, and by the end of the year, 25 cities and towns had sprung up in the 36 miles between Los Angeles and San Bernardino County. Along the line of the Southern Pacific, eight more had been surveyed, and between the two rights-of-way, three other towns were platted (Reps 1981:100-101). Most of these towns were more populated by empty subdivided lots than by residents and vanished when the boom collapsed by 1889, but in general, the 1880s contributed a considerable increase in wealth and approximately 137,000 tourists-turned-residents to the region (JMRC 2010).

By the time Riverside incorporated as a city, the first rail line had just arrived in the young town, the California Southern, part of the AT&SF system after 1884, with a branch line through Riverside and a station on the eastern edge of the Mile Square (Hammond 1995:5 and Patterson 1996:161, 184), and in 1888, the Southern California Motor Road (1886) extended their San-Bernardino-Colton line into Riverside, which was soon purchased by the competitive Southern Pacific Company (SPRR; (Patterson 1996:167). The line came in from the northeast and branched in two different directions – south to run parallel with the AT&SF line along the citrus packinghouses on Pachappa Avenue (Commerce Street) and west across Main Street (Sanborn Map 1895, 1908, 1931).

The Southern Pacific had been founded in 1865 by Timothy Phelps and a group of businessmen (American Public University 2014), but was purchased by the Central Pacific in 1868. The two railroads merged in 1870, and while legally known as the Pacific Improvement Company (Riverside County 1892-1899), the rail giant retained the Southern Pacific name and essential business plan, and soon spread tracks across Southern California and the country. Unlike other railroads, the company employed increasingly elaborate, settlement-oriented marketing and community investment, like their involvement in Riverside's local citriculture, which masked a focused, aggressive strategy. From simple flyers to detailed brochures and maps, the SP encouraged the development of small family farms on its lands, promoted settlement and development, and contributed to the establishment of local hotels, hospitals, churches, schools, parks, and more, thereby playing a comprehensive role in the settlement and development of numerous communities, like Riverside, along its routes (Orsi 2005:109, 111; Tibbet 2011:19).

The alignment of this southern branch of the SPRR right-of-way became a critical center of local freight shipping in the late-19th century. In 1896, the company constructed a freight station edged by a 4' platform (demolished 1967) and main line track, and by 1908, the line had increased to five sets of tracks (most removed in 1960, final removal ca. 2000), from which the SP served the varied shipping needs of the young town, particularly the perishable goods and other industrial exports from the nearby citrus packing houses and other industrial plants and warehouses within the corridor that had emerged on this western edge of the Eastside.

The development of transcontinental and local rail systems served to greatly advance Riverside's agro-economy, and by 1895, Riverside was a thriving, irrigated cooperative that specialized in citriculture. Development in the Mile Square had begun immediately, concurrently, with the support of canal-irrigated agriculture, which soon became the supporting economy of young Riverside, supporting the growth of vegetables, melons, raisin grapes, berries, walnuts, honey, beans, grain, and hay, and livestock ranches and dairy farms were also found in Riverside. While agriculture in general supported Riverside, no crop was as pursued or as successful as citrus. Few in southern California had been engaged in the production of citrus before the late 1870s when "Orange Fever" erupted due to the introduction of the navel orange and the potential for large profits, and new communities from Pasadena to Redlands were founded on orange agriculture. Before 1862, there had been only about 25,000 orange trees in the state, but by 1882, there were approximately 500,000 orange trees in California – half of them growing in Riverside (Lawton 1989:9).

In addition to success in the growth of citrus, early Riversiders made great and innovative advances in all areas associated witth getting their product to market, including picking, handling, packing, shipping, and even technological and organizational achievements. Although the Eastside was developed for its residential potential, the early foothold of the railroads prompted citrus industrial development here, and a corridor along its western edge coalesced to become Riverside's leading packing and shipping center. With the Southern Pacific a presence on the Pachappa Avenue edge of Block 10 of White's Addition and other rail lines to the west, packing houses, storage warehouses, feed mills, and more stretched out to the north and south. At corner of Eighth Street and Pachappa Avenue, R.B. Devine, one of the largest packers and shippers in Riverside, maintained a commission and storage warehouse as well as a raisin and orange packing house, which was used as a feed mill and for wood and coal storage after the turn of the century. Other vacant warehouses filled these lots facing Pachappa Avenue, and at the corner of Ninth Street, was W.V. Wiley's Wood, Hay, and Coal Yard as well as a warehouse for baled hay and guano, which became an orange crate box nailing warehouse owned by H.K. Small and Sons (Sanborn Map 1895:8, 1908:18, 30). The Riverside Heights Orange Growers Association Packing House and the Blue Goose Growers Fruit Packing House with box nailing and storage just south of Ninth Street are no longer extant.

True to the Southern Pacific's tendency to invest in local development, the SP participated deeply in the local citrus market. A small number of privately owned cars whisked the relatively small tonnage of perishables to eastern markets before the Southern Pacific and Union Pacific railroads jointly organized the Pacific Fruit Express Company (PFE) in 1906 to provide refrigerator cars for the swift movement of fresh fruits and vegetables. The PFE began operations with 6,000 refrigerator cars and by 1944 became the largest refrigerator car line in the world, offering over 36,000 cold cars across United States and Mexico. In addition, unlike other citrus-related or other industrial developments in the corridor, the Independent Fruit Company was owned by the SP. The Independent Fruit Company Packing House (1898) once faced Mission Inn Avenue on the east side of the railroad tracks from Lot 4 of White's Addition (Riverside County 1896-1899; Sanborn Map 1908:18).

The challenging lean years of the depressed 1930s had prompted comprehensive strategic and operational change that ultimately allowed the SP to pioneer a new era in modernized equipment, discount and economy services as well as enhancements such as the introduction of air-conditioning to the travelling public, and creative ways of meeting competition (Heath 1945). It was during the 1930s that the SP firmly established a motor truck "store-door" service, which met the competition of highway truckers by employing motor trucks in conjunction with freight trains in the delivery of less than a carload of freight from shipper to receiver. A contract local drayman picked up the freight packages

from the shippers, took them to the freight station for train haul to a destination station where the freight was retrieved by another local drayman for delivery to the receiver. Begun as an experimental service in 1929 with the SP's electric line subsidiary, the Pacific Electric, between Los Angeles and twenty stations in southern California, the immediate popularity of the store-door service prompted its expansion first over Pacific Electric lines and then into further territory on SP lines by February 1930. The service was formalized with the establishment of the Pacific Motor Transport (PMT) Company, based out of San Francisco by the following April, and soon spread across California and Oregon (Heath 1945). The Riverside freight station became an early store-door destination station, with the PMT providing local truck delivery, and nearby Arlington was soon added to the areas served in the vicinity (RDP 1929a).

The service expanded rapidly, soon offering overnight delivery to metropolitan distributing centers to reach the most outlying towns and keep fully-loaded freight trains moving swiftly past smaller towns. Service increased more than 43% and spread to most California communities by 1932 and was also initiated on other SP lines in Texas and Louisiana. Finally, the SP introduced the "Overnight," the first exclusive merchandise train operating on a fast passenger train schedule, which made its debut on October 22, 1935 in a dusk-to-dawn run over the 470-miles between San Francisco and Los Angeles, which led to similar speedy merchandise trains that would later provide modernized overnight freight deliveries to principal SP metropolitan distributing centers. "Break-bulk" points were established at strategically located stations for the swift transfer of freight to line-haul trucks, which then delivered to regular stations for pick up and local store-door deliveries. Freight was loaded and unloaded with cranes and forklifts by the pallet or by the item into and out of general purpose boxcars onto platforms or directly into trucks. By the end of 1939, over 7,745 highway miles were coordinated with rail freight service and reached 12,491 miles by the end of 1944 (Heath 1945).

The outbreak of war in Europe in September 1939 and the looming threat of American involvement, the SP shifted focus to meet the all-encompassing transportation needs of a nation at war again, which were particularly acute on the west coast where 290 military and naval establishments were located, compared with only 15 before Pearl Harbor, as well as about half of the nation's wartime aircraft and cargo ships were produced. In a massive and unprecedented home front transportation of America's men and materials of war and industry, railroad companies across the country, combined, also handled approximately 97% of all organized troop movements and about 90% of all Army and Navy freight and express, moving ever-mounting volumes of traffic through a variety of established and newly formed railroad and governmental organizations. These defense activities poured a ceaseless flow of traffic into plants and ports, especially the Army's busy Ports of Embarkation in Los Angeles and San Francisco Bay, which sent major support to the entire Pacific offensive (Heath 1945).

Increased defense era earnings were funneled back into improvements, funding terminal yard and roundhouse expansions, facilities improvements, main line siding extensions, trackage to serve new military and industrial establishments, about 650 miles of new heavier rail, improvements to shops, communication lines and other facilities throughout the system, and an extensive repair and reconditioning program for every piece of serviceable equipment. The increased length of freight trains required the extension of yard trackage and numerous main line sidings at several terminals. In addition, the SP took a leading part in the national wartime scrap drive, collecting scrap for reuse in the war effort and reclaiming millions of pounds of second hand rail and like tonnage of other track materials for reuse in track layouts at military and naval establishments (Heath 1945). The realted extant, ramped loading platform (ca. 1930-1947), which is now a free-standing, approximately 138-foot-long structure framed with reused rail segments, was added to the original freight station (demolished 1967) after the development and heyday of the local rail-dependent citrus industrial economy to facilitate automobile-related loading and unloading either as part of the SP's store-door motor truck service era in the depressed 1930s or to accommodate longer trains and the motor transfer of greater quantities of military-related freight during the material-shortage war years of the 1940s.

Riverside's economic landscape slowly changed slowly throughout the first half of the 20th century, accelerating rapidly in the postwar period and second half decades. A devastating, four-night freeze in 1913 began to shift the local economic position toward one of diversification in the early-20th century, and population increases and the resultant suburban development between the world wars, which both increased the number of local workers and decreased vast tracts of agricultural acreage, effectively altered the view of citriculture as a panoramic staple, both visually and perceptually. While grove and agricultural lands, particularly to the south, were converted to tree-lined streets of single-family dwellings, scattered lots and strips of property on the edges of the original townsite were the target of infill residential construction, and vacant lots, particularly along the arterials in the downtown core, were eyed for commercial development.

While economic interests became broader, commercial and industrial enterprise seemed to consolidate geographically as some areas became increasingly associated with these uses, and emerging strips of concentrated commercial zones appeared such as Magnolia Center to the south, Eighth Street (University Avenue) on the Eastside, the Magnolia Avenue/Van Buren Business District, and the expanding Main Street Industrial Corridor. This geographic concentration of commercial enterprise in Riverside was linear as it was associated with major arterials or highways and generally focused first on the streetcar, and later motoring, patron in addition to the neighborhood pedestrian, and eventually use shifted to mainly auto- or travel-related uses like auto courts, motels, service stations or related auto services, and roadside eateries. The suburbanization of areas more distant from downtowns and streetcar lines was made possible by a nation on the move. With nine million cars on American roads by 1920, attention was given to the improvement of transportation infrastructure. The use of automobiles by working class Americans rose steadily throughout the first half of the 20th century. Not just an important local arterial, Eighth Street became part of the California highway system in the 1930s and was signed Highway 19. By the mid-20th century, while many buildings remained in the industrial corridor on the western edge of the Eastside, fewer were dedicated to citrus-packing and shipping or had become vacant, like the SP's Independent Fruit

Company's Packing House (Sanborn Map 1952:18, 30).

The close of WWII marked the beginning of lasting change on many levels. Advances in land use and planning coupled with the rising importance of the automobile forever altered the urban landscape. In Riverside, the economic shift and population growth reflected regional trends. Characteristically, post-war development vied for proximity to growing suburban commercial centers. By the early 1950s, Eighth Street functioned as a vital regional transportation link. Increased traffic along the corridor prompted the conversion from residential to roadside commercial uses that catered to the needs of travelers and also served the residents of the neighborhoods to the north and south. Subdivision reached record heights as did traffic congestion, and the completion of the University of California, Riverside in the mid-1950s caused a dramatic increase in traffic patterns on Eighth Street (renamed University Avenue in 1966) and the Eastside. These challenges prompted the professionalization of city planning and the building of the Riverside Freeway (1957) and the Pomona Freeway (1960-63) through Riverside, which supplanted the local corridors as regional arterials, and forever altered a wide swath of adjacent streets and lots. The loss of direct contact with motorists began to be evinced on the local economy, and the financial decline continued through the 1970s, and '80s. The City's agricultural economy slowly gave way to the rising force of industry as well-known industrial giants, such as Rohr Corporation, Bourns Incorporated, and the Lily-Tulip Cup Corporation arrived in Riverside, and the increasing diversification of Riverside's economic livelihood saw the destruction of much of Riverside's once vast citrus and agricultural acreage.

Thus, it was the construction of the Riverside Freeway, State Route 91 (1957) on the eastern edge of downtown that prompted the grade separation of University Avenue (1957-1960), the subsequent construction of numerous bridges (ca. 1960) to accommodate the through path of Commerce Street, Santa Fe Avenue, the Riverside Canal, and the Union Pacific, AT&SF, and Southern Pacific tracks across the arterial street, and the demolition of the SP freight station (1967). The construction of the SPRR bridge, which was completed in 1960, prompted the removal of most of the track, including the original main line. The last lines were removed ca. 2000, and a curved vehicular asphalt drive was constructed from Commerce Street to the abandoned railroad bridge. State Route 91 was widened in 2008, further segregating the Eastside and the citrus-rail-industrial corridor on its western edge from the downtown core. The retention of the concrete loading platform as a freestanding structure after the demolition of most of the track in 1960 and the former freight house in 1967 supported the continued, but reduced, movement of rail freight in a forever changed local industrial economy and the diminished role of the Southern Pacific and other railroad companies, which began a slow decline in the face of the rising dominance of automobile and air transportation for both passengers and freight in the latter half of the 20th century.

The railroad bridge (1960) is associated with the Southern Pacific Railroad Company, a giant in the transcontinental and local rail era of western town settlement that played an active role in the settlement and development of Riverside and the early success of its citrus driven agro-economy. As a later remnant component of a much larger, more extensive, and no longer extant SPRR property, the construction of which required the demolition of original track across the historic alignment of Eighth Street (University Avenue), the railroad bridge lacks the level of architectural distinction, strength of historic association, and sufficient integrity to merit individual listing in the NR, CR, or for local designation. While currently within the boundaries of the Seventh Street East Historic District and the Citrus Thematic Industrial Potential Historic District, the railroad bridge does not fall within the period of significance nor does it contribute to the significance of these districts and should be considered a non-contributor. Therefore, JMRC recommends that the SPRR loading platform and SPRR bridge are each assigned a CHR Status Code of ***6L – Determined ineligible for local listing or designation through local government review process; may warrant special consideration in local planning***.

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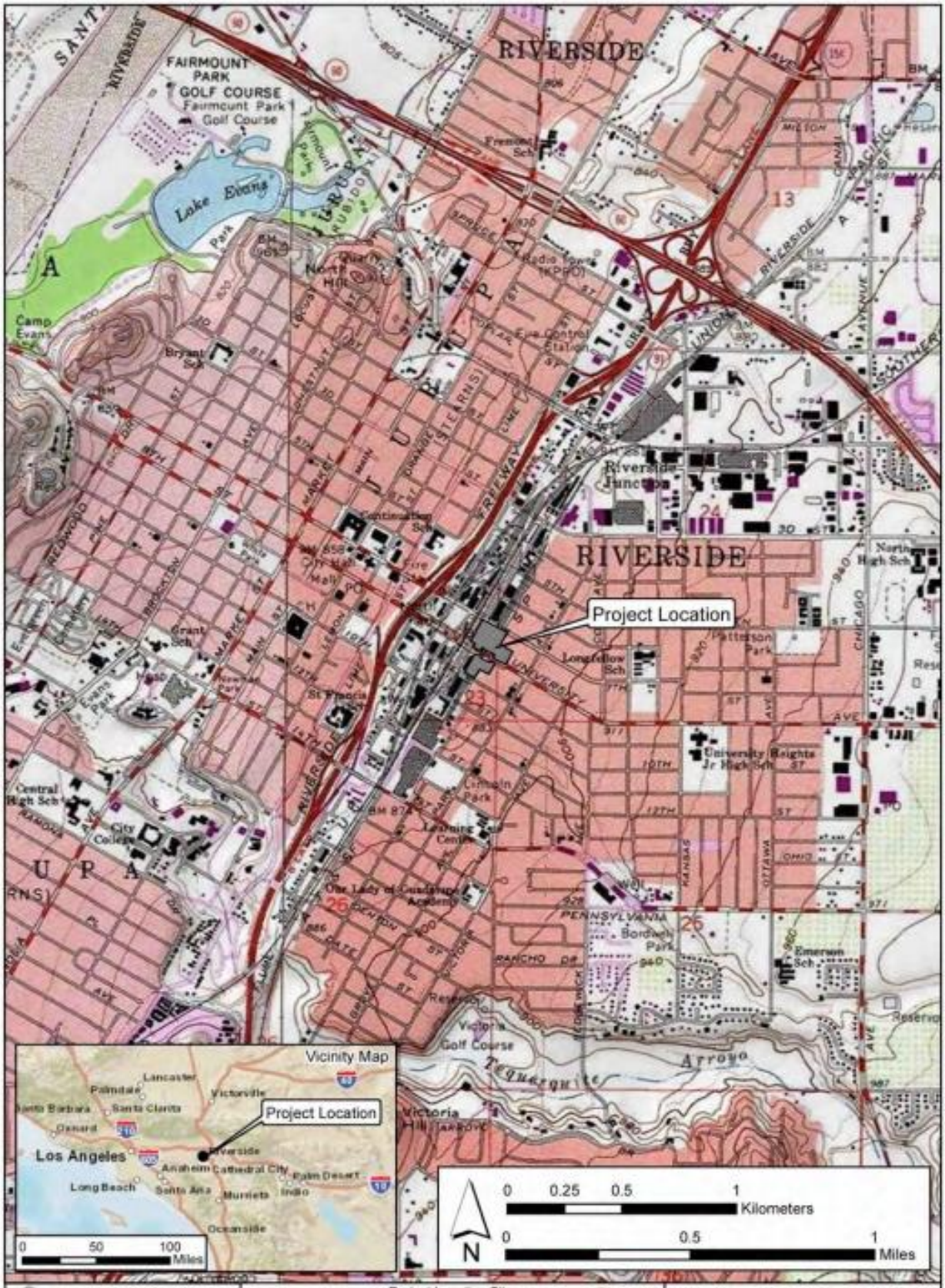
| State of California — The Resources Agency<br>DEPARTMENT OF PARKS AND RECREATION<br>**CONTINUATION SHEET** | Primary #<br>HRI#<br>Trinomial |
|---|---|

**Page** 8 **of** 8 ***Resource Name or #** (Assigned by recorder) Southern Pacific Railroad Bridge 56C0059

*** Recorded by** Jennifer Mermilliod ***Date** March 16, 2015 ☒ Continuation ☐ Update




BCRCONSULTING LLC

Project Location Site
Mission Lofts Project

Figure 1

JM Research and Consulting
5110 Magnolia Avenue
Riverside, California 92505

DI on

# Appendix B
## Proposed Project Exhibits

## Sheet Index

A0.1 Cover Sheet

SP1.0 Architectural Site Plan
SP1.1 Open Space Exhibit

### Civil

C1 Preliminary Grading Plan
C2 Preliminary Grading Plan

### Landscape

L.1 Conceptual Landscape Plan - North Side
L.2 Conceptual Landscape Plan - South Side
L.3 Pool Courtyard Enhancement
L.4 Contextual Imagery

### Architecture

A1.0 Building A Plan - Level 1
A1.1 Building A Plan - Level 2
A1.2 Building A Plan - Level 3&4
A1.3 Building A Plan - Roof
A1.4 Building A Elevations
A1.5 Building A Elevations

A2.0 Building B Plans & Sections
A2.1 Building B Elevations

A3.0 Unit Plans
A3.1 Unit Plans
A3.2 Unit Plans
A3.3 Unit Plans
A3.4 Fitness Room Plan
A3.5 Leasing & Clubroom Plans

A4.0 Perspectives
A4.1 Perspectives
A4.2 Perspectives
A4.3 Perspectives
A4.4 Perspectives

A5.0 Architectural Site Plan: Parcel 2
A5.1 Parcel 2 Elevation & Perspectives

A6.0 Material Board

**Civil:**
**KHR Associates**
4100 Newport Place Drive, Suite 200
Newport Beach, CA 92660
949.756.6440

**Landscape:**
**MJS Design Group, Inc.**
507 30th Street
Newport Beach, CA 92663
949.675.9964
mjsdesigngroup.com

# MISSION LOFTS

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

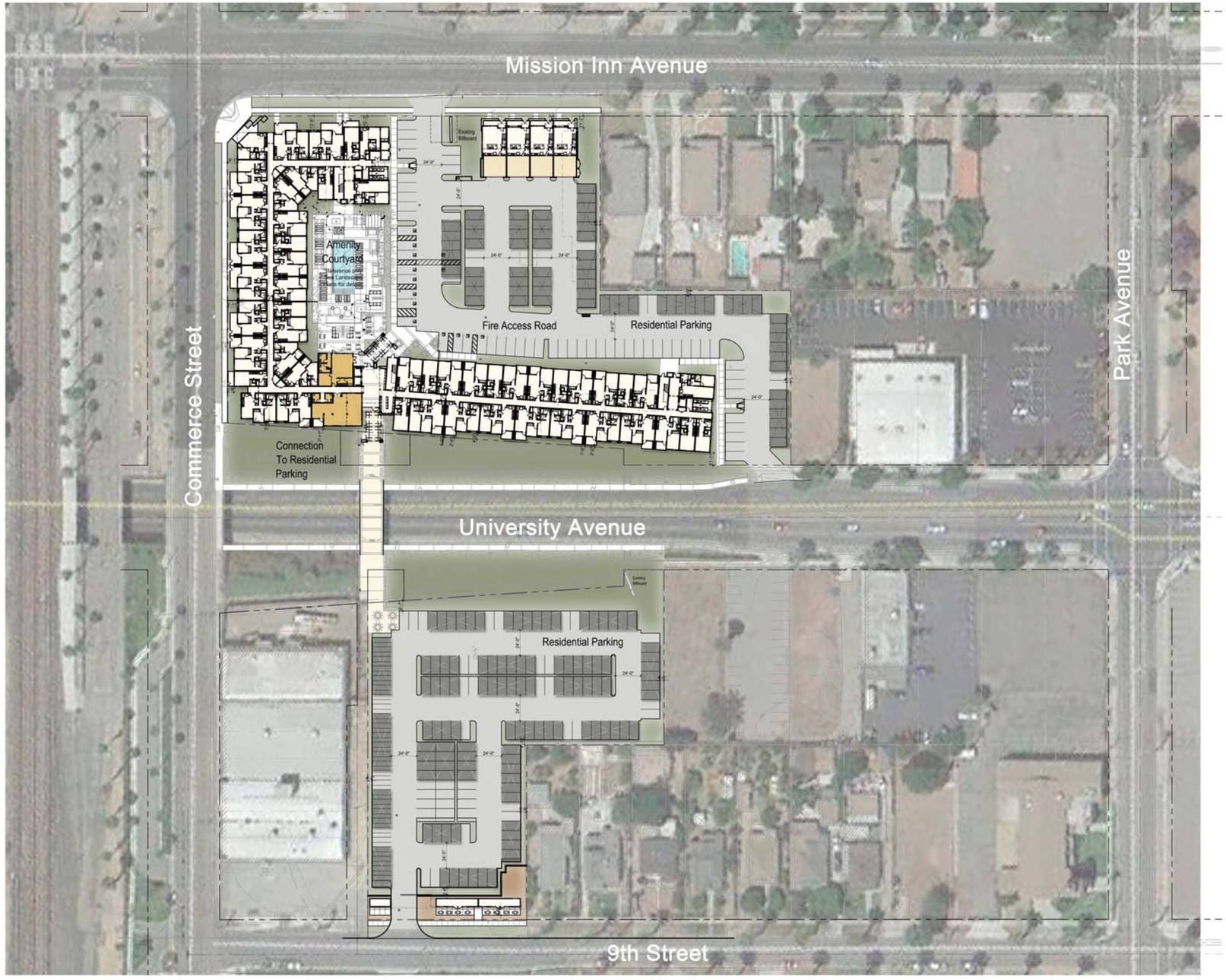
# COVER SHEET

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A0.1

**KTGY Group, Inc.**
**Architecture+Planning**
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com




| Project Data | | | |
|---|---|---|---|
| Project | Mission Lofts<br>Riverside, CA | | |
| Site Area Information | | | |
| Parcel North | Gross Site Area | | 3.16 AC |
| Parcel South | Gross Site Area | | 1.53 AC |
| Total | Gross Site Area | 4.69 AC | |
| | Total Dwelling Units | 212 DU | |
| | Density | 45.2 DU/AC | |

| Building Plan Summary | Type V Construction |
|---|---|
| Building A | 4 Story Residential on Grade |
| Building B | 2 Story Residential on Grade |
| Building A | 208 DU |
| Building B | 4 DU |
| **Total** | **212 DU** |

| Unit Plan | Unit Type | Gross SF | Total | Percent |
|---|---|---|---|---|
| Plan 0-1 | Studio | 459 | 51 | 24.1% |
| Plan 0-2 | Studio | 639 | 1 | 0.5% |
| Plan 1-0 | 1 Bd / 1 Ba | 624 | 16 | 7.5% |
| Plan 1-1 | 1 Bd / 1 Ba | 657 | 4 | 1.9% |
| Plan 1-2 | 1 Bd / 1 Ba | 661 | 52 | 24.5% |
| Plan 1-3 | 1 Bd / 1 Ba | 739 | 2 | 0.9% |
| Plan 1-4 | 1 Bd / 1 Ba | 828 | 3 | 1.4% |
| Plan 2-0 | 2 Bd / 2 Ba | 888 | 73 | 34.4% |
| Plan 2-1 | 2 Bd / 2 Ba | 952 | 6 | 2.8% |
| Plan 2-2 | 2 Bd / 2 Ba | 1,177 | 4 | 1.9% |
| **Totals** | | | **212** | **100%** |
| Average Unit Size | | 709 SF | | |
| Studio Plan | | | 52 | 25% |
| 1 Bedroom Plan | | | 77 | 36% |
| 2 Bedroom Plan | | | 83 | 39% |
| Totals | | | 212 | 100% |

| Residential Parking Provided | |
|---|---|
| Parcel North Parking | |
| Covered Parking | 67 stalls |
| Open Parking | 79 stalls |
| Total Parcel North Parking | 146 stalls |
| Parcel South Parking | |
| Covered Parking | 124 stalls |
| Open Parking | 50 stalls |
| Total Parcel South Parking | 174 stalls |
| Total Covered Parking | 191 stalls |
| Total Open Parking | 129 stalls |
| **Total Stalls Provided** | **320 stalls** |
| **Parking Ratio** | **1.51 stalls per unit** |

Carport Parking

0 20 40 80

# MISSION LOFTS

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

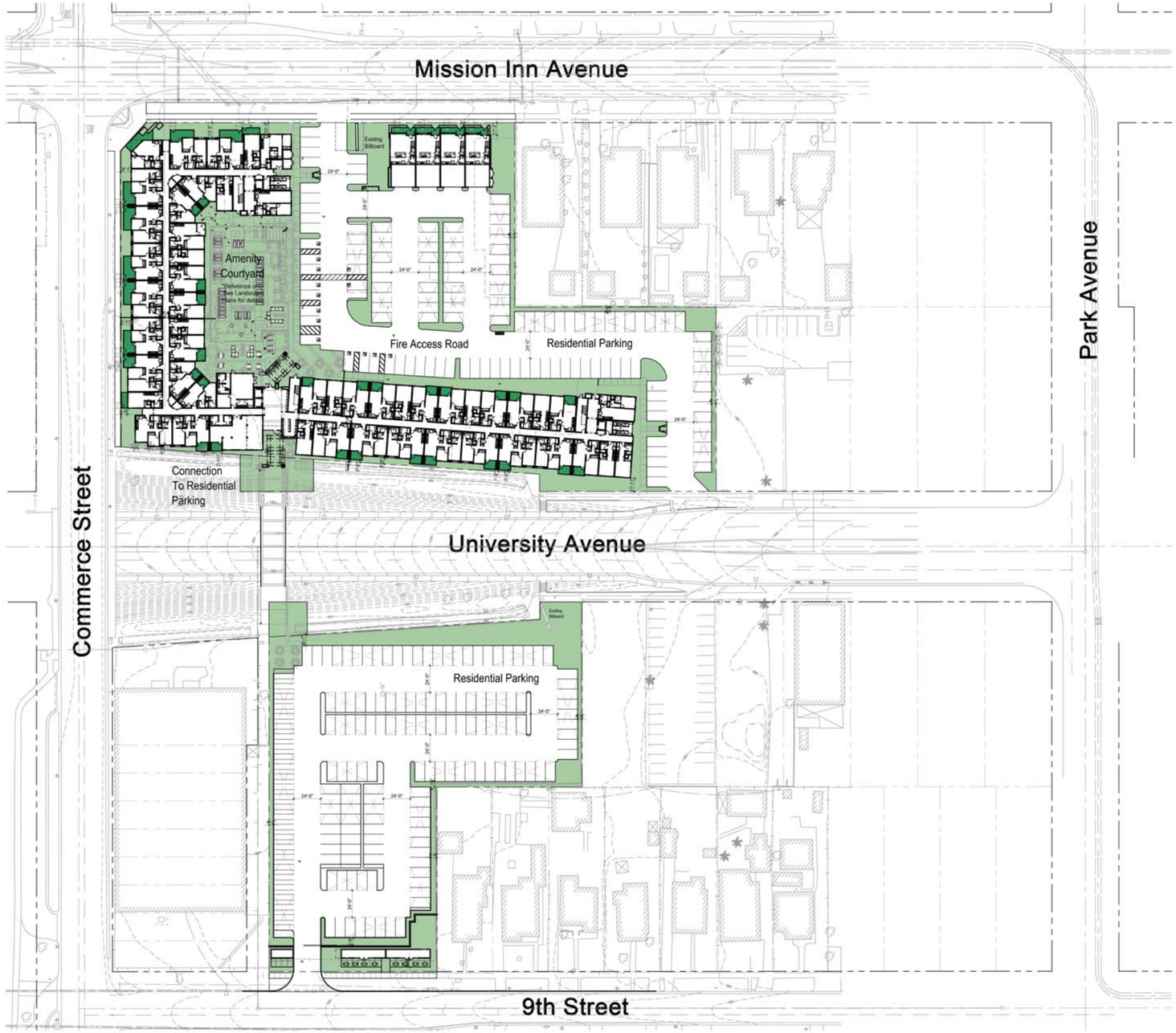
# ARCHITECTURAL SITE PLAN

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# SP1.0

**KTGY Group, Inc.**
**Architecture+Planning**
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com




| | |
|---|---|
| Total Private Open Space Provided | 11,430 SF |
| Total Common Open Space Provided | 50,616 SF |
| **Total Open Space Provided** | **62,046 SF** |

Carport Parking

0 20 40 80

# MISSION LOFTS

# OPEN SPACE EXHIBIT

SP1.1

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

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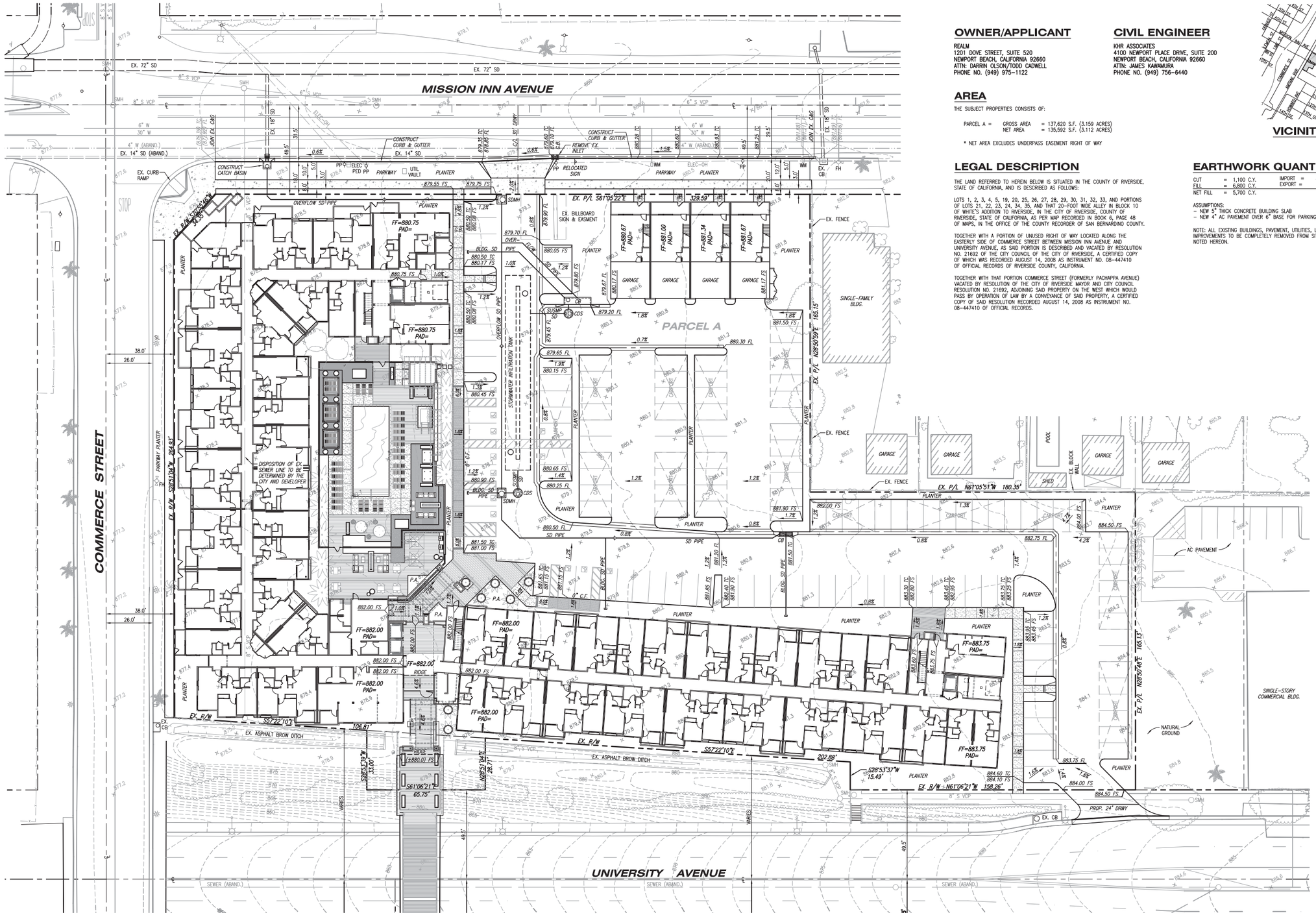



## OWNER/APPLICANT

REALM
1201 DOVE STREET, SUITE 520
NEWPORT BEACH, CALIFORNIA 92660
ATTN: DARRIN OLSON/TODD CADWELL
PHONE NO. (949) 975-1122

## CIVIL ENGINEER

KHR ASSOCIATES
4100 NEWPORT PLACE DRIVE, SUITE 200
NEWPORT BEACH, CALIFORNIA 92660
ATTN: JAMES KAWAMURA
PHONE NO. (949) 756-6440

## VICINITY MAP

## AREA

THE SUBJECT PROPERTIES CONSISTS OF:

PARCEL A = GROSS AREA = 137,620 S.F. (3.159 ACRES)
NET AREA = 135,592 S.F. (3.112 ACRES)

* NET AREA EXCLUDES UNDERPASS EASEMENT RIGHT OF WAY

## LEGAL DESCRIPTION

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

LOTS 1, 2, 3, 4, 5, 19, 20, 25, 26, 27, 28, 29, 30, 31, 32, 33, AND PORTIONS OF LOTS 21, 22, 23, 24, 34, 35, AND THAT 20-FOOT WIDE ALLEY IN BLOCK 10 OF WHITE'S ADDITION TO RIVERSIDE, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 6, PAGE 48 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY.

TOGETHER WITH A PORTION OF UNUSED RIGHT OF WAY LOCATED ALONG THE EASTERLY SIDE OF COMMERCE STREET BETWEEN MISSION INN AVENUE AND UNIVERSITY AVENUE, AS SAID PORTION IS DESCRIBED AND VACATED BY RESOLUTION NO. 21692 OF THE CITY COUNCIL OF THE CITY OF RIVERSIDE, A CERTIFIED COPY OF WHICH WAS RECORDED AUGUST 14, 2008 AS INSTRUMENT NO. 08-447410 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

TOGETHER WITH THAT PORTION COMMERCE STREET (FORMERLY PACHAPPA AVENUE) VACATED BY RESOLUTION OF THE CITY OF RIVERSIDE MAYOR AND CITY COUNCIL RESOLUTION NO. 21692, ADJOINING SAID PROPERTY ON THE WEST WHICH WOULD PASS BY OPERATION OF LAW BY A CONVEYANCE OF SAID PROPERTY, A CERTIFIED COPY OF SAID RESOLUTION RECORDED AUGUST 14, 2008 AS INSTRUMENT NO. 08-447410 OF OFFICIAL RECORDS.

## EARTHWORK QUANTITIES

| | | | |
|---|---|---|---|
| CUT | = 1,100 C.Y. | IMPORT | = 5,700 C.Y. |
| FILL | = 6,800 C.Y. | EXPORT | = 0 C.Y. |
| NET FILL | = 5,700 C.Y. | | |

ASSUMPTIONS:
- NEW 5" THICK CONCRETE BUILDING SLAB
- NEW 4" AC PAVEMENT OVER 6" BASE FOR PARKING LOT

NOTE: ALL EXISTING BUILDINGS, PAVEMENT, UTILITIES, LANDSCAPING, & OTHER IMPROVEMENTS TO BE COMPLETELY REMOVED FROM SITE, UNLESS OTHERWISE NOTED HEREON.

0 10 20 40 60
SCALE: 1"=20' DATE: 10/20/14

# MISSION LOFTS

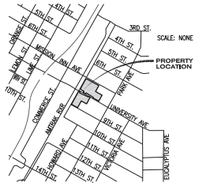
## REALM

## PRELIMINARY GRADING PLAN - SHEET C1

## RIVERSIDE, CALIFORNIA

KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
4100 Newport Place Drive - Suite 200 Tel (949) 756-6440
Newport Beach, California 92660 Fax (949) 756-6444

R:\Realm\Realm-Riverside\Cbb\Preliminary\KRAL-GRAD-BASE.dwg Oct 17, 2014 - 12:16pm




## VICINITY MAP

## OWNER/APPLICANT

REALM
1201 DOVE STREET, SUITE 520
NEWPORT BEACH, CALIFORNIA 92660
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## CIVIL ENGINEER

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4100 NEWPORT PLACE DRIVE, SUITE 200
NEWPORT BEACH, CALIFORNIA 92660
ATTN: JAMES KAWAMURA
PHONE NO. (949) 756-6440

## AREA

THE SUBJECT PROPERTIES CONSISTS OF:

| | | | |
|---|---|---|---|
| PARCEL B = | GROSS AREA | = | 66,582 S.F. (1.528 ACRES) |
| | NET AREA | = | 65,547 S.F. (1.504 ACRES) |

* NET AREA EXCLUDES UNDERPASS EASEMENT RIGHT OF WAY

## LEGAL DESCRIPTION

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

LOTS 26, 27, 28 AND PORTION OF LOTS 3, 4, 5, 6, AND 7 IN BLOCK 12 OF WHITE'S ADDITION TO RIVERSIDE, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 6, PAGE 48 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

EXCEPT THOSE PORTIONS OF SAID LOTS 3 AND 4 AS CONVEYED TO THE STATE OF CALIFORNIA, IN DEED RECORDED APRIL 24, 1959 AS INSTRUMENT NO. 34760 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

ALSO EXCEPTING THEREFROM THOSE PORTIONS OF SAID LOTS 5, 6 AND 7 DESCRIBED AS FOLLOWS:

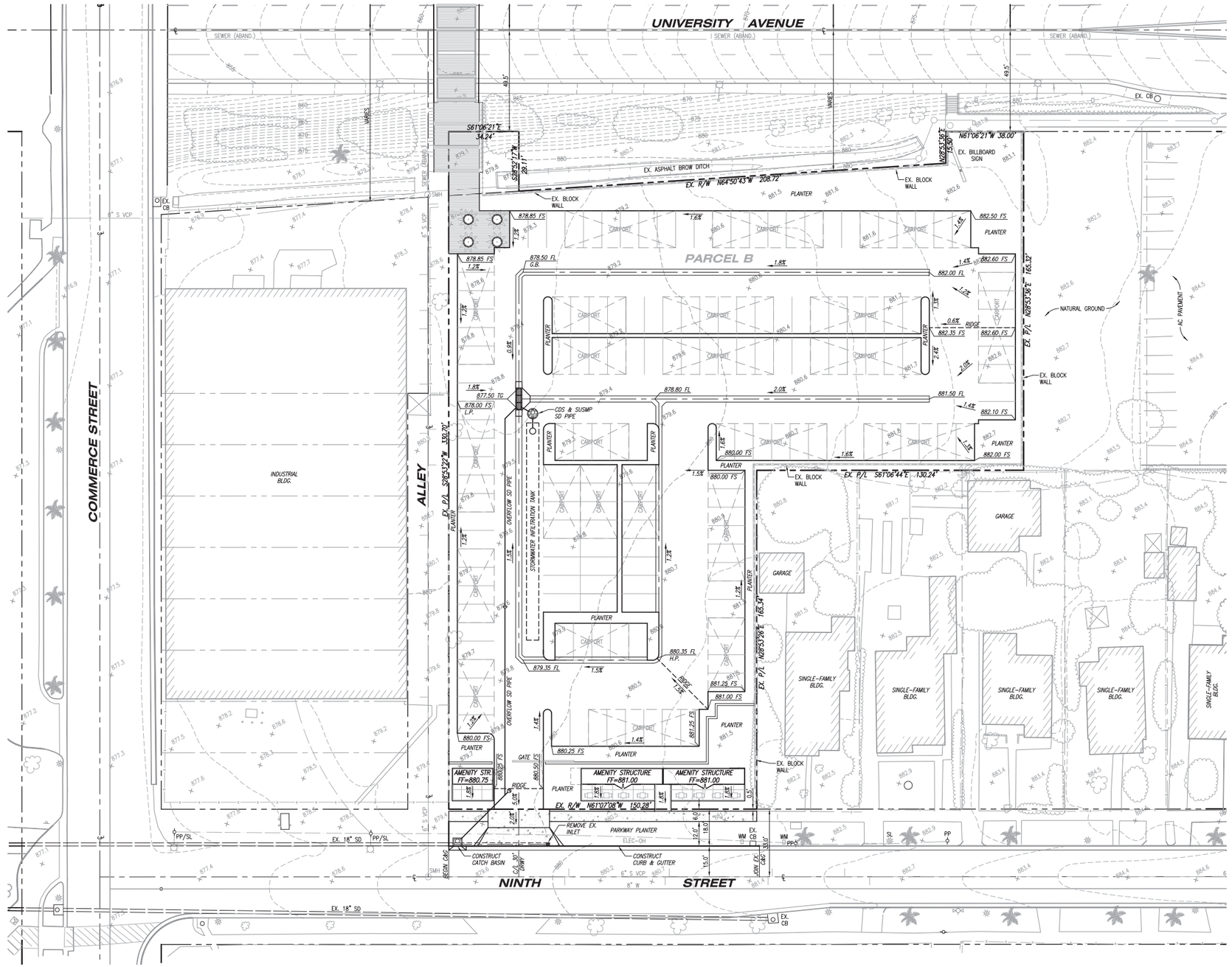
BEGINNING AT THE MOST NORTHERLY CORNER OF LOT 5; THENCE ALONG THE NORTHERLY LINES OF SAID LOTS 5, 6, 7 AND TO THE MOST NORTHERLY CORNER OF THE EASTERLY RECTANGULAR 38 FEET OF SAID LOT 7; THENCE SOUTHERLY, ALONG THE WESTERLY LINE OF SAID EASTERLY 38 FEET OF LOT 7, 15.50 FEET; THENCE ALONG A STRAIGHT LINE WESTERLY TO A POINT IN THE WESTERLY LINE OF LOT 5, 24.80 FEET SOUTHERLY FROM THE POINT OF BEGINNING; THENCE NORTHERLY ALONG SAID WESTERLY LINE 24.80 FEET TO SAID POINT OF BEGINNING.

## EARTHWORK QUANTITIES

| | | | | | |
|---|---|---|---|---|---|
| CUT | = | 2,200 C.Y. | IMPORT | = | 0 C.Y. |
| FILL | = | 100 C.Y. | EXPORT | = | 2,100 C.Y. |
| NET CUT | = | 2,100 C.Y. | | | |

ASSUMPTIONS:
- NEW 5" THICK CONCRETE BUILDING SLAB
- NEW 4" AC PAVEMENT OVER 6" BASE FOR PARKING LOT

NOTE: ALL EXISTING BUILDINGS, PAVEMENT, UTILITIES, LANDSCAPING, & OTHER IMPROVEMENTS TO BE COMPLETELY REMOVED FROM SITE, UNLESS OTHERWISE NOTED HEREON.




SCALE: 1"=20' DATE: 10/20/14

KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
4100 Newport Place Drive - Suite 200 Tel (949) 756-6440
Newport Beach, California 92660 Fax (949) 756-6444

# MISSION LOFTS

## REALM

## PRELIMINARY GRADING PLAN - SHEET C2

## RIVERSIDE, CALIFORNIA

R:\Realm\Vestin-Riverside\C3D\Preliminary\REAL-GRAD-BASE.dwg Oct 17, 2014 - 12:22pm

## PROPOSED PLANT LIST

| SYMBOL | BOTANICAL NAME | COMMON NAME | SIZE | WUCOLS |
|---|---|---|---|---|
| **TREES** | | | | |
| | ACACIA STENOPHYLLA | SHOESTRING ACACIA | 36" BOX | LOW |
| | ARBUTUS 'MARINA' | HYBRID STRAWBERRY TREE | 24" BOX | MEDIUM |
| | CERCIDIUM X 'DESERT MUSEUM' | PALO VERDE | 36" BOX | MEDIUM |
| | MELALEUCA QUINQUENERVIA | CAJEPUT TREE | 24" BOX | MEDIUM |
| | POPLAR NIGRA 'ITALICA' | LOMBARDY POPLAR | 36" BOX | MEDIUM |
| **PALMS/ACCENT/EVERGREEN VERTICAL SHRUBS** | | | | |
| | BAMBUSA OLDHAMII | GIANT TIMBER BAMBOO | 15 GAL. | MEDIUM |
| | DRACAENA DRACO | DRAGON TREE | 6' BTH | LOW |
| | PODOCARPUS MACROPHYLLUS | YEW PINE | 15 GAL. | MEDIUM |
| | WASHINGTONIA FILIFERA | CALIFORNIA FAN PALM | 16' BTH | MEDIUM |
| **STREET TREES** | | | | |
| | MISSION INN AVENUE / COMMERCE STREET / 9TH STREET STREET TREE PER CITY OF RIVERSIDE MASTER STREET TREE PROGRAM | | 24" BOX | T.B.D. |
| **SHRUBS - HYDRO-ZONE 1 NORTH/EAST EXPOSURE** | | | | |
| | MEDIUM SHRUBS | | | |
| | ASPARAGUS DENSIPLORUS 'MYERSII' | MYER ASPARAGUS | 5 GAL. | LOW |
| | CHONDROPETALUYM 'ELEPHANTINUM' | LARGE CAPE RUSH | 5 GAL. | LOW |
| | CARISSA M. 'HORIZONTALIS' | NATAL PLUM | 5 GAL. | MEDIUM |
| | SMALL SHRUBS | | | |
| | CAREX DIVULSA | BERKELEY SEDGE | 5 GAL. | MEDIUM |
| | LIRIOPE MUSCARI | BIG BLUE LILY TURF | 5 GAL. | MEDIUM |
| | LOMANDRA LONGIFOLIA 'BREEZE' | SPINY HEADED MAT RUSH | 5 GAL. | MEDIUM |
| | PHILODENDRON XANADU | PHILODENDRON | 5 GAL. | MEDIUM |
| **SHRUBS - HYDRO-ZONE 2 SOUTH/WEST EXPOSURE** | | | | |
| | LARGE SHRUBS | | | |
| | DASYLIRION WHEELERI | DESERT SPOON | 5 GAL | LOW |
| | KALANCHOE BEHARENSIS | FELT PLANT | 15 GAL | LOW |
| | PHORMIUM HYBRIDS | NEW ZEALAND FLAX | - | - |
| | MEDIUM SHRUBS | | | |
| | ALOE STRIATA | CORAL ALOE | 5 GAL | LOW |
| | DIANELLA REVOLUTA | LITTLE REV | 5 GAL | LOW |
| | CALLISTEMON 'LITTLE JOHN' | DWARF CALLISTEMON | 5 GAL | LOW |
| | ECHEVERIA PEACOCKII | PEACOCK ECHEVERIA | 5 GAL | LOW |
| | FESTUCA OVINA GLAUCA | BLUE FESCUE | 5 GAL | LOW |
| | HESPERALOE PARVIFLORA | RED YUCCA | 5 GAL | VERY LOW |
| | LIMONIUM PEREZII | SEA LAVENDAR | 5 GAL | LOW |
| | MUHLENBURGIA CAPILLARIS | PINK MUHLY | 5 GAL | MEDIUM |
| | SMALL SHRUBS | | | |
| | ROSMARINUS PROSTRATUS | DWARF ROSEMARY | 5 GAL | LOW |
| | FESTUCA OVINA GLAUCA | BLUE FESCUE | 5 GAL | LOW |
| | SENECIO MANDRALISCAE | SENECIO | 1 GAL | LOW |
| **SYNTHETIC TURF** | | | | |
| | SYNTHETIC TURF AT POOL COURTYARD | | | |

## PLANT PALETTE NOTES:

THIS PRELIMINARY PLANT PALETTE IS INTENDED TO REPRESENT A TYPICAL SAMPLE OF THE PROPOSED PLANTS BUT DOES NOT INDICATE THE EXACT SPECIES WHICH WILL BE DEVELOPED ON THE DETAILED PLANS.

## WUCOLS NOTE:

WUCOLS, WATER USE CLASSIFICATION OF LANDSCAPE SPECIES, IS A UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION PUBLICATION AND IS A GUIDE TO THE WATER NEEDS OF LANDSCAPE PLANTS.

## TREE SURVEY NOTE:

1. NO EXISTING TREES ON-SITE TO BE PROTECTED.

## WATER EFFICIENT LANDSCAPING

THE FOLLOWING MEASURES WILL BE INCORPORATED INTO THE PROJECT TO CONSERVE WATER:

1. THE IRRIGATION SYSTEM SHALL MEET THE REQUIREMENTS OF THE CITY OF RIVERSIDE GUIDELINES FOR WATER EFFICIENT LANDSCAPES.
2. THE ESTIMATED APPLIED WATER USE ALLOWED FOR THE LANDSCAPE AREA SHALL NOT EXCEED THE MAWA CALCULATION.

0 10 20 40

# MISSION LOFTS

# CONCEPTUAL LANDSCAPE PLAN (NORTH SITE)

# L.1

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.22.2014

**MJS Design Group**
Cannery Lofts
507 30th Street
Newport Beach, CA 92663
(949) 675-9964

## PROPOSED PLANT LIST

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| | ARBUTUS 'MARINA' | HYBRID STRAWBERRY TREE | 24" BOX | MEDIUM |
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| | MELALEUCA QUINQUENERVIA | CAJEPUT TREE | 24" BOX | MEDIUM |
| | POPLAR NIGRA 'ITALICA' | LOMBARDY POPLAR | 36" BOX | MEDIUM |
| **PALMS/ACCENT/EVERGREEN VERTICAL SHRUBS** | | | | |
| | BAMBUSA OLDHAMII | GIANT TIMBER BAMBOO | 15 GAL. | MEDIUM |
| | DRACAENA DRACO | DRAGON TREE | 6' BTH | LOW |
| | PODOCARPUS MACROPHYLLUS | YEW PINE | 15 GAL. | MEDIUM |
| | WASHINGTONIA FILIFERA | CALIFORNIA FAN PALM | 16' BTH | MEDIUM |
| **STREET TREES** | | | | |
| | MISSION INN AVENUE / COMMERCE STREET / 9TH STREET STREET TREE PER CITY OF RIVERSIDE MASTER STREET TREE PROGRAM | | 24" BOX | T.B.D. |
| **SHRUBS - HYDRO-ZONE 1 NORTH/EAST EXPOSURE** | | | | |
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| | ASPARAGUS DENSIPLORUS 'MYERSII' | MYER ASPARAGUS | 5 GAL. | LOW |
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| | SMALL SHRUBS | | | |
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| | PHORMIUM HYBRIDS | NEW ZEALAND FLAX | - | - |
| | MEDIUM SHRUBS | | | |
| | ALOE STRIATA | CORAL ALOE | 5 GAL | LOW |
| | DIANELLA REVOLUTA | LITTLE REV | 5 GAL | LOW |
| | CALLISTEMON 'LITTLE JOHN' | DWARF CALLISTEMON | 5 GAL | LOW |
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| | HESPERALOE PARVIFLORA | RED YUCCA | 5 GAL | VERY LOW |
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| | SMALL SHRUBS | | | |
| | ROSMARINUS PROSTRATUS | DWARF ROSEMARY | 5 GAL. | LOW |
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| **SYNTHETIC TURF** | | | | |
| | SYNTHETIC TURF AT POOL COURTYARD | | | |

### PLANT PALETTE NOTES:

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0 10 20 40

# MISSION LOFTS

# CONCEPTUAL LANDSCAPE PLAN (SOUTH SITE)

# L.2

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.22.2014

**MJS Design Group**
Cannery Lofts
507 30th Street
Newport Beach, CA 92663
(949) 675-9964

## LANDSCAPE AMENITIES KEY:

1. POOL EQUIPMENT ROOM with METAL TRELLIS and OUTDOOR SHOWERS
2. MATCHING HEIGHT PALM TREES
3. SPA with WATER EFFECTS - 8' W x 12' L
4. ENHANCED LINEAR PAVING with BANDING
5. SPECIMEN TREE in RAISED METAL PLANTER
6. 3 METAL CABANAS - 8' W x 8' L
7. POOL - 20' WD x 50' L
8. METAL POOL ENCLOSURE
9. FIRE PIT TERRACE with LOUNGE FURNITURE
10. DRAGON TREES IN OVERSIZED POTTERY
11. SPA WALL with METAL TRELLIS
12. FABRIC SUNNING BEDS on SYNTHETIC TURF
13. FIRE PIT with LOUNGE FURNITURE
14. BARBECUE COUNTER with 2 UNITS
15. DINING TERRACE with OFFSET UMBRELLAS

0 5 10 20

# MISSION LOFTS

# POOL COURTYARD ENLARGEMENT

L.3

**Mission Lofts LLC**
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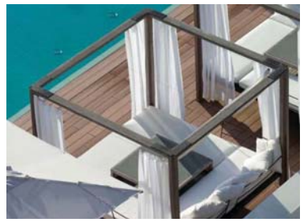
RIVERSIDE, CA

KTGY # 2012-0471 10.22.2014

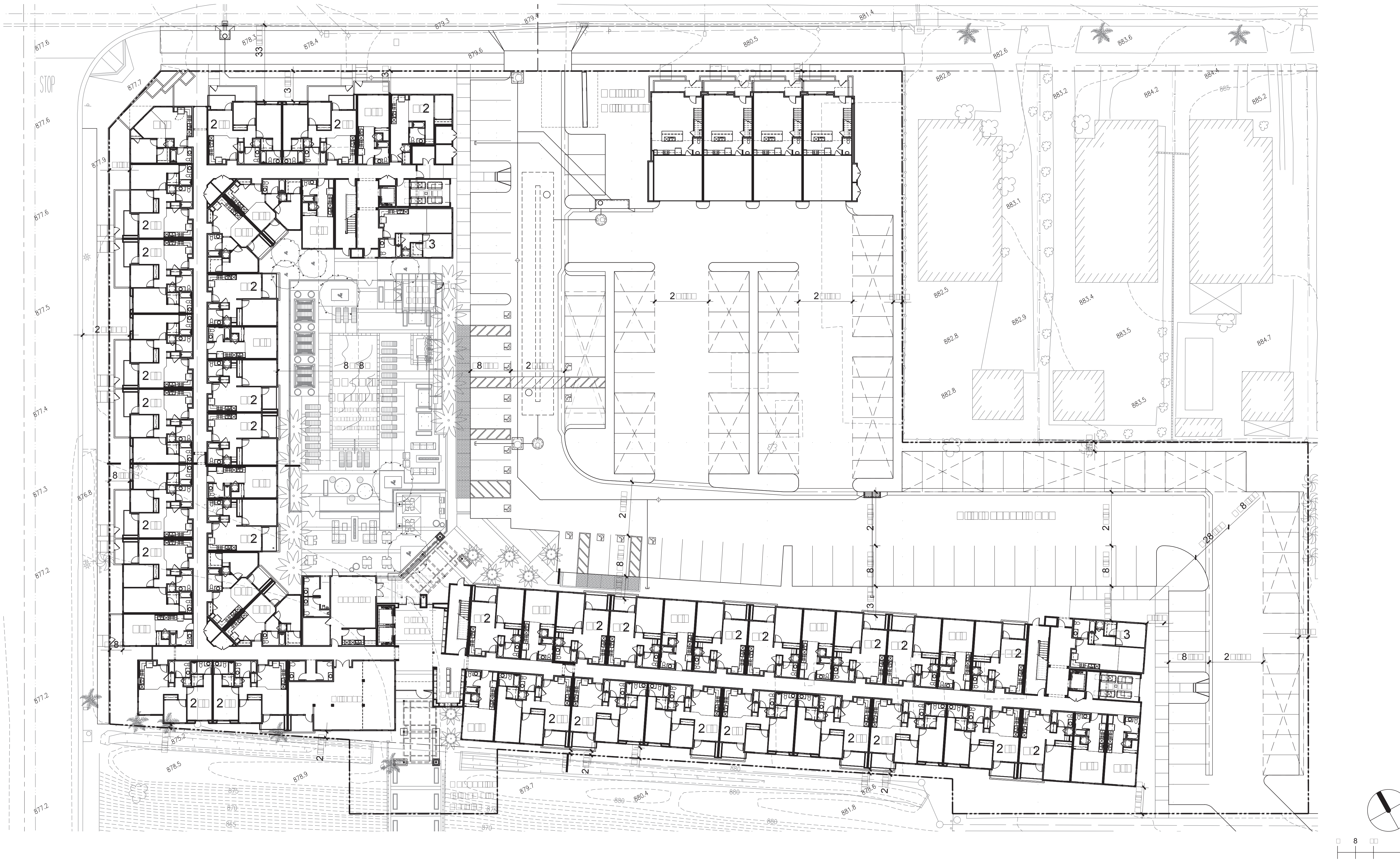
**MJS Design Group**
Cannery Lofts
507 30th Street
Newport Beach, CA 92663
(949) 675-9964



POOL COURTYARD

PLANT MATERIAL

LIGHTING




# MISSION LOFTS

**Mission Lofts LLC**

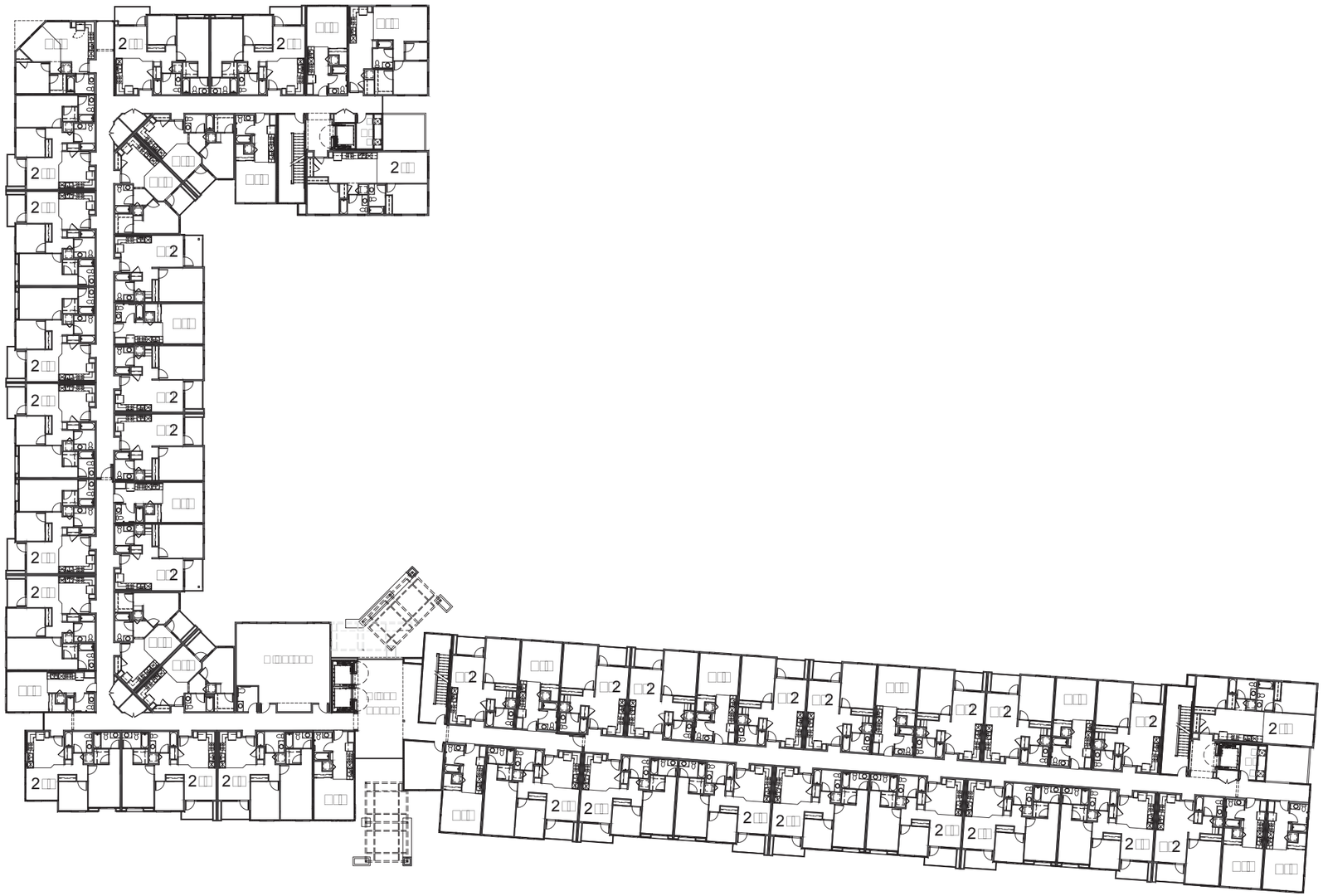
# BUILDING A PLAN - LEVEL 1

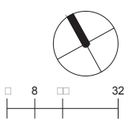
RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A1.0

**KTGY Group, Inc.**
**Architecture+Planning**






# MISSION LOFTS

**Mission Lofts LLC**

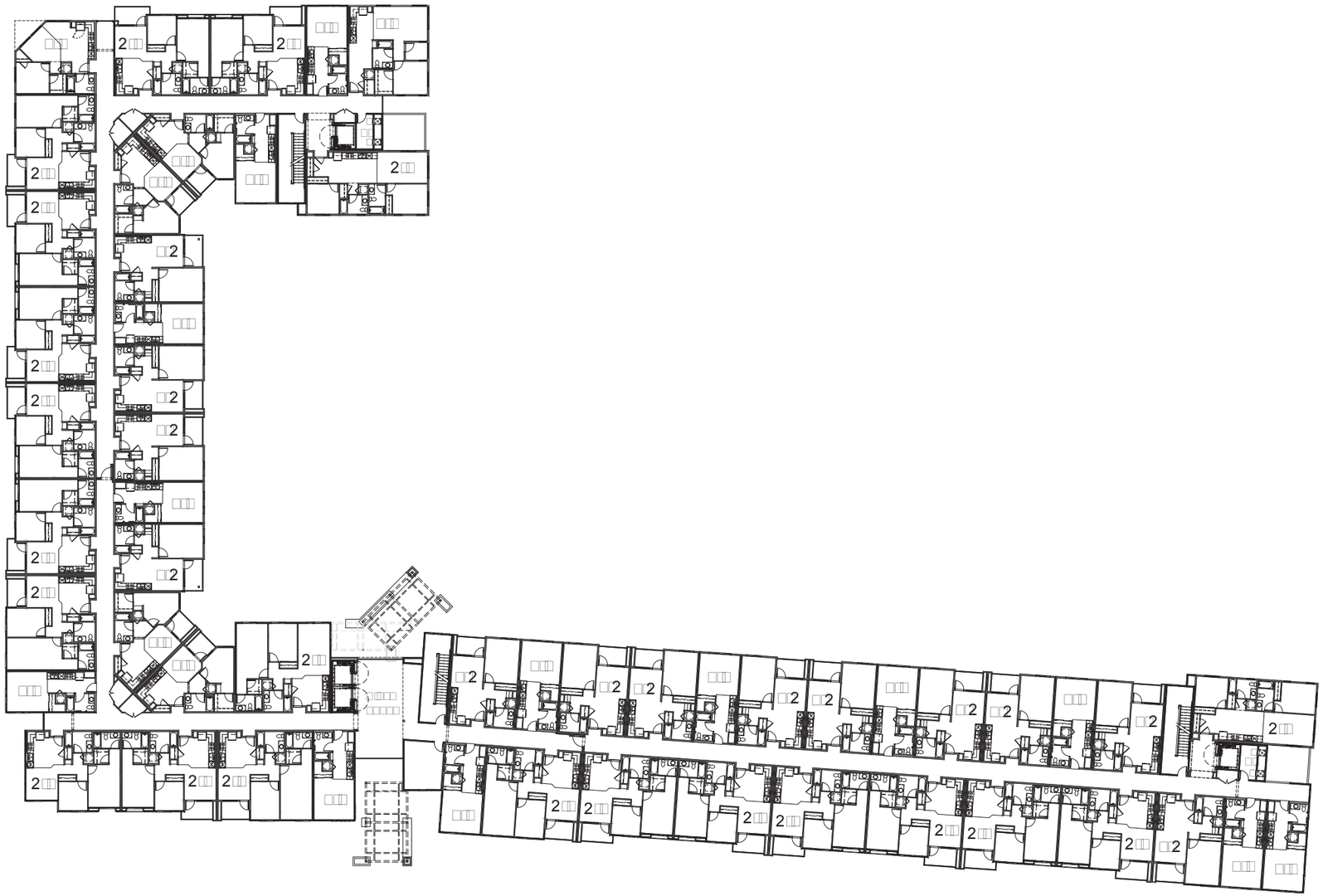
# BUILDING A PLAN - LEVEL 2

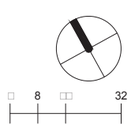
RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A1.1

**KTGY Group, Inc.**
**Architecture+Planning**






# MISSION LOFTS

**Mission Lofts LLC**
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# BUILDING A PLAN - LEVEL 3 & 4

# A1.2

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

**KTGY Group, Inc.**
**Architecture+Planning**
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# MISSION LOFTS

# BUILDING A PLAN - ROOF

# A1.3


**Mission Lofts LLC**
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RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014


**KTGY Group, Inc.**
**Architecture+Planning**
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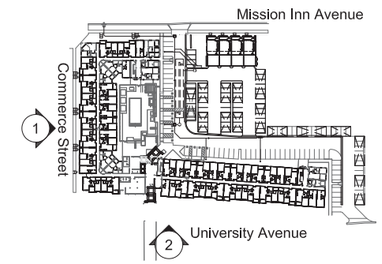



Key Map n.t.s.

1. Commerce Street Elevation

2. University Avenue Elevation

## Material Legend

1. Corrugated Metal Siding
2. Exterior Metal System
3. Stucco
4. Cementitious Plaster
5. Recessed Window
6. Metal Awning
7. Perforated Metal
8. Concrete Block
9. Project Signage
10. Carport

0 8 16 32

# MISSION LOFTS

# BUILDING A: ELEVATIONS

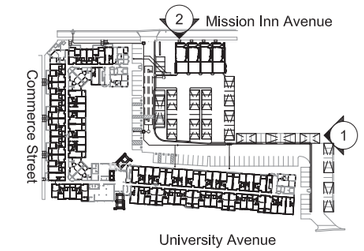
# A1.4

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

**KTGY Group, Inc.**
**Architecture+Planning**
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com




Key Map n.t.s.

1. East Elevation

2. Mission Inn Avenue Elevation

## Material Legend

1. Corrugated Metal Siding
2. Exterior Metal System
3. Stucco
4. Cementitious Plaster
5. Recessed Window
6. Metal Awning
7. Perforated Metal
8. Concrete Block
9. Project Signage
10. Carport

0 8 16 32

# MISSION LOFTS

# BUILDING A: ELEVATIONS

# A1.5

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

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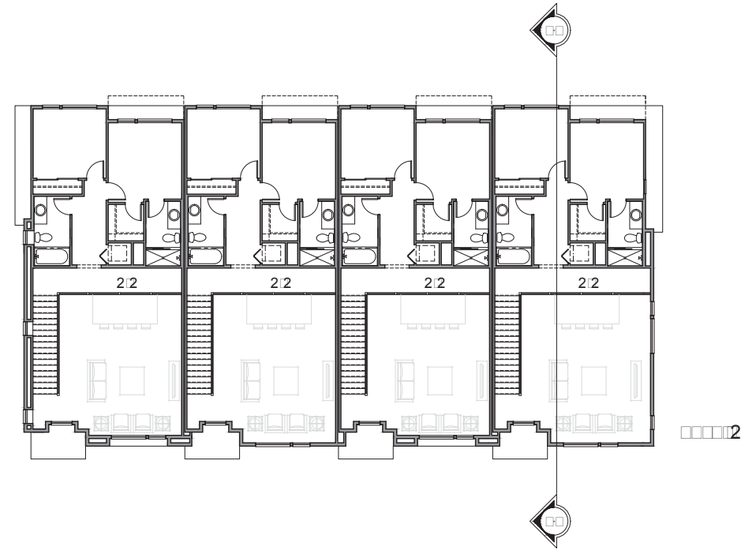


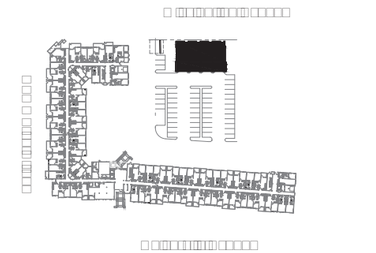

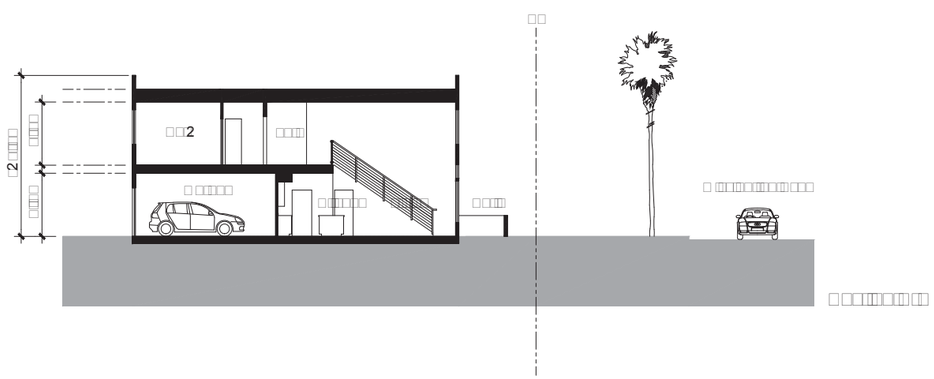


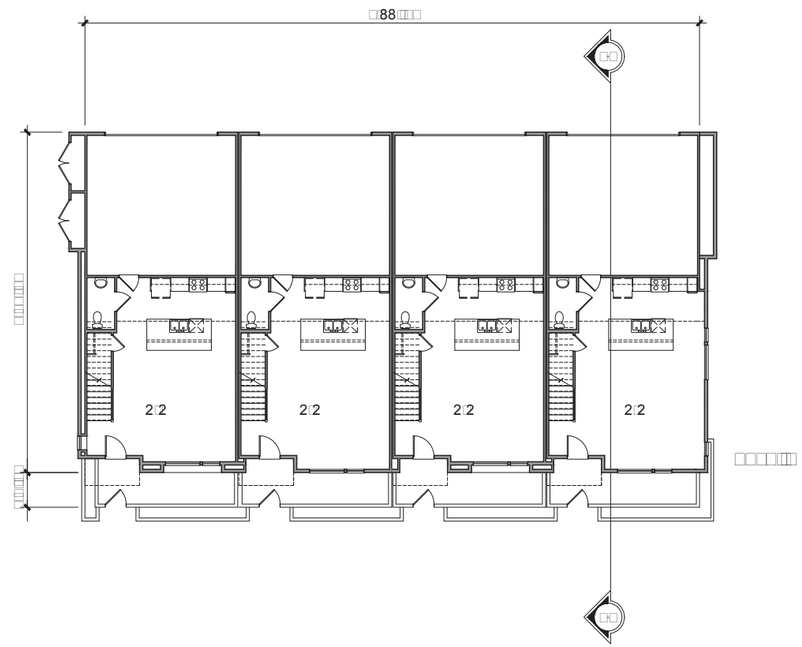


# MISSION LOFTS

**Mission Lofts LLC**
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22

# BUILDING B: PLANS & SECTION

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

8

# A2.0

**KTGY Group, Inc.**
**Architecture+Planning**
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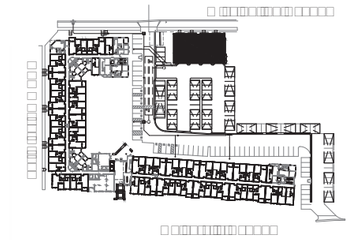

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3

# MISSION LOFTS

**Mission Lofts LLC**

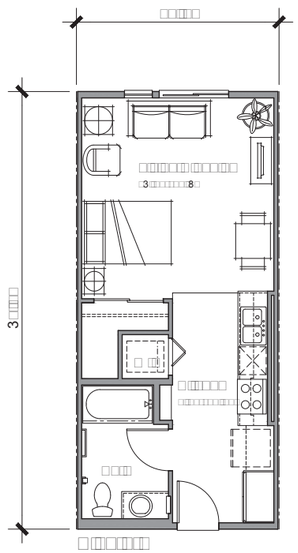
# BUILDING B: ELEVATIONS

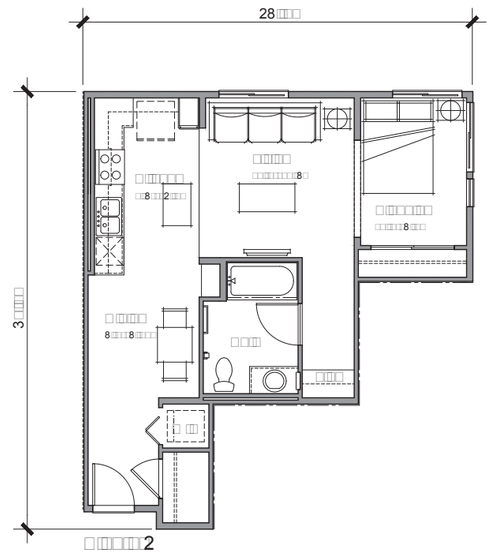
RIVERSIDE, CA

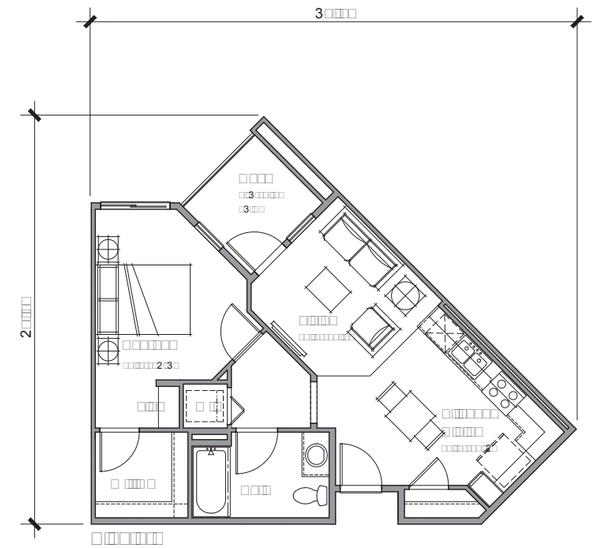
KTGY # 2012-0471 10.20.2014

# A2.1

**KTGY Group, Inc.**
**Architecture+Planning**







# MISSION LOFTS

**Mission Lofts LLC**

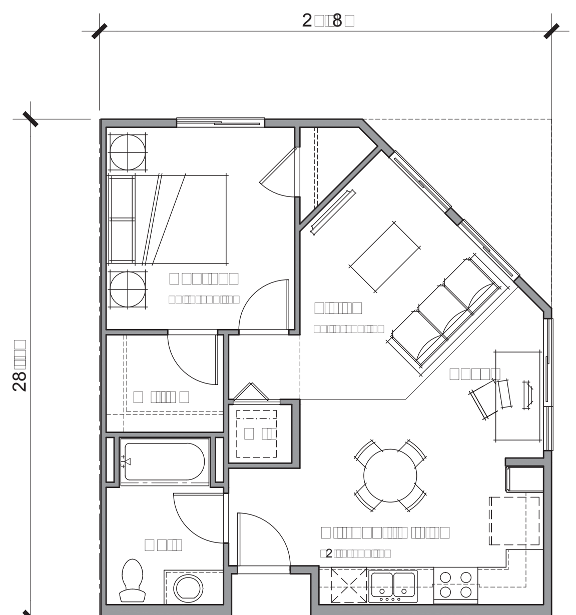
# UNIT PLANS

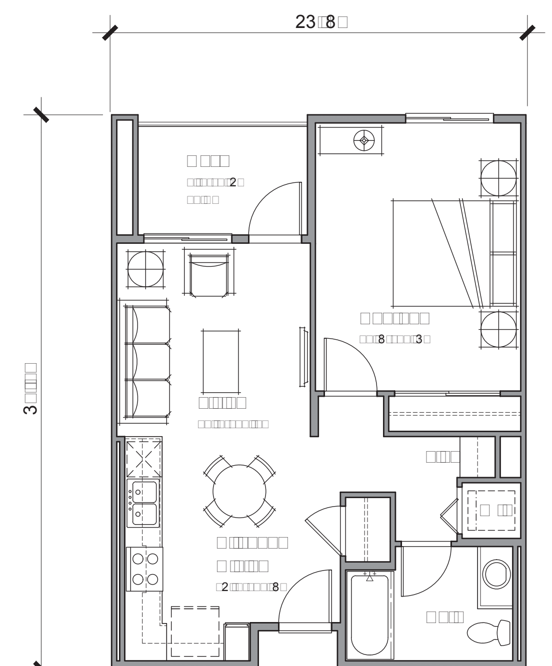
RIVERSIDE, CA

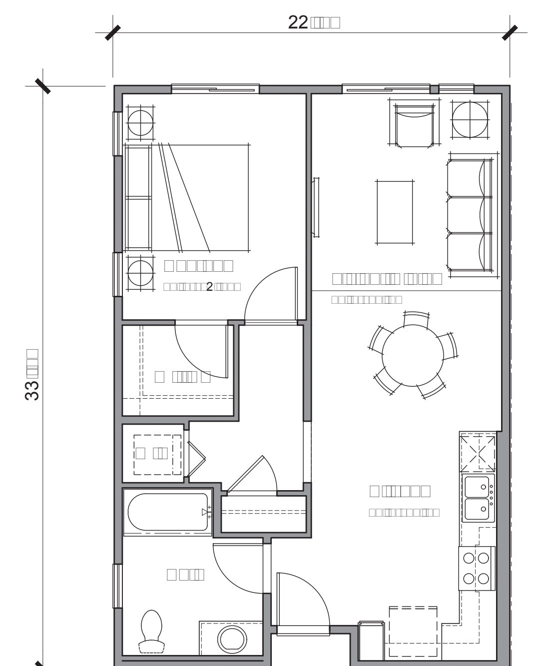
KTGY # 2012-0471 10.20.2014

# A3.0

**KTGY Group, Inc.**
**Architecture+Planning**







# MISSION LOFTS

**Mission Lofts LLC**

# UNIT PLANS

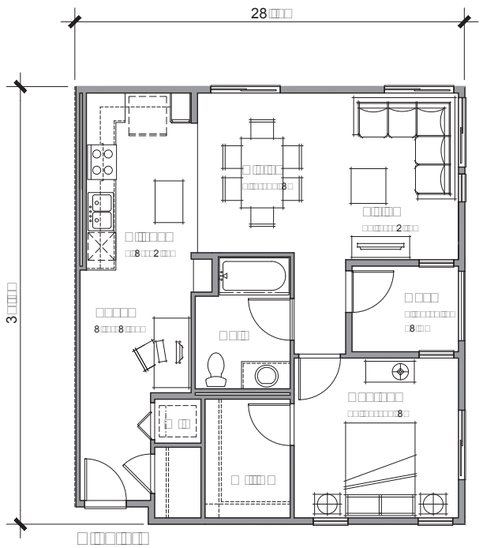
RIVERSIDE, CA

KTGY # 2012-0471

10.20.2014

**KTGY Group, Inc.**
**Architecture+Planning**

A3.1

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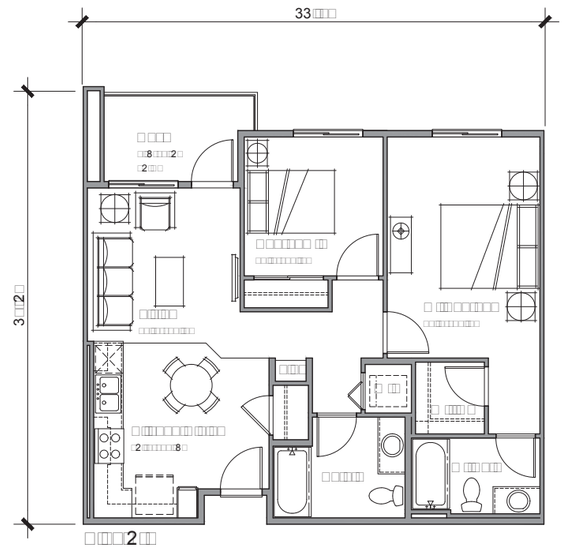


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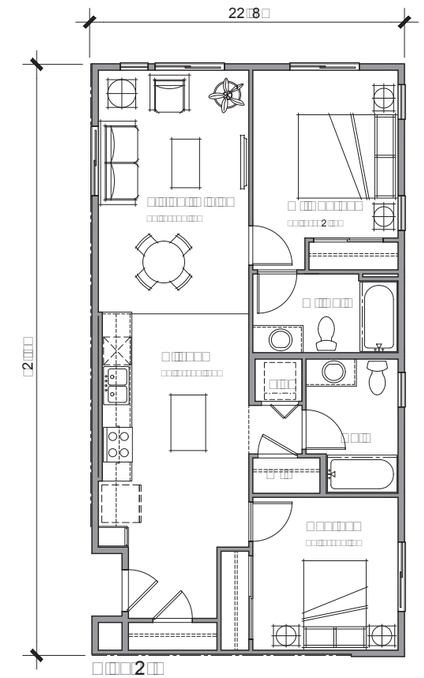


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# MISSION LOFTS

**Mission Lofts LLC**
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# UNIT PLANS

RIVERSIDE, CA
KTGY # 2012-0471 10.20.2014

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# A3.2

**KTGY Group, Inc.**
**Architecture+Planning**
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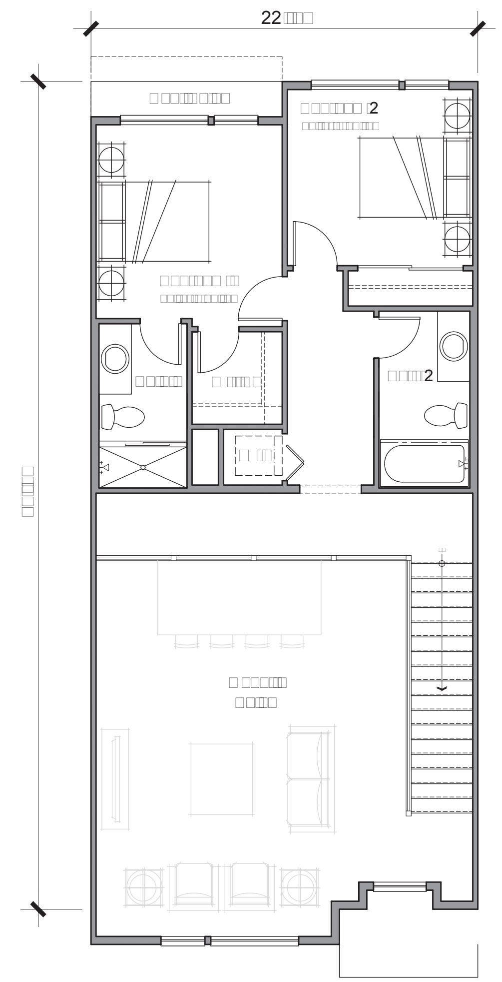
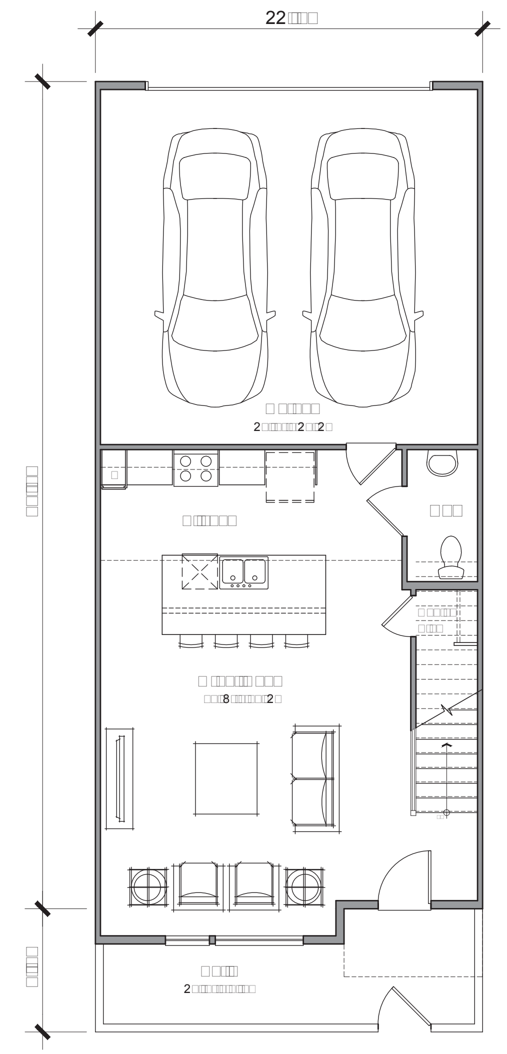




# MISSION LOFTS

**Mission Lofts LLC**

# UNIT PLANS: LOFT PLAN

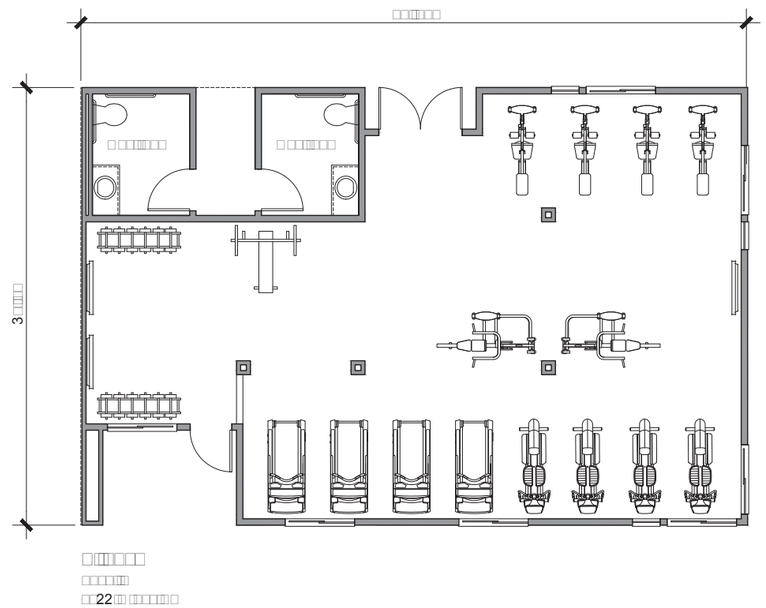
RIVERSIDE, CA

KTGY # 2012-0471

10.20.2014

A3.3

**KTGY Group, Inc.**
**Architecture+Planning**



# MISSION LOFTS

**Mission Lofts LLC**
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# FITNESS ROOM PLAN

RIVERSIDE, CA
KTGY # 2012-0471 10.20.2014

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# A3.4

**KTGY Group, Inc.**
**Architecture+Planning**
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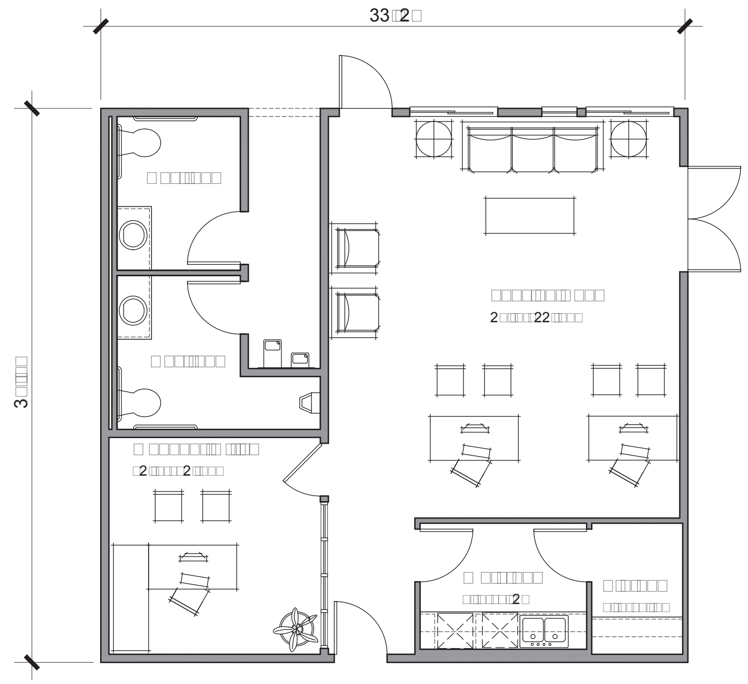

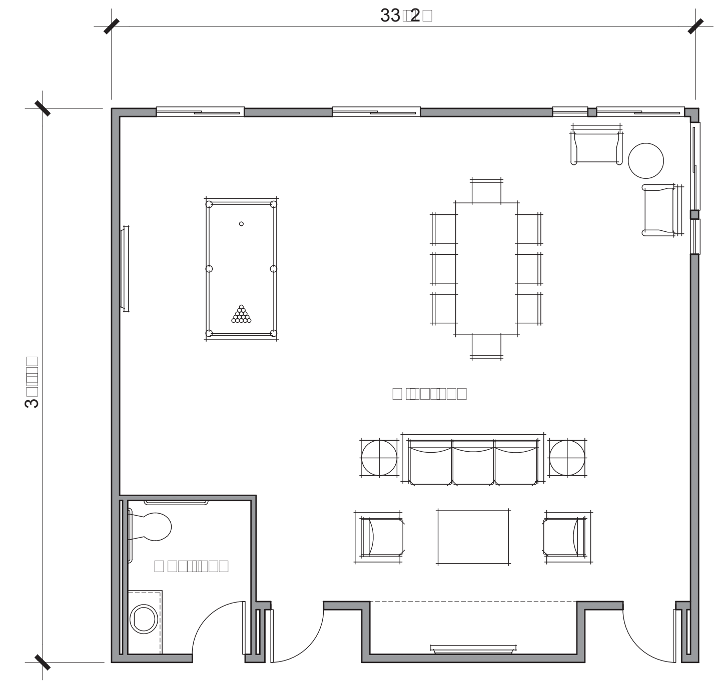

# MISSION LOFTS


**Mission Lofts LLC**


# LEASING & CLUBROOM PLANS

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A3.5


**KTGY Group, Inc.**
**Architecture+Planning**

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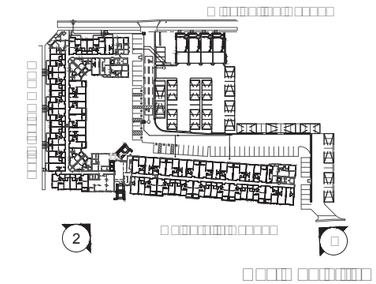



# MISSION LOFTS

**Mission Lofts LLC**

# PERSPECTIVES

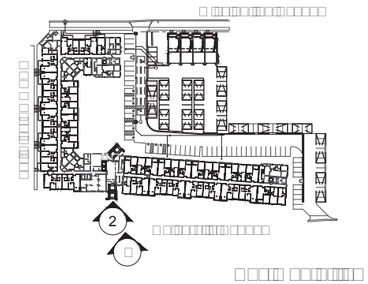
RIVERSIDE, CA

KTGY # 2012-0471

10.20.2014

# A4.0

**KTGY Group, Inc.**
**Architecture+Planning**



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# MISSION LOFTS

**Mission Lofts LLC**
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# PERSPECTIVES

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A4.1

**KTGY Group, Inc.**
**Architecture+Planning**
22
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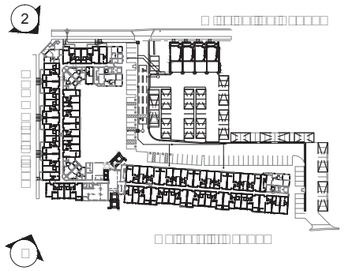


2

# MISSION LOFTS

**Mission Lofts LLC**

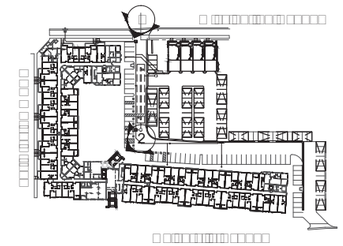
# PERSPECTIVES

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A4.2

**KTGY Group, Inc.**
**Architecture+Planning**



2

# MISSION LOFTS

**Mission Lofts LLC**
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22

# PERSPECTIVES

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A4.3

**KTGY Group, Inc.**
**Architecture+Planning**
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2
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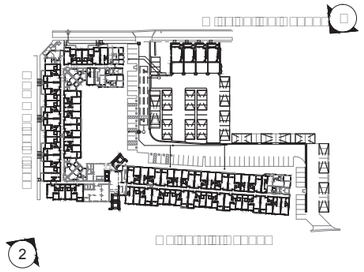

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# MISSION LOFTS

**Mission Lofts LLC**

# PERSPECTIVES

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A4.4

**KTGY Group, Inc.**
**Architecture+Planning**

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# MISSION LOFTS

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

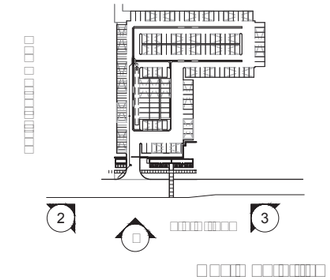
# ARCHITECTURAL SITE PLAN: PARCEL 2

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

# A5.0

**KTGY Group, Inc.**
**Architecture+Planning**
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com



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# MISSION LOFTS

**Mission Lofts LLC**

# PARCEL 2 ELEVATION & PERSPECTIVES

# A5.1

RIVERSIDE, CA

KTGY # 2012-0471 10.20.2014

**KTGY Group, Inc.**
**Architecture+Planning**

**Body 1**
32 8 33

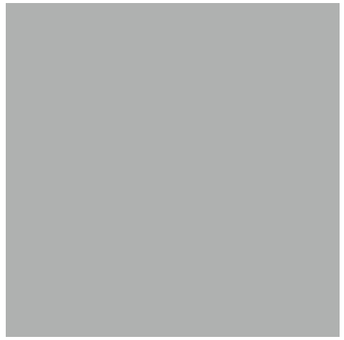
**Body 2**
2 3

**Body 3**
23



**Body 4-**
32 2

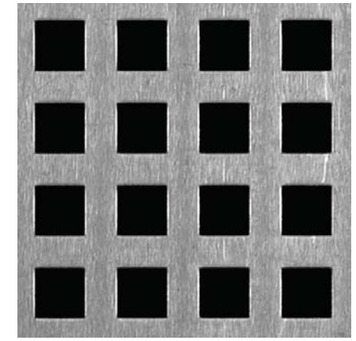
**Body 5**
3323



**Accent 1**
3 3

**Accent 2**
3 2

**Concrete Block**
8



**Perforated Metal**
2

2 8

# MISSION LOFTS

**Mission Lofts LLC**
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22

# MATERIAL BOARD

RIVERSIDE, CA

KTGY # 2012-471 10.20.2014

# A6.0

**KTGY Group, Inc.**
**Architecture+Planning**
22
2
8 2 33

# Appendix C
## Professional Qualifications

# Professional and Academic Resume


# Jennifer Mermilliod, M.A.

## JM Research and Consulting

5110 Magnolia Avenue
Riverside, CA 92506
Phone 951-233-6897
Email jennifer@jmrc.biz


## Education

*Master of Arts degree in History/Program in Historic Resources Management*
University of California, Riverside (2001)

Specialization: Historic Preservation
Sub-Specialization: CNative American Studies

Graduate Internship: City of Riverside, Planning Department, Riverside, California.
This internship included work in both historical survey and research as well as administrative procedures.

*Bachelor of Arts degree in History*
University of California, Riverside (2000)

## Professional Experience

### Independent Cultural Resources Consultant: 2001 to present

JM Research and Consulting

Independent research and survey work, which includes private and public properties. Experience has focused on historic research, architectural survey, Section 106 reviews, CEQA compliance preparation of reports, presentation and service as an expert witness, the development of historic context statements, and California Register, State Point of Historical Interest, and National Register nominations.

### Reviewing Official: 2012 to present

March Joint Powers Authority

JMRC is contracted to act as Reviewing Official under the Memorandum of Understanding (MOU) between March Joint Powers Authority (MJPA) and the California State Historic Preservation Officer (SHPO) for the preservation and disposition of MJPA historic properties located within the surplus and excess areas of March Field Historic District in the County of Riverside, California. Duties include review, analysis, and consultation with MJPA regarding proposed undertakings, minor renovation and maintenance, environmental remediation, and disposal to ensure compliance under the MOU.

### Historic Preservation Management Intern: June 2001 to June 2003

City of Riverside

*Assistance in management and administration of the City's Historic Preservation Program, which includes a wide variety of ethnically and culturally diverse resources. Responsibilities include financial reporting, grant writing, preparation of brochures and other written materials, historic research and evaluation, Section 106 survey work, and CEQA compliance.*

## Selected Projects and Reports

**Preservation Planning**

*Cultural Resources Survey for the development of the Chicago-Linden Strategic Revitalization Plan*

Prepared as part of the Terra Nova Planning & Research, Inc. Consultant Team for The Housing Authority of the City of Riverside

July 2013

*Historic Preservation Consultation and Draft/Review of Selected Sections of the California Baptist University Specific Plan – California Baptist University, Riverside, CA*

Prepared for California Baptist University

June 2012

*Cultural Resources Survey for the development of the California Baptist University Specific Plan*

Prepared for California Baptist University

June 2012

**Section 106 Compliance**

*Historical Resources Evaluation Report Colton Undergrade Crossing Seismic Retrofit Project STPLZ 5065 (015) Bridge 54c-0078 – Colton, San Bernardino County, California*

For DUKE CRM; City of Colton (lead agency); Caltrans District 8

February 2014

*Historical Resources Evaluation Report C Street Underpass Crossing Seismic Retrofit Project STPLZ 5065 (019) Bridge 54c-0384 – Colton, San Bernardino County, California*

For DUKE CRM; City of Colton (lead agency); Caltrans District 8

February 2014

*Historic Property Survey Report Inglewood Avenue Corridor Widening Project – Lawndale & Redondo Beach, Los Angeles County, California*

For Ultra Systems; City of Lawndale (lead agency); Caltrans District 7

December 2013

*Cultural Resources Study for Section 106 Compliance for EDA Funded Van Buren Improvement Project - March JPA, Riverside County, California*

For March Joint Powers Authority

August 2013

*Cultural Resources Assessment for Section 106 Compliance – Wattstar Cinema and Education in the Watts Community of Los Angeles, CA*

For BCR Consulting

July 2010

*Cultural Resources Survey for Section 106 Compliance - Individual properties in Highland, Redlands, and San Bernardino*

For San Bernardino County's Lead Abatement Program

February 2003

**Section 106 Review and CEQA Compliance**

*Cultural Resources Survey for Section 106 & CEQA Compliance – Camp Anza Officers Club, Riverside, Riverside County, CA*

Prepared for Wakeland Housing and Development Corporation & the City of Riverside

July 2013

*Historic Property Survey Report for the University Avenue Streetscape Project and Finding of Effect Document*

For the City of Riverside (lead agency); Caltrans District 8

April 2005

*Historic Property Survey Report for the Victoria Avenue Streetscape – Historic Victoria Parkway Restoration Project and Finding of Effect Document*

For the City of Riverside (lead agency); Caltrans District 8

June 2004

*Historic Property Survey Report for the Jurupa Avenue Underpass / Mountain Avenue Crossing Closure Project*

Co-authored with Janet Hansen for the City of Riverside (lead agency); Caltrans District 8

December 2001

**CEQA Compliance**

*Cultural Resources Survey for CEQA Compliance – Dhammakaya Retreat, 801 East Foothill Blvd, Azusa, CA*

Prepared for DUKE Cultural Resources Management

June 2013

*Cultural Resources Survey for CEQA Compliance – former Harris' Department Store at the Riverside Plaza, Riverside, CA*

Prepared for Architects Orange

October 2012

*Cultural Resources Survey for CEQA Compliance – 156-040-001, Eastvale, CA*

Prepared for Steve Whyld

October 2012

*Cultural Resources Survey for CEQA Compliance – 3114 Gibson Street, Riverside, CA*
Prepared for World Premier Investments, Inc.
October 2012

*Cultural Resources Survey for CEQA Compliance – 1115 E. Central Avenue, Redlands, CA*
Prepared for University of Redlands
May 2012

*Cultural Resources Survey for CEQA Compliance – 1st & Market Block, Riverside, CA*
Prepared for Preferred Bank
April 2012

*Cultural Resources Survey for CEQA Compliance – Urbatec, Riverside, CA*
Prepared for John MacLaurin
March 2011

*Cultural Resources Survey for CEQA Compliance – Old Town Plaza, San Jacinto, CA*
Prepared for Dave Leonard Associates for the Jimenez Initial Study
March 2011

*Phase I Cultural Resources Assessment for CEQA Compliance – Pfennighausen Ranch, Pedley, unincorporated Riverside County, CA*
Co-authored with BCR Consulting for Glenn Schoeman, property owner, Riverside County
July 2010

*Cultural Resources Survey for CEQA Compliance - William A. Cooper House, Riverside CA*
Prepared for California Baptist University, property owner
July 2010

*Evaluation of Impacts for CEQA Compliance with Guidelines for Reconstruction for the Proposed Demolition of the National Register of Historic Places March Field Historic District Garage Building #113, Riverside County, CA*
Prepared for the March Joint Powers Authority, property owner
May 2009

*Cultural Resources Survey for CEQA Compliance for the Proposed Realignment of La Sierra Avenue at Five Points, Riverside CA*
Prepared for the City of Riverside
Current 2008

*Cultural Resources Survey for CEQA Compliance - Former March AFB Main Entrance*
Prepared for the March Joint Powers Authority, property owner
May 2008

*Cultural Resources Survey for CEQA Compliance - Fox Block, Riverside CA*
Prepared for the City of Riverside Redevelopment Agency
September 2007

*Cultural Resources Survey for CEQA Compliance - 3102 Main Street, Riverside CA*
Prepared for the City of Riverside Redevelopment Agency
July 2007

*Cultural Resources Survey for CEQA Compliance - Brown's Garage, Riverside CA*
Prepared for the City of Riverside Redevelopment Agency
March 2007

*Cultural Resources Survey for CEQA Compliance - 3250 Main Street, Riverside CA*
Prepared for the Mark Rubin, property owner
February 2007

*Cultural Resources Survey for CEQA Compliance - 4068 10th Street, Riverside CA*
Prepared for Brian Pearcy, property owner
January 2007

*Historic Resources Record Search, Needs Assessment, and Restoration Consultation - 236 S. Shaffer Street, Orange, CA*
Prepared for Mike and Kathryne O'Hara
April 2006

*Cultural Resources Survey for CEQA Compliance - M Sole' Project, Riverside, CA*
Prepared for the Alan Muruvka, The Alan Muruvka Company
September 2006

*Review of City of Orange CEQA Compliance - 260 S. Shaffer Street, Orange CA*
Prepared for the Old Towne Preservation Association
April 2005

*Cultural Resources Survey for CEQA Compliance - Thunderbird Lodge, Riverside CA*
Prepared for the property owner, Neil Baca
December 2004

*Consultation re: Rancho Cucamonga Environmental Initial Study Part II & Mitigation Requirements – Pioneer Winery*
Prepared for the Hofer Family
March 2004

*Consultation re: Rancho Cucamonga Preservation Ordinance & Environmental Review Process*
Prepared for the Hofer Family
July 2003

*Review of City of Orange Section 106 and CEQA Compliance - 655 S. Glassell Street, Orange CA*
Prepared for the Old Towne Preservation Association
June 2003

**Historic/Architectural Surveys and Historic Context Statements**

*Historic Resources Intensive-Level Survey and Context Statement – Auto Context, Riverside, CA*
For the City of Riverside Redevelopment Agency
October 2010 – in progress

*Historic Resources Reconnaissance-Level Survey and Context Statement – Northside, Riverside, CA*
For the City of Riverside Planning Department under a 2004-2005 CLG Grant
October 2004 – September 2005

*Historic Resources Intensive-Level Survey and Context Statement - Palm Heights, Riverside, CA*
For the City of Riverside Planning Department under a 2003-2004 CLG Grant
December 2003 – September 2004

**Historic/Architectural Surveys**

*Phase I Cultural Resources Survey – Preliminary Determination of Eligibility – Marywood Retreat Center, City of Orange, Orange County, California*
For confidential potential buyer
October 2013

*Determination of Eligibility - 4135 Market Street, Riverside, California*
For Ron Douglas, potential buyer
May 2012

*Determination of Eligibility - 4135 Market Street, Riverside, California*
For Ron Douglas, potential buyer
May 2012

*Determination of Eligibility and Recommendations for Treatment - 2792 Woodbine Street*
For Shonda Herold, Housing Coordinator, City of Riverside
August 2011

*Architectural and Historic Survey - 3604 Madison Street, Riverside, California*
For Dr Hurtado, property owner
May 2008

*Architectural Survey – Donuthole Survey, Riverside, CA*
For the City of Riverside Planning Department
October 2007

*Architectural and Historic Survey - 204 and 220 Terracina Boulevard, Redlands, California*
For Harvey Hansen, Redlands Community Hospital
February 2004

*Architectural Survey – Approx. 40 properties and Historical Research in Victorville, California*
For CRM Tech
April – May 2003

*Architectural Survey - Approximately 80 properties in Lancaster, California*
For CRM Tech
November – December 2002

*Architectural and Historic Survey - 170 S. Spring Street, Blythe, California*
For CRM Tech
November 2002

*Historic Resources Survey and Project Evaluation - 1293 and 1301 East Brockton Avenue, Redlands, CA*
For Phillip Doolittle, University of Redlands
October 2002

*Historic Resources Survey - 1310 East Lugonia Avenue, Redlands, CA*
For Phillip Doolittle, University of Redlands
October 2002

*Historic Resources Survey and Analysis - 2750 W. Devonshire Avenue, Hemet, CA*
For Joseph Cagliero, property owner, Hemet, California
January 2002

**Historic Context Statements**

*Development of the Historic Context Statement for Grand Avenue Bluff Historic District*
In partnership with Galvin Preservation Associates (GPA) for City of Riverside CLG Grant
*September 2012*

*Development of a Historic Context Statement - East Village, City of Long Beach*
For CRM Tech
*June 2006*

*Development of a Historic Context Statement - Village of Arlington, City of Riverside*
For CRM Tech, project recipient of City of Riverside CLG Grant
*September 2003*

**National Register of Historic Places Nominations**

*Mount Rubidoux - Riverside, CA*
Project Management and Consultation provided to Wilkman Historical Services and Old Riverside Foundation
In Progress

*Huntington Beach Public Library on Triangle Park - Huntington Beach, CA*
Prepared for the Huntington Beach Neighbors
February 2013

*Grand Boulevard - Corona, CA*
Prepared for the Corona Historic Preservation Society
January 2011

*Selected Properties – Pasadena, California*
National Register designation of five properties under a Multiple Property Listing
February 2003

*The Camarillo Ranch House – Camarillo, California*
Co-authored with Janet Hansen for the Camarillo Ranch Foundation
October 2002

**California Register of Historical Resources**

*The Jackson Building, a commercial building at 3643 University Avenue - Riverside, California*
Designation to the California Register
August 2009

**California Point of Historical Resources**

*The Camarillo Ranch House – Camarillo, California*
Designation as a State Point of Historical Interest for the Camarillo Ranch Foundation
June 2005 *(approved by the State Historical Resources Commission; August 2005)*

**Local Designation Nominations**

*Segment of SR-18 - Corona, California*
Designation as a Historic District
April 2012

*The A.C.E. Hawthorne House and Tree - Riverside, California*
Designation as a City Landmark & Development of Landmark Plaques
November 2011 & January 2012

*The Walter C. Banks Residence – Riverside, California*
Designation as a City Landmark & Development of Landmark Plaque
October 2008 & March 2012

*The Jackson Building, a commercial building at 3643 University Avenue - Riverside, California*
Designation as a City Landmark & Development of Landmark Plaque
January 2007 & June 2008

*House at 3855-59 11th Street – Riverside, California*
Designation as a City Structure of Merit
November 2003

**Recordation**

Recordation of Harden Square and the Central Plant/Ceramics Building - *California Baptist University, Riverside, California*
Prepared for California Baptist University
January 2011

**Additional Consultation**

*Consultation regarding the rehabilitation of the Camp Anza Officers Club – Riverside, California*
Prepared for Wakeland Housing and Development Corporation & the City of Riverside
*March 2013 – ongoing*

*Consultation regarding artifact concentration – California Baptist University, Riverside, California*
Prepared for California Baptist University
November 2012

*Consultation regarding artifact remains near the Santa Ana River – Riverside, California*
Prepared for Wellington family
October 2012

*Consultation regarding the rehabilitation of the A.C.E. Hawthorne House – California Baptist University, Riverside, California*
Prepared for California Baptist University
September 2011-2013

*Consultation regarding the rehabilitation of the James Complex – California Baptist University, Riverside, California*
Prepared for California Baptist University
May 2011-2013

*Historic Resources Consultation regarding selected properties in Napa County, California*
Prepared for BCR Consulting
July 2011

*Consultation and Historic Research regarding potential redevelopment – 9525-29 Magnolia Avenue, Riverside, CA*
Prepared for United American Properties
July 2010

*Consultation regarding façade restoration of the Jackson Building - 3643 University Avenue, Riverside, California*
Designation as a City Landmark
January 2007

*Consultation and Historic Research - 4202 University Avenue, Riverside, CA*
Prepared for Kim Hodges, realtor
March 2008

*Consultation on National Register eligibility - former YWCA Building, Riverside, CA*
Prepared for Bent Corydon, property owner
October 2005

*Consultation on historical deeds and Assessor's records in preparation of litigation*
Prepared for Mr. Jerome Schwartz and counsel - Mayer, Glassman, & Gaines, Attorney's at Law
August - September 2004

**Database Management**

*Historic Resources Inventory: Instructions for Recording and Viewing*
Historic Resources Database User's Manual prepared for the City of Riverside
September 2001

*Historic Resources Inventory Database Web site: Instructions for Online Navigation*
Historic Resources Database Web site User's Manual prepared for the City of Riverside
September 2002

**Publications**

*"The Grandest Boulevard"*
Published by the Riverside County Historical Commission and the Riverside County Regional Park and Open-Space District in *The Riverside County Chronicles,* Issue No. 5
Fall 2011

**Presentations**

*"Architecture: Form, Function, and Ornamentation"*
Diocese of San Bernardino, Our Lady of Perpetual Help 8th Grade Elective Architecture Series
October 2011

"*How to Research Your Historic Home*"
City of Riverside Public Workshop
October 2010

"*Riverside's Hidden Histories: The Gems Among Us – Nava Tires*"
The Mission Inn Foundation and Museum Public Program, entitled *Riverside's Hidden Histories*
June 17, 2010

"*The Art of the Survey: A Look at the Survey Process and Your Role In It*"
Riverside County Historical Commission 5th Annual Symposium, entitled *Conservation, Preparation, Preservation*
October 26, 2007

"*Historic Preservation within the Field of Public History"*
Wendy Elliott Scheinberg, Ph.D., Department of History, California State University, Fullerton,
November 14, 2006

*"Arlington Heights, the Realization and Preservation of a California Dream"*
California Preservation Foundation Conference - *Arlington Heights, A California Dream: Born in the 19th Century Citrus Industry and Played Out in the Realities of Today's Urban Southern CA*
May 14, 2005

*"How to Research Your Historic Home"*
Riverside County Historical Commission History Workshop, entitled *Castles to Bungalows: Historic Architecture of Riverside County*
April 16, 2004

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## EXPERTISE

Cultural Resource Project Management
National Environmental Policy Act Cultural Resource Compliance
California Environmental Quality Act Cultural Resource Compliance
National Historic Preservation Act (NHPA) Section 106 Compliance
Government Agency (Federal/State/Regional) Partnering, Streamlining, and Consultation
Technical Report Writing for Archaeology, History, and Architectural History
NRHP/CRHR Evaluation of Pre/historic Archaeological, and Historic Architectural Resources
Preparation of all DPR523 Site Records
Archaeological, Historical, and Architectural History Research
Archaeological Excavation
Archaeological and Architectural History Survey
Lithic and Ground Stone Analysis
Global Positioning Systems / Archaeological Mapping and Orienteering
Fossil Preparation
Laboratory Analysis
Native American Consultation

## EDUCATION

California State University, Fullerton, Master of Arts Anthropology/Archaeology, 2002
Thesis: *Architectural Evaluation of the Marymount College Campus in the City of Rancho Palos Verdes, Los Angeles County, California*

California State University, Fullerton, B.A. Anthropology, 1997

Pomona College Field School, Southern Oregon/Northern California, 1995

### Continuing Education

Riverside County Cultural Sensitivity Training 2011, 2009, 2007

Cal State San Bernardino College of Extended Learning, Science of Flint Knapping, 2007

National Preservation Institute NHPA Section 106 Training, 2004

## PERMITS

BLM Principal Investigator for Cultural Resource Investigations (CA, NV)
California Department of Transportation Principal Investigator for Cultural Resources
Authorized Researcher at Each of the Twelve California Archaeological Information Centers

## PROFESSIONAL AFFILIATIONS, AWARDS, AND CERTIFICATIONS

2002-13 Member, Register of Professional Archaeologists
2000-13 Member, Society for American Archaeology
2009-13 Member, Society for California Archaeology
2011-13 Certified Archaeologist for Unincorporated Orange County
2013 Board of Directors, Claremont Heritage
2000 McKenna Scholarship Award, 4th Recipient
1996-2002 Lambda Alpha Society, National Collegiate Honors Society for Anthropology
2008-09 Board of Directors, Pomona Valley Historical Society

## SELECTED PROJECTS

*Phase I Cultural Resources Assessment of the Crown Castle Verizon Temecula DAS Extension Project, Temecula, Riverside County, California*

*Phase I Cultural Resources Assessment and Archaeological Testing Program for the City of Murrieta Mass Grading and Control Plan, Jefferson Crosswinds and Disposal Site, Murrieta, Riverside County, California*

*Phase I Cultural Resources Assessment of the Elsinore Valley Municipal Water District Waite Street Reservoir and Pipeline Project, Wildomar, Riverside County, California*

*Phase I Cultural and Paleontological Resources Assessment of the Murrieta Hills Specific Plan Project, City of Murrieta, Riverside County, California*

*Phase I Cultural Resources Investigation of Tentative Tract Map 30489, Murrieta, Riverside County, California*

*Phase I Cultural Resources Survey of the Meadowview Golf Course Property, Temecula, Riverside County, California*

*Phase I Cultural and Paleontological Resources Assessment and Archaeological Excavations at Stoneridge Ranch Project, Moreno Valley, Riverside County, California*

*Phase I Cultural Resources Assessment of Tentative Parcel Map No. 36229, APN 471-080-014, Reche Canyon, Unincorporated Riverside County, California*

*Archaeological Monitoring/Excavations at the Dateland Project, Indio, Riverside County, California*

*Phase I Cultural Resources Assessment and Evaluations for Habitat Conservation Plan of 100 Acres for North Pit Expansion, USFWS, Unincorporated San Bernardino County*

*Draft Archaeological ASR and HPSR (Caltrans) for the I-15/Cajalco Interchange Project, Unincorporated Riverside County*

*Phase I Cultural Resource Assessment of the Jacqueline Cochran Regional Airport, Community of Thermal, Unincorporated Riverside County, California*

*Phase I Cultural Resource Assessment of the Southern California Edison San Gorgonio Hydroelectric Plant, Riverside County, California*

*Phase I Cultural and Paleontological Resources Assessment of the Sun Ranch Drainage Project, San Juan Capistrano, Orange County, California*

*Phase I Cultural Resources Assessment of the Block Bounded by 1st-2nd Streets and Market Street and Fairmount Boulevard in the City of Riverside, Riverside County, California.*

# Appendix D
## Photographs

**Overview of Project Area, view south**

**Overview of Project Area and across Commerce Street, view southwest**

**Overview outside Project Area across Commerce Street, view north/northwest**

**Overview outside Project Area across Mission Inn Avenue, view north**

**SPRR Loading Platform (1930-1947), view southwest**

**SPRR Loading Platform (1930-1947), view southeast**

**SPRR Loading Platform, view northwest**

**SPRR Loading Platform, view north/northeast**

**Debris pile at south end of SPRR Loading Platform, view north/northwest**

**South end of SPRR Loading Platform, missing debris pile on return field visit, view north/northwest**

**SPRR Loading Platform surface, view south/southwest**

**SPRR Loading Platform surface, view north/northeast**

**SPRRR Loading Platform rail framing, view west**

**SPRRR Loading Platform rail framing close-up showing markings, view north/northeast**

**Brocken clay sewer pipe at base of billboard sign, view north**

**Concrete pads (unknown date) in northern portion of Project Area, view northwest**

**Concrete pad of former auto warehouse in northern portion of Project Area, view south**

**Concrete pad in rear of former auto warehouse in northern portion of Project Area, view southwest**

**Vacant area in northern portion of Project Area, view north**

**Vacant area in northern portion of Project Area, view south**

**Close-up of standing utility pole in northern portion of Project Area, view west**

**Vacant area with asphalt and concrete remnants in northern portion of Project Area, view west**

**Concrete pad remnants (1970s) in northern portion of Project Area, view west**

**Asphalt-lines brow drainage ditch (ca. 1960) north of University Avenue, view east/southeast**

**Brow drainage ditch (ca. 1960) north of University Avenue, view west/northwest**

**Brow drainage ditch (ca. 1960) culvert north of University Avenue, view northwest**

**Brow drainage ditch and culvert (ca. 1960) north of University Avenue, view east/southeast**

**Project Area boundary north of (above) University Avenue, view west/northwest**

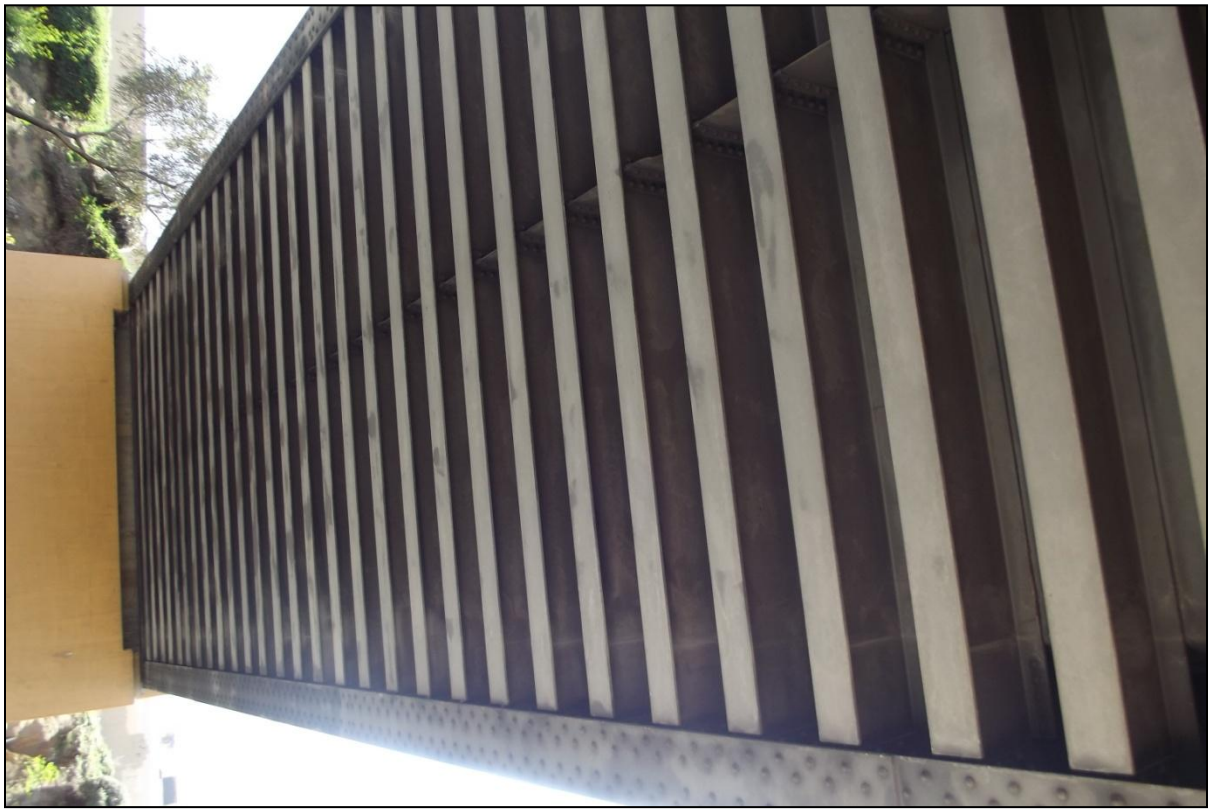
**Grade separation public improvements along northern edge of University Avenue, view west/northwest**

**Southern Pacific Railroad Bridge (1960) above University Avenue, view west/northwest**

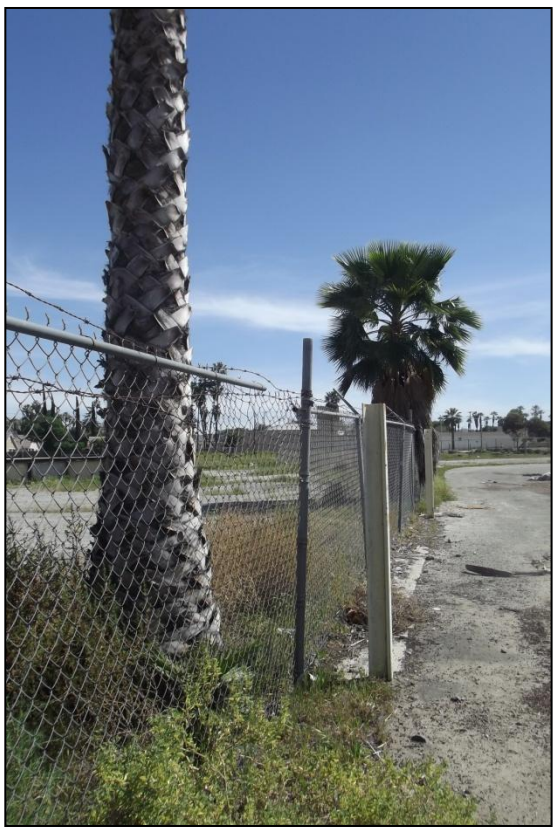
**Southern Pacific Railroad Bridge (1960) above University Avenue, view south/southeast**

**Southern Pacific Railroad Bridge (1960) close-up above University Avenue, view west**

**Southern Pacific Railroad Bridge (1960) northerly abutment, view northwest**



**Bottom of Southern Pacific Railroad Bridge (1960) above University Avenue**



**Rail segments used as bollards in the northern portion of the Project Area, views east and southeast**

**Asphalt vehicular entry (ca. 2000) to Southern Pacific Railroad Bridge (1960) from north, view south**

**Southern Pacific Railroad Bridge (1960) surface, view south/southwest**

**Southern Pacific Railroad Bridge (1960) surface, view north/northeast**

**Southern Pacific Railroad Bridge (1960) wall and railing, view west**

**Asphalt-lined brow drainage ditch (ca. 1960) south of University Avenue, view east/southeast**

**Vacant area in southerly portion of Project Area, view south**

**Vacant area in southerly portion of Project Area, view southeast**

# Appendix D

# Geotechnical Investigation

GEOTECHNICAL
PROFESSIONALS INC.

# GEOTECHNICAL INVESTIGATION
# PROPOSED MISSION LOFTS
# SEC MISSION INN AVENUE AND COMMERCE STREET
# RIVERSIDE, CALIFORNIA

Prepared for:
**REALM**
1201 Dove Street, Suite 520
Newport Beach, California 92660

Prepared by:
**Geotechnical Professionals Inc.**
5736 Corporate Avenue
Cypress, California 90630
(714) 220-2211

Project No. 2591.I

February 17, 2014

GEOTECHNICAL
PROFESSIONALS INC.

February 17, 2014

REALM
1201 Dove Street, Suite 520
Newport Beach, California 92660

Attention: Mr. Todd Cadwell

Subject: Report of Geotechnical Investigation
Proposed Mission Lofts
SEC University Avenue at Commerce Street
Riverside, California
GPI Project No. 2591.I

Dear Mr. Cadwell:

Transmitted herewith are six copies of our report of geotechnical investigation for the subject project. The report presents our evaluation of the foundation conditions at the site and recommendations for design and construction.

We appreciate the opportunity of offering our services on this project and look forward to seeing the project through its successful completion. Feel free to call us if you have any questions regarding our report or need further assistance.

Very truly yours,
**Geotechnical Professionals Inc.**

James E. Harris, G.E.
Principal

JEH:sph

2591-I-01L.doc (2/14)

5736 Corporate Avenue • Cypress, CA 90630 • (714) 220-2211, FAX (714) 220-2122

# TABLE OF CONTENTS

| | | | PAGE |
|---|---|---|---|
| 1.0 INTRODUCTION | | | 1 |
| 1.1 | GENERAL | | 1 |
| 1.2 | PROJECT DESCRIPTION | | 1 |
| 1.3 | PURPOSE OF INVESTIGATION | | 1 |
| 2.0 SCOPE OF WORK | | | 2 |
| 3.0 SITE CONDITIONS | | | 3 |
| 3.1 | SURFACE CONDITIONS | | 3 |
| 3.2 | SUBSURFACE SOILS | | 3 |
| 3.3 | GROUNDWATER AND CAVING | | 4 |
| 4.0 CONCLUSIONS AND RECOMMENDATIONS | | | 5 |
| 4.1 | GENERAL | | 5 |
| 4.2 | SEISMIC CONSIDERATIONS | | 6 |
| | 4.2.1 | General | 6 |
| | 4.2.2 | Strong Ground Motion Potential | 6 |
| | 4.2.3 | Potential for Ground Rupture | 6 |
| | 4.2.4 | Liquefaction | 6 |
| | 4.2.5 | Seismic Ground Subsidence | 7 |
| 4.3 | EARTHWORK | | 7 |
| | 4.3.1 | Clearing and Grubbing | 7 |
| | 4.3.2 | Excavations | 7 |
| | 4.3.3 | Subgrade Preparation | 8 |
| | 4.3.4 | Material for Fill | 9 |
| | 4.3.5 | Placement and Compaction of Fills | 9 |
| | 4.3.6 | Shrinkage and Subsidence | 10 |
| | 4.3.7 | Trench/Wall Backfill | 10 |
| | 4.3.8 | Observation and Testing | 10 |
| 4.4 | COLLAPSE POTENTIAL | | 10 |
| 4.6 | FOUNDATIONS | | 11 |
| | 4.6.1 | Foundation Type | 11 |
| | 4.6.2 | Mat Foundations | 11 |
| | 4.6.3 | Shallow Foundations | 12 |
| | 4.6.4 | Lateral Load Resistance | 13 |
| | 4.6.5 | Foundation Concrete | 13 |
| | 4.6.6 | Slope Setback | 14 |
| | 4.6.7 | Foundation Concrete | 15 |
| | 4.6.8 | Foundation Inspection | 15 |
| 4.7 | SLABS-ON-GRADE | | 15 |
| 4.8 | LATERAL EARTH PRESSURES | | 16 |
| 4.9 | CORROSIVITY | | 16 |
| 4.10 | DRAINAGE | | 17 |
| 4.11 | STORM INFILTRATION | | 17 |
| 4.12 | EXTERIOR CONCRETE AND MASONRY FLATWORK | | 17 |
| 4.13 | PAVED AREAS | | 17 |
| 4.14 | GEOTECHNICAL OBSERVATION AND TESTING | | 18 |
| 5.0 LIMITATIONS | | | 19 |

REFERENCES

APPENDICES
- A EXPLORATORY BORINGS
- B LABORATORY TEST RESULTS

# LIST OF FIGURES

FIGURE NO.

| | |
|---|---|
| 1 | Site Location Map |
| 2 | Site Plan |

**APPENDIX A**

| | |
|---|---|
| A-1 to A-17 | Logs of Borings |

**APPENDIX B**

| | |
|---|---|
| B-1 | Atterberg Limit Test Results |
| B-2 to B-5 | Direct Shear Test Results |
| B-6 | Consolidation Test Results |
| Table 1 | Corrosivity Test Results |

# 1.0 INTRODUCTION

## 1.1 GENERAL

This report presents the results of a geotechnical investigation performed by Geotechnical Professionals Inc. (GPI) for the proposed apartment development to be located at the southeast corner of Mission Inn Avenue and Commerce Street in Riverside, California. The general site location is shown on the Site Location Map, Figure 1.

## 1.2 PROJECT DESCRIPTION

Based on our understanding, the project will consist of new apartment buildings with surface parking on a 4.7-acre site. The site is divided by University Avenue with the apartment buildings and surface parking planned on the northern portion (3.2 acres) and remote surface parking planned for the southern portion (1.5 acres). An existing bridge connects the two portions of the overall site.

The apartments will be 4-story buildings covering a footprint of approximately 39,500 square feet. The buildings will be located along the western and southern portion of the northern site. A recreation area with a swimming pool will be located adjacent to the apartment buildings. Surface parking with carports will be located adjacent to the apartment buildings and in the remote parking on the southern site. The proposed site configuration is shown on the Site Plan, Figure 2.

We understand that the apartment buildings will be wood-frame construction supported on post-tensioned mat slabs. We expect mat pressures on the order of 200 to 300 pounds per square foot.

We have assumed that finish grades will remain near existing site grades.

Our recommendations are based upon the above structural and grading information. We should be notified if the actual loads and/or grades change during the project design to either confirm or modify our recommendations. Also, when the project grading and foundation plans become available, we should be provided with copies for review and comment.

## 1.3 PURPOSE OF INVESTIGATION

The primary purpose of this investigation and report is to provide an evaluation of the existing geotechnical conditions at the site as they relate to the design and construction of the proposed development. More specifically, this investigation was aimed at providing geotechnical recommendations for earthwork, and design of foundations.

## 2.0 SCOPE OF WORK

Our scope of work for this investigation consisted of review of existing information, field exploration, laboratory testing, engineering analysis, and the preparation of this report.

We previously prepared a report documenting infiltration/percolation testing (Reference 1) for the project. The infiltration/percolation well installation and testing were performed during the field investigation for this report. In general, we found that infiltration of storm water at the site is feasible. We are currently preparing our full report of percolation/ infiltration testing.

Our field exploration consisted of seventeen exploratory borings. The locations of the subsurface explorations are shown on the Site Plan, Figure 2.

The exploratory borings were drilled using truck-mounted hollow-stem auger drilling equipment to depths of 11 to 50 feet below existing site grades. Details of the drilling, and Logs of Borings are presented in Appendix A.

Laboratory soil tests were performed on selected representative samples as an aid in soil classification and to evaluate the engineering properties of the soils. The geotechnical laboratory testing program included determinations of moisture content and dry density, fines content, shear strength, compressibility (consolidation), collapse potential, expansion potential, maximum density/optimum moisture, subgrade strength (R-value), and soil corrosivity. Laboratory testing procedures and results are summarized in Appendix B.

Soil corrosivity testing was performed by HDR Schiff. R-value testing was performed by Geologic Associates. This work was performed under subcontract to GPI. Their test results are presented in Appendix B.

Engineering evaluations were performed to provide earthwork criteria, foundation and slab design parameters and assessments of seismic hazards. The results of our evaluations are presented in the remainder of the report.

# 3.0 SITE CONDITIONS

## 3.1 SURFACE CONDITIONS

The project site is currently vacant parcels with sparse vegetation, remnants of asphalt pavements, and debris. An existing railroad type bridge over University Avenue connects the north and south sites. Historic aerial photographs (Reference 2) indicate that the site contained a former rail line with storage yards surrounding the line. The existing bridge was constructed in the late 1950's as a grade separation for University Avenue which was depressed below the rail line.

The northern portion of the overall site is irregularly shaped and bounded on the north by Mission Inn Avenue, on the west by Commerce Street, on the south by University Avenue, and on the east by an abandoned single story retail building, parking, and a single family home.

The southern portion of the overall site is also irregularly shaped and bounded on the north by University Avenue, on the west a single-story warehouse building, on the south by 9$^{th}$ Street and single family homes, and on the east by a single family home and empty lot.

University Avenue is located below both portions of the site along vegetated cut slopes ranging from approximately 1 to 6 feet near the eastern limits to approximately 15 to 20 feet at the western limits. The cut slopes appear to be at an inclination of approximately 2:1 (horizontal:vertical).

The ground surfaces at the northern and southern portions of the site are relatively flat with minor downward slopes toward the southwest and northwest, respectively.

## 3.2 SUBSURFACE SOILS

Our field investigation disclosed a subsurface profile consisting of undocumented fills overlying natural soils. Detailed descriptions of the subsurface conditions encountered in our explorations are provided in Appendix A. A brief summary of the subsurface conditions are provided below.

Undocumented fills soils were encountered in our explorations within the upper 2 to 5 feet below existing site grades. The fills consist of sandy silts, silty sands, clayey sands, and sandy clays. The fill soils consisting of silty sands and sandy silts were difficult to distinguish from the underlying natural soils. Documentation regarding the placement and compaction of the fill soils was not provided.

The natural soils consist predominantly of interbedded layers of sandy silts, silty sands, silts and sands. In general, the silty sands were loose to medium dense and the sandy silts were stiff to hard. The silty sands and sandy silts varied from slightly moist to very moist. The interbedded layers of clean sands were predominately dry. The natural soils have moderate strength and low to moderate compressibility characteristics. The near surface soils, in general, exhibit low expansion potential. The hydrocollapse potential of tested in-place sandy silts was found to be moderate (approximately 2.2 percent).

## 3.3 GROUNDWATER AND CAVING

Groundwater was not measured in our borings to a depth of 50 feet below existing grade. Groundwater is not anticipated to be encountered during grading or to adversely impact the development.

Due to the methods of drilling, the potential for caving was difficult to determine but dry, loose to medium dense, granular soils can be anticipated to exhibit caving.

# 4.0 CONCLUSIONS AND RECOMMENDATIONS

## 4.1 GENERAL

Based on the results of our investigation, it is our opinion that from a geotechnical viewpoint it is feasible to develop the site as proposed, provided the following geotechnical issues are incorporated into the design and construction of the proposed structures:

- Prior to placement of fills or construction of the building foundations, all undocumented fills, disturbed soils, and a portion of the compressible natural soils should be removed and replaced as properly compacted fill. The depth of removals for each building and details regarding grading are provided in "Earthwork" section of this report.

- To lessen the potential impacts of collapsible and loose dry sandy soils at the site, consideration should be given to minimizing the potential for wetting of soils underlying structures and other improvements. We recommend that landscaping requiring irrigation be avoided within 10 feet of buildings to help mitigate potential for infiltration of water under the structures. If providing the 10-foot setback from buildings is not feasible, lining the bottom of the landscape areas should be considered. Deeper infiltration or retention systems should not be constructed within 30 feet of the buildings and 15 feet of the carport structure.

- The proposed buildings may be supported on post-tensioned slab foundations after completion of remedial grading. The use of conventional foundations for the apartment buildings is feasible, but we understand that post-tensioned slabs are the preferred foundation alternative for the apartment buildings

- Carport structures are typically supported on drilled pier foundations. Based on the density and moisture content of the soils encountered, the caving potential of the soils is considered to be moderate to high in the dry sands. The drilled pile contractor should evaluate the potential drilling conditions when planning the installation methods.

- If storm water infiltration is used for the subject site, there is a risk of settlement/subsidence in the pavement areas. Infiltration systems should not be constructed within 30 feet of the buildings. We recommend the underground infiltration systems be located at least 10 feet horizontally from the drilled pile foundations. If infiltration systems are located closer to the drilled pile foundations, there is a potential for settlement of the carports.

- Resistivity testing of the on-site soils indicates that they are severely corrosive to metal.

Our recommendations related to the geotechnical aspects of the development of the site are presented in the subsequent sections of this report.

## 4.2 SEISMIC CONSIDERATIONS

### 4.2.1 General

The site is located in a seismically active area of Southern California and is likely to be subjected to strong ground shaking due to earthquakes on nearby faults.

We understand that the seismic design of the proposed buildings at the subject site will be in accordance with the 2013 California Building Code (CBC) criteria. For the 2013 CBC, a Site Class D may be used. The remaining seismic code values can be obtained from the tables in the building code using the above values and the appropriate United States Geological Survey web site (Reference 3).

The Project Structural Engineer should determine the actual method of seismic design.

### 4.2.2 Strong Ground Motion Potential

Based on published information (Reference 4), the most significant fault in the proximity of the site is the San Jacinto Fault, which is located about 10 kilometers northeast of the site.

During the life of the project, the site will likely be subject to strong ground motions due to earthquakes on nearby faults. Based on the USGS website (Reference 3), we computed that the site could be subject to a peak ground acceleration ($PGA_m$) of 0.51g. This acceleration has been computed using the mapped ground acceleration (PGA) from ASCE 7-10 and a site coefficient ($F_{PGA}$) based on Site Class. The structural design of the facility will need to incorporate measures to mitigate the effects of strong ground motion.

### 4.2.3 Potential for Ground Rupture

There are no known active faults crossing or projecting through the site. The site is not located in an Alquist-Priolo Earthquake Fault Zone. Therefore, ground rupture due to faulting is considered unlikely at this site.

### 4.2.4 Liquefaction

Soil liquefaction is a phenomenon in which saturated cohesionless soils undergo a temporary loss of strength during severe ground shaking and acquire a degree of mobility sufficient to permit ground deformation. In extreme cases, the soil particles can become suspended in groundwater, resulting in the soil deposit becoming mobile and fluid-like. Liquefaction is generally considered to occur primarily in loose to medium dense deposits of saturated soils. Thus, three conditions are required for liquefaction to occur: (1) a cohesionless soil of loose to medium density; (2) a saturated condition; and (3) rapid large strain, cyclic loading, normally provided by earthquake motions.

The State of California has not yet prepared seismic hazard zone maps for the City of Riverside. The site is located within an area shown as having a low potential for soil liquefaction as determined by the City of Riverside (Reference 5).

Soil liquefaction is not likely to occur at the project site due to the deep groundwater.

### 4.2.5 Seismic Ground Subsidence

Seismic ground subsidence (not related to liquefaction induced settlements) occurs when strong earthquake shaking results in the densification of loose to medium dense sandy soils above groundwater. We estimate the total magnitude of subsidence would be on the order of ¼- to 1-inch. We estimate differential settlement due to subsidence across a 40 foot span may be on the order of one-half the total subsidence. The majority of the subsidence will occur in soils at depths from 10 to 25 feet below the existing ground surface.

## 4.3 EARTHWORK

The earthwork anticipated at the project site will consist of clearing, overexcavation of undocumented fills and disturbed soils, subgrade preparation, and placement and compaction of fill.

### 4.3.1 Clearing and Grubbing

Prior to grading, the areas to be developed should be stripped of any vegetation and cleared of all debris and pavements. Buried obstructions, such as footings, utilities, and tree roots should be removed. Deleterious material generated during the clearing operation should be removed from the site. Inert demolition debris, such as concrete and asphalt may be crushed for reuse in engineered fills, in accordance with the criteria presented in the "Materials for Fill" section of this report.

Although none were encountered, any cesspools or septic systems encountered during grading should be removed in their entirety. The resulting excavation should be backfilled as recommended in the "Subgrade Preparation" and "Placement and Compaction of Fill" sections of this report. As an alternative, any cesspools can be backfilled with a lean sand-cement slurry. At the conclusion of the clearing operations, a GPI representative should observe and accept the site prior to any further grading.

### 4.3.2 Excavations

Excavations at this site will include removals of undocumented fill soils, removals of disturbed/compressible soils, footing excavations, and trenching for proposed utility lines.

Prior to placement of fills or construction of the building foundations, all undocumented fills, disturbed soils, and a portion of the compressible natural soils should be removed and replaced as properly compacted fill. These materials require densification to provide adequate support of foundations.

For planning purposes, we recommend the removal/replacement for the apartment building to extend to a minimum depth of 5 feet below existing grades or 3 feet below the bottom of the post-tensioned slab, whichever is deeper. For footings of minor lightly-loaded structures, such as small walls and trash enclosures, we recommend the removals and replacement extend to at least 2 feet below the bottom of footings.

In pavement areas, we recommend removals extend 1-foot below existing or proposed grades, whichever is deeper.

The actual depths of removals should be determined in the field during grading by the Geotechnical Engineer.

The base of the removals should extend laterally a minimum of 5 feet beyond the building lines or the depth of removal, whichever is greater. Building lines include the footprint of the building and other foundation supported improvements, elevator pits, stairwells, screen walls, loading docks, ramps, and canopies. Prior to grading, the corners of the areas to be overexcavated should be accurately staked in the field by the project surveyor. The project surveyor should confirm the limits of removal relative to the actual building to confirm that the recommended remedial excavations have been performed. GPI does not practice surveying; therefore, we cannot confirm any lines, grades, or limits of excavations.

Where not removed by the aforementioned excavations, existing utility trench backfill within the planned building area should be removed and replaced as properly compacted fill. This is especially important for deeper fills such as existing sewers and storm drains. For planning purposes, removals over the utilities should extend to within 1-foot of the top of the pipe. For utilities which are 5 feet or shallower, the removal should extend laterally 1-foot beyond both sides of the pipe. For deeper utilities, the removals should include a zone defined by a 1:1 projection upward (and away from the pipe) from each side of the pipe. The actual limits of removal will be confirmed in the field. We recommend that known utilities be shown on the grading plan.

Temporary construction excavations may be made vertically without shoring to a depth of 5 feet below adjacent grade. For deeper cuts up to 10 feet, the slopes should be properly shored or sloped back to at least 1:1 or flatter. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing. No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet from the top of the excavation, whichever is greater, unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site facilities should be properly shored to maintain support of adjacent elements. All excavations and shoring systems should meet the minimum requirements given in the State of California Occupational Safety and Health Standards.

### 4.3.3 Subgrade Preparation

After removals are complete and prior to placing any fills or construction of the proposed structure, the subgrade soils should be scarified to a depth of 12 inches, moisture-conditioned, and compacted to at least 90 percent (95 percent for granular soils) of the maximum dry density in accordance with ASTM D 1557 and to a firm and unyielding condition.

In areas to receive pavements, the top 12 inches below the pavement base should be compacted to a minimum of 95 percent of the maximum dry density.

### 4.3.4 Material for Fill

The on-site soils are, in general, suitable for use as compacted fill under the buildings, under concrete pavement, under the flatwork, and behind retaining/ramp walls. Clayey soils, if encountered at the site, should not be used within 12 inches of concrete pavements, or flatwork. Clayey/silty soils are not suitable for use as retaining wall backfill.

Imported fill material should be predominately granular (containing no more than 40 percent fines - portion passing No. 200 sieve) and non-expansive (Expansion Index of 20 or less). The import should also exhibit a minimum R-value of 20, consistent with the existing near surface soils. The Geotechnical Engineer should be provided with a sample (at least 50 pounds) and notified of the location of soils proposed for import at least 72 hours in advance of importing. Each proposed import source should be sampled, tested and accepted for use prior to delivery of the soils to the site. Soils imported prior to acceptance by the Geotechnical Engineer may be rejected if not suitable.

Soils used for compacted fills should not contain particles greater than 6 inches in size.

If encountered, on-site inert demolition debris, such as concrete and asphalt, may be reused in the compacted fills provided approval is obtained from the reviewing regulatory agency and the owner. The material should be crushed to the consistency of aggregate base and blended with the on-site or imported soils.

### 4.3.5 Placement and Compaction of Fills

All fill soils should be placed in horizontal lifts, moisture-conditioned, and mechanically compacted to at least 90 percent (95 percent for granular soils) of maximum dry density in accordance with ASTM D-1557. The optimum lift thickness will depend on the compaction equipment used and can best be determined in the field. The following uncompacted lift thickness can be used as preliminary guidelines.

| | |
|---|---|
| Plate compactors | 4-6 inches |
| Small vibratory or static rollers (5-ton±) | 6-8 inches |
| Scrapers and heavy loaders | 8-12 inches |

The maximum lift thickness should not be greater than 12 inches and each lift should be thoroughly compacted and accepted prior to placement of subsequent lifts.

The moisture content of the on-site materials should be between 0 to 2 percent over the optimum moisture content to readily achieve the required degree of compaction. The on-site soils in the upper 5 feet were generally below the optimum moisture content such that moistening of the sandy soils during grading of the fill may be required.

During backfill of excavations, the fill should be properly benched into the construction slopes as it is placed in lifts.

### 4.3.6 Shrinkage and Subsidence

Shrinkage is the loss of soil volume caused by compaction of fills to a higher density than before grading. Subsidence is the settlement of in-place subgrade soils caused by loads generated by large earthmoving equipment. For earthwork volume estimating purposes, an average shrinkage value of 10 to 15 percent and subsidence of 0.1 feet may be assumed for the surficial soils. These values are estimates only and exclude losses due to removal of vegetation or debris. Actual shrinkage and subsidence will depend on the types of earthmoving equipment used and should be determined during grading.

### 4.3.7 Trench/Wall Backfill

Utility trench backfill should be mechanically compacted in lifts. Wall backfill should consist of on-site or imported, non-expansive sandy soils. Lift thickness should not exceed those values given in the "Compacted Fill" section of this report. Jetting or flooding of trench or wall backfill materials should not be permitted. The Geotechnical Engineer should observe and test all trench and wall backfills as they are placed.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain one sack of cement per cubic yard and have a maximum slump of 5 inches. When set, such a mix typically has the consistency of compacted soil.

### 4.3.8 Observation and Testing

A representative of GPI should observe all excavations, subgrade preparation, and fill placement activities. Sufficient in-place field density tests should be performed during fill placement to evaluate the overall compaction of the soils. Soils that do not meet minimum compaction requirements should be reworked and tested prior to placement of any additional fill.

## 4.4 COLLAPSE POTENTIAL

A collapsible soil will undergo a reduction in volume upon wetting. Collapsible soil will typically have a low dry density and low moisture content. Collapsible soils may support large pressures with low compressibility when dry but experience significant compression upon wetting without an increase in pressure. Fine grained, aeolian or alluvial soils deposited in a semi-arid to arid climate tend to be the most susceptible to collapse.

Laboratory testing indicated the hydrocollapse potential of the in-place soils to be moderate, in accordance with ASTM D-5333, with test results of 2.2 percent. After performing the recommended removals, there is a potential for soils exhibiting a moderate potential for collapse to remain within interbedded thin layers of soils at depths from 10 to 25 feet below existing grade.

To lessen the potential impacts of collapsible soils at the site, consideration should be given to minimizing the potential for wetting of soils underlying structures and other improvements. We recommend landscaping requiring irrigation be avoided within 10 feet

of buildings to help mitigate potential for infiltration of water under the structures. If this setback is not feasibly, lining the bottom of the landscape areas should be considered.

Infiltration or retention systems should not be constructed within 30 feet of the buildings.

## 4.6 FOUNDATIONS

### 4.6.1 Foundation Type

The proposed apartment buildings may be supported on post-tensioned slab foundations, provided the subsurface soils are prepared in accordance with the recommendations given in this report. The use of conventional foundations for the apartment buildings is feasible; however, we understand that post-tensioned slabs are the preferred foundation alternative for the apartment buildings.

The post-tensioned slab foundations should be supported on compacted fill. Footings for minor at-grade structures, such as the pool shade structures, screen or retaining walls, or trash enclosures, should also be supported on properly compacted fill. Carport structures are typically supported on drilled pier foundations.

### 4.6.2 Post-Tensioned Slab Foundations

Based on similar projects, we have assumed that the post-tensioned slab pressure near the center of the mat will be approximately 200 to 300 psf for the 4-story buildings. These pressures are significantly less than the allowable bearing capacity of the compacted fill and natural soils underlying the buildings. The apartment building structures will have a rectangular shaped plan with largest footprint of approximately 300 feet by 70 feet in plan dimension.

We estimate that the ground surface under the center of a loaded area having the above dimensions and applied pressures of 200 to 300 psf will settle approximately ½-inch. The edges and corners of this area under the same loading conditions are expected to settle ¼-inch and less than ¼-inch for the above applied pressures, respectively. At the center of the loaded area, this equates to a modulus of subgrade reaction (spring constant) of approximately 7 pci.

The post-tensioned slab can be supported by the graded pads, which will consist of at least 5 feet of non-expansive, compacted fill derived from the on-site undocumented fills and underlying natural soils. These soils have a very low expansion potential with expansion indices anticipated near zero. Since the on-site soils have a very low expansion potential, the structural engineer needs not consider the soil shrinkage or swelling in the design of the post-tensioned slab.

These settlements assume a uniformly applied pressure and do not include the effects (stiffness) of the post tensioned slab. The actual settlement of the post tensioned slab will depend on its stiffness and its ability to distribute the loads and should be determined by the structural engineer.

If the loading of the post-tensioned slabs differ from the above assumptions, we should be notified to modify our recommendations.

### 4.6.3 Shallow Foundations

Based on the shear strength and elastic settlement characteristics of the compacted fill derived from on-site soils, minor lightly-loaded structures, including retaining walls, site walls, and trash enclosures, a static allowable net bearing pressure of up to 2,000 pounds per square foot (psf) may be used for both continuous footings and isolated column footings. The actual bearing pressure used may be less, such that economics and structural loads will determine the minimum width for footings as discussed below. These bearing pressures are for dead-plus-live loads, and may be increased one-third for short-term, transient, wind and seismic loading. The maximum edge pressures induced by eccentric loading or overturning moments should not be allowed to exceed these recommended values.

The following minimum footing widths and embedments are recommended for the corresponding allowable bearing pressures.

| STATIC BEARING PRESSURE (psf) | MINIMUM FOOTING WIDTH (inches) | MINIMUM FOOTING* EMBEDMENT (inches) |
|---|---|---|
| 2,000 | 24 | 18 |
| 1,500 | 18 | 18 |
| 1,000 | 15 | 15 |

* Depth to bottom of footing below lowest adjacent finish grade.

A minimum footing width and depth of 15 inches should be used even if the actual bearing pressure is less than 1,000 psf.

Maximum total static settlement will depend on the loads imposed on the foundations. In general, the total static settlements anticipated for wall loads of lightly-loaded structures will be limited to less than ½-inch. Maximum differential settlements are expected to be less than ¼-inch over a span of 40 feet.

The above estimates are based on the assumption that the recommended earthwork will be performed and that the footings will be sized in accordance with our recommendations.

In addition to the static settlement provided above, there is a potential for an additional total seismic induced ground subsidence or collapse upon wetting at the site on the order of ½- to 1-inch and a differential settlement across a span of 40 feet is estimated to be on the order of ¼- to ½-inch. The project structural engineer should consider the total and differential settlement due to the above sources when designing the foundations of the minor, lightly-loaded structures.

### 4.6.4 Lateral Load Resistance

Soil resistance to lateral loads will be provided by a combination of frictional resistance between the bottom of post-tensioned slabs or spread footings and underlying soils and by passive soil pressures acting against the embedded sides of the slabs or footings. For frictional resistance, a coefficient of friction of 0.35 may be used for design. In addition, an allowable lateral bearing pressure equal to an equivalent fluid weight of 300 pounds per cubic foot may be used, provided the footings are poured tight against undisturbed natural soils or compacted fill. These values may be used in combination without reduction.

### 4.6.5 Carport Foundations

Carport structures can be supported on drilled pier foundations in accordance with the recommendations provided below.

Drilled pile foundations will develop their frictional capacity with relatively small deflection (about ¼-inch). The allowable capacities will depend on the pile diameter and the total depth of the pile below the pile cap. The downward vertical capacities shown below do not include capacity for end bearing, as it is difficult to adequately clean the base of small diameter drilled shafts. The values presented are for static loads, and can be increased by one-third for short-term wind and seismic loads. The allowable uplift capacity for a given pile may be taken as one-half of the compressive capacity provided below. We recommend a minimum pile depth of 8 feet.

| DEPTH BELOW PILE CAP (feet) | ALLOWABLE COMPRESSIVE CAPACITY (kips) | |
|---|---|---|
| | 24-inch Diameter | 30-inch Diameter |
| 8 | 12 | 16 |
| 10 | 18 | 24 |
| 12 | 24 | 32 |
| 14 | 30 | 40 |
| 16 | 36 | 48 |

If other diameters of piles are considered, an allowable frictional resistance of 150 pounds per square feet can be used for downward static loads in the upper 5 feet of the soil profile and 500 pounds per square foot for soils below 5 feet.

We recommend the underground infiltration systems be located at least 10 feet horizontally from the drilled pile foundations. If infiltration systems are located closer to the drilled pile foundations, there is a potential for settlement of the foundations due to collapse of underlying soils upon wetting on the order of ½- to 1-inch and a differential settlement across a span of 40 feet is estimated to be on the order of ¼- to ½-inch. The project structural engineer should consider the total and differential settlement due to the above source when designing the foundations of the carport structures.

Soil resistance to lateral loads can be provided by the piles. The design of the piles will be governed by lateral force considerations. For design by the simplified pole formula presented in Section 1807A.3.2.1 of the 2013 California Building Code, a unit passive resistance of 300 pounds per square foot per foot (to a maximum of 3,000 pounds per square foot) may be used for the piles with level ground in lieu of the presumptive lateral bearing values presented in Table 1806A.2. As stated in the code, a passive resistance of 600 pounds per square foot per foot (to a maximum of 6,000 pounds per square foot) may be used for isolated piles as determined by the Project Structural Engineer. We recommend that the upper 1-foot of the subgrade soils be ignored in determining the required depth of embedment to allow for surface disturbance adjacent to the pile unless the pile is located within a paved surface.

Pile excavations should be filled with concrete on the same day they are drilled. Concrete mix designs should include provisions to minimize shrinkage, which can lead to lower frictional resistance of the pile shaft and reduced allowable capacity. The concrete should be placed with special equipment so that it is not allowed to fall freely more than 5 feet or strike the walls of the excavations. Drilling for piles should not be performed within 5 feet of recently excavated or recently poured piles until the concrete has been allowed to set for at least 6 hours. The piles should be poured in a manner that will not result in concrete flowing into adjacent drilled pile excavations and prevent segregation of aggregate. Drilled pile construction should be performed in accordance with the latest edition of ACI 336.1, "Standard Specifications for the Construction of Drilled Piles."

Based on the density and moisture content of the soils encountered, the caving potential of the soils is considered to be moderate to high in the dry sands. The drilled pile contractor should evaluate the potential drilling conditions when planning the installation methods. We do not anticipate encountering groundwater during the installation of piles.

Since the drilled piles will be designed to derive resistance from friction only, rigorous cleaning of loose material from the bottom of the excavation prior to placement of steel and concrete is not considered essential. Every effort should be made to clean the bottom with the drill rig-mounted equipment.

Downhole inspection of drilled pile excavations (by lowering an inspector into the excavation) is not needed as the piles are designed as frictional elements. However, pile and footing excavations should be observed by a representative of GPI to confirm and document the depth, diameter, and embedment in suitable materials.

### 4.6.6 Slope Setback

We recommend the building foundations be setback from the existing, descending slope along University Avenue. We recommend a minimum setback from the edge of foundation to the face of slope of at least one-third of the height of the slope or a minimum of 5 feet. Site improvements, such as retaining walls, sidewalks, pavements, and fences, constructed within this this setback zone (H/3) may be subject to lateral movement and/or differential settlement.

### 4.6.7 Foundation Concrete

Laboratory chemical testing performed by HDR Schiff (Appendix B) indicates a soluble sulfate content of 347 mg/kg (0.035± percent of weight). Foundation concrete should conform to the requirements outlined in ACI 318, Section 4.3 for negligible levels of soluble sulfate exposure for soil.

### 4.6.8 Foundation Inspection

Prior to placement of concrete and steel, a representative of GPI should be observe and approve all foundation excavations.

## 4.7 SLABS-ON-GRADE

A vapor/moisture retarder should be placed under any slabs (including post-tensioned slabs) that are to be covered with moisture-sensitive floor coverings (parquet, vinyl tile, etc.). Currently, common practice is to use 10-mil polyethylene as a vapor retarder placed either directly on the subgrade or over a thin layer of sand. Recently, other types of vapor retarders with much lower permanence and higher puncture resistance have become available and should be considered as an alternative. Polyolefin in 10-mil or 15-mil thickness is such a material and could be considered for this project. This material should be covered by a layer of clean sand (less than 5% by weight passing the No. 200 sieve) having a minimum thickness of 2 inches. The function of the sand layer is to protect the vapor retarder during construction and to aid in the uniform curing of the concrete. This layer should be nominally compacted using light equipment. The sand placed over the vapor retarder should be only slightly moist. If the sand gets wet (for example, as a result of rainfall) it must be allowed to dry prior to placing concrete.

It should be noted that the material used as a vapor retarder is only one of several factors affecting the prevention of moisture accumulation under floor coverings. Other factors include effective sealing of joints edges (particularly at pipe penetration) as well as excess moisture in the concrete. The manufacturer of floor coverings should be consulted for establishing acceptable criteria for the condition of floor surface prior to placing moisture-sensitive floor coverings.

For lateral resistance design, a coefficient of friction value of 0.35 between select fill and concrete may be used. For a slab on a visqueen moisture barrier, a coefficient of 0.1 should be used.

## 4.8 LATERAL EARTH PRESSURES

Based on information available to us at the time this report was prepared, no major retaining walls or basements were planned for the site. The following recommendations are provided for walls less than 6 feet in height. We recommend that all walls be backfilled with on-site or imported non-expansive, granular (sandy) soils. On-site silty or clayey soils should not be used as wall backfill.

Active earth pressures can be used for designing walls that can yield at least 1-inch laterally in 10 feet of wall height under the imposed loads. For level backfill comprised of on-site or imported granular soils (no more than 40 percent passing No. 200 U.S. standard sieve), the magnitude of active pressures are equivalent to the pressures imposed by a fluid weighing 35 pounds per cubic foot (pcf). The Structural Engineer should indicate on the plans the type of backfill recommended above.

At-rest pressures should be used for restrained walls that remain rigid enough to be essentially non-yielding. At-rest pressures for on-site or imported granular soils are equivalent to the pressures imposed by a fluid weighing 52 pounds per cubic foot.

If the design of retaining walls requires seismic earth pressures to be included, we recommend a total lateral earth pressure (active plus seismic) equal to a fluid weighing 62 pcf. If walls are designed using at-rest pressures, a total lateral earth pressure may be limited to 62 pcf.

Walls subject to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third and one-half the anticipated surcharge pressure for unrestrained and restrained walls, respectively.

The recommended pressures are based on the assumption that the supported earth will be fully drained, preventing the build-up of hydro-static pressures. For traditional backfilled retaining walls, a drain consisting of perforated pipe surrounded by gravel and wrapped in filter fabric should be used. As a minimum, one cubic foot of rock should be used for each lineal foot of drain. The fabric (non-woven filter fabric, Mirafi 140N or equivalent) should be lapped at the top.

Retaining wall footings should be designed as discussed in the *"Shallow Foundations"* section.

## 4.9 CORROSIVITY

Resistivity testing (Appendix B) of representative samples of the on-site soils indicates that they are severely corrosive to metals. Should the use of buried metallic structures be proposed, a corrosion engineer such as HDR Schiff should be retained to provide recommendations to protect these elements from corrosion. GPI does not practice corrosion engineering.

## 4.10 DRAINAGE

Positive surface gradients should be provided adjacent to all structures so as to direct surface water run-off and roof drainage away from foundations and slabs toward suitable discharge facilities. Long-term ponding of surface water should not be allowed on pavements or adjacent to buildings.

Careful efforts should be made to provide methods of transporting runoff water to collection devices and preventing runoff water from infiltrating soils within the vicinity of the buildings or other improvements. Proper measures should also be take reduce the potential for future pipe leakage and/or landscape irrigation infiltration into the soils near the buildings or other proposed improvements.

## 4.11 STORM INFILITRATION

Current regulations require that storm water be infiltrated in the site soils of new developments when possible. Portions of the sandy silts, silty sands and sands in on-site soils at depths from 10 to 30 feet below existing grade profile exhibit significant potential for settlement from liquefaction or collapse upon saturation. Storm water infiltration into the underlying soils may adversely impact the proposed buildings and structure as well as adjacent properties. We do not recommend storm water infiltration for the subject site unless the risk is accepted for settlement of soils in the pavement areas and under carports.

If on-site infiltration of storm water is used, we recommend that infiltration areas directly adjacent to the buildings and carport structures should be avoided as discussed above.

A separate report (Reference 1) has been prepared discussing the results of our on-site percolation tests and corresponding infiltration rates.

## 4.12 EXTERIOR CONCRETE AND MASONRY FLATWORK

Exterior concrete and masonry flatwork should be supported on non-expansive, compacted fill. Prior to placement of concrete, the subgrade should be prepared as recommended in "Subgrade Preparation" section. The use of clay soils directly under the exterior concrete and flatwork should not be permitted unless differential heave is tolerable.

## 4.13 PAVED AREAS

Preliminary pavement design has been based on an R-value of 15 based upon laboratory testing of the near-surface soils at the site. The California Division of Highways Design Method was used for design of the recommended preliminary pavement sections. Final pavement design should be based on R-value testing performed near the conclusion of rough grading. The following pavement sections are recommended for planning purposes only.

**PAVEMENT SECTIONS**

| PAVEMENT AREA | TRAFFIC INDEX | SECTION THICKNESS (inches) | |
|---|---|---|---|
| | | **Asphalt Concrete** | **Aggregate Base Course** |
| Auto Parking Stalls | 4 | 3 | 6 |
| Circulation Drives (no trucks) | 5 | 3 | 8 |
| Truck Driveways | 6 | 3 | 12 |
| | | **Portland Cement Concrete** | **Aggregate Base Course** |
| Auto Parking Stalls | 4 | 7 | --- |
| Circulation Drives (no trucks) | 5 | 7 | --- |
| Truck Driveways | 6 | 7.5 | --- |

The concrete used for paving should have a modulus of rupture of at least 550 psi (equivalent to an approximate compressive strength of 3,700 psi at the time the pavement is subjected to traffic).

The pavement subgrade underlying the aggregate base should be properly prepared and compacted in accordance with the recommendations outlined under "Subgrade Preparation".

The pavement base course should be compacted to at least 95 percent of the maximum dry density (ASTM D 1557). Aggregate base should conform to the requirements of Section 26 of the California Department of Transportation Standard Specifications for Class II aggregate base (three-quarter inch maximum) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book) for untreated base materials (except processed miscellaneous base).

The above recommendations are based on the assumption that the base course and compacted subgrade will be properly drained. The design of paved areas should incorporate measures to prevent moisture build-up within the base course, which can otherwise lead to premature pavement failure. For example, curbing adjacent to landscaped areas should be deep enough to act as a barrier to infiltration of irrigation water into the adjacent base course.

## 4.14 GEOTECHNICAL OBSERVATION AND TESTING

We recommend that a representative of GPI observe all earthwork during construction to confirm that the recommendations provided in our report are applicable during construction. The earthwork activities include grading, compaction of all fills and subgrade preparation, as well as foundation construction. If conditions are different than expected, we should be afforded the opportunity to provide an alternate recommendation based on the actual conditions encountered.

## 5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from GPI's efforts were prepared exclusively for use by REALM and their consultants in designing the proposed development. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed development as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only. This report cannot be utilized by another entity without the express written permission of GPI. This report is an instrument of our services and remains the property of GPI.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to non-uniformity of the geologic formations or to man-made cut and fill operations. While we cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this report are based on the assumption that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

Furthermore, our recommendations were developed with the assumption that a proper level of field observation and construction review will be provided during grading, excavation, and foundation construction by GPI. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations. If construction phase services are performed by others they must accept full responsibility (as Project Geotechnical Engineer) for all geotechnical aspects of the project including this report.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Geotechnical Engineers practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

Respectfully submitted,
**Geotechnical Professionals Inc.**

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FEB 17 2014

## REFERENCES

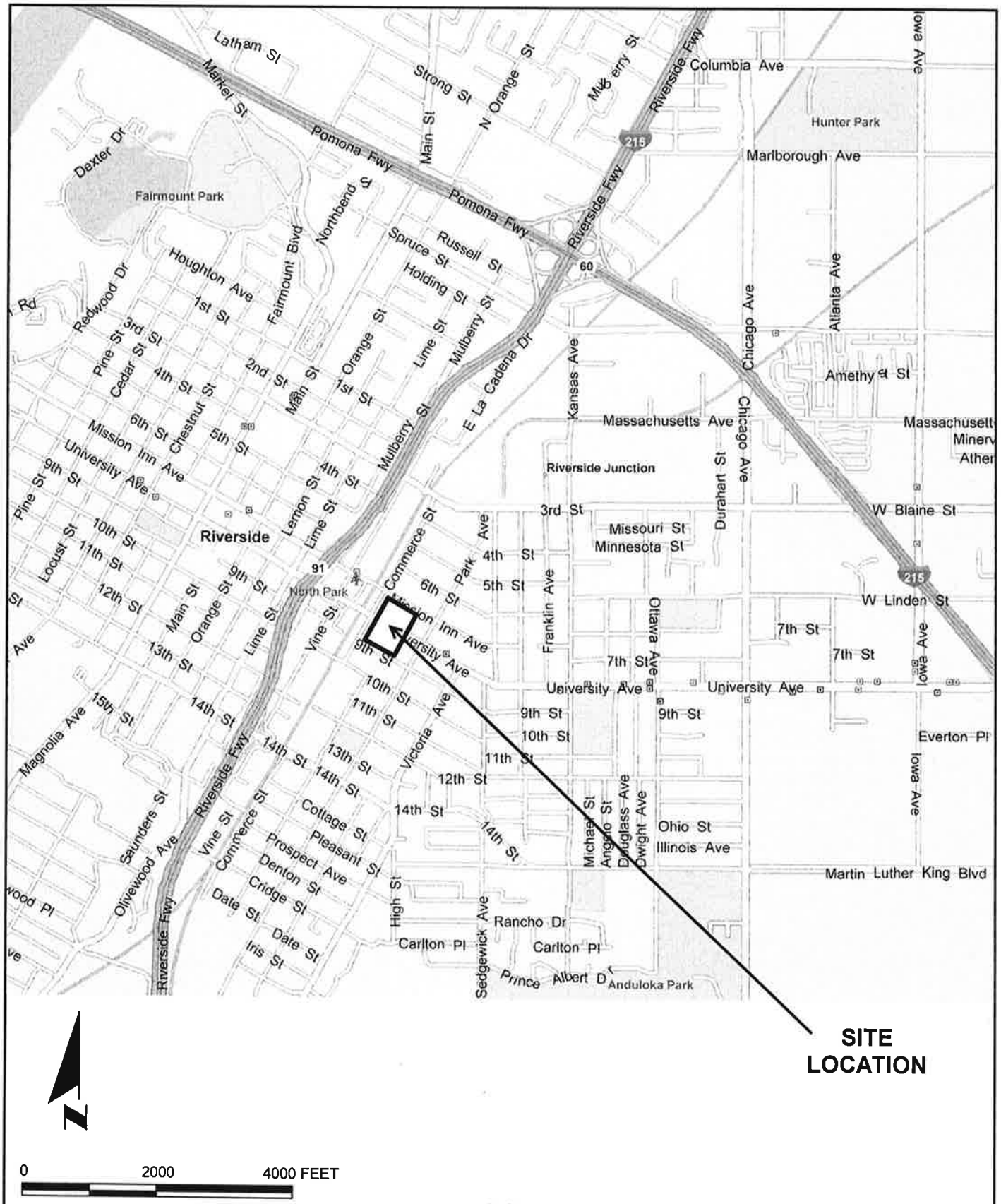
1. Geotechnical Professionals Inc., "Interim Report of Percolation/Infiltration Testing, Proposed Mission Lofts, University Avenue at Commerce Street, Riverside, California", GPI Project No. 2591.I, dated January 17, 2014.

2. http://www.historicaerials.com, Aerial Photography from the Past and Present", National Environmental Title Research, LLC.

3. United States Geologic Survey, Earthquake Ground Motion Parameters Application, http://earthquake.usgs.gov/research/hazmaps/design

4. Risk Engineering, Inc. 2010, EZ-Frisk, Software for Earthquake Ground Motion Estimation, Version 7.43.

5. City of Riverside, Community Development Department, "Liquefaction Zones, Riverside General Plan, 2025, Public Safety Element", Figure PS-2, plan dated November 2007.




BASE MAP REPRODUCED FROM MICROSOFT STREETS AND TRIPS (C. 2008)

GEOTECHNICAL PROFESSIONALS, INC.

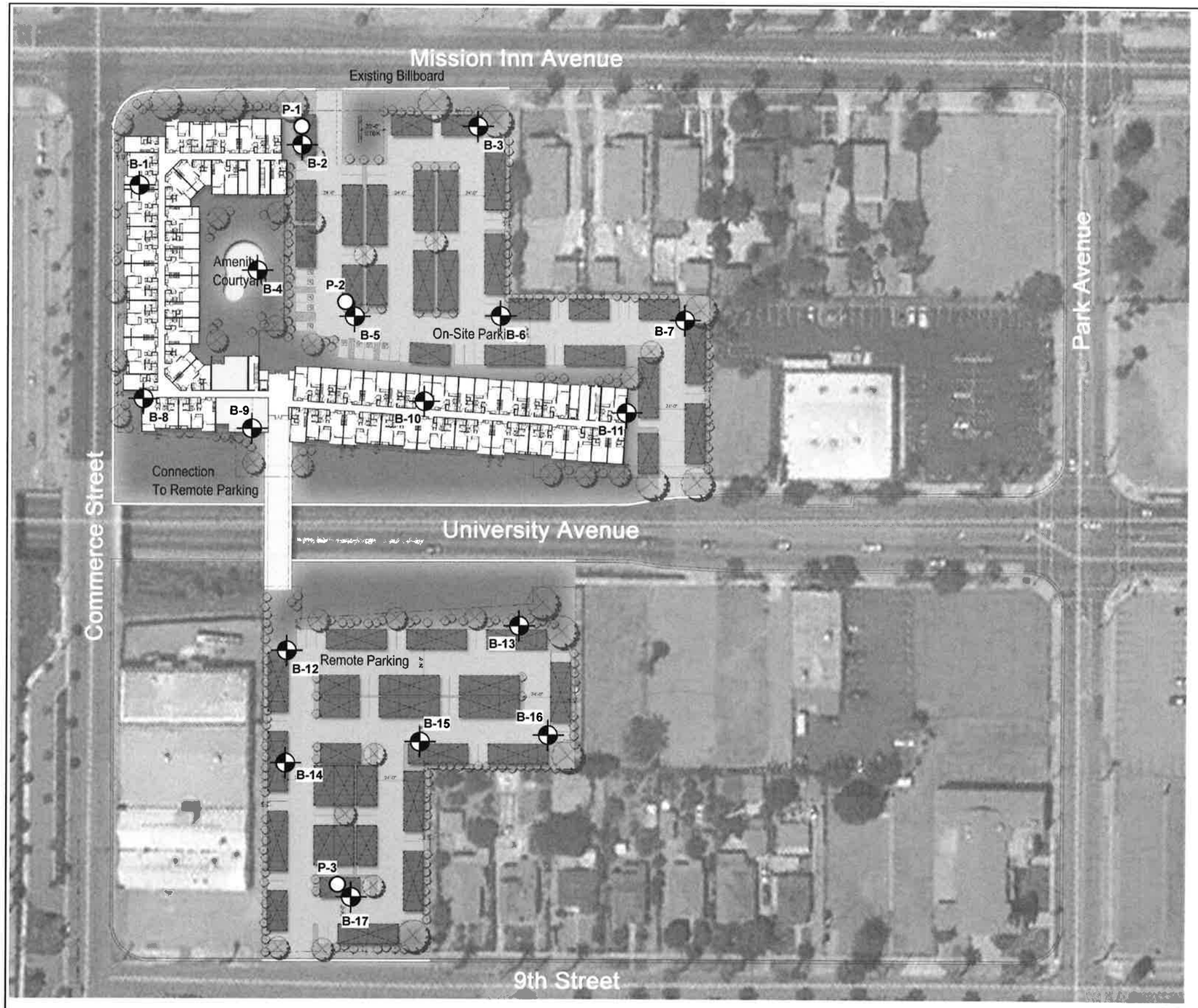
MISSION LOFTS - RIVERSIDE

GPI PROJECT NO. 2591.I

SCALE: 1" = 2000'

## SITE LOCATION

FIGURE 1




EXPLANATION

B-1 APPROXIMATE LOCATION AND NUMBER OF EXPLORATORY BORING

P-2 APPROXIMATE LOCATION AND NUMBER OF PERCOLATION WELL

0 100 200 FEET

N

PROJECT

BASE MAP REPRODUCED FROM CONCEPTUAL SITE PLAN PREPARED BY KTGY GROUP, INC.: DATED 11/21/2013

GPI GEOTECHNICAL PROFESSIONALS, INC.

MISSION LOFTS - RIVERSIDE

GPI PROJECT NO.: 2591.I

SCALE: 1" = 100'

**SITE PLAN**

FIGURE 2

# APPENDIX A

# APPENDIX A

## EXPLORATORY BORINGS

The subsurface conditions at the site were investigated by drilling and sampling 17 exploratory borings and three percolation wells. The borings were advanced to depths ranging from 11 to 50 feet below the existing ground surface. The percolation wells were installed at depths of 10 feet below the existing ground surface. The locations of the explorations and wells are shown on the Site Plan, Figure 2.

The exploratory borings were drilled using truck-mounted hollow-stem auger drill equipment. Relatively undisturbed samples were obtained using a brass-ring lined sampler (ASTM D 3550). The brass-rings have an inside diameter of 2.42 inches. The ring samples were driven into the soil by a 140-pound hammer dropping 30 inches. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

At selected locations, disturbed samples were obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D 6066). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing the "free-fall" hammer described above. After an initial seating drive of 6 inches, the number of blows needed to drive the sampler into the soil a depth of 12 inches was recorded as the penetration resistance. These values are the raw uncorrected blowcounts.

The percolation wells were installed in boreholes driller using truck-mounted hollow-stem auger drill equipment. The wells were constructed using 2-inch diameter slotted and solid PVC/ABS casing installed in an 8-inch diameter borehole. The bottom 4 to 5 feet of the borehole was backfilled with #3 sand.

The field explorations for the investigation were performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed samples for examination and laboratory testing. The soils encountered in the borings were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. Detailed logs of the borings are presented in Figures A-1 to A-17 in this appendix.

The boring locations were laid out in the field by measuring from existing site features. Ground surface elevations at the exploration locations were estimated from internet sources, and should be considered very approximate. As topographic surveys are performed for the site, the ground elevations should be confirmed or modified.

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | 2.5" Asphalt | 870 |
| | | | | | Fill: **SILTY SAND (SM)** brown, moist, loose, with gravel | |
| 11.3 | 114 | 9 | D | | **SANDY CLAY (CL)** brown, moist, firm | |
| | | | B | | | |
| 12.9 | 113 | 19 | D | 5 | Natural?: **SANDY SILT (ML)** brown, moist, stiff, trace clay | 865 |
| 10.6 | 102 | 46 | D | | **SILT WITH SAND (ML)** brown, moist, hard, trace porosity | |
| 10.6 | 111 | 27 | D | 10 | @ 10 feet, very stiff, trace porosity | 860 |
| 10.4 | 101 | 15 | D | 15 | @ 15 feet, stiff | 855 |
| 16.3 | 98 | 19 | D | 20 | **SANDY SILT (ML)** brown, very moist, stiff | 850 |
| 11.6 | 94 | 30 | D | 25 | @ 25 feet, moist, very stiff | 845 |
| 15.4 | 102 | 29 | D | 30 | @ 29 feet, very moist | 840 |
| | | | | | Total Depth 30 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.I
MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-1

FIGURE A-1

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | | 870 |
| 8.3 | 118 | | | | Fill: **CLAYEY SAND (SC)** light brown to brown, moist, medium dense, trace gravel | |
| 8.3 | 118 | 17 | D | | | |
| 11.9 | 116 | | B | | | |
| | | | | 5 | | 865 |
| 15.8 | 106 | 44 | D | | Natural?: **SANDY SILT (ML)** brown, very moist, very stiff to hard | |
| 10.5 | 107 | 35 | D | | @ 7 feet, moist, stiff | |
| | | | | 10 | | 860 |
| 3.8 | | 8 | S | | **SILTY SAND (SM)** brown, dry, loose | |
| 11.6 | | 13 | S | | **SANDY SILT (ML)** brown, moist, stiff | |
| 8.7 | | 7 | S | 15 | **SILTY SAND (SM)** brown, moist, loose | 855 |
| 1.5 | | 17 | S | | **SAND WITH SILT (SP-SM)** light brown and white, dry, medium dense | |
| 12.6 | | 11 | S | | **SANDY SILT (ML)** brown, moist, stiff, with lens of sand | |
| 14.4 | | 15 | S | 20 | @ 20 feet, very stiff | 850 |
| 3.1 | 100 | 34 | D | 25 | **SILTY SAND (SP)** light brown, dry, medium dense | 845 |
| 10.6 | 109 | 42 | D | 30 | **SANDY SILT (ML)** brown, moist, hard | 840 |
| | | | | | Total Depth 30 feet | |
| | | | | | P-1 percolation well placed adjacent to B-2 | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-10-14

EQUIPMENT USED: 8" Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2591.I

MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-2

FIGURE A-2

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SANDY CLAY (CL)** brown, slightly moist, with gravel | 870 |
| 8.0 | 106 | 18 | D | | Natural?: **SANDY SILT (ML)** brown, slightly moist, stiff, trace porosity | |
| | | | B | | | |
| 10.9 | 98 | 68 | D | 5 | @ 5 feet, moist, hard | 865 |
| 8.5 | 108 | 51 | D | | | |
| 7.1 | 105 | 23 | D | 10 | @ 10 feet, very stiff, trace porosity | 860 |
| | | | | | Total Depth 11 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.I
MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-3

FIGURE A-3

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, slightly moist, medium dense, with gravel | 870 |
| 9.1 | 111 | 25 | D | | Natural?: **SANDY SILT (ML)** brown, moist, very stiff | |
| | | | B | | | |
| 16.4 | 104 | 38 | D | 5 | @ 5 feet, very moist, trace porosity | 865 |
| 13.4 | 105 | 39 | D | | @ 7 feet, moist, trace porosity | |
| 6.9 | 112 | 27 | D | 10 | **SILTY SAND (SM)** brown, slightly moist, medium dense | 860 |
| 12.5 | 111 | 21 | D | 15 | **SANDY SILT (ML)** brown, moist, stiff, trace porosity | 855 |
| | | | | | Total Depth 16 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.1
MISSION LOFTS - RIVERSIDE

## LOG OF BORING NO. B-4

FIGURE A-4

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, slightly moist, medium dense | 870 |
| 6.3 | 91 | 31 | D<br>B | | **SANDY SILT (ML)** brown, slightly moist, very stiff | |
| 6.5 | 99 | 41 | D | 5 | Natural?: **SANDY SILT (ML)** light brown, slightly moist, very stiff | 865 |
| 5.6 | 94 | 50 | D | | @ 7 feet, hard | |
| 7.0 | | 29 | S | 10 | @ 10 feet, very stiff | 860 |
| 14.6 | | 29 | S | | **SILT WITH SAND (ML)** brown to light brown, moist to very moist, very stiff to hard | |
| 11.5 | | 22 | S | 15 | **SANDY SILT (ML)** brown, moist, very stiff | 855 |
| 1.4 | | 16 | S | | **SAND (SP)** light brown and white, dry, medium dense | |
| 16.3 | | 20 | S | | **SANDY SILT (ML)** brown, very moist, stiff | |
| 12.1 | | 11 | S | 20 | @ 20 feet, moist, firm | 850 |
| | | | | | Total Depth 21.5 feet<br><br>P-2 percolation well placed adjacent to B-5 | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-10-14

EQUIPMENT USED: 8" Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2591.I

MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-5

FIGURE A-5

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SANDY SILT (ML)** brown, moist, trace clay. trace concrete | 880 |
| 6.2 | 102 | 30 | D | | Natural?: **SANDY SILT (ML)** brown, slightly moist, very stiff | |
| 10.5 | 100 | 28 | D | 5 | @ 5 feet, moist, trace porosity | 875 |
| 10.2 | 101 | 42 | D | | **SILTY SAND (SM)** brown, slightly moist, medium dense | |
| 5.3 | 106 | 23 | D | 10 | | 870 |
| | | | | | Total Depth 11 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.1
MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-6

FIGURE A-6

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SANDY CLAY (CL)** brown, very moist, firm | 880 |
| 17.5 | 107 | 9 | D | | | |
| | | | B | | | |
| | | | | 5 | | 875 |
| 18.8 | 108 | 16 | D | | Natural: **SANDY SILT (ML)** brown, wet, stiff | |
| 17.5 | 103 | 44 | D | | @ 7 feet, very moist | |
| | | | | 10 | | 870 |
| 6.8 | 97 | 31 | D | | @ 10 feet, slightly moist | |
| | | | | | Total Depth 11 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.I
MISSION LOFTS - RIVERSIDE

## LOG OF BORING NO. B-7

FIGURE A-7

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **CLAYEY SAND (SC)** brown, slightly moist, with gravel | 870 |
| 6.9 | 96 | 21 | D | | Natural?: **SANDY SILT (ML)** brown, slightly moist, stiff, with gravel, trace clay | |
| | | | B | | | |
| 8.1 | 101 | 33 | D | 5 | @ 5 feet, moist, very stiff, no gravel | 865 |
| 6.2 | 98 | 38 | D | | | |
| 7.4 | 104 | 48 | D | 10 | @ 10 feet, hard | 860 |
| 4.3 | 101 | 21 | D | 15 | **SILTY SAND (SM)** brown, dry to slightly moist, medium dense | 855 |
| 8.7 | 92 | 22 | D | 20 | **SILT (ML)** brown, slightly moist, stiff to very stiff | 850 |
| | | | | | **SANDY SILT (ML)** brown, slightly moist, stiff to very stiff | |
| 6.1 | 101 | 25 | D | 25 | **SILTY SAND (SM)** brown, moist, medium dense | 845 |
| 11.8 | 100 | 22 | D | | | |
| | | | | 30 | Total Depth 30 feet | 840 |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.I
MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-8

FIGURE A-8

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, moist, with gravel | 870 |
| 8.7 | 95 | 19 | D<br>B | | Natural?: **SANDY SILT (ML)** brown, slightly moist, stiff, trace porosity | |
| 9.9 | 109 | 29 | D | 5 | **SILT WITH SAND (ML)** brown, moist, very stiff | 865 |
| 13.5 | 99 | 32 | D | | **SANDY CLAYEY SILT (ML)** brown, moist, very stiff | |
| 14.5 | 105 | 51 | D | 10 | **SANDY SILT (ML)** brown, moist, hard | 860 |
| 14.0 | 98 | 18 | D | 15 | @ 15 feet, stiff | 855 |
| 5.9 | 102 | 24 | D | 20 | **SILTY SAND (SM)** brown, slightly moist, medium dense | 850 |
| 12.1 | 98 | 26 | D | 25 | **SANDY SILT (ML)** brown, moist, very stiff, trace porosity | 845 |
| 10.4 | 102 | 19 | D | | @ 29 feet, stiff | |
| | | | | 30 | Total Depth 30 feet | 840 |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.I
MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-9

FIGURE A-9

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, dry to slightly moist, very dense | 870 |
| 6.1 | 108 | 71 | D | | Natural?: **SILTY SAND (SM)** light brown, slightly, dense to very dense | |
| 6.3 | 103 | 70 | D | 5 | | 865 |
| 8.0 | 97 | 44 | D | | @ 7 feet, medium dense | |
| 7.8 | 95 | 28 | D | 10 | | 860 |
| 10.4 | 88 | 14 | D | 15 | **SANDY SILT (ML)** brown, moist, stiff | 855 |
| 11.2 | 96 | 28 | D | 20 | @ 20 feet, very stiff | 850 |
| 11.3 | 100 | 31 | D | 25 | | 845 |
| 16.7 | 97 | 27 | D | 30 | @ 30 feet, very moist | 840 |
| 7.6 | 105 | 21 | D | 35 | **SILTY SAND (SM)** brown, moist, medium dense | 835 |
| | | | | | | 830 |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-10-14

EQUIPMENT USED: 8" Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2591.I

MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-10

FIGURE A-10

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 40 | | 830 |
| 2.2 | 107 | 33 | D | | **SAND (SP)** light brown and white, dry, medium dense | |
| | | | | | **SILTY SAND (SM)** brown, dry, medium dense | |
| | | | | 45 | | 825 |
| 14.9 | 107 | 30 | D | | **SANDY SILT (ML)** brown, moist to very moist, very stiff | |
| 6.9 | 118 | 50 | D | | **SILTY SAND (SM)** brown, moist, dense | |
| | | | | 50 | Total Depth 50 feet | 820 |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-10-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

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## LOG OF BORING NO. B-10

FIGURE A-10

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | 3" Asphalt | 880 |
| | | | | | Fill: **SILTY SAND (SM)** brown, moist, medium dense, trace gravel | |
| 7.4 | 111 | 18 | D | | @ 2 feet, trace clay | |
| | | | | | **SANDY SILT (ML)** brown, slightly moist, stiff | |
| | | | | 5 | | 875 |
| 7.1 | 104 | 29 | D | | Natural?: **SILTY SAND (SM)** brown, slightly moist, medium dense | |
| 9.5 | 105 | 47 | D | | **SANDY SILT (ML)** brown, slightly moist, very stiff<br>@ 7 feet, hard | |
| | | | | 10 | | 870 |
| 11.1 | 98 | 22 | D | | @ 10 feet, moist, stiff to very stiff | |
| | | | | 15 | | 865 |
| 17.6 | 105 | 45 | D | | @ 15 feet, very moist, very stiff to hard | |
| | | | | 20 | | 860 |
| 1.4 | 110 | 26 | D | | **SAND (SP)** brown, dry, medium dense, trace gravel | |
| | | | | 25 | | 855 |
| 1.4 | 104 | 35 | D | | **SANDY SILT (ML)** brown, moist, very stiff | |
| 9.3 | 109 | 35 | D | | | |
| | | | | 30 | Total Depth 30 feet | 850 |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-14-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

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# LOG OF BORING NO. B-11

FIGURE A-11

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SANDY CLAY (CL)** brown, moist, stiff, with gravel | 870 |
| 12.3 | 117 | 20 | D | | | |
| | | | B | | | |
| | | | | 5 | Natural?: **SANDY SILT (ML)** brown, moist, stiff, trace porosity | 865 |
| 15.7 | 110 | 17 | D | | | |
| 19.1 | 104 | 60 | D | | @ 7 feet, wet, hard | |
| | | | | 10 | @ 10 feet, very moist, very stiff | 860 |
| 15.2 | 112 | 38 | D | | | |
| | | | | 15 | **SILTY SAND (SM)** brown, moist, medium dense | 855 |
| 10.5 | 110 | 17 | D | | | |
| 15.8 | 105 | 23 | D | | **SANDY SILT (ML)** brown, moist to very moist, very stiff | |
| | | | | 20 | Total Depth 20 feet | 850 |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-15-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

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MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-12

FIGURE A-12

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, slightly moist | 880 |
| 4.2 | 110 | 21 | D | | Natural?: **CLAYEY SAND (SC)** brown, dry to slightly moist, medium dense, trace porosity | |
| | | | B | | | |
| | | | | 5 | | 875 |
| 7.1 | 87 | 29 | D | | **SANDY SILT (ML)** brown, slightly moist, very stiff | |
| 12.8 | 90 | 15 | D | | @ 7 feet, moist, stiff | |
| | | | | 10 | | 870 |
| 9.2 | 91 | 13 | D | | Total Depth 11 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-15-14

EQUIPMENT USED: 8" Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2591.I

MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-13

FIGURE A-13

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, moist, medium dense | 880 |
| 13.0 | 109 | 17 | D | | Natural?: **SANDY SILT (ML)** brown, moist, stiff, trace porosity | |
| 13.3 | 108 | 16 | D | 5 | | 875 |
| 13.4 | 100 | 19 | D | | | |
| 14.5 | 108 | 23 | D | 10 | @ 10 feet, very stiff, trace clay | 870 |
| | | | | | Total Depth 11 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-15-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.I
MISSION LOFTS - RIVERSIDE

**LOG OF BORING NO. B-14**

FIGURE A-14

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, moist | 880 |
| 14.1 | 88 | 28 | D | | Natural?: **SANDY SILT (ML)** brown, moist, very stiff | |
| 16.9 | 100 | 52 | D | 5 | @ 5 feet, very moist | 875 |
| 13.0 | 90 | 13 | D | | @ 7 feet, moist, stiff | |
| 12.8 | 107 | 21 | D | 10 | | 870 |
| | | | | | Total Depth 11 feet | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-15-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2591.I
MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-15

FIGURE A-15

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** brown, slightly moist | 880 |
| 5.9 | 99 | 18 | D | | Natural?: **SILTY SAND (SM)** brown, slightly moist, medium dense, trace porosity | |
| 3.9 | 100 | 8 | D | 5 | @ 5 feet, dry, loose | 875 |
| 2.9 | 106 | 19 | D | | **SAND WITH SILT (SP-SM)** brown, dry, medium dense | |
| 1.6 | 102 | 15 | D | 10 | **SAND (SP)** brown, dry, loose to medium dense | 870 |
| 5.4 | 108 | 28 | D | 15 | **SILTY SAND (SM)** brown, slightly moist, medium dense | 865 |
| 1.6 | 107 | 37 | D | | **SAND (SP)** brown, dry, medium dense | |
| | | | | 20 | Total Depth 20 feet | 860 |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
1-15-14

EQUIPMENT USED:
8" Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

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MISSION LOFTS - RIVERSIDE

## LOG OF BORING NO. B-16

FIGURE A-16

| MOISTURE (%) | DRY DENSITY (PCF) | PENETRATION RESISTANCE (BLOWS/FOOT) | SAMPLE TYPE | DEPTH (FEET) | DESCRIPTION OF SUBSURFACE MATERIALS<br>This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. | ELEVATION (FEET) |
|---|---|---|---|---|---|---|
| | | | | 0 | Fill: **SILTY SAND (SM)** dark brown, slightly moist, loose, with gravel | 870 |
| 6.7 | 107 | 9 | D<br>B | | | |
| 11.1 | 97 | 18 | D | 5 | Natural?: **SANDY SILT (ML)** brown, moist, stiff | 865 |
| 11.2 | 94 | 40 | D | | @ 7 feet, moist, very stiff | |
| 11.1 | | 19 | S | 10 | @ 10 feet, stiff | 860 |
| 12.8 | | 23 | S | | @ 12 feet, very stiff | |
| 9.7 | | 38 | S | 15 | | 855 |
| 8.7 | | 49 | S | | **SILTY SAND (SM)** brown, moist, dense to very dense | |
| 7.8 | | 80 | S | | @ 18 feet, light brown, very dense | |
| 10.6 | | 65 | S | 20 | **SANDY SILT (ML)** brown, moist, hard | 850 |
| | | | | | Total Depth 21.5 feet<br><br>P-3 percolation well placed adjacent to B-17 | |

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 1-10-14

EQUIPMENT USED: 8" Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

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PROJECT NO.: 2591.I

MISSION LOFTS - RIVERSIDE

# LOG OF BORING NO. B-17

FIGURE A-17

# APPENDIX B

# APPENDIX B

# LABORATORY TESTS

## INTRODUCTION

Representative undisturbed soil samples and bulk samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented in the figures that follow.

## MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density was determined from a number of the samples. The samples were weighed to determine the wet weight and then were dried in accordance with ASTM D 2216. After drying, the weight of each sample was measured, and moisture content was calculated. Moisture content values are presented on the boring logs in Appendix A.

## ATTERBERG LIMITS

Liquid and plastic limits were determined for a sample of cohesive material in accordance with ASTM D 4318. The results of the Atterberg Limits tests are presented in Figure B-1.

## GRAIN SIZE DISTRIBUTION

Multiple soil samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and weighed to determine the percentage of the material passing the No. 200 sieve. A summary of the percentages passing the No. 200 sieve is presented below.

| BORING NO. | DEPTH (ft) | SOIL DESCRIPTION | PERCENT PASSING No. 200 SIEVE |
|---|---|---|---|
| B-1 | 7 | Silt With Sand (ML) | 80 |
| B-2 | 10 | Silty Sand (SM) | 19 |
| B-2 | 12 | Sandy Silt (ML) | 66 |
| B-2 | 14 | Silty Sand (SM) | 40 |
| B-2 | 18 | Sandy Silt (ML) | 61 |
| B-5 | 10 | Sandy Silt (ML) | 74 |

| BORING NO. | DEPTH (ft) | SOIL DESCRIPTION | PERCENT PASSING No. 200 SIEVE |
|---|---|---|---|
| B-5 | 12 | Silt With Sand (ML) | 78 |
| B-5 | 14 | Sandy Silt (ML) | 68 |
| B-9 | 5 | Silt With Sand (ML) | 81 |
| B-10 | 15 | Sandy Silt (ML) | 76 |
| B-10 | 25 | Sandy Silt (ML) | 61 |
| B-10 | 30 | Sandy Silt (ML) | 74 |
| B-10 | 35 | Silty Sand (SM) | 45 |
| B-10 | 40 | Sand (SP) | 5 |
| B-17 | 10 | Sandy Silt (ML) | 59 |
| B-17 | 12 | Sandy Silt (ML) | 53 |

## DIRECT SHEAR

Direct shear tests were performed on relatively undisturbed and remolded bulk samples in accordance with ASTM D 3080. The bulk samples were remolded to approximately 90 percent of the maximum dry density. The test specimens were placed in the shear machine, and a normal load comparable to the in-situ overburden stress was applied. The samples were inundated, allowed to consolidate, and then were sheared to failure at a strain rate of 0.0010 inches per minute. The tests were repeated on additional test specimens under increased normal loads. Shear stress and sample deformation were monitored throughout the test. The results of the direct shear tests are presented in Figures B-2 to B-5.

## CONSOLIDATION

A one-dimensional consolidation test was performed on an undisturbed sample in accordance with ASTM D 2435. After trimming the ends, the sample was placed in the consolidometer and loaded to up to 0.4 ksf. Thereafter, the sample was incrementally loaded to a maximum load of up to 25.6 ksf. The sample was inundated at 1.6 ksf. Sample deformation was measured to 0.0001 inch. Rebound behavior was investigated by unloading the sample back to 0.4 ksf. Results of the consolidation test, in the form of percent consolidation versus log pressure, are presented in Figure B-6.

## COLLAPSE

A collapse test was performed on a undisturbed ring sample in accordance with ASTM D 5333. After trimming the ends, the samples were placed in the consolidometer and loaded to 0.4 ksf. Thereafter, the samples were incrementally loaded to a maximum load of 1.6 ksf at the in-situ moisture content and then saturated. Sample deformation was measured to 0.0001 inch. The amount of collapse is shown as follows as percent compression of the sample.

| BORING NO. | DEPTH (ft) | SOIL DESCRIPTION | TOTAL COMPRESSION (%) | |
|---|---|---|---|---|
| | | | BEFORE SATURATION | AFTER SATURATION |
| B-1 | 15 | Sandy Silt (ML) | 2.6 | 4.8 |

## EXPANSION INDEX

An expansion index test was performed on a bulk sample. The test was performed in accordance with ASTM 4829, to assess the expansion potential of on-site soils. The results of the test are summarized below:

| BORING NO. | DEPTH (ft) | SOIL DESCRIPTION | EXPANSION INDEX |
|---|---|---|---|
| B-8 | 0 – 4 | Clayey Sand (SC) | 0 |

## COMPACTION TEST

A maximum dry density/optimum moisture test was performed in accordance with ASTM D1557 on a representative bulk sample of the surficial soils. The test results, without rock correction, are as follows.

| BORING NO. | DEPTH (ft) | SOIL DESCRIPTION | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) |
|---|---|---|---|---|
| B-2 | 0 – 4 | Clayey Sand (SC) | 8 | 131 |

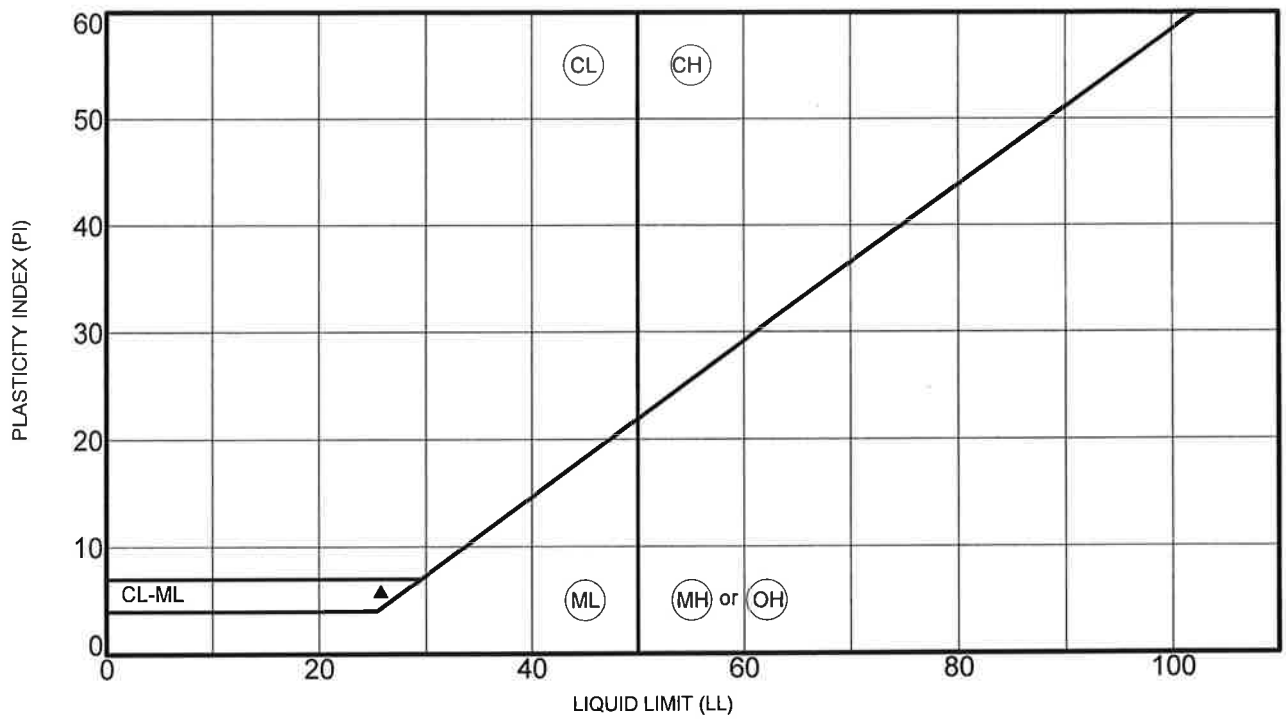
## R-VALUE

Suitability of the near-surface soils for pavement was evaluated by conducting an R-value test. The test was performed in accordance with ASTM D 2844 by GeoLogic Associates under subcontract to GPI. The result of the test is as follows:

| BORING NO. | DEPTH (ft) | SOIL DESCRIPTION | R-VALUE BY EXUDATION |
|---|---|---|---|
| B-12 | 0-4 | Sandy Clay (CL) | 17 |

## CORROSIVITY

Soil corrosivity testing was performed by HDR/Schiff on a soil sample provided by GPI. The test results and corrosion protection recommendations are summarized in this Appendix.




| | SAMPLE LOCATION | | LL | PL | PI | Fines, % | Classification |
|---|---|---|---|---|---|---|---|
| ▲ | B-09 | 7.0 | 26 | 20 | 6 | | SANDY CLAYEY SILT (ML) |

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PROJECT NO. 2591.I

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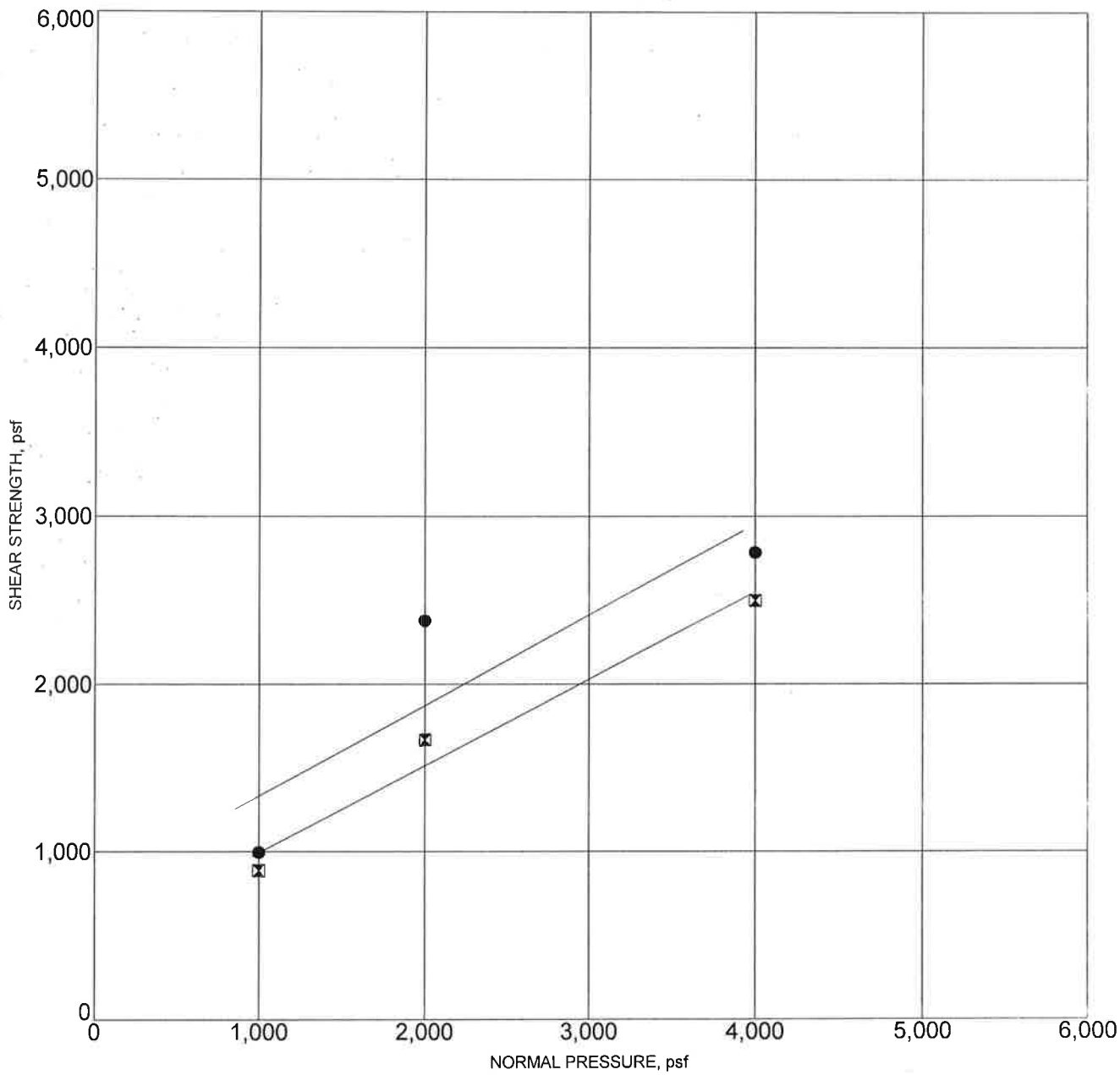
## ATTERBERG LIMITS TEST RESULTS

FIGURE B-1




● **PEAK STRENGTH**
*Friction Angle= 28 degrees*
*Cohesion= 792 psf*

⊠ **ULTIMATE STRENGTH**
*Friction Angle= 27 degrees*
*Cohesion= 474 psf*

| Sample Location | | Classification | DD,pcf | MC,% |
|---|---|---|---|---|
| B-1 | 7.0 | SANDY SILT (ML) | 102 | 10.6 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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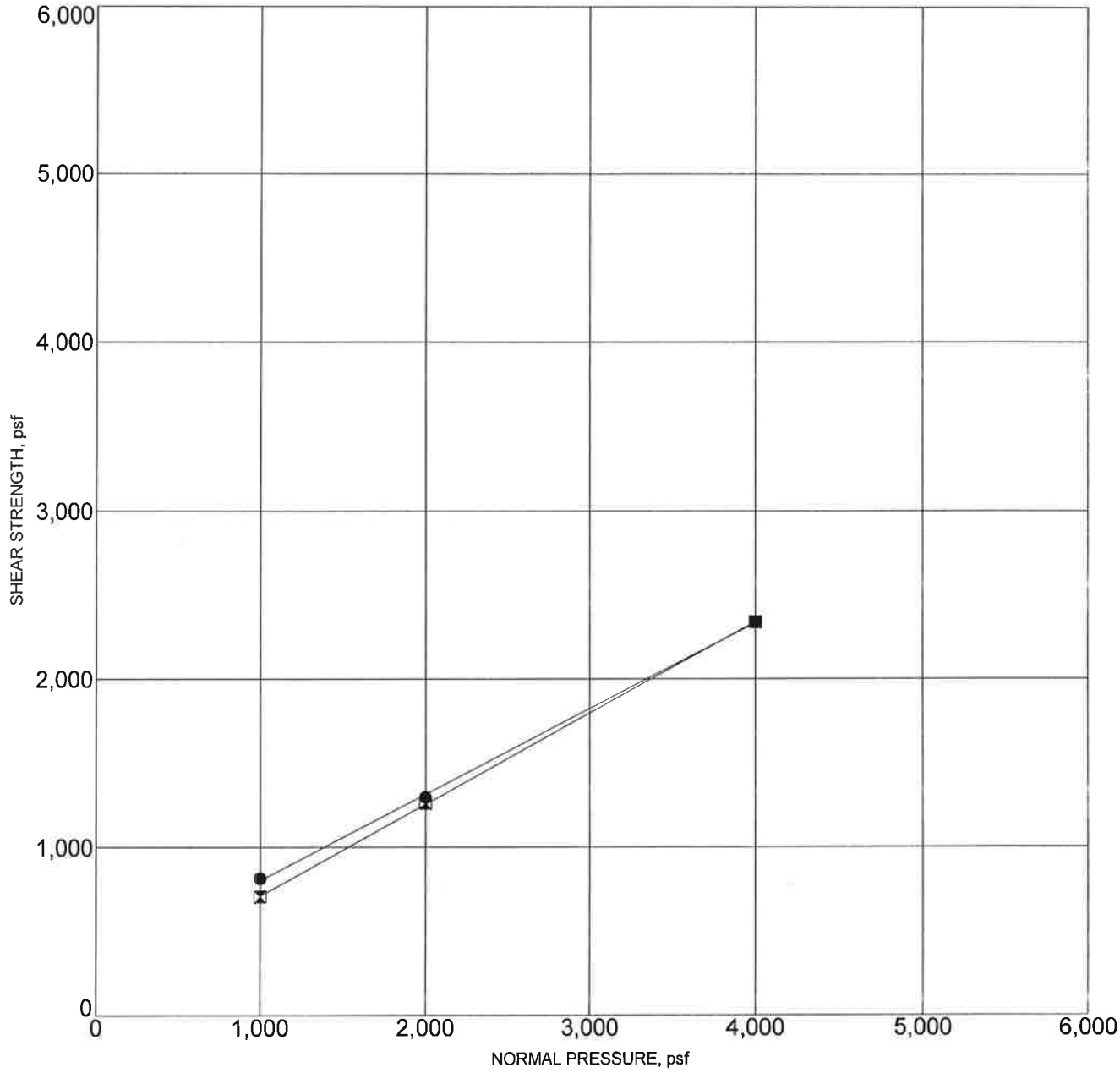
## DIRECT SHEAR TEST RESULTS

FIGURE B-2




● **PEAK STRENGTH**
*Friction Angle= 27 degrees*
*Cohesion= 294 psf*

⧗ **ULTIMATE STRENGTH**
*Friction Angle= 29 degrees*
*Cohesion= 168 psf*

*Note: Samples remolded to 90% of maximum dry density*

| Sample Location | | Classification | DD,pcf | MC,% |
|---|---|---|---|---|
| B-2 | 0-4 | CLAYEY SAND (SC) | 118 | 8.3 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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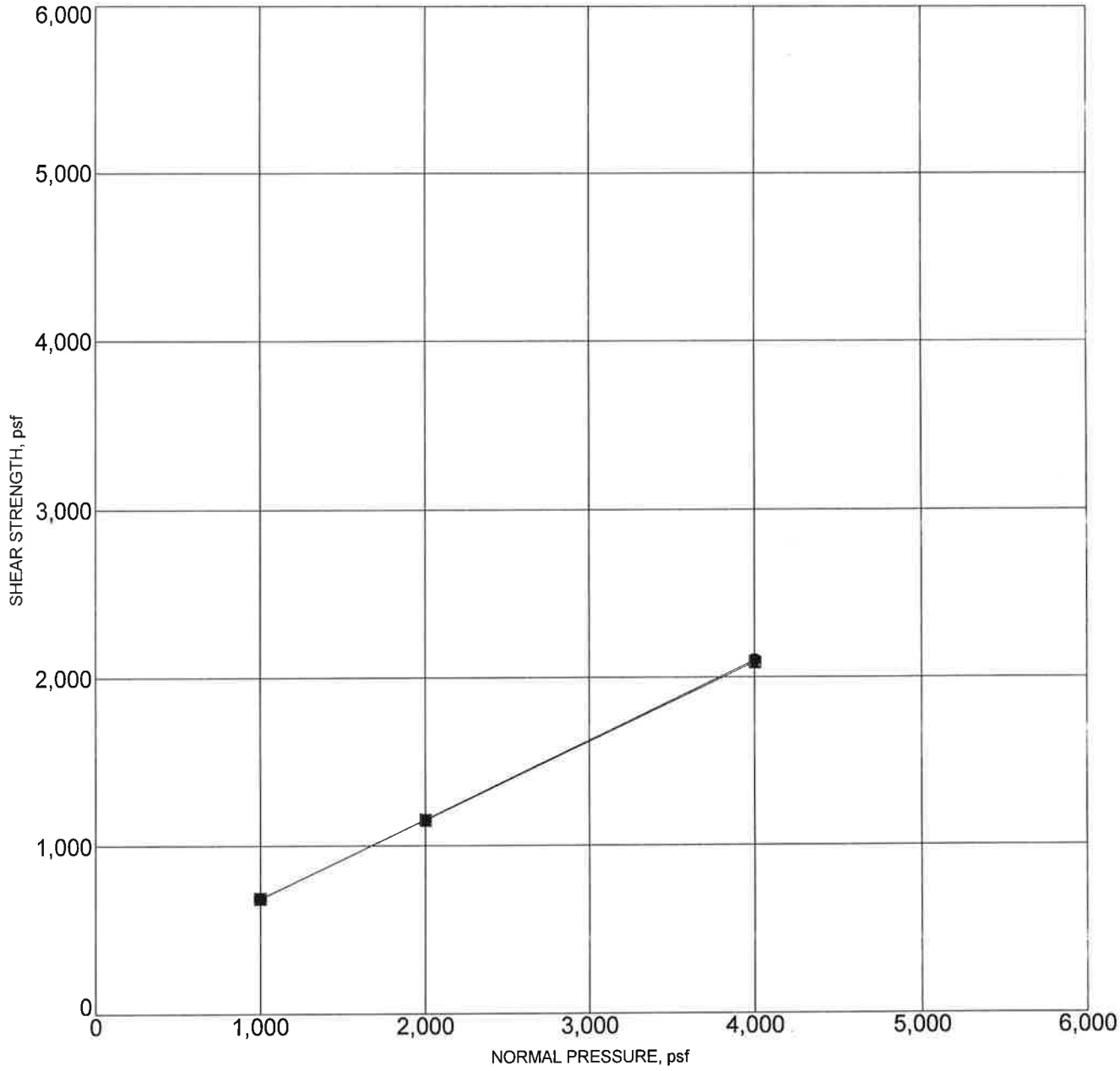
## DIRECT SHEAR TEST RESULTS

FIGURE B-3




● **PEAK STRENGTH**
*Friction Angle= 25 degrees*
*Cohesion= 210 psf*

☒ **ULTIMATE STRENGTH**
*Friction Angle= 25 degrees*
*Cohesion= 216 psf*

| Sample Location | | Classification | DD,pcf | MC,% |
|---|---|---|---|---|
| B-8 | 5.0 | SANDY SILT (ML) | 101 | 8.1 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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PROJECT NO.: 2591.I

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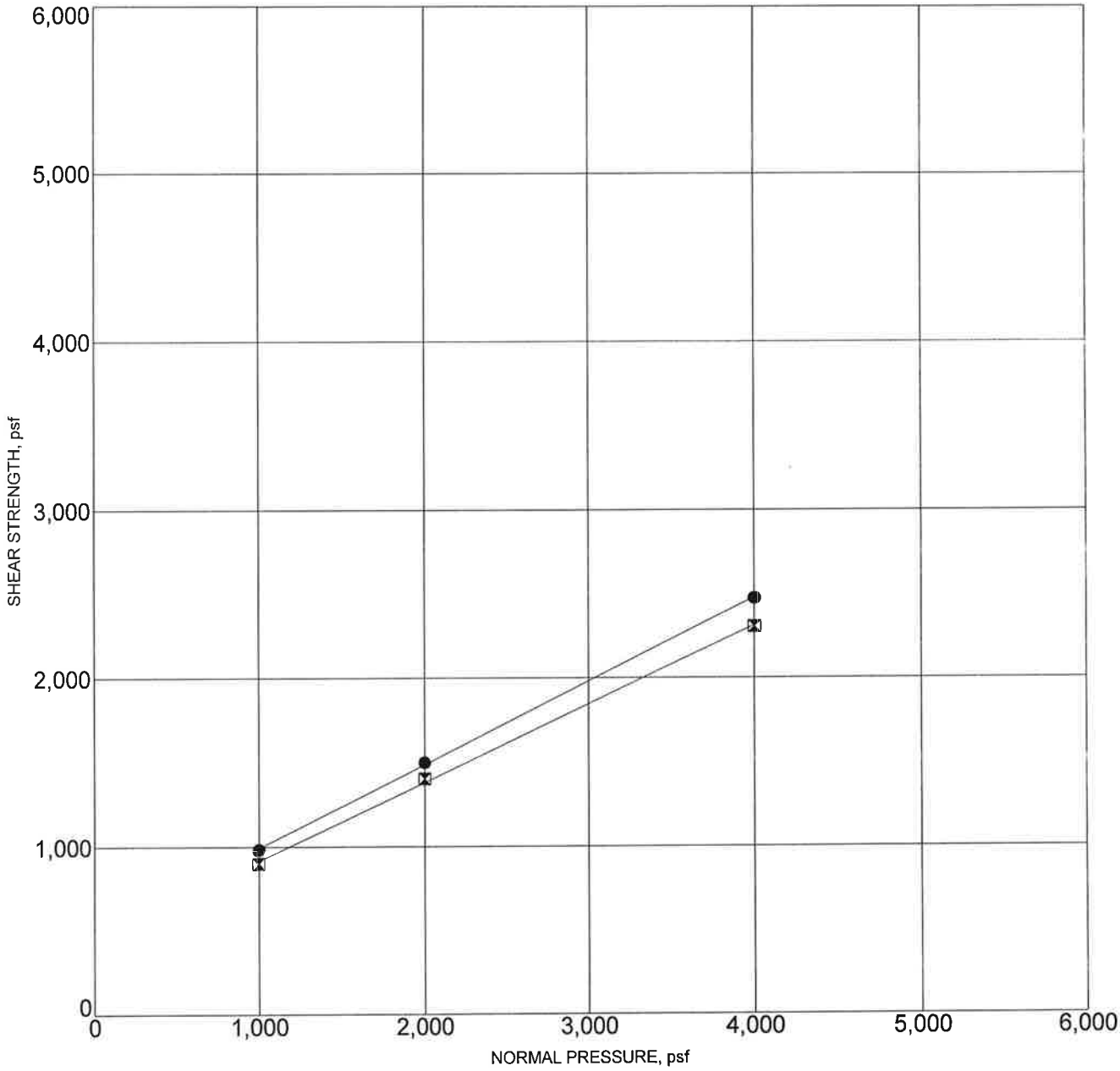
## DIRECT SHEAR TEST RESULTS

FIGURE B-4




● **PEAK STRENGTH**
*Friction Angle= 26 degrees*
*Cohesion= 498 psf*

⊠ **ULTIMATE STRENGTH**
*Friction Angle= 25 degrees*
*Cohesion= 450 psf*

| Sample Location | | Classification | DD,pcf | MC,% |
|---|---|---|---|---|
| B-10 | 7.0 | SANDY SILT (ML) | 97 | 8.0 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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PROJECT NO.: 2591.I

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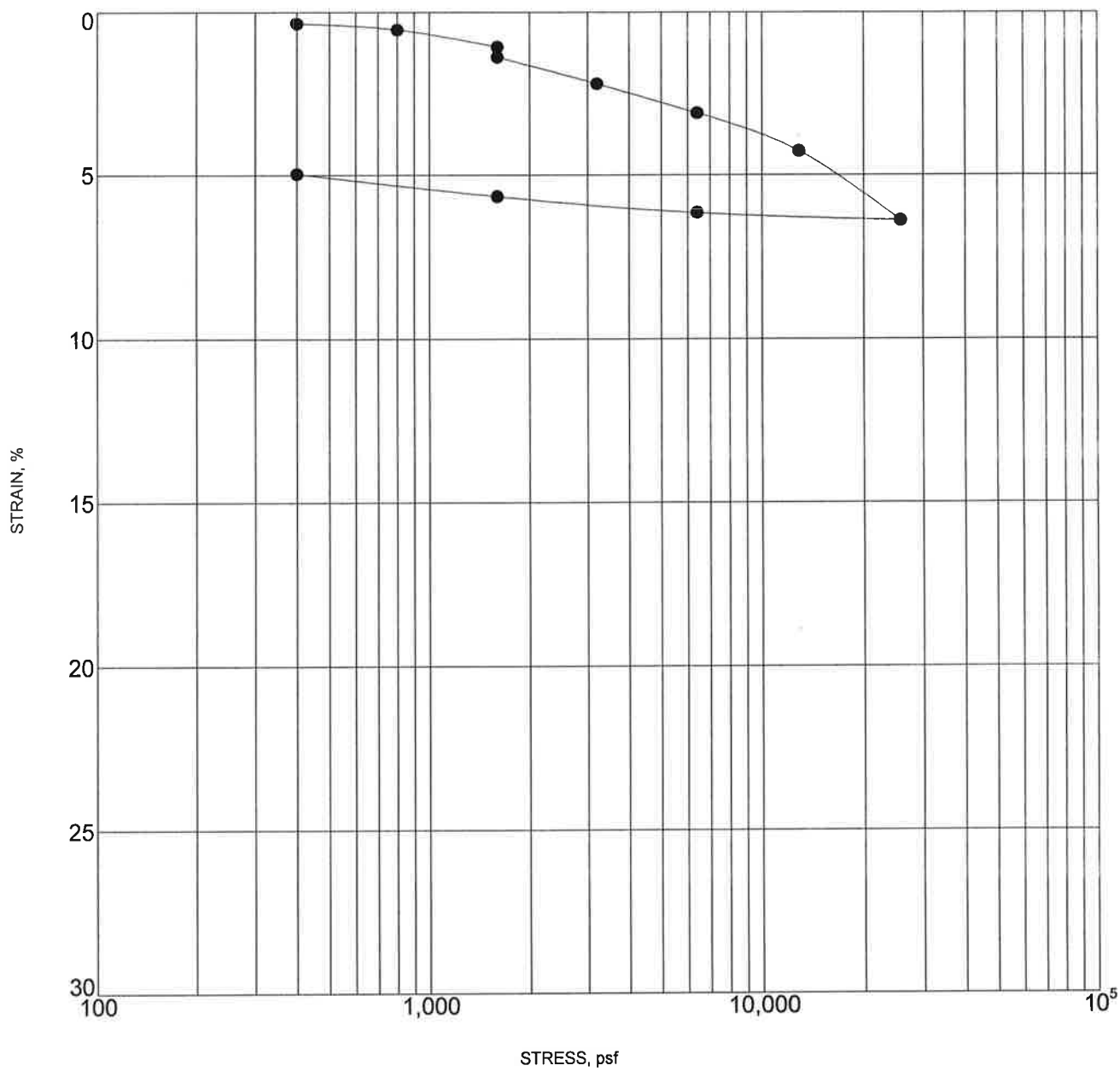
## DIRECT SHEAR TEST RESULTS

FIGURE B-5




*Sample inundated at 1600 psf*

| | Sample Location | | Classification | DD,pcf | MC,% |
|---|---|---|---|---|---|
| ● | B-9 | 7.0 | SANDY CLAYEY SILT (ML) | 99 | 13.5 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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## CONSOLIDATION TEST RESULTS

FIGURE B-6

# Table 1 - Laboratory Tests on Soil Samples

***Geotechnical Professionals, Inc.***
***Mission Lofts***
***Your #2591.I, HDR|Schiff #14-0036LAB***
***17-Jan-14***

| | | | |
|---|---|---|---|
| **Sample ID** | | | B-8 @ 0-4' Silty Sand/Clayey Silt |
| **Resistivity** | | **Units** | |
| as-received | | ohm-cm | 36,800 |
| saturated | | ohm-cm | 920 |
| **pH** | | | 7.3 |
| **Electrical Conductivity** | | mS/cm | 0.44 |
| **Chemical Analyses** | | | |
| **Cations** | | | |
| calcium | $Ca^{2+}$ | mg/kg | 212 |
| magnesium | $Mg^{2+}$ | mg/kg | 27 |
| sodium | $Na^{1+}$ | mg/kg | 167 |
| potassium | $K^{1+}$ | mg/kg | 16 |
| **Anions** | | | |
| carbonate | $CO_3^{2-}$ | mg/kg | ND |
| bicarbonate | $HCO_3^{1-}$ | mg/kg | 183 |
| fluoride | $F^{1-}$ | mg/kg | 3.8 |
| chloride | $Cl^{1-}$ | mg/kg | 91 |
| sulfate | $SO_4^{2-}$ | mg/kg | 347 |
| phosphate | $PO_4^{3-}$ | mg/kg | 3.0 |
| **Other Tests** | | | |
| ammonium | $NH_4^{1+}$ | mg/kg | ND |
| nitrate | $NO_3^{1-}$ | mg/kg | 429 |
| sulfide | $S^{2-}$ | qual | na |
| Redox | | mV | na |

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

# Appendix E

# Project Specific Water Quality Management Plan

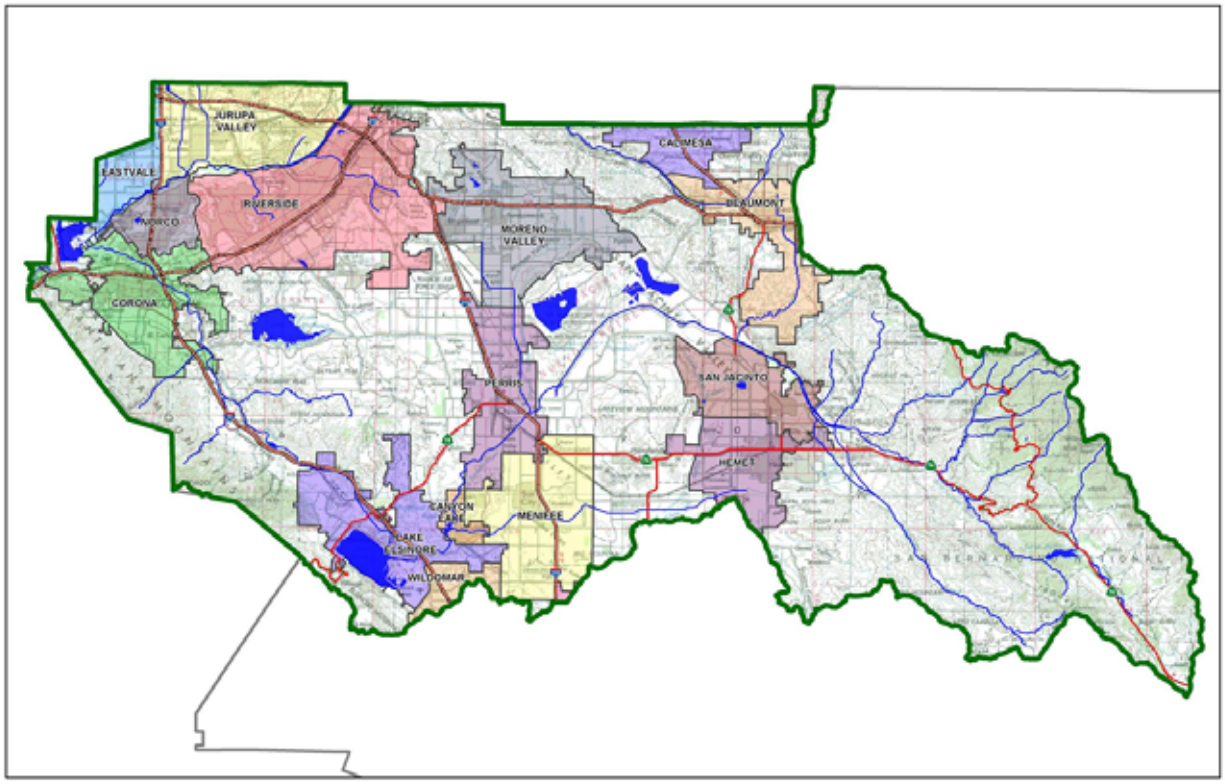
# Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

**Project Title:** Mission Lofts

**Public Works No:**

**Design Review/Case No:**




**Contact Information:**

**Prepared for:** Realm, Darrin Olson, 1201 Dove Street, Suite 250, Newport Beach, CA 92660, (949) 975-1122

**Prepared by:** KHR Associates, James H. Kawamura, President, 4100 Newport Place Drive, Suite 200, Newport Beach, CA 92660, (949) 756-6440

☒ **Preliminary**
☐ **Final**

**Original Date Prepared**: January 20, 2014

**Revision Date(s)**:

*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 Realm by KHR Associates for the Mission Lofts project.

This WQMP is intended to comply with the requirements of the City of Riverside for <Insert Ordinance No.>, Planning Case No. <Insert Ordinance No.> 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 the 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 |
| James H. Kawamura | President |
| Preparer's Printed Name | Preparer's Title/Position |

Preparer's Licensure: Registered Civil Engineer No. C30560
Exp. 3/31/14

## 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) ..... 8
Section C: Delineate Drainage Management Areas (DMAs) ..... 9
Section D: Implement LID BMPs ..... 11
D.1 Infiltration Applicability ..... 11
D.2 Harvest and Use Assessment ..... 12
D.3 Bioretention and Biotreatment Assessment ..... 12
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 ..... 22
Section I: Operation, Maintenance and Funding ..... 23

## List of Tables

Table A.1 Identification of Receiving Waters ..... 6
Table A.2 Other Applicable Permits ..... 6
Table C.1 DMA Classifications ..... 9
Table C.2 Type 'A', Self-Treating Areas ..... 9
Table C.3 Type 'B', Self-Retaining Areas ..... 9
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas ..... 10
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 ..... 22

## List of Appendices

Appendix 1: Maps and Site Plans ..... 24
Appendix 2: Construction Plans ..... 27
Appendix 3: Soils Information ..... 28
Appendix 4: Historical Site Conditions ..... 29
Appendix 5: LID Infeasibility ..... 30
Appendix 6: BMP Design Details ..... 31
Appendix 7: Hydromodification ..... 36
Appendix 8: Source Control ..... 39
Appendix 9: O&M ..... 40
Appendix 10: Educational Materials ..... - 42 -

# Section A: Project and Site Information

North Site: The proposed development involves the construction of approximately 3.11 acres (135,592 sf.) for a four-story, 208-unit apartment complex and a surface parking lot with 88 carport parking stalls and 77 open parking stalls. There will be approximately 48,436 square feet (1.11 acres) of building area, 24,755 square feet (0.57 acres) of landscaping, 51,490 square feet (1.18 acres) of parking, 9,807 square feet (0.23 acres) of hardscape and 1,104 square feet (0.03 acres) for a pool and spa. Open space for residential use consists of a pool and landscaping. CDS units will be used for pre-treatment and a perforated corrugated metal pipe (CMP) will be used to infiltrate the Design Capture Volume (DCV).

South Site: The proposed development involves the construction of approximately 1.50 acres (66,547 sf.) for remote surface parking for residents and visitors of the *Mission Lofts* apartments, with 140 carport parking stalls and 41 open parking stalls. There will be approximately 12,561 square feet (0.28 acres) of landscaping, 52,273 square feet (1.28 acres) of parking and 1,713 square feet (0.04 acres) of hardscape. The remote parking will be accessible to the apartment complex via a pedestrian bridge over University Avenue. A CDS unit will be used for pre-treatment and a perforated corrugated metal pipe (CMP) will be used to infiltrate the Design Capture Volume (DCV).

| PROJECT INFORMATION | |
|---|---|
| Type of Project: | Residential |
| Planning Area: | Eastside |
| Community Name: | Eastside |
| Development Name: | Mission Lofts |
| **PROJECT LOCATION** | |
| Latitude & Longitude (DMS): 33D 58M 43S N, 117D 21M 58S W | |
| Project Watershed and Sub-Watershed: Santa Ana; Santa Ana River, Reach 3 | |
| APN(s): Site 1: 211-121-02; 211-121-020; 211-121-27; 211-121-33; 211-121-32; 211-121-024; 211-121-028; Site 2: 211-121-022; 211-122-024; 211-122-004; 211-122-023 | |
| Map Book and Page No.: Book 6, Page 48 | |
| **PROJECT CHARACTERISTICS** | |
| Proposed or Potential Land Use(s) | Residential |
| Proposed or Potential SIC Code(s) | 8811 |
| Area of Impervious Project Footprint (SF) | 164,823 sf. |
| Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement | Total Area: 164,823 sf.; North Site: 110,837 sf.; South Site: 53,986 sf. |
| 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) | Total Area: 10,107 sf.; North Site: 6,780 sf.; South Site: 3,327 sf. |
| 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) | N/A |
| What is the Water Quality Design Storm Depth for the project? | 0.60 |

## 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 | Hydrologic Unit | EPA Approved 303(d) List Impairments | Designated Beneficial Uses | Proximity to RARE Beneficial Use |
|---|---|---|---|---|
| Insert name of 1st receiving water | Insert name of 1st receiving water | List any 303(d) impairments of 1st receiving water, including Approved TMDL pollutant limitations | Insert designated beneficial use of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations |
| insert name of 2nd receiving water | Insert name of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations | Insert designated beneficial use of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations |
| Insert name of 3rd receiving water | Insert name of 1st receiving water | List any 303(d) impairments of 3rd receiving water, including Approved TMDL pollutant limitations | Insert designated beneficial use of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations |
| Insert name of 1st receiving water | Insert name of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations | Insert designated beneficial use of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations |
| Insert name of 1st receiving water | Insert name of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including | Insert designated beneficial use of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved |

| | | | | |
|---|---|---|---|---|
| | | Approved TMDL pollutant limitations | | TMDL pollutant limitations |
| Insert name of 1st receiving water | Insert name of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations | Insert designated beneficial use of 1st receiving water | List any 303(d) impairments of 2nd receiving water, including Approved TMDL pollutant limitations |
| Insert name of 1st receiving water | Insert name of 1st receiving water | Pathogens, Lead, Copper | Insert designated beneficial use of 1st receiving water | 1.65 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?

*Both sites will match as close to possible existing drainage paths and minimize usage of inlets. For the most part, drainage will occur over impervious surfaces. The north site will drain a portion of two drive aisles into planters for conveyance of runoff into inlets that discharge to the infiltration tank.*

Does the project identify and protect existing vegetation? If so, how? If not, why?

*Both sites, although vacant, do not have any existing vegetation or sensitive areas to protect.*

Does the project identify and preserve natural infiltration capacity? If so, how? If not, why?

*The geotechnical report has shown that the underlying soils are good for infiltration and therefore an underground retention tank will be used.*

Does the project identify and minimize impervious area? If so, how? If not, why?

*The nature of the developments limits the potential to minimize impervious areas. Landscaping will be utilized around the buildings and parking lots as well as used within the parking lots to the maximum extent practical. Drive aisles, parking stalls and sidewalks will be designed to the minimum widths allowed.*

Does the project identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

*Portions of the parking lot within the north site will drain to planters between the carports prior to collection within and area drain for infiltration of the low flows and discharge off-site for the high flows. Due to the grades and configuration of the southerly parking lot, runoff will not drain to planters prior to infiltration of the low flows and off-site discharge of the high flows.*

# Section C: Delineate Drainage Management Areas (DMAs)

**Table C.1** DMA Classifications

| DMA Name or ID | Surface Type(s) | Area (Sq. Ft.) | DMA Type |
|---|---|---|---|
| North | Roof/Walk/Asphalt | 135,592 | D |
| South | Roof/Walk/Asphalt | 66,547 | D |
| | | | |
| | | | |
| | | | |
| | | | |

**Table C.2** Type 'A', Self-Treating Areas

| DMA Name or ID | Area (Sq. Ft.) | Stabilization Type | Irrigation Type (if any) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**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) | Storm Depth (inches) | DMA Name / ID | [C] from Table C.4 = | Required Retention Depth (inches) |
| | | [A] | [B] | | [C] | [D] |
| | | | | | | |
| | | | | | | |
| | | | | | | |

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

**Table C.4** Type 'C', Areas that Drain to Self-Retaining Areas

| DMA | | | | | Receiving Self-Retaining DMA | | |
|---|---|---|---|---|---|---|---|
| DMA Name/ ID | Area (square feet) | Post-project surface type | Runoff factor | Product | DMA name /ID | Area (square feet) | Ratio |
| | [A] | | [B] | [C] = [A] x [B] | | [D] | [C]/[D] |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Table C.5** Type 'D', Areas Draining to BMPs

| DMA Name or ID | BMP Name or ID |
|---|---|
| North | North CMP |
| South | South CMP |
| | |
| | |
| | |

# Section D: Implement LID BMPs

## D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (ref: Chapter 2.4.4 of the WQMP Guidance Document)? ☐ 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, see 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: | | |
| …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 (verified with the City of Riverside).

☒ The Design Capture Volume will be addressed using Infiltration Only BMPs. (Harvest and Use BMPs are still encouraged, but are not required as the Design Capture Volume will be infiltrated or evapotranspired).

☐ None of the above.

Harvest and Use BMPs need not be assessed for the site.

## 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 | |
| North | ☒ | ☐ | ☐ | ☐ | ☐ |
| South | ☒ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ |

## 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 | *Enter BMP Name / Identifier Here* | | |
|---|---|---|---|---|---|---|---|---|
| | [A] | | [B] | [C] | [A] x [C] | | | |
| ***North*** | *135,592* | *Roof, Walks, Asphalt* | *1* | *0.89* | *120,948.1* | *Design Storm Depth (in)* | *Design Capture Volume, $V_{BMP}$ (cubic feet)* | *Proposed Volume on Plans (cubic feet)* |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | 135,592 | | | | 120,948.1 | 0.6 | 6,047.4 | 6,220 |

[B], [C] are obtained from Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A of the WQMP Guidance Document
[G] is obtained from LID BMP design procedure sheet, placed in Appendix 6

| DMA Type/ID | DMA Area (square feet) | Post-Project Surface Type | Effective Impervious Fraction, $I_f$ | DMA Runoff Factor | DMA Areas x Runoff Factor | *Enter BMP Name / Identifier Here* | | |
|---|---|---|---|---|---|---|---|---|
| | [A] | | [B] | [C] | [A] x [C] | | | |
| ***South*** | *66,547* | *Roof, Walks, Asphalt* | *1* | *0.89* | *59,359.9* | *Design Storm Depth (in)* | *Design Capture Volume, $V_{BMP}$ (cubic feet)* | *Proposed Volume on Plans (cubic feet)* |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | 66,547 | | | | 59,359.9 | 0.6 | 2,968 | 2,997 |

[B], [C] are obtained from Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A of the WQMP Guidance Document
[G] is obtained from LID BMP design procedure sheet, 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 confirmation of LID waiver approval by the Regional Board). 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 Regional Board 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 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 Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

**HCOC EXEMPTION 2**: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- ☐ Riverside County Hydrology Manual
- ☐ Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- ☐ Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

Results included in Table F.1 below and hydrologic analysis included in Appendix 7.

**Table F.1** Hydrologic Conditions of Concern Summary

| | 2 year – 24 hour | | |
|---|---|---|---|
| | **Pre-condition** | **Post-condition** | **% Difference** |
| **Time of Concentration** | | | |
| **Flow (CFS)** | | | |
| **Volume (Cubic Feet)** | | | |

[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, 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 Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

## 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 Co-Permittee approved methodologies for site-specific HCOC analysis.

☐ b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

☐ c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

☒ d. None of the above.

# Section G: Source Control BMPs

The following table identifies the potential sources of runoff pollutants for this project and specifies how they are addressed through permanent controls and operational BMPs:

**Table G.1** Permanent and Operational Source Control Measures

| Potential Sources of Runoff pollutants | Permanent Structural Source Control BMPs | Operational Source Control BMPs |
|---|---|---|
| On-site storm drain inlets | Location of inlets shown on WQMP Exhibit.<br><br>Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. | Maintain and periodically repaint or replace inlet markings.<br><br>Provide stormwater pollution prevention information to new site owners, lessees, or operators.<br><br>See applicable operational BMPs in Fact Sheet SC-44, "Drainage Systems Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.<br><br>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." |
| Interior floor drains and elevator shaft sump pumps | Interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer. | Inspect and maintain drains to prevent blockages and overflow. |
| Need for future indoor & structural pest control | Pests will be kept out of buildings using barriers, screens and caulking. | Provide Integrated Pest Management information to owners, lessees, and operators. |
| Landscape/Outdoor Pesticide Use | Location of native trees shown on WQMP Exhibit.<br><br>Stormwater treatment facility shown on WQMP Exhibit.<br><br>Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.<br><br>Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides | Maintain landscaping using minimum or no pesticides.<br><br>Provide IPM information to new owners, lessees and operators.<br><br>See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/. |

| | | |
|---|---|---|
| | that can contribute to stormwater pollution.<br><br>Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.<br><br>Consider using pest-resistant plants, especially adjacent to hardscape.<br><br>To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. | |
| Pools, spas, ponds, decorative fountains, and other water features | Plumb to sewer in accordance with local requirements. If draining to landscaped area, remove any chemicals and debris before slowly discharging to landscaping. | See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/. |
| Refuse areas | Location of refuse areas shown on WQMP Exhibit.<br><br>Signs will be posted on or near dumpster stating "Do not dump hazardous materials here" or similar.<br><br>Any doors to trash area and bin lids will be kept closed.<br><br>Bins will be emptied weekly. | Receptacles will be inspected weekly and repaired/replaced when leaking.<br><br>Bin lids are to remain closed and refuse area will be maintained daily.<br><br>See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com. |
| Vehicle and Equipment Cleaning | Vehicle and equipment cleaning will not be allowed on-site. | Lease agreement shall state that vehicle and equipment cleaning is prohibited on-site.<br><br>See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com. |
| Vehicle / Equipment Repair and Maintenance | Vehicle and equipment repair and maintenance will not be allowed on-site. | No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, |

| | | |
|---|---|---|
| | | hazardous materials, or rinse water from parts cleaning into stormwater.<br><br>No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building. Leaking vehicle fluids shall be contained or drained from vehicle immediately.<br><br>No person shall leave unattended drip parts or other open containers containing vehicle fluids, unless such containers are in use or in an area of secondary containment. |
| Miscellaneous Drain or Wash Water or Other Sources:<br><br>Boiler drain lines;<br><br>Condensate drain lines;<br><br>Rooftop equipment;<br><br>Drainage sumps;<br><br>Roofing, gutters, and trim;<br><br>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.<br><br>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.<br><br>Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.<br><br>Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.<br><br>Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. | |
| 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

To be completed for Final WQMP.

**Table H.1** Construction Plan Cross-reference

| BMP No. or ID | BMP Identifier and Description | Plan Sheet Number(s) | Latitude / Longitude |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# 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:** Funding for the on-going operation and maintenace of post-construction BMPs is the responsibility of Realm.

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

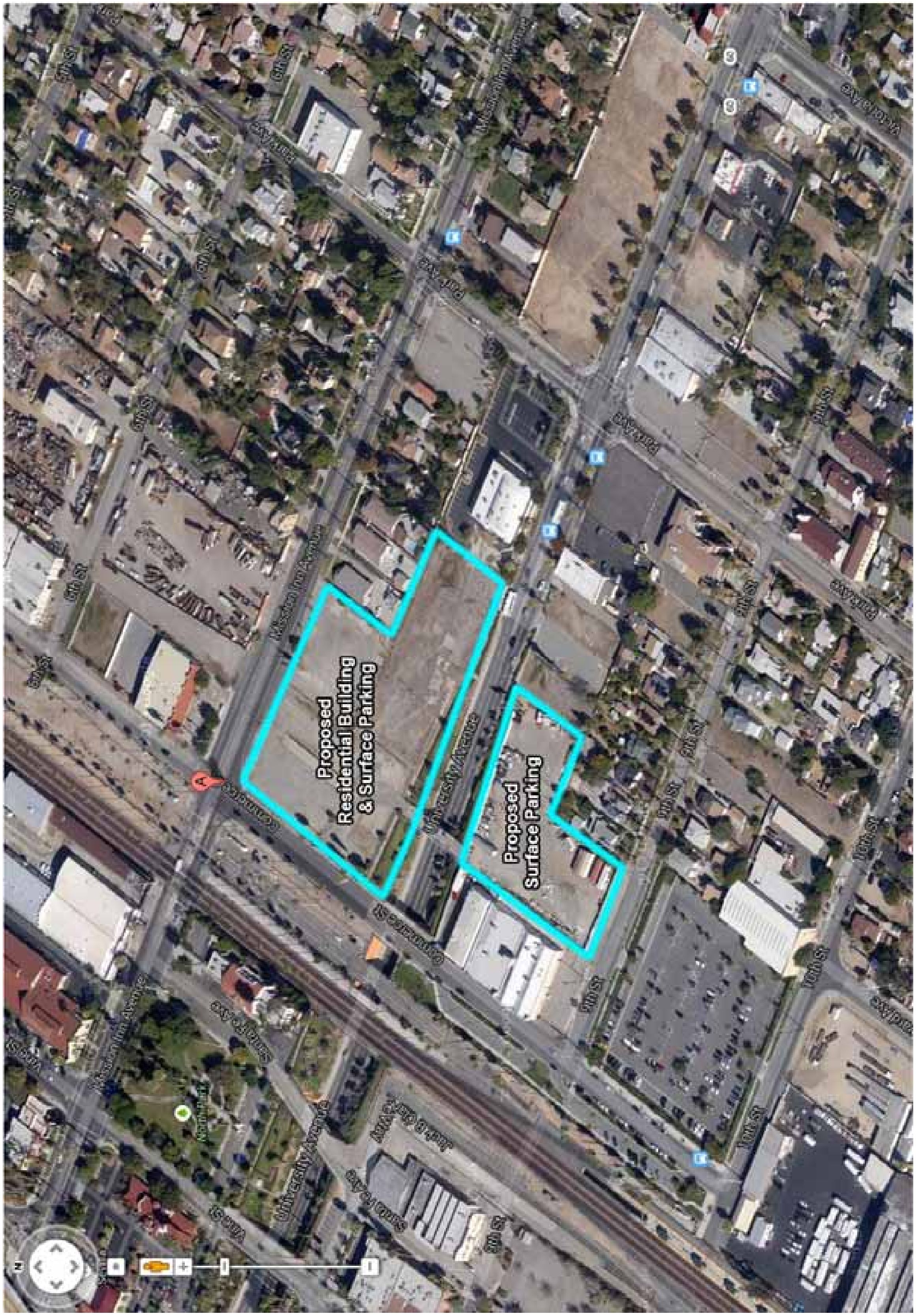
☐ Y ☒ N

Operation and Maintenance Plan and Maintenance Mechanism is 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.

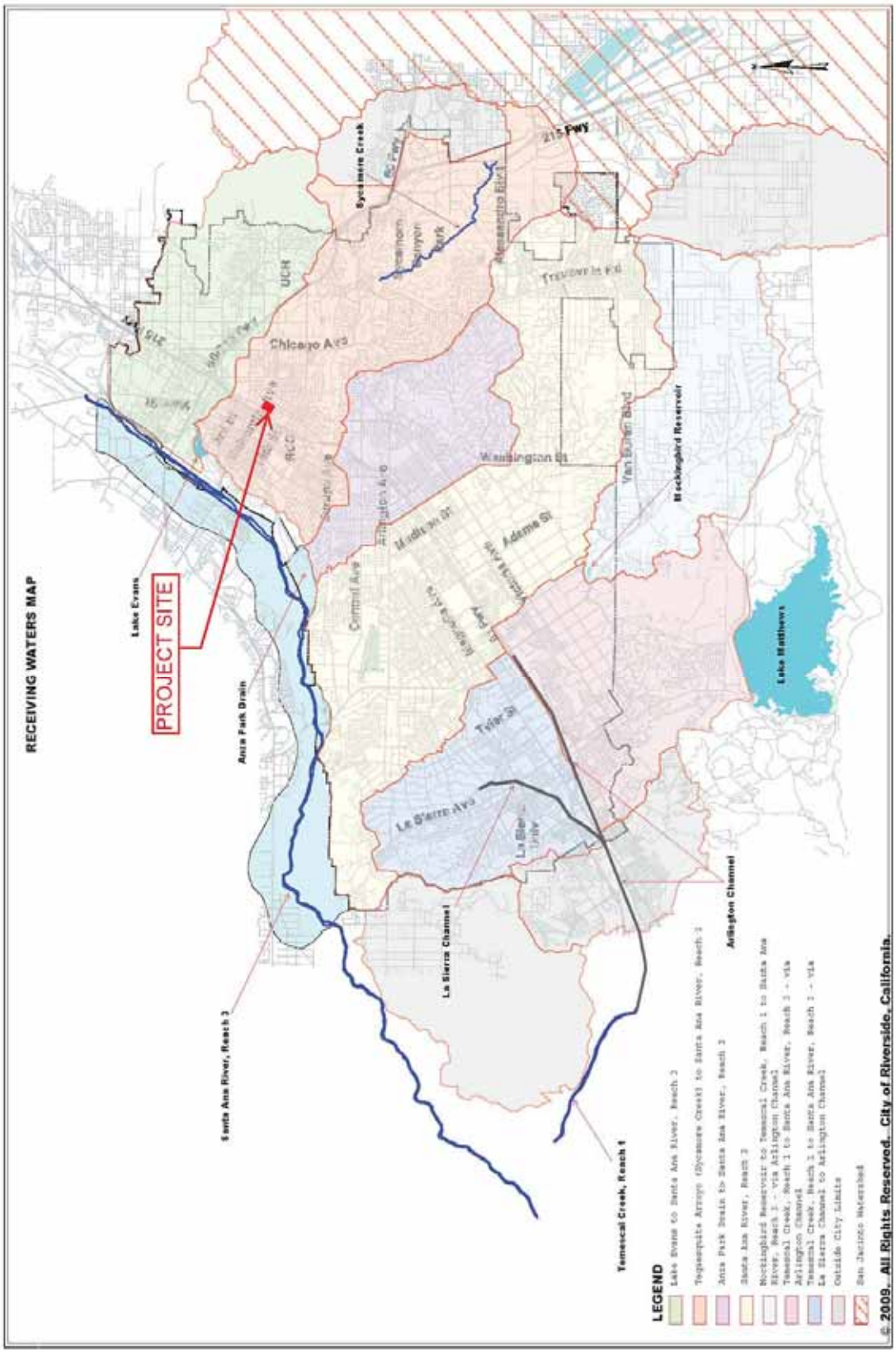
# Appendix 1: [illegible]

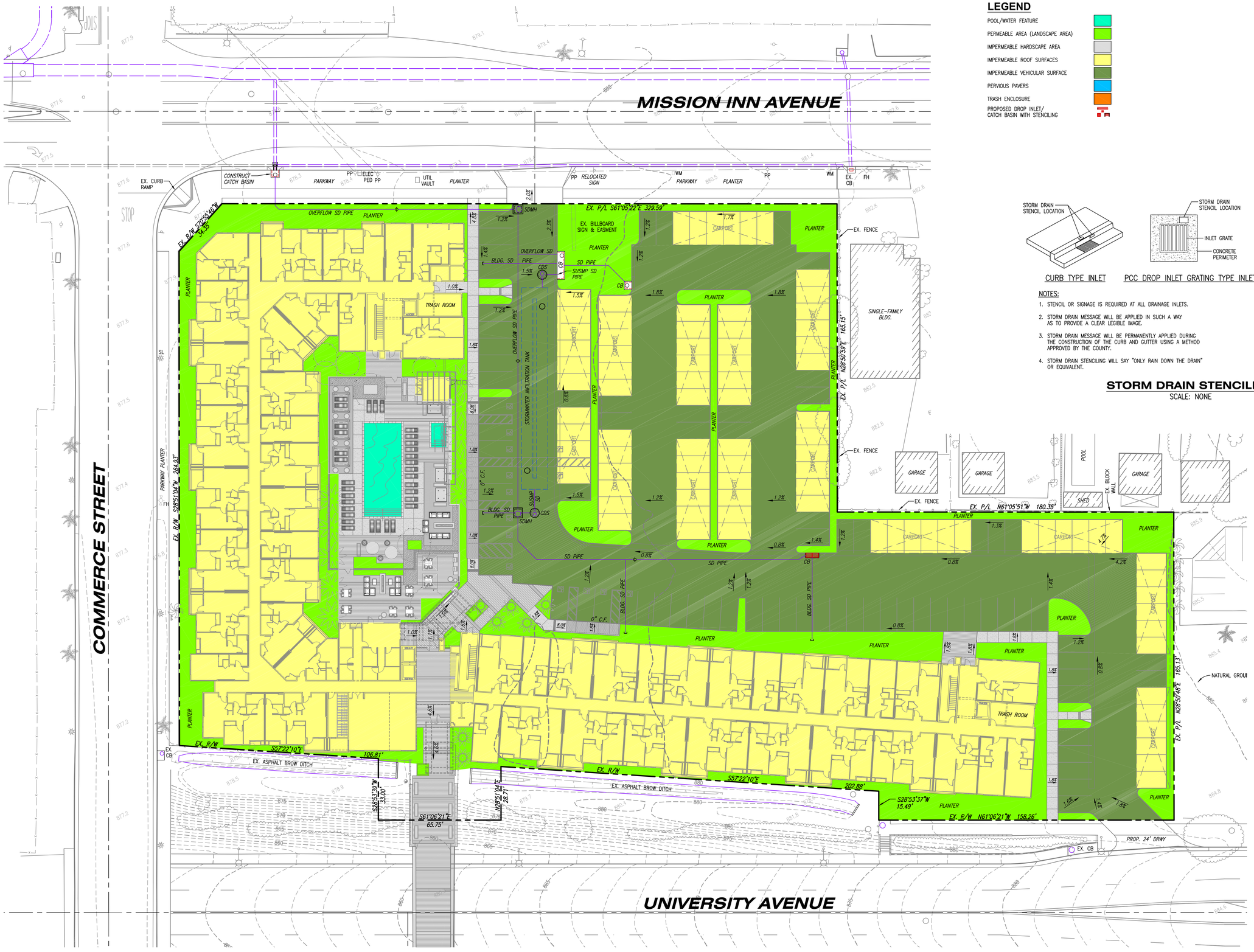
*Location Map, WQMP Site Plan and Receiving Waters Map*

## Location Map



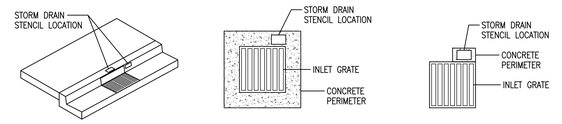
## Receiving Waters Map






## LEGEND

- POOL/WATER FEATURE
- PERMEABLE AREA (LANDSCAPE AREA)
- IMPERMEABLE HARDSCAPE AREA
- IMPERMEABLE ROOF SURFACES
- IMPERMEABLE VEHICULAR SURFACE
- PERVIOUS PAVERS
- TRASH ENCLOSURE
- PROPOSED DROP INLET/ CATCH BASIN WITH STENCILING




CURB TYPE INLET | PCC DROP INLET GRATING TYPE INLET | AREA DRAIN TYPE INLET

NOTES:

1. STENCIL OR SIGNAGE IS REQUIRED AT ALL DRAINAGE INLETS.
2. STORM DRAIN MESSAGE WILL BE APPLIED IN SUCH A WAY AS TO PROVIDE A CLEAR LEGIBLE IMAGE.
3. STORM DRAIN MESSAGE WILL BE PERMANENTLY APPLIED DURING THE CONSTRUCTION OF THE CURB AND GUTTER USING A METHOD APPROVED BY THE COUNTY.
4. STORM DRAIN STENCILING WILL SAY "ONLY RAIN DOWN THE DRAIN" OR EQUIVALENT.

## STORM DRAIN STENCILING

SCALE: NONE

0 10 20 40 60

SCALE: 1"=20' DATE: 01-20-14

# MISSION LOFTS

## REALM

## PRELIMINARY WQMP SITE PLAN (SHEET 1 OF 2)

## RIVERSIDE, CALIFORNIA

KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
4100 Newport Place Drive - Suite 200 Tel (949) 756-6440
Newport Beach, California 92660 Fax (949) 756-6444

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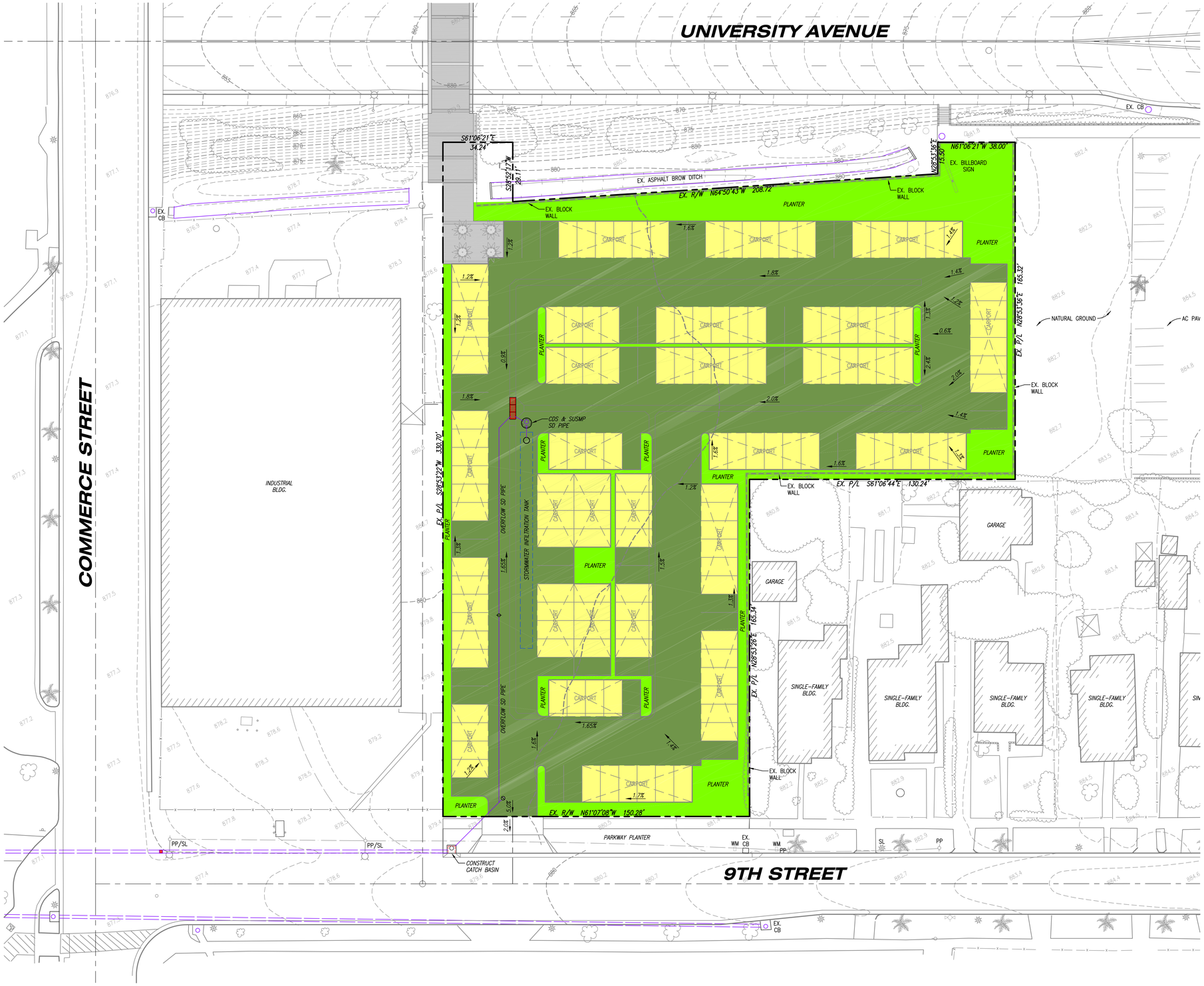
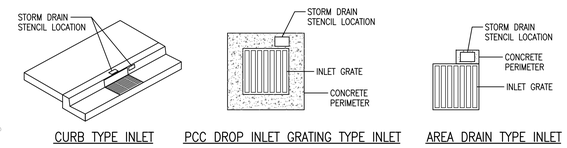



## LEGEND

- POOL/WATER FEATURE
- PERMEABLE AREA (LANDSCAPE AREA)
- IMPERMEABLE HARDSCAPE AREA
- IMPERMEABLE ROOF SURFACES
- IMPERMEABLE VEHICULAR SURFACE
- PERVIOUS PAVERS
- TRASH ENCLOSURE
- PROPOSED DROP INLET/ CATCH BASIN WITH STENCILING




CURB TYPE INLET | PCC DROP INLET GRATING TYPE INLET | AREA DRAIN TYPE INLET

NOTES:

1. STENCIL OR SIGNAGE IS REQUIRED AT ALL DRAINAGE INLETS.
2. STORM DRAIN MESSAGE WILL BE APPLIED IN SUCH A WAY AS TO PROVIDE A CLEAR LEGIBLE IMAGE.
3. STORM DRAIN MESSAGE WILL BE PERMANENTLY APPLIED DURING THE CONSTRUCTION OF THE CURB AND GUTTER USING A METHOD APPROVED BY THE COUNTY.
4. STORM DRAIN STENCILING WILL SAY "ONLY RAIN DOWN THE DRAIN" OR EQUIVALENT.

**STORM DRAIN STENCILING**

SCALE: NONE

0 10 20 40 60

SCALE: 1"=20' DATE: 01-20-14

# MISSION LOFTS

## PRELIMINARY WQMP SITE PLAN (SHEET 2 OF 2)

REALM

RIVERSIDE, CALIFORNIA

KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
4100 Newport Place Drive - Suite 200 Tel (949) 756-6440
Newport Beach, California 92660 Fax (949) 756-6444

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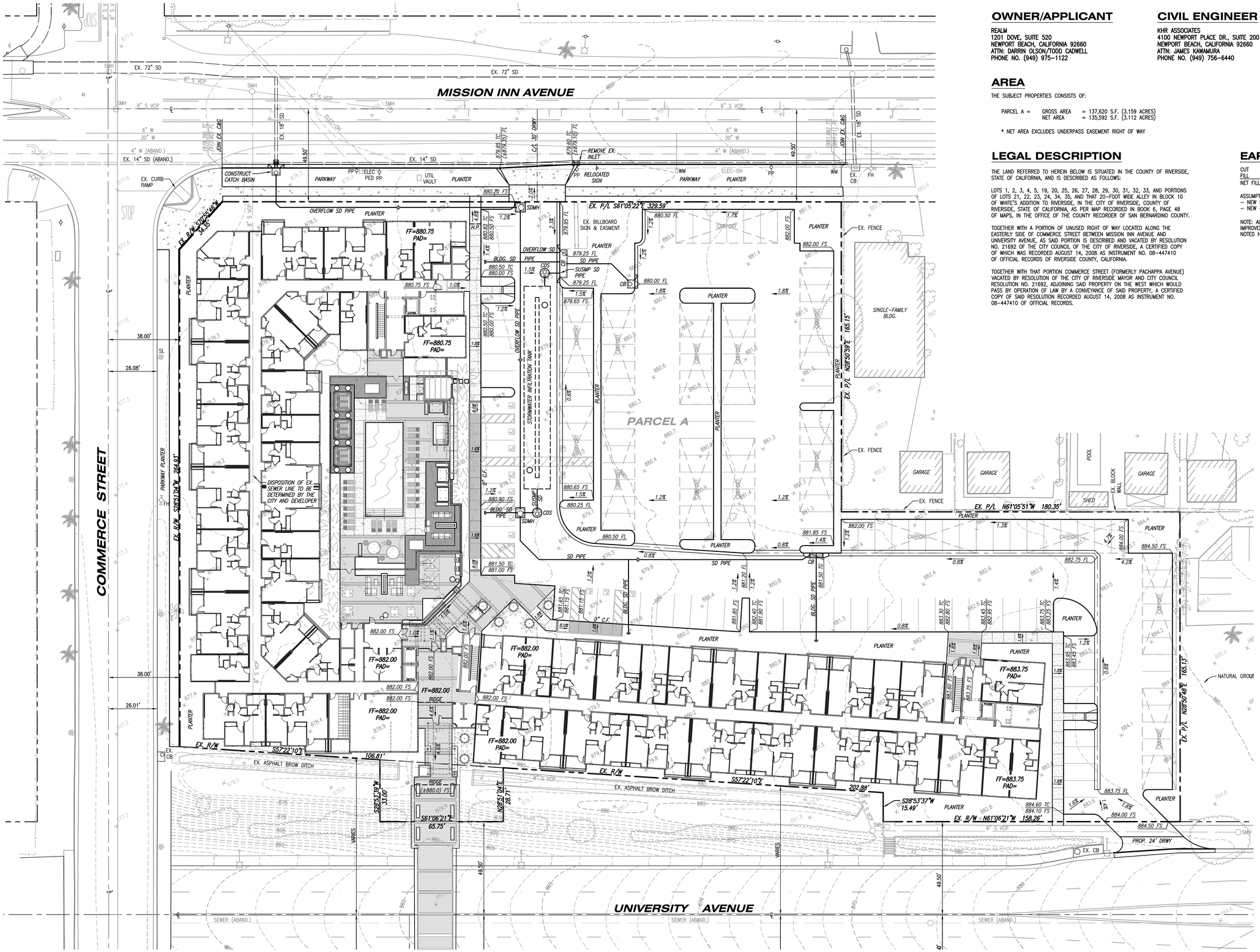
# Appendix 2: Construction Plans

*Grading and Drainage Plans*

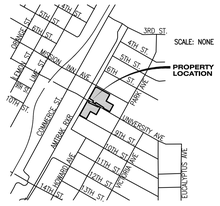



## OWNER/APPLICANT

REALM
1201 DOVE, SUITE 520
NEWPORT BEACH, CALIFORNIA 92660
ATTN: DARRIN OLSON/TODD CADWELL
PHONE NO. (949) 975-1122

## CIVIL ENGINEER

KHR ASSOCIATES
4100 NEWPORT PLACE DR., SUITE 200
NEWPORT BEACH, CALIFORNIA 92660
ATTN: JAMES KAWAMURA
PHONE NO. (949) 756-6440




VICINITY MAP

## AREA

THE SUBJECT PROPERTIES CONSISTS OF:

PARCEL A = GROSS AREA = 137,620 S.F. (3.159 ACRES)
NET AREA = 135,592 S.F. (3.112 ACRES)

* NET AREA EXCLUDES UNDERPASS EASEMENT RIGHT OF WAY

## LEGAL DESCRIPTION

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

LOTS 1, 2, 3, 4, 5, 19, 20, 25, 26, 27, 28, 29, 30, 31, 32, 33, AND PORTIONS OF LOTS 21, 22, 23, 24, 34, 35, AND THAT 20-FOOT WIDE ALLEY IN BLOCK 10 OF WHITE'S ADDITION TO RIVERSIDE, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 6, PAGE 48 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY.

TOGETHER WITH A PORTION OF UNUSED RIGHT OF WAY LOCATED ALONG THE EASTERLY SIDE OF COMMERCE STREET BETWEEN MISSION INN AVENUE AND UNIVERSITY AVENUE, AS SAID PORTION IS DESCRIBED AND VACATED BY RESOLUTION NO. 21692 OF THE CITY COUNCIL OF THE CITY OF RIVERSIDE, A CERTIFIED COPY OF WHICH WAS RECORDED AUGUST 14, 2008 AS INSTRUMENT NO. 08-447410 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

TOGETHER WITH THAT PORTION COMMERCE STREET (FORMERLY PACHAPPA AVENUE) VACATED BY RESOLUTION OF THE CITY OF RIVERSIDE MAYOR AND CITY COUNCIL RESOLUTION NO. 21692, ADJOINING SAID PROPERTY ON THE WEST WHICH WOULD PASS BY OPERATION OF LAW BY A CONVEYANCE OF SAID PROPERTY, A CERTIFIED COPY OF SAID RESOLUTION RECORDED AUGUST 14, 2008 AS INSTRUMENT NO. 08-447410 OF OFFICIAL RECORDS.

## EARTHWORK QUANTITIES

| | | | | |
|---|---|---|---|---|
| CUT | = | 1,100 C.Y. | IMPORT = | 5,700 C.Y. |
| FILL | = | 6,800 C.Y. | EXPORT = | 0 C.Y. |
| NET FILL | = | 5,700 C.Y. | | |

ASSUMPTIONS:
- NEW 5" THICK CONCRETE BUILDING SLAB
- NEW 4" AC PAVEMENT OVER 6" BASE FOR PARKING LOT

NOTE: ALL EXISTING BUILDINGS, PAVEMENT, UTILITIES, LANDSCAPING, & OTHER IMPROVEMENTS TO BE COMPLETELY REMOVED FROM SITE, UNLESS OTHERWISE NOTED HEREON.

0 10 20 40 60

SCALE: 1"=20' DATE: 01/20/14

# MISSION LOFTS

## PRELIMINARY GRADING PLAN - SHEET C1

REALM

RIVERSIDE, CALIFORNIA

KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
4100 Newport Place Drive - Suite 200 Tel (949) 756-6440
Newport Beach, California 92660 Fax (949) 756-6444

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## VICINITY MAP

## OWNER/APPLICANT

REALM
1201 DOVE, SUITE 520
NEWPORT BEACH, CALIFORNIA 92660
ATTN: DARRIN OLSON/TODD CADWELL
PHONE NO. (949) 975-1122

## CIVIL ENGINEER

KHR ASSOCIATES
4100 NEWPORT PLACE DR., SUITE 200
NEWPORT BEACH, CALIFORNIA 92660
ATTN: JAMES KAWAMURA
PHONE NO. (949) 756-6440

## AREA

THE SUBJECT PROPERTIES CONSISTS OF:

PARCEL B = GROSS AREA = 66,582 S.F. (1.528 ACRES)
NET AREA = 65,547 S.F. (1.504 ACRES)

* NET AREA EXCLUDES UNDERPASS EASEMENT RIGHT OF WAY

## LEGAL DESCRIPTION

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

LOTS 26, 27, 28 AND PORTION OF LOTS 3, 4, 5, 6, AND 7 IN BLOCK 12 OF WHITE'S ADDITION TO RIVERSIDE, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 6, PAGE 48 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

EXCEPT THOSE PORTIONS OF SAID LOTS 3 AND 4 AS CONVEYED TO THE STATE OF CALIFORNIA, IN DEED RECORDED APRIL 24, 1959 AS INSTRUMENT NO. 34760 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

ALSO EXCEPTING THEREFROM THOSE PORTIONS OF SAID LOTS 5, 6 AND 7 DESCRIBED AS FOLLOWS:

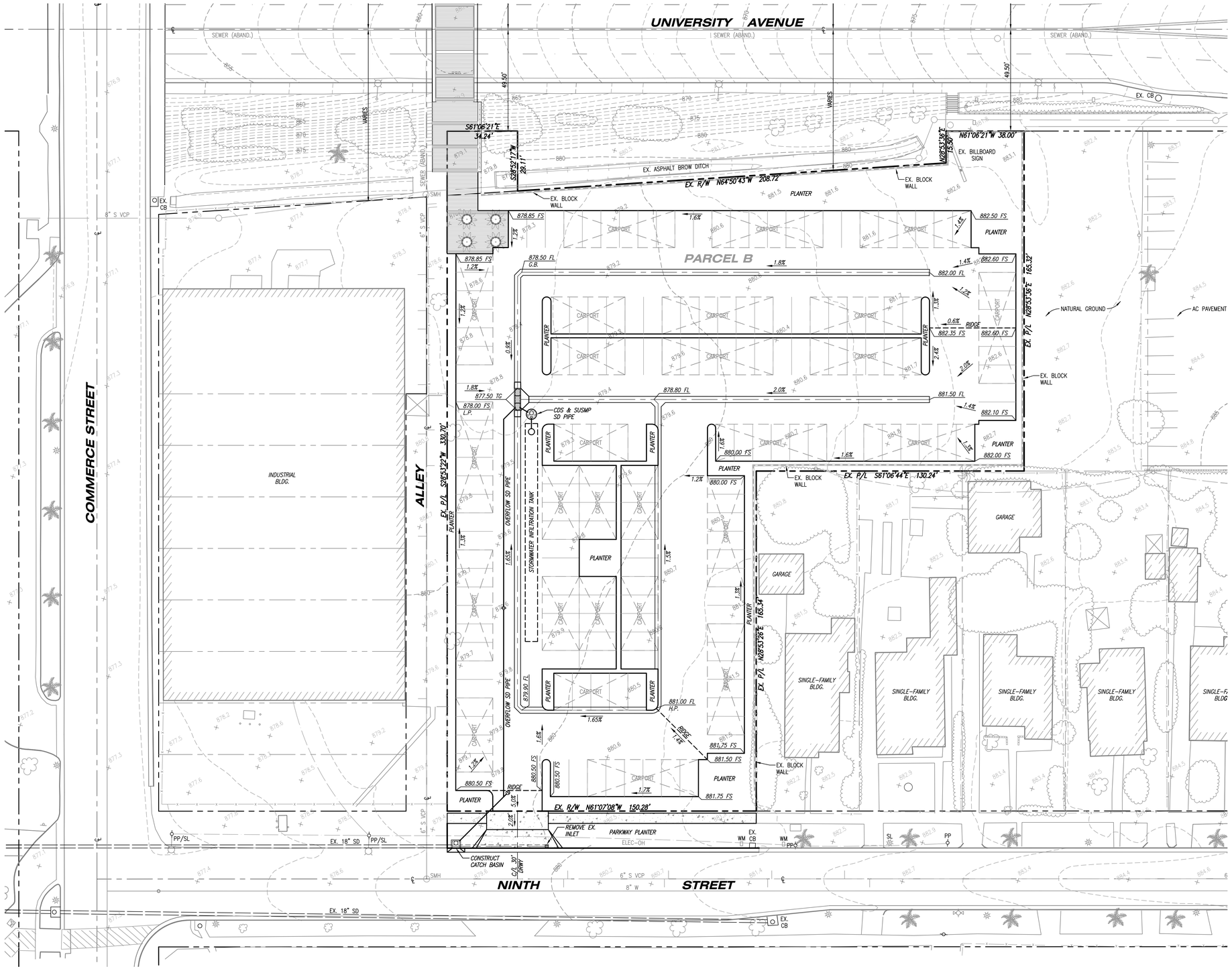
BEGINNING AT THE MOST NORTHERLY CORNER OF LOT 5; THENCE ALONG THE NORTHERLY LINES OF SAID LOTS 5, 6, 7 AND TO THE MOST NORTHERLY CORNER OF THE EASTERLY RECTANGULAR 38 FEET OF SAID LOT 7; THENCE SOUTHERLY, ALONG THE WESTERLY LINE OF SAID EASTERLY 38 FEET OF LOT 7, 15.50 FEET; THENCE ALONG A STRAIGHT LINE WESTERLY TO A POINT IN THE WESTERLY LINE OF LOT 5, 24.80 FEET SOUTHERLY FROM THE POINT OF BEGINNING; THENCE NORTHERLY ALONG SAID WESTERLY LINE 24.80 FEET TO SAID POINT OF BEGINNING.

## EARTHWORK QUANTITIES

| | | | | | |
|---|---|---|---|---|---|
| CUT | = | 2,200 C.Y. | IMPORT | = | 0 C.Y. |
| FILL | = | 100 C.Y. | EXPORT | = | 2,100 C.Y. |
| NET CUT | = | 2,100 C.Y. | | | |

ASSUMPTIONS:
- NEW 5" THICK CONCRETE BUILDING SLAB
- NEW 4" AC PAVEMENT OVER 6" BASE FOR PARKING LOT

NOTE: ALL EXISTING BUILDINGS, PAVEMENT, UTILITIES, LANDSCAPING, & OTHER IMPROVEMENTS TO BE COMPLETELY REMOVED FROM SITE, UNLESS OTHERWISE NOTED HEREON.




SCALE: 1"=20' DATE: 01/20/14

# MISSION LOFTS

## REALM

## PRELIMINARY GRADING PLAN - SHEET C2

## RIVERSIDE, CALIFORNIA

KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
4100 Newport Place Drive - Suite 200 Tel (949) 756-6440
Newport Beach, California 92660 Fax (949) 756-6444

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# Appendix 3: Soils Information

*Geotechnical Study and Other Infiltration Testing Data*

GEOTECHNICAL
PROFESSIONALS INC.

January 17, 2014

REALM
1201 Dove Street, Suite 520
Newport Beach, California 92660

Attention: Mr. Todd Cadwell

Subject: Interim Report of Percolation/Infiltration Testing
Proposed Mission Lofts
University Avenue at Commerce Street
Riverside, California
GPI Project No. 2591.1I

Dear Mr. Cadwell:

This letter presents the interim results of the field percolation/infiltration testing to be included with a submittal to the City of Riverside for stormwater disposal. In response to your request, we have completed the field portion of the percolation/infiltration testing, as described in our proposal dated January 10, 2014, at the subject site. The purpose of this report is to present the results of the field testing while we complete the balance of our services and issue a full report.

The testing was performed in 3 test wells at locations determined by Josh Stracker of KHR Associates, the project civil engineer. The tests were performed at a depth of 10 feet as indicated by Mr. Stracker.

In general, the testing was performed in accordance with the requirements outlined in Appendix A of the County of Riverside-Low Impact Development BMP Design Handbook (Handbook). Typically, the Handbook requires 2 tests at each basin, however, due to the very preliminary nature of the design of the storm water disposal system at this time, only a single test was performed at each location as discussed with you.

At the location of each proposed disposal facility, a well was constructed to the proposed infiltration depth (10 feet deep) in an exploratory boring. The well consisted of 2 feet of slotted pipe at the test depth with solid PVC pipe (2-inch diameter) to the ground surface.

Adjacent to each test well, a geotechnical boring was advanced to a depth of at least 10 feet below the infiltration elevation as discussed above. Samples were obtained for laboratory index testing. In general the soils encountered consisted of interbedded layers of silty sand and sandy silts.

The results of the testing indicated infiltration rates ranging from 2 to 5 inches per hour. These rates are based on percolation rates, corrected as required by the Handbook. The

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lower rate is associated with the sandy silt layers below the site. The higher rate is for the silty sand layers. At this time we recommend that an infiltration rate of 2 inches per hour be used for all locations. While higher rates were measured at some locations, the presence of silt layers immediately below the test horizon could have a long term limiting effect on infiltration rates.

These infiltration rates are for clean, clear water and do not include any effects of sediment, fines, dissolved solids or any other debris as the materials will significantly reduce the percolation rates of the subsurface soils. Prior to infiltration, any water should be cleaned of any sediment or other deleterious materials to help reduce the potential for clogging and reduced percolation rates.

We are currently performing grain size analysis tests of the soils directly below the level of the storm water disposal system.

Our final report will include a summary of our field measurements, the results of laboratory testing, a site plan showing the locations of the wells and Logs of the Borings.

It should be noted that the soils underlying the site may be subject to settlement/subsidence should they become saturated by infiltrated water. The results of limited laboratory testing indicate that the subsurface soils exhibit low densities and moisture contents. Combined with low blowcounts, the data indicates that the soils could be subject to settlement due liquefaction or hydroconsolidation. Should the soils between 10 and 30 feet become saturated, there is a potential for settlement on the order of a few inches. While most developers would accept the risk in pavement areas, there would be an impact to the carports should the settlement occur. It is probably less expensive to infiltrate and accept the potential for the settlement than it is to find an alternative to infiltration or supporting the carports on deep foundations.

The opportunity to be of service is appreciated. If you have any questions or comments, please call.

Very truly yours,
**Geotechnical Professionals Inc.**

James E. Harris, G.E.
Principal

JEH:sph 1/17/14

REGISTERED PROFESSIONAL ENGINEER
JAMES E. HARRIS, IV
No. GE 2100
Exp. 12-31-15
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
JAMES E. HARRIS, IV
No. CE 2108
Exp. 12-31-15
OF TENNESSEE

# Appendix 4: Historical Site Conditions

*Phase I Environmental Site Assessment or Other Information on Past Site Use*

# Appendix 5: LID Infeasibility

*LID Technical Infeasibility Analysis*

Not Applicable.

# Appendix 6: BMP Design Details

*BMP Sizing, Design Details and other Supporting Documentation*

## 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: KHR Associates — Date: 1/20/2014

Designed by: James H. Kawamura — Case No:

Company Project Number/Name: Mission Lofts

### BMP Identification

BMP NAME / ID: North CMP

*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: $D_{85}$= 0.60 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) |
|---|---|---|---|---|---|---|---|---|
| North | 135592 | Concrete or Asphalt | 1 | 0.89 | 120948.1 | | | |
| | 135592 | | Total | | 120948.1 | 0.60 | 6047.4 | 6220 |

Notes:

# CMP INFILTRATION CALCULATIONS:

North:

| | |
|---|---|
| DCV: | 6,047.4 cubic feet |
| $K_{sat,measured}$: | 2 in/hr |
| CMP Diameter: | 6 feet |
| $CMP_{Length}$: | 220 linear feet |
| FS (Factor of Safety): | 3 |
| T (Drawdown Time): | 72 hr |

Determine $K_{sat,design}$

$$K_{sat,design} = K_{sat,measured} \div FS$$

$$K_{sat,design} = 0.67 \text{ in/hr}$$

Determine $A_{min}$

$$A_{min} = (DCV \times 12 \text{ in/ft}) \div (T \times K_{sat,design})$$

$$A_{min} = 1{,}512 \text{ S.F.}$$

Determine $V_{actual}$

$$V_{actual} = (\pi r^2) x CMP_{Length}$$

$$V_{actual} = 6{,}220 \text{ C.F.}$$

Determine $A_{actual}$

$$A_{actual} = (2\pi r \div 2) x CMP_{Length}$$

$$A_{actual} = 2{,}073 \text{ S.F.}$$

Determine $T_{actual}$

$$T_{actual} = (V_{actual} \times 12 \text{ in/ft}) \div (A_{actual} \times K_{sat,design})$$

$$T_{actual} = 54 \text{ hr}$$

**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: KHR Associates — Date: 1/20/2014
Designed by: James H. Kawamura — Case No:
Company Project Number/Name: Mission Lofts

## BMP Identification

BMP NAME / ID: South CMP

*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: $D_{85}$= 0.60 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) |
|---|---|---|---|---|---|---|---|---|
| South | 66547 | Concrete or Asphalt | 1 | 0.89 | 59359.9 | | | |
| | 66547 | | Total | | 59359.9 | 0.60 | 2968 | 2997 |

Notes:

# CMP INFILTRATION CALCULATIONS:

South:

| | |
|---|---|
| DCV: | 2,968.0 cubic feet |
| $K_{sat,measured}$: | 2 in/hr |
| CMP Diameter: | 6 feet |
| $CMP_{Length}$: | 106 linear feet |
| FS (Factor of Safety): | 3 |
| T (Drawdown Time): | 72 hr |

Determine $K_{sat,design}$

$$K_{sat,design} = K_{sat,measured} \div FS$$
$$K_{sat,design} = 0.67 \text{ in/hr}$$

Determine $A_{min}$

$$A_{min} = (DCV \times 12 \text{ in/ft}) \div (T \times K_{sat,design})$$
$$A_{min} = 742 \text{ S.F.}$$

Determine $V_{actual}$

$$V_{actual} = (\pi r^2) x CMP_{Length}$$
$$V_{actual} = 2{,}997 \text{ C.F.}$$

Determine $A_{actual}$

$$A_{actual} = (2\pi r \div 2) x CMP_{Length}$$
$$A_{actual} = 999 \text{ S.F.}$$

Determine $T_{actual}$

$$T_{actual} = (V_{actual} \times 12 \text{ in/ft}) \div (A_{actual} \times K_{sat,design})$$
$$T_{actual} = 54 \text{ hr}$$

CONTECH®
CONSTRUCTION PRODUCTS INC.

# CDS Guide
## Operation, Design, Performance and Maintenance

## CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs. Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs. The pollutant removal capacity of the CDS system has been proven in lab and field testing.

## Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.

## Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall MethodTM and Probabalistic Method are used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125-microns ($\mu$m). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75-microns ($\mu$m).

### Water Quality Flow Rate Method

In many cases, regulations require that a specific flow rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval (i.e. the six-month storm) or a water quality depth (i.e. 1/2-inch of rainfall).

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the treatment flow rate around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and reduces the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore they are variable based on the gradation and removal efficiency specified by the design engineer.

### Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to

calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

### Probabalistic Rational Method

The Probabalistic Rational Method is a sizing program CONTECH developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic rational method is an extension of the rational method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (i.e.: 2-year storm event). Under this method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

### Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus helping to prevent re-suspension or re-entrainment of previously captured particles.

### Hydraulic Capacity

CDS hydraulic capacity is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. As needed, the crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulics.

## Performance

### Full-Scale Laboratory Test Results

A full-scale CDS unit (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This full-scale CDS unit was evaluated under controlled laboratory conditions of pumped influent and the controlled addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSD) of the test materials were analyzed using standard method "Gradation ASTM D-422 with Hydrometer" by a certified laboratory. UF Sediment is a mixture of three different U.S. Silica Sand products referred as: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 $\mu$m) covering a wide size range (uniform coefficient Cu averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 $\mu$m) (NJDEP, 2003). The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

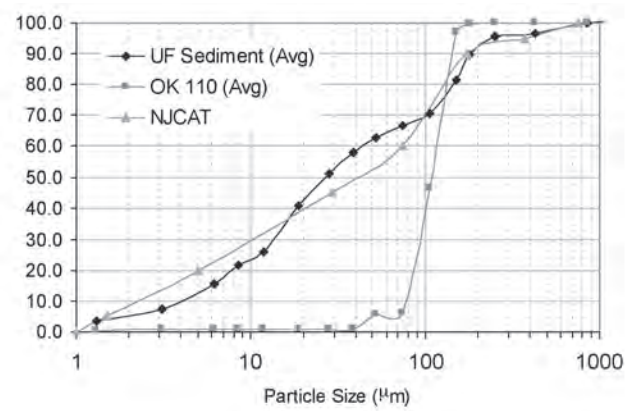



Figure 1. Particle size distributions for the test materials, as compared to the NJCAT/NJDEP theoretical distribution.

Tests were conducted to quantify the CDS unit (1.1 cfs (31.3-L/s) design capacity) performance at various flow rates, ranging from 1% up to 125% of the design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC – ASTM Standard Method D3977-97) and particle size distribution analysis.

## Results and Modeling

Based on the testing data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve for the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect to SSC removal for any particle size gradation assuming sandy-silt type of inorganic components of SSC. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand).

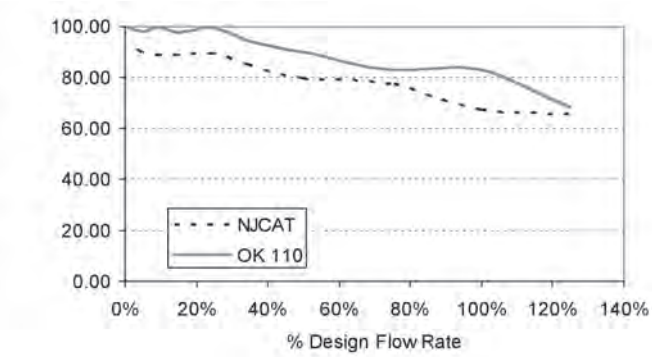



Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (WADOE, 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). Supported by the laboratory data, the model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at 100% of design flow rate, for this particle size distribution (d50 = 125 $\mu$m).

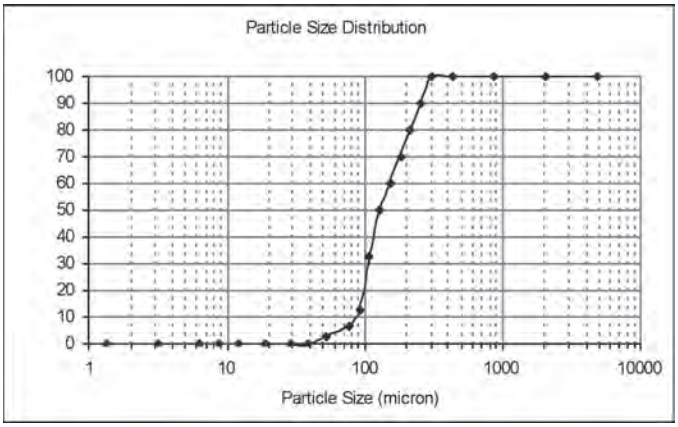



Figure 3. PSD with d50 = 125 microns, used to model performance for Ecology submittal.

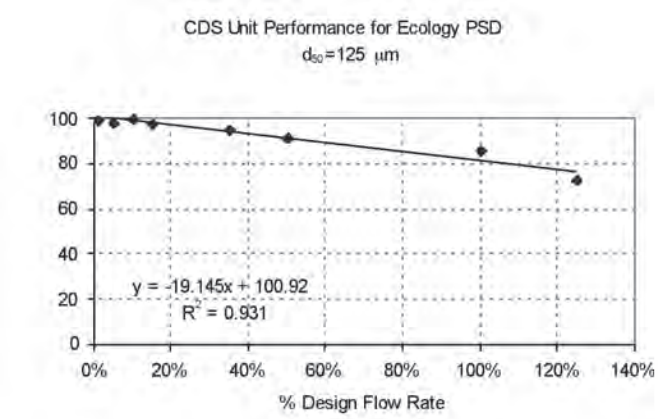



Figure 4. Modeled performance for CDS unit with 2400 microns screen, using Ecology PSD.

## Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, e.g., unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

## Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help insure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Additionally, installations should be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions to inlet and/or separation screen. The inspection should also identify evidence of vector infestation and accumulations of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If sorbent material is used for enhanced removal of hydrocarbons then the level of discoloration of the sorbent material should also

be identified during inspection. It is useful and often required as part of a permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (screen/cylinder) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained behind the screen. For units possessing a sizable depth below grade (depth to pipe), a single manhole access point would allow both sump cleanout and access behind the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine if the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

## Cleaning

Cleaning of the CDS systems should be done during dry weather conditions when no flow is entering the system. Cleanout of the CDS with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should be pumped out also if pollutant build-up exists in this area.

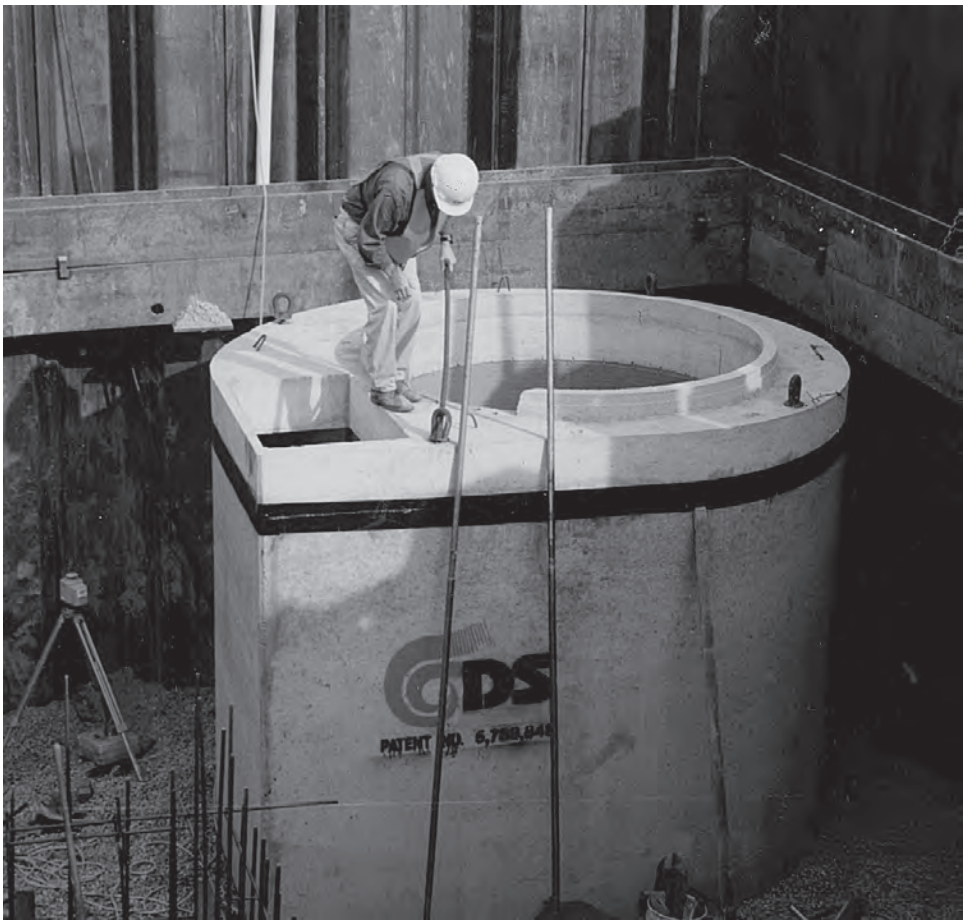
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash can be netted out if you wish to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. Confined Space Entry procedures need to be followed. Disposal of all material removed from the CDS system should be done is accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

| CDS Model | Diameter | | Distance from Water Surface to Top of Sediment Pile | | Sediment Storage Capacity | |
|---|---|---|---|---|---|---|
| | ft | m | ft | m | yd3 | m3 |
| CDS2015-4 | 4 | 1.2 | 3.0 | 0.9 | 0.5 | 0.4 |
| CDS2015 | 5 | 1.5 | 3.0 | 0.9 | 1.3 | 1.0 |
| CDS2020 | 5 | 1.5 | 3.5 | 1.1 | 1.3 | 1.0 |
| CDS2025 | 5 | 1.5 | 4.0 | 1.2 | 1.3 | 1.0 |
| CDS3020 | 6 | 1.8 | 4.0 | 1.2 | 2.1 | 1.6 |
| CDS3030 | 6 | 1.8 | 4.6 | 1.4 | 2.1 | 1.6 |
| CDS3035 | 6 | 1.8 | 5.0 | 1.5 | 2.1 | 1.6 |
| CDS4030 | 8 | 2.4 | 4.6 | 1.4 | 5.6 | 4.3 |
| CDS4040 | 8 | 2.4 | 5.7 | 1.7 | 5.6 | 4.3 |
| CDS4045 | 8 | 2.4 | 6.2 | 1.9 | 5.6 | 4.3 |

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



# CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

| Date | Water depth to sediment[1] | Floatable Layer Thickness[2] | Describe Maintenance Performed | Maintenance Personnel | Comments |
|---|---|---|---|---|---|
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1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. **Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.


7

## Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

CONTECH®
CONSTRUCTION PRODUCTS INC.
800.925.5240
contechstormwater.com

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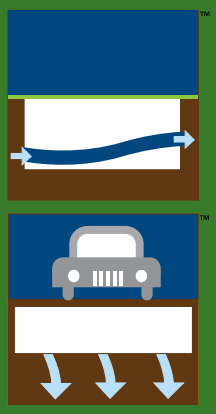
cds_manual 10/08 3M

RECYCLED PAPER

# UrbanGreen™

## Metal Detention and Infiltration Products



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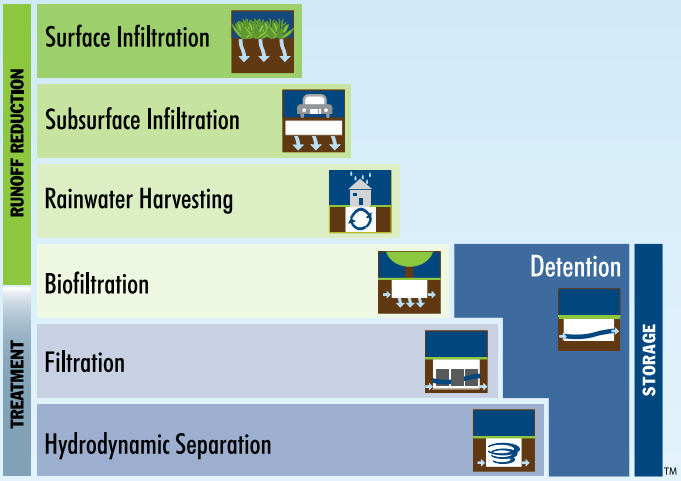
CONTECH®
ENGINEERED SOLUTIONS

# Corrugated Metal Pipe for Stormwater Detention and Infiltration

## Selecting the right stormwater solution just got easier...

It's simple to choose the right low impact development (LID) solution to achieve your runoff reduction goals with the Contech UrbanGreen™ Staircase. First, select the runoff reduction practices that are most appropriate for your site, paying particular attention to pretreatment needs. If the entire design storm cannot be retained, select a treatment best management practice (BMP) for the balance. Finally, select a detention system to address any outstanding downstream erosion.




© 2012 Contech Engineered Solutions LLC

Learn more about our low impact development at: www.ContechES.com/lid

## Meet your stormwater quantity and runoff reduction requirements with ease.

Contech's corrugated metal pipe (CMP) underground detention/infiltration systems can be sized and shaped to meet your site-specific needs. The versatile material provides almost limitless opportunities to match individual site requirements while lowering site development costs.

### Durable

- Proven service life – Exceeds 100-years with proper specification that meets all AASHTO and ASTM pipe specifications
- Handles fill heights in excess of 100 feet – steel combines strength with soil
- 100% traceable material – maintains performance even when recycled
- Homogenous material – eliminates failures due to stress cracks, shrinkage cracks and air voids
- Various coatings available with predictable service life
  - Aluminized Steel™ Type 2
  - Galvanized
  - CORLIX®
  - TRENCHCOAT®

Learn more about our available coatings at: www.ContechES.com/cmp

Various coatings available.

## Versatile

- Wide range of shapes and sizes – round and pipe-arch in diameters from 6 to 144 inches
- Variety of layouts – rectangular, L-shape and staggered cells are frequently used
- Array of fittings – tees, wyes, elbow, saddle branches, manifolds, reducers and custom fabrication available

## Sustainable

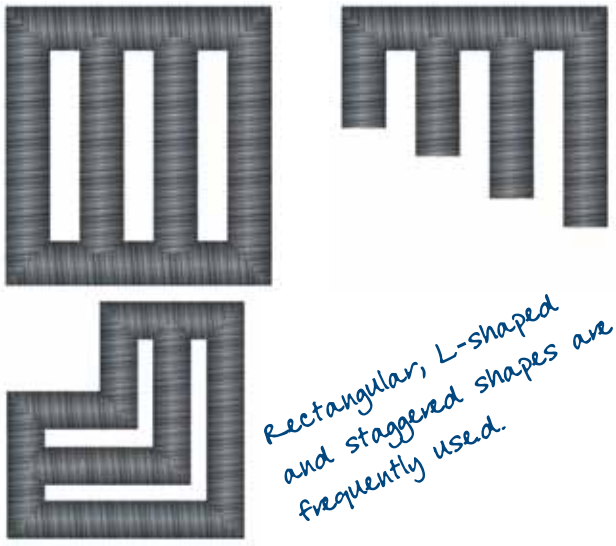
- World's most recycled content – can count towards LEED® credits
- Requires less energy and materials to produce – lowers carbon footprint

Learn how Contech products can help contribute to LEED credits at: www.ContechES.com/LEED

## Easy to Install and Maintain

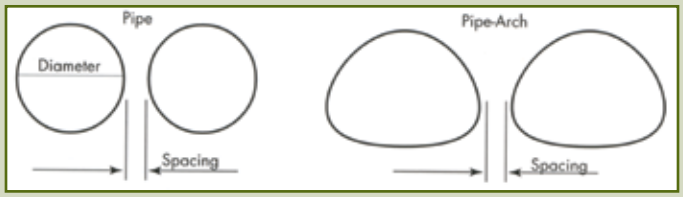
- Flexible and forgiving during installation
- Lightweight for easy handling
- Quick assembly shortens site development time
- Integrated outlet control structure eliminates need for downstream control structure
- Manhole riser sections, complete with ladders facilitate any access and scheduled maintenance

Tees, wyes, elbows, saddle branches, manifolds and reducers are available



Rectangular, L-shaped and staggered shapes are frequently used.

## Typical Spacing for Multiple Barrels



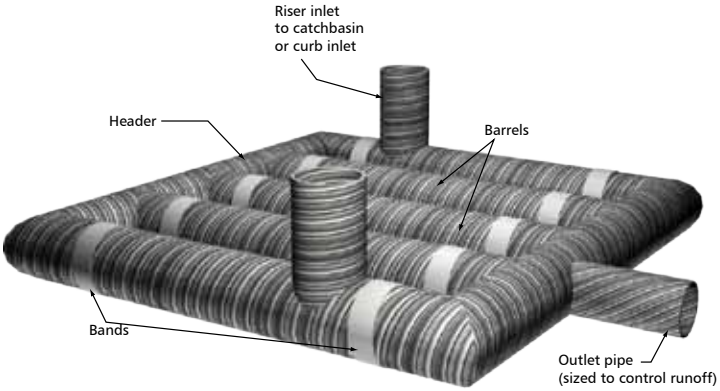

| Diameter | Spacing* | Pipe-Arch Span | Spacing* |
|---|---|---|---|
| Up to 24″ | 12″ | Up to 36″ | 12″ |
| 24″ to 72″ | 1/2 Diameter of Pipe | 36″ to 108″ | 1/3 Span of Pipe-Arch |
| 72″ + | 36″ | 108″ to 189″ | 36″ |

* Spacing shown provides room for proper backfill to enable the structure to develop adequate side support. Spacing with AASHTO M-145, A-1, A-2, A-3 granular fill. Closer spacing is possible depending on quality of backfill and placing and compaction methods.

# Applications

## Detention

Contech CMP detention systems store stormwater runoff exceeding a site's allowable discharge rate and release it slowly over time. Installed belowgrade, the systems maximize property usage and meet your specific water quantity requirements. CMP detention systems are available in all AASHTO M-36 Types. For larger systems, the Optimizer™ flow control device can reduce required storage volume.



CMP detention system

## High Volume Storage

Contech plate systems allow for high volume stormwater storage in small footprint areas. The systems are offered in a wide variety of shapes and sizes in both aluminum and galvanized steel. Full-pipe systems and three-sided structures with open bottoms can be used for infiltration.

Typically, Contech plate systems are used on high vertical rise applications or in areas where the smallest possible footprint is of the greatest concern. The systems are bolted together in the field, which reduces the number of freight loads. Remote sites or projects with challenging accessibility often utilize plate systems.

Plate system for high volume storage.

Perforated CMP infiltration system

## Infiltration

CMP pipe and pipe-arch is available fully or partially perforated to meet your Low Impact Development (LID) requirements. Standard pipe-wall perforations (3/8" diameter holes meeting AASHTO M-36, Class 2) provide approximately 2.5% open area. Subsurface perforated CMP infiltration systems store stormwater runoff in the pipe and surrounding stone during a storm until it can be slowly released into the surrounding native soil.

Stormwater runoff is stored in the pipe and surrounding stone.

# Meet Your Low Impact Development Requirements

Pipe-arch for low profile application.

## Low Profile

When vertical space must be maximized, the CMP can be utilized in a pipe-arch shape. The low, wide pipe-arch design allows for greater storage in a shallow profile than typical round pipe without losing any structural integrity. Like our round pipe, pipe arch is produced in six wall thicknesses including 18, 16, 14, 12, 10 and 8 gage, which are available with either helical or annular corrugations.

# Applications

## On-Site Manufacturing

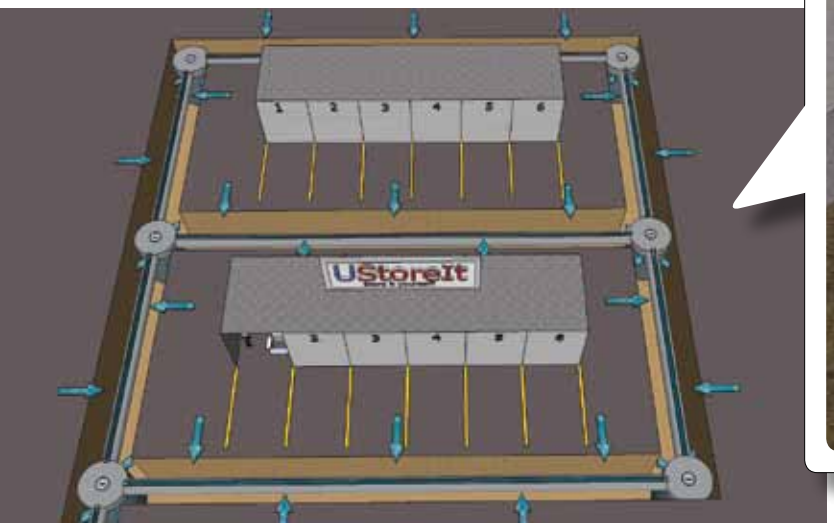
If your job site is remote or you have limited storage space or restricted traffic patterns, take advantage of our Mobile Production Vehicle (MPV) for fast and cost effective on-site steel pipe manufacturing. The PIPE MPV® is designed to be a self-supporting factory that can be quickly deployed and put into production. Once on site, pipe manufacturing progresses quickly enough to allow pipe installation within four hours.

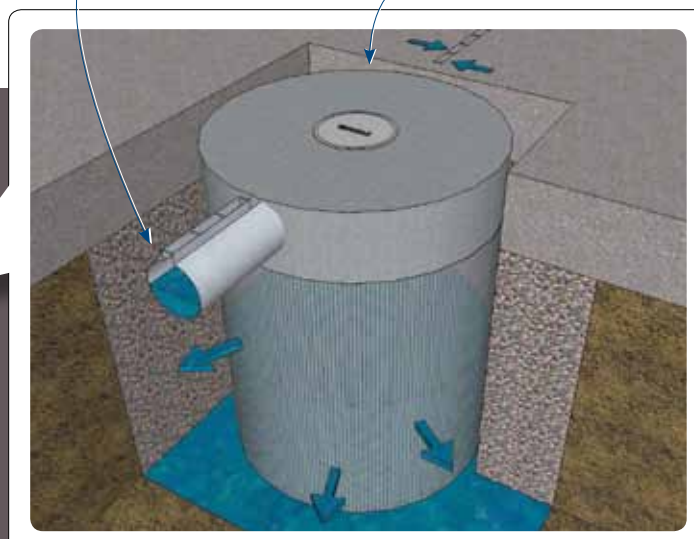
The PIPE MPV can produce corrugated metal pipe in a variety of sizes. Diameters from 36" – 192" and lengths up to 35' can be accommodated. This pipe meets the same levels of quality construction as does all Contech manufactured pipe, with high coil feedrate speeds and the same lock-seem edge process used in conventional pipe manufacturing.

Mobile Production vehicle

## Innovative Solutions for Challenging Sites

The flexibility of CMP allows you to create innovative solutions when dealing with challenging sites. For example, when trying to meet runoff reduction requirements, your site may be mostly impervious or you may have a thin, shallow clay layer just below the surface, limiting the infiltration capacity of surface BMPs. One solution is to utilize CMP infiltration wells. First, collect the site runoff using our Slotted Drain™ around the perimeter of each drive isle. The Slotted Drain then directs water into vertical lengths of perforated CMP. The vertical perforated CMP is long enough to penetrate the clay layer and infiltrate the stormwater into a highly permeable alluvial layer about 12'-14' belowground. This allows the developer to meet the LID requirements and eliminate the need for the extended detention basin.



# Sizing

## Round Pipe - CMP and Plate (CMP → 12-in to 144-in; Plate → 60-in to 240-in)

| Diameter (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Diameter (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Diameter (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Diameter (inches) | Volume ($ft^3/ft$) | Min. Cover Height |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | .78 | 12″ | 60 | 19.6 | 12″ | 120 | 78.5 | 18″ | 180 | 176 | 24″ |
| 15 | 1.22 | 12″ | 66 | 23.7 | 12″ | 126 | 86.5 | 18″ | 186 | 188 | 24″ |
| 18 | 1.76 | 12″ | 72 | 28.2 | 12″ | 132 | 95.0 | 18″ | 192 | 201 | 24″ |
| 21 | 2.40 | 12″ | 78 | 33.1 | 12″ | 138 | 103.8 | 18″ | 198 | 213 | 30″ |
| 24 | 3.14 | 12″ | 84 | 38.4 | 12″ | 144 | 113.1 | 18″ | 204 | 227 | 30″ |
| 30 | 4.9 | 12″ | 90 | 44.1 | 12″ | 150 | 122 | 24″ | 210 | 240 | 30″ |
| 36 | 7.0 | 12″ | 96 | 50.2 | 12″ | 156 | 132 | 24″ | 216 | 254 | 30″ |
| 42 | 9.6 | 12″ | 102 | 56.7 | 18″ | 162 | 143 | 24″ | 222 | 268 | 30″ |
| 48 | 12.5 | 12″ | 108 | 63.6 | 18″ | 168 | 153 | 24″ | 228 | 283 | 30″ |
| 54 | 15.9 | 12″ | 114 | 70.8 | 18″ | 174 | 165 | 24″ | 234 | 298 | 30″ |

## Pipe-Arch - CMP

| 1/2″ Deep Corrugations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Shape (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Shape (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Shape (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Shape (inches) | Volume ($ft^3/ft$) | Min. Cover Height |
| 17 x 13 | 1.1 | 12″ | 28 x 20 | 2.9 | 12″ | 49 x 33 | 8.9 | 12″ | 71 x 47 | 18.1 | 12″ |
| 21 x 15 | 1.6 | 12″ | 35 x 24 | 4.5 | 12″ | 57 x 38 | 11.6 | 12″ | 77 x 52 | 21.9 | 12″ |
| 24 x 18 | 2.2 | 12″ | 42 x 29 | 6.5 | 12″ | 64 x 43 | 14.7 | 12″ | 83 x 57 | 26.0 | 12″ |
| 1″ Deep Corrugations | | | | | | | | | | | |
| 60 x 46 | 15.6 | 15″ | 81 x 59 | 27.4 | 18″ | 103 x 71 | 42.4 | 18″ | 128 x 83 | 60.5 | 24″ |
| 66 x 51 | 19.3 | 15″ | 87 x 63 | 32.1 | 18″ | 112 x 75 | 48.0 | 21″ | 137 x 87 | 67.4 | 24″ |
| 73 x 55 | 23.2 | 18″ | 95 x 67 | 37.0 | 18″ | 117 x 79 | 54.2 | 21″ | 142 x 91 | 74.5 | 24″ |

## Pipe-Arch - MULTI-PLATE®

| 2″ Deep Corrugations | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Shape (ft-in) | Volume ($ft^3/ft$) | Min. Cover Height | Shape (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Shape (inches) | Volume ($ft^3/ft$) | Min. Cover Height | Shape (inches) | Volume ($ft^3/ft$) | Min. Cover Height |
| 18-in Corner Radius (Rc) | 6-1 x 4-7 | 22 | 12″ | 8-7 x 5-11 | 41 | 18″ | 8-7 x 5-11 | 41 | 18″ | 14-1 x 8-9 | 97 | 24″ |
| | 6-4 x 4-9 | 24 | 12″ | 8-10 x 6-1 | 43 | 18″ | 8-10 x 6-1 | 43 | 18″ | 14-3 x 8-11 | 101 | 24″ |
| | 6-9 x 4-11 | 26 | 12″ | 9-4 x 6-3 | 46 | 18″ | 9-4 x 6-3 | 46 | 18″ | 14-10 x 9-1 | 105 | 24″ |
| | 7-0 x 5-1 | 29 | 12″ | 9-6 x 6-5 | 49 | 18″ | 9-6 x 6-5 | 49 | 18″ | 15-4 x 9-3 | 109 | 24″ |
| | 7-3 x 5-3 | 31 | 12″ | 9-9 x 6-7 | 52 | 18″ | 9-9 x 6-7 | 52 | 18″ | 15-6 x 9-5 | 114 | 24″ |
| | 7-8 x 5-5 | 33 | 12″ | 10-3 x 6-9 | 55 | 18″ | 10-3 x 6-9 | 55 | 18″ | 15-8 x 9-7 | 118 | 24″ |
| | 7-11 x 5-7 | 36 | 12″ | 10-8 x 6-11 | 58 | 18″ | 10-8 x 6-11 | 58 | 18″ | 15-10 x 9-10 | 122 | 24″ |
| | 8-2 x 5-9 | 38 | 18″ | 10-11 x 7-1 | 61 | 18″ | 10-11 x 7-1 | 61 | 18″ | 16-5 x 9-11 | 126 | 30″ |
| | | | | | | | 13-11 x 8-7 | 93 | 24″ | 16-7 x 10-1 | 131 | 30″ |
| 31-in Corner Radius (Rc) | 13-3 x 9-4 | 98 | 24″ | 15-4 x 10-4 | 124 | 24″ | 17-2 x 11-4 | 153 | 30″ | 19-3 x 12-4 | 185 | 30″ |
| | 13-6 x 9-6 | 102 | 24″ | 15-7 x 10-6 | 129 | 24″ | 17-5 x 11-6 | 158 | 30″ | 19-6 x 12-6 | 191 | 30″ |
| | 14-0 x 9-8 | 106 | 24″ | 15-10 x 10-8 | 134 | 24″ | 17-11 x 11-8 | 163 | 30″ | 19-8 x 12-8 | 196 | 30″ |
| | 14-2 x 9-10 | 111 | 24″ | 16-3 x 10-10 | 138 | 30″ | 18-1 x 11-10 | 168 | 30″ | 19-11 x 12-10 | 202 | 30″ |
| | 14-5 x 10-0 | 115 | 24″ | 16-6 x 11-0 | 143 | 30″ | 18-7 x 12-0 | 174 | 30″ | 20-5 x 13-0 | 208 | 30″ |
| | 14-11 x 10-2 | 120 | 24″ | 17-0 x 11-2 | 148 | 30″ | 18-9 x 12-2 | 179 | 30″ | 20-7 x 13-2 | 214 | 36″ |

# Next Steps

## Learn more

Read our white paper, *Economic Optimization of Infiltration Systems*, to learn more. You'll receive free PDH credits for completing a quick quiz.

Available at www.ContechES.com/cmp

## Quick Links:

- LEED information – www.ContechES.com/leed
- LID Application Guide – www.ContechES.com/lid
- Articles – www.ContechES.com/pdh

## Connect with us

We're here to make your job easier – and that includes being able to get in touch with us when you need to. Search for your local rep at **www.ContechES.com**

While you're there, be sure to check out our upcoming seminar schedule or request an in-house technical presentation.

## Links to Stormwater Tools:

To use the Design Your Own Detention System tool, visit: www.ContechES.com/dyods

To use the Land Value Calculator, visit: www.ContechES.com/lvc

*(Please scroll to the bottom right to download the Land Value Calculator)*

To use the Rain Water Harvesting Runoff Reduction Calculator tool, visit: www.ContechES.com/rwh-calculator

## Start a Project

If you are ready to begin a project, contact your local representative to get started. Or you can check out our design toolbox for all our online resources at www.ContechES.com/designtoolbox.

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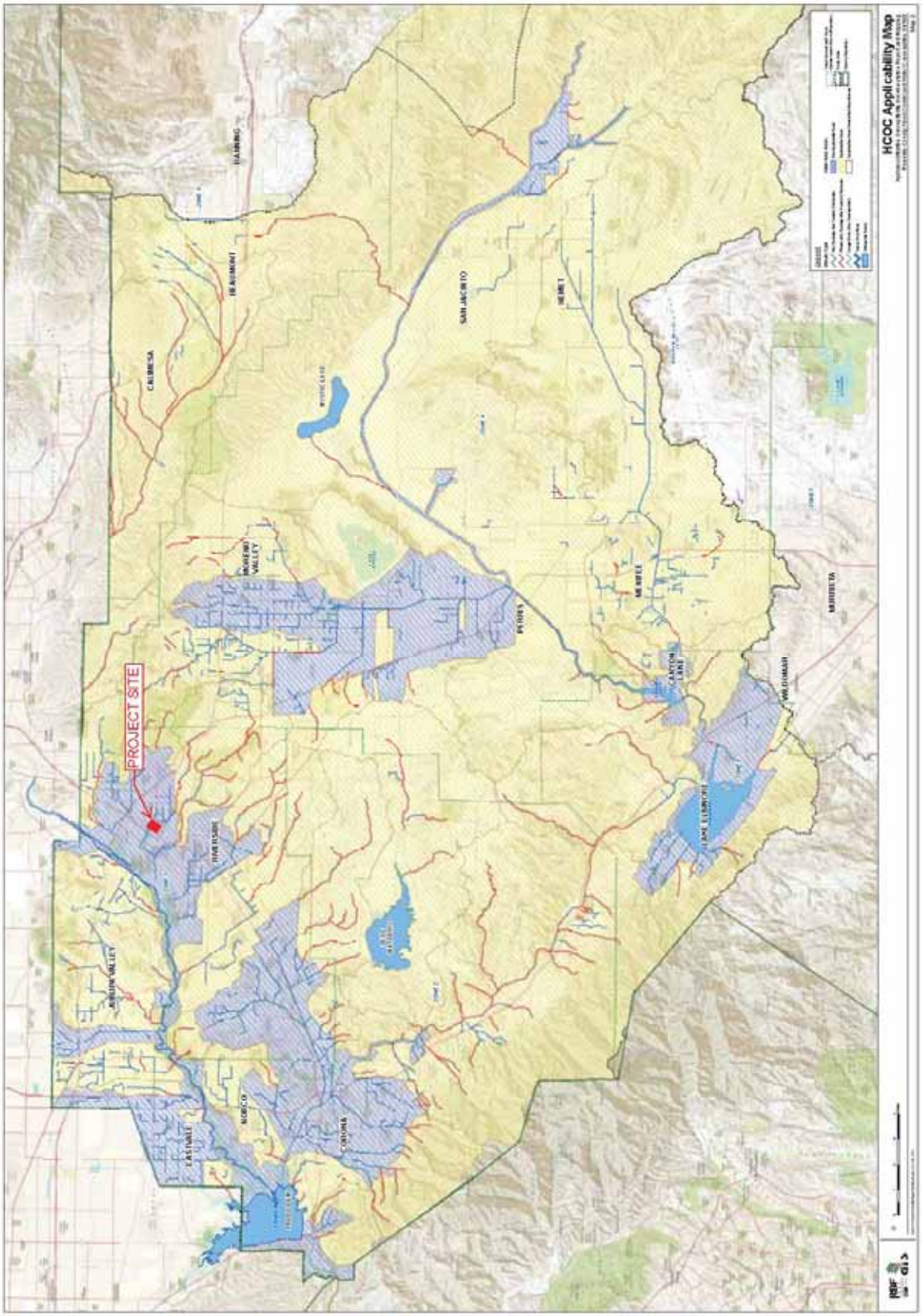
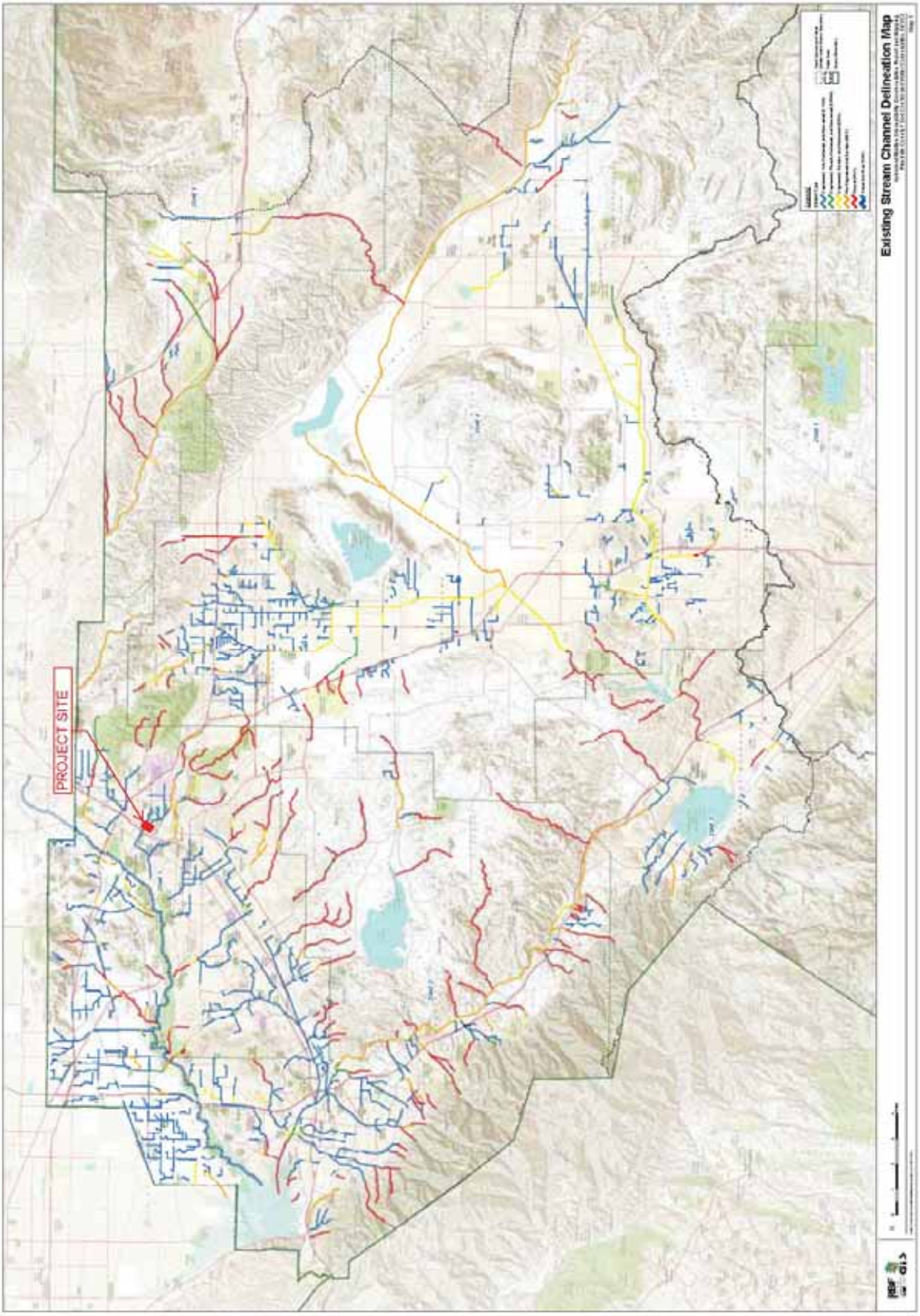
# Appendix 7: Hydromodification

*Supporting Detail Relating to Hydrologic Conditions of Concern*

**HCOC Applicability Map**



**Existing Stream Channel Delineation Map**



# Appendix 8: Source Control

*Pollutant Sources/Source Control Checklist*

# Appendix 9: O&M

*Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms*

WHEN RECORDED MAIL TO:

City Clerk
City of Riverside
City Hall, 3900 Main Street
Riverside, CA 92522

Planning Case: P__-____

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 _____, 20__, by _____{Insert Name of Owner}_____ _____("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 _____ _____{Insert Project Description for Above Referenced Planning Case}_____ _____.

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 P__-____, 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 P__-____, 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.

**_____{Insert_Name_of_Owner}_____**

_____
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)**

| BMP Name | BMP Location | Frequency |
|---|---|---|
| **Structural Treatment** | | |
| Catch Basin Marker Inspection | As designated on WQMP Plot Plan | Bi-annually |
| Catch Basin Marker Maintenance | As designated on WQMP Plot Plan | Yearly |
| Trash Storage Areas | As designated on WQMP Plot Plan | Weekly basis |
| Irrigation and Landscape | As designated on WQMP Plot Plan | Monthly basis |
| **Non-Structural Treatment** | | |
| Educational Material | Manager's Office | Upon hire and annually |
| Activity Restriction | Manager's Office | Daily basis |
| Common Landscape Management | Throughout project site | Monthly basis |
| BMP Maintenance | Manager's Office & staff | Daily basis |
| Common Area Litter Control | Throughout project site | Weekly basis |
| Employee Training | Manager's Office | Upon hire and annually |
| Common Area Catch Basin Inspection | As designated on WQMP Plot Plan | After and before rain storm |
| Sweeping of Parking Structure/Driveway | As designated on WQMP Plot Plan | Monthly basis |
| Fountain and Pool Maintenance | As designated on WQMP Plot Plan | As needed |
| **Treatment Control** | | |
| CDS Inspection | As designated on WQMP Plot Plan | Quarterly, before, during, after rain event |
| CDS Maintenance | As designated on WQMP Plot Plan | Annually and as needed |
| CMP Inspection | As designated on WQMP Plot Plan | Quarterly, before, during, after rain event |
| CMP Maintenance | As designated on WQMP Plot Plan | Annually and as needed |

# Appendix 10: Educational Materials

*BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information*

# Appendix F

# Noise Impact Analysis

KUNZMAN ASSOCIATES, INC.

# MISSION LOFTS PROJECT

# NOISE IMPACT ANALYSIS

May 31, 2015

Traffic Engineering | Transportation Planning | Parking | Noise/Vibration | Expert Witness
Air Quality | Global Climate Change | Health Risk Assessment

KUNZMAN ASSOCIATES, INC.

# MISSION LOFTS PROJECT

# NOISE IMPACT ANALYSIS

## May 31, 2015

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**5962**

## Table of Contents


**I. Introduction and Setting ..... 1**
- A. Purpose and Objectives ..... 1
- B. Project Location ..... 1
- C. Project Description ..... 1

**II. Noise and Vibration Fundamentals ..... 4**
- A. Noise Fundamentals ..... 4
- B. Vibration Fundamentals ..... 5

**III. Existing Noise Environment ..... 8**
- A. Existing Land Uses and Sensitive Receptors ..... 8
- B. Ambient Noise Measurements ..... 8

**IV. Regulatory Setting ..... 11**
- A. Federal Regulations ..... 11
- B. State Regulations ..... 11
- C. Local Regulations ..... 13

**V. Analytical Methodology and Model Parameters ..... 16**
- A. Noise Modeling and Input ..... 16

**VI. Impact Analysis ..... 18**
- A. Noise Impacts ..... 18
- B. Vibration Impacts ..... 21

**VII. Mitigation Measures ..... 31**
- A. Construction Mitigation ..... 31
- B. Building Mitigation ..... 32
- C. Vibration Mitigation ..... 32

**VIII. References ..... 33**


## APPENDICES


**Appendix A – Larson Davis Model 820-SLM Output**

**Appendix B – RCNM Noise Modeling Output**

**Appendix C – FHWA-RD-77-108 Model Output**

**Appendix D – Create Rail Worksheet and FRA Train Inventory Report**

**Appendix E – Environmental Noise and Vibration Study, Mission Lofts**

## List of Tables


Table 1. Definitions of Acoustical Terms ..... 6

Table 2. Ambient Noise Levels ..... 9

Table 3. City of Riverside Noise/Land Use Compatibility Criteria ..... 15

Table 4. Typical Construction Equipment Noise Levels ..... 24

Table 5. Comparison of Existing and Existing Plus Project Traffic Noise Levels ..... 25

Table 6. Typical Noise Attenuation Methods to Insulate the Noise Receiver ..... 26

Table 7. Construction Equipment Vibration Source Levels ..... 27

Table 8. Typical Human Reaction and Effect on Buildings Due to Groundborne Vibration ..... 28

## List of Figures

Figure 1. Project Location Map ..... 2
Figure 2. Site Plan ..... 3
Figure 3. Common Noise Sources and Noise Levels ..... 7
Figure 4. Noise Measurement Location Map ..... 10
Figure 5. Future Transportation Noise Levels ..... 29
Figure 6. Future Transportation Noise Level Contours ..... 30

# I. Introduction and Setting

## A. Purpose and Objectives

The purpose of this report is to provide an assessment of the noise impacts resulting from the development of the proposed project and to identify mitigation measures that may be necessary to reduce those impacts. The noise issues related to the proposed land use and development have been evaluated in the context of the California Environmental Quality Act.

The City of Riverside is acting as the lead agency responsible for preparation of the noise impact analysis, in accordance with California Environmental Quality Act authorizing legislation.

Although this is a technical report, every effort has been made to write the report clearly and concisely. To assist the reader with those terms unique to noise analysis, a glossary of terms is provided in Section II of this report.

## B. Project Location

The proposed development is located in the City of Riverside and is located south of the intersection of Mission Inn Avenue and Commerce Street and is bisected by University Avenue. A vicinity map showing the project location is provided on Figure 1.

## C. Project Description

As shown on Figure 2, the proposed project is a transit oriented development consisting of 212 apartment dwelling units. The project site is bisected by University Avenue and connected by a pedestrian bridge over University Avenue. The northern site (Project Site 1) contains all of the apartment units and 45% of the supplied on-site parking. The southern site (Project Site 2) contains the remaining parking supply. Project Site 1 proposes to provide access driveways to Mission Inn Avenue and University Avenue. Project Site 2 proposes to provide an access driveway at the existing intersection of 9th Street and the Metrolink parking lot driveway.

Figure 1
Project Location Map

5962/1

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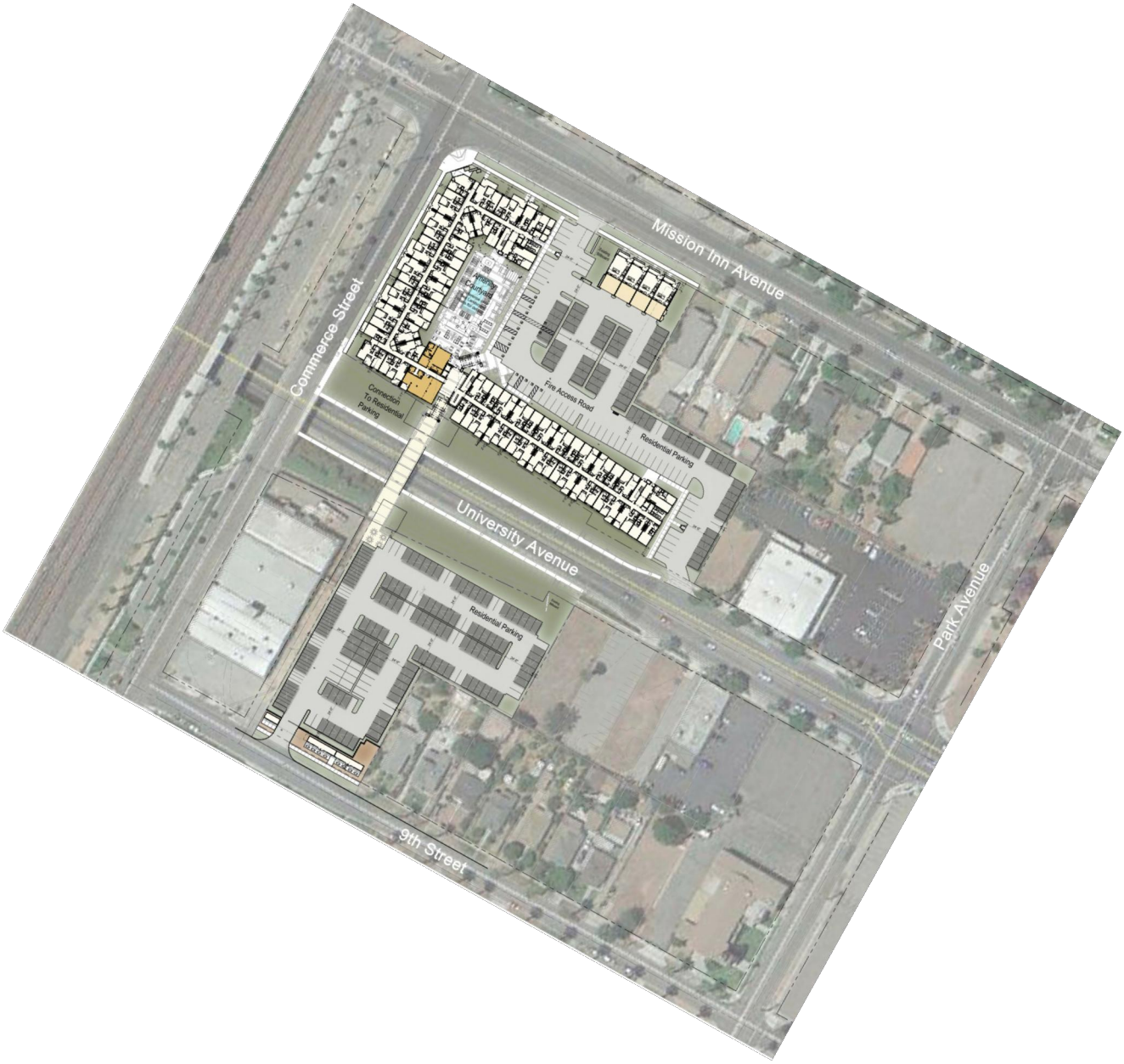
# Figure 2
# Site Plan

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5962/2

# II. Noise and Vibration Fundamentals

## A. Noise Fundamentals

Sound is a pressure wave created by a moving or vibrating source that travels through an elastic medium such as air. Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in extreme circumstances, hearing impairment.

Commonly used noise terms are presented in Table 1. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the "A-weighted" noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A-weighted measurements are written dB(A) or dBA.

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiates uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as a doubled traffic volume, would increase the noise levels by 3 dBA; halving of the energy would result in a 3 dBA decrease.

Figure 3 shows the relationship of various noise levels to commonly experienced noise events.

Average noise levels over a period of minutes or hours are usually expressed as $dBAL_{eq}$or the equivalent noise level for that period of time. For example, $L_{eq(3)}$ would represent a 3-hour average. When no period is specified, a one-hour average is assumed.

Noise standards for land use compatibility are stated in terms of the Community Noise Equivalent Level (CNEL) and the Day-Night Average Noise Level ($L_{dn}$). CNEL is a 24-hour weighted average measure of community noise. CNEL is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human

sensitivity to noise during the evening and nighttime hours. $L_{dn}$ is a very similar 24-hour average measure that weights only the nighttime hours.

It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA; that a change of 5 dBA is readily perceptible, and that an increase (decrease) of 10 dBA sounds twice (half) as loud. This definition is recommended by the California Department of Transportation's Traffic Noise Analysis Protocol for New Highway and Reconstruction Projects (2009).

## B. Vibration Fundamentals

Typically, peak particle velocity (PPV) is used to describe vibration in relation to potential structural damage. It is defined as the maximum instantaneous positive or negative peak of the vibration signal. Groundborne vibration related to human annoyance is generally related to root mean square (rms) velocity levels expressed in VdB. The background vibration velocity level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans which is around 65 VdB.

The way in which vibration is transmitted through the earth is called propagation. Propagation of earthborn vibrations is complicated and difficult to predict because of the endless variations in the soil through which waves travel. There are three main types of vibration propagation: surface, compression and shear waves. Surface waves, or Raleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. Compression waves, or P-waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. Shear waves, or S-waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse or "side-to-side and perpendicular to the direction of propagation".

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and void spaces. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Construction operations generally include a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at up to 200 feet. Heavy trucks can also generate groundborne vibrations, which can vary depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, or the differential settlement of pavement all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration from normal traffic flows on streets and freeways with smooth pavement conditions.

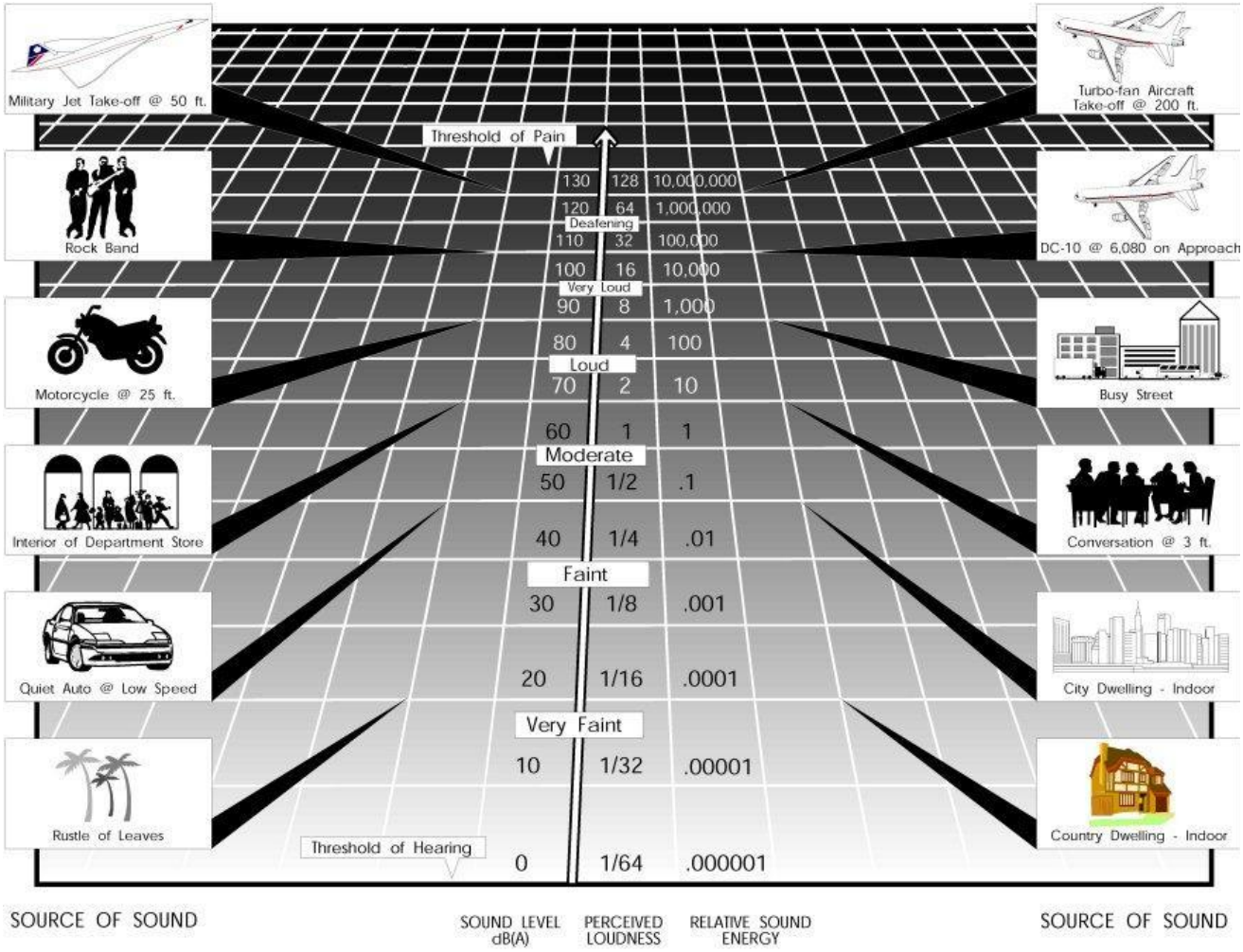
## Table 1

## Definitions of Acoustical Terms[1]

| Term | Definition |
|---|---|
| CNEL | CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10:00 PM and 7:00 AM, and a 5-dB penalty applied to the A-weighted sound levels occurring during evening hours between 7:00 PM and 10:00 PM. |
| Decibel, dB | A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio. |
| Frequency, Hertz | In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the 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. |
| Root Mean Square (RMS) | A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function. |
| Fast/Slow Meter Response | The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second. |
| $L_{02}$, $L_{08}$, $L_{50}$, $L_{90}$ | The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively. |
| Equivalent Continuous Noise Level, $L_{eq}$ | A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound. |
| $L_{max}$, $L_{min}$ | $L_{max}$ is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. $L_{min}$ is the minimum level. |
| Ambient Noise Level | The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant. |
| Offensive/ Offending/ Intrusive Noise | The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level. |

[1] Adapted from: Cyril M. Harris; Handbook of Acoustical Measurement and Noise Control, 1991.

# Figure 3
## Common Noise Sources and Noise Levels




5962/3

# III. Existing Noise Environment

## A. Existing Land Uses and Sensitive Receptors

The proposed development is located in the City of Riverside and is located south of the intersection of Mission Inn Avenue and Commerce Street and is bisected by University Avenue. The site is currently vacant. It is bordered by residential development and a Health Services building to the south/southeast, University Avenue on the south/southwest, a rail yard to the northwest and commercial/light industrial land uses to the northeast.

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, single-and multiple-family residential, including transient lodging, motels and hotel uses make up the majority of these areas. Sensitive receptors that may be affected by project generated noise include the single-family detached residential dwelling units and the health services center building located southeast of the project site.

## B. Ambient Noise Measurements

An American National Standards Institute (ANSI Section SI4 1979, Type 1) Larson Davis model LxT sound level meter was used to document existing ambient noise levels. Nine 10-minute daytime noise measurements were taken between 3:04 PM and 4:49 PM on April 13, 2015. Measurement locations are shown on Figure 4. Measured ambient noise levels in the project area ranged between 60.8 to 82.5 dBA Leq (shown in Table 2). Measurement output data is included in Appendix A.

The dominant noise source was from vehicle traffic on University Avenue, Mission Inn Avenue, and trains passing by. There was also a general background noise emanating from vehicle traffic on the SR-91 Freeway and other urban noise. Noise associated with train pass-bys reached up to 82.5 dBA Leq (10 minutes) and 104 dBA Lmax (horn) at a distance of 90 feet.

## Table 2

## Ambient Noise Levels[1]

| Name | Measurement Period | Duration of Measurement | Description | Existing Ambient Noise Levels (dBA) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | $L_{eq}$ | $L_{max}$ | $L_2$ | $L_8$ | $L_{25}$ | $L_{50}$ |
| NM1 | 3:04 PM - 3:14 PM | 10 min | West corner of Mission Inn Ave and Rail Line | 82.5 | 104.0 | 86.2 | 72.3 | 69.2 | 65.5 |
| NM2 | 3:28 PM - 3:38 PM | 10 min | Along northwestern boundary of site | 62.4 | 73.3 | 68.0 | 66.3 | 63.2 | 60.7 |
| NM3 | 3:40 PM - 3:50 PM | 10 min | North of project next to commercial/industrial land uses | 62.9 | 75.4 | 70.5 | 67.4 | 62.4 | 59.5 |
| NM4 | 3:55 PM - 4:05 PM | 10 min | On-site at location of proposed driveway | 60.8 | 72.7 | 66.5 | 64.0 | 60.9 | 58.9 |
| NM5 | 4:10 PM - 4:20 PM | 10 min | East of site at adjacent single-family residential unit | 61.9 | 73.6 | 69.6 | 66.7 | 62.1 | 57.8 |
| NM6 | 4:22 PM - 4:32 PM | 10 min | Southeast of site in single-family residential area | 63.9 | 79.8 | 72.5 | 67.8 | 63.1 | 58.3 |
| NM7 | 4:35 PM - 4:45 PM | 10 min | Southeast of site in single-family residential area | 66.1 | 87.4 | 73.8 | 67.5 | 62.6 | 57.8 |
| NM8 | 4:49 PM - 4:59 PM | 10 min | On-site at location of proposed driveway | 69.1 | 79.3 | 75.6 | 73.3 | 70.5 | 66.2 |
| NM9 | 4:49 PM - 4:59 PM | 10 min | Southwest of site at single-family residential unit | 69.1 | 79.3 | 75.6 | 73.3 | 70.5 | 66.2 |

[1] Source: Site Visit, Kunzman Associates, Inc. (August 29, 2014).

Figure 4
Noise Measurement Location Map

5962/4

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# IV. Regulatory Setting

## A. Federal Regulations

### 1. Federal Noise Control Act of 1972

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In response, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Levels of Environmental Noise). The Levels of Environmental Noise recommended that the Ldn should not exceed 55 dBA outdoors or 45 dBA indoors to prevent significant activity interference and annoyance in noise-sensitive areas.

In addition, the Levels of Environmental Noise identified five (5) dBA as an "adequate margin of safety" for a noise level increase relative to a baseline noise exposure level of 55 dBALdn (i.e., there would not be a noticeable increase in adverse community reaction with an increase of five dBA or less from this baseline level). The EPA did not promote these findings as universal standards or regulatory goals with mandatory applicability to all communities, but rather as advisory exposure levels below which there would be no risk to a community from any health or welfare effect of noise.

In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to State and local governments. However, noise control guidelines and regulations contained in EPA rulings in prior years remain in place by designated Federal agencies, allowing more individualized control for specific issues by designated Federal, State, and local government agencies.

### 2. Federal Transportation Association Guidance Manual

The Federal Transportation Association Guidance Manual for Transit Noise and Vibration Impact Assessment suggests that the ground-borne vibration velocity should not exceed 80 VdB for infrequent events (fewer than 70 per day) and 72 VdB for frequent events (more than 70 per day) to minimize potential vibration impacts. In addition, the FTA prescribes third-octave band limitations on vibration levels from 4 Hz to 80 Hz.

## B. State Regulations

### 1. State of California Building Code

Title 24 of the California Code of Regulations, also known as the California Building Standards Code (2013) establishes uniform minimum noise insulation performance standards to protect persons with hotels, motels, dormitories, apartment houses and dwellings other than single-family detached residential dwelling units from the effects of excessive noise, including, but not limited to, hearing loss or impairment, and interference with speech and sleep. The code provides acoustical regulations for both exterior-to-interior sound insulation, as well as sound and impact isolation between adjacent spaces of various occupied units. Title 24 regulations state that interior noise levels generated by exterior noise sources shall not exceed 45 dBA Ldn/CNEL, with windows closed, in any habitable room for general residential uses.

Section 1208A, Sound Transmission, of the California Building Code requires acoustical evaluation and insulated building design and construction when exterior noise levels exceed 60 Ldn. New residential construction must be acoustically designed and constructed to reduce the intrusion of transportation noise and local fixed noise sources. Specifically, the California Building Code requires that a minimum Sound Transmission Class of 50 (STC50) and Impact Isolation Class 50 (IIC50) for multi-family attached residential dwelling units be achieved.

### 2. State of California General Plan Guidelines 2003

Though not adopted by law, the State of California General Plan Guidelines 2003, published by the California Governor's Office of Planning and Research (OPR) (OPR Guidelines), provide guidance for the compatibility of projects within areas of specific noise exposure. The OPR Guidelines identify the suitability of various types of construction relative to a range of outdoor noise levels and provide each local community some flexibility in setting local noise standards that allow for the variability in community preferences. Findings presented in the Levels of Environmental Noise Document (EPA 1974) influenced the recommendations of the OPR Guidelines, most importantly in the choice of noise exposure metrics (i.e., Ldn or CNEL) and in the upper limits for the Normally Acceptable outdoor exposure of noise-sensitive uses.

The OPR Guidelines include a Noise and Land Use Compatibility Matrix (Shown in Table 3) identifies acceptable and unacceptable community noise exposure limits for various land use categories. The City of Riverside has adopted their own land use/noise compatibility guidelines which are discussed below under Section C, Local Regulations.

### 3. California Environmental Quality Act

CEQA requires analysis of noise related to the proposed project in light of local plans and ordinances and other applicable standards of other agencies. CEQA also requires evaluation of potential noise impacts related to aircraft and the project's potential to result in substantial temporary or permanent increases in ambient noise levels. CEQA also requires the evaluation of potential groundborne vibration impacts.

Industry-accepted standards for what is considered to be a “substantial increase” in noise ranges from 3 dB to 12 dB. It should be noted that a change of 3 dB is considered to be “barely audible” to a trained ear and that a change of 5 dB is considered to be a readily audible change. The City of Riverside has not identified a numerical increase that would represent a substantial increase in noise levels. For the purposes of this analysis, increases in traffic noise due to the project's contribution will be considered to be "substantial" if project generated increases in noise levels cause an increase of 5 dBA CNEL or greater at a sensitive receptor.

4. California Department of Transportation (Caltrans)

The California Department of Transportation (Caltrans) has published one of the seminal works for the analysis of groundborne noise and vibration relating to transportation- and construction-induced vibrations and although the project is not subject to these regulations, it serves as useful tools to evaluate vibration impacts. These guidelines recommend that a standard of 0.2 inches per section (in/sec) PPV not be exceeded for the protection of normal residential buildings (Caltrans 2002). No use may generate any ground-transmitted vibration that is perceptible to the human sense of touch measured at the outside boundary of the immediate space occupied by the enterprise generating the vibration if the enterprise is one of several located on a lot, or at the lot line if the enterprise generating the vibration is the only enterprise located on a lot.

## C. Local Regulations

1. City of Riverside General Plan

Applicable policies and standards governing environmental noise in the City are set forth in the General Plan Noise Element. Those applicable to the proposed project are presented below.

Objective N–1: Minimize noise levels from point sources throughout the community and, wherever possible, mitigate the effects of noise to provide a safe and healthful environment.

Policy N–1.2: Require the inclusion of noise-reducing design features in development consistent with standards in Table 3 (Noise/Land Use Compatibility Criteria).

The noise/land use compatibility guidelines mentioned in Policy N-1.2 recognize and respond to the many different noise environments in Riverside: the relative quiet within the greenbelt area, the sounds typical in suburban neighborhoods and the higher activity areas such as Downtown and within mixed-use districts. For example, infill residential development is considered to be “normally acceptable” in areas where the ambient noise level is not expected to exceed 65 dBA CNEL, and “conditionally acceptable” in areas where ambient noise levels are not expected to exceed 75 dBA CNEL. New construction in areas that have noise levels that are considered to be “conditionally acceptable”, should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features included in design. It should be noted that

the City's Noise and Land Use Compatibility Matrix does not include multiple family residential development as a land use category.

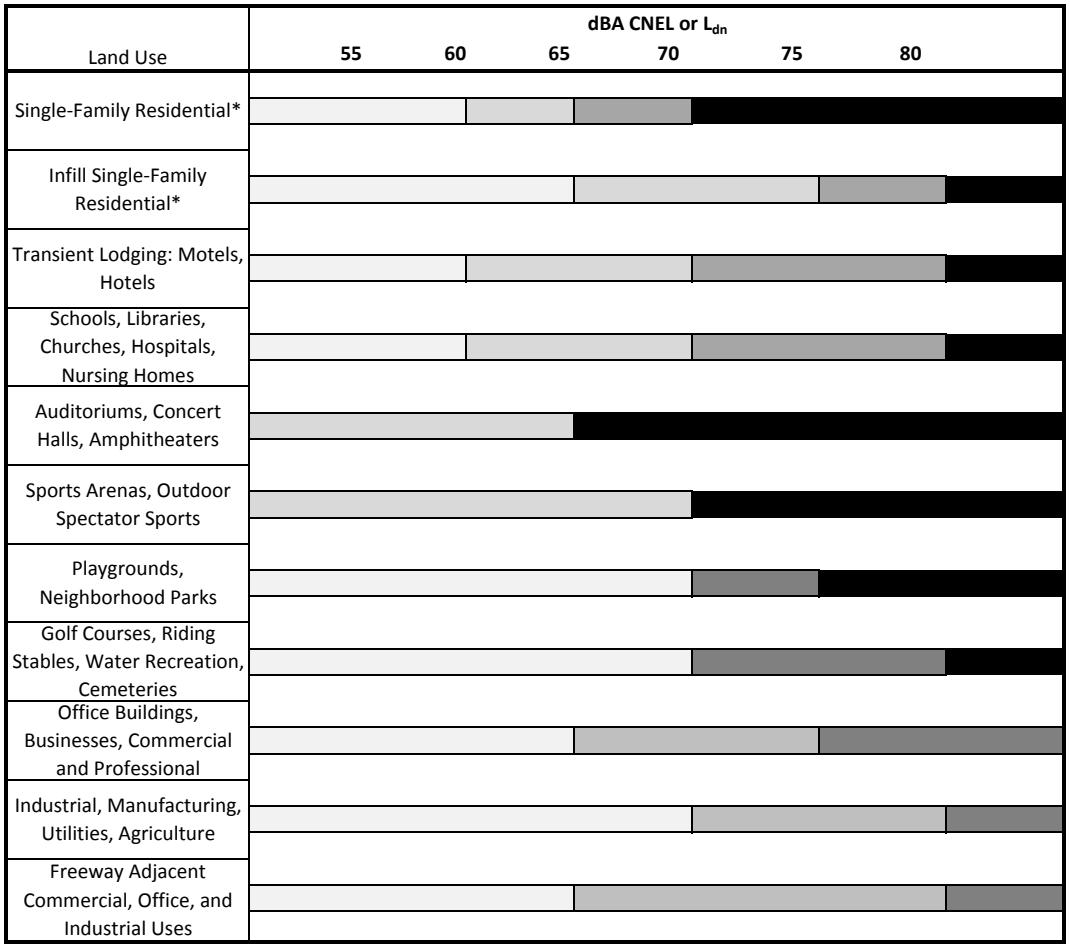
As a matter of policy, the City supports new residential development within already urbanized areas where ambient noise levels may be higher than those experienced in neighborhoods located on the urban periphery. This is in an effort to promote "smart growth," mixed use development, making more efficient use of land and resources. Interior noise levels for new residential development, regardless of location within the Planning Area, will be required to comply with standards set forth in Title 24 of the State Health and Safety Code. New construction may need to incorporate special insulation, windows and sealants in order to ensure that interior noise levels meet Title 24 standard of 45 dBA CNEL.

2. City of Riverside Ordinance

Section 7.35.010 of the city of Riverside ordinance prohibits the operation or allowing the operation of any tools or equipment used in construction, drilling, repair, alteration, grading or demolition work between the hours of 7:00 PM and 7:00 AM on week days and between 5 PM and 8 AM on Saturdays or at any time on Sunday or federal holidays such that the sound therefrom creates a noise disturbance across a residential or commercial property line or at any time exceeds the maximum permitted noise level for the underlying land use category set forth in (Section 7.30), except for emergency work or by variance.

## Table 3

## Noise and Land Use Compatibility Matrix[1]




| Normally Acceptable: | Conditionally Acceptable: | Normally Unacceptable: | Conditionally Unacceptable: |
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |

*For properties located within airport influence areas, acceptable noise limits for single-family detached residential uses are established by the Riverside County Airport Land Use Compatibility Plan

[1] Source: State Department of Health as modified by the City of Riverside (2010).

# V. Analytical Methodology and Model Parameters

## A. Noise Modeling and Input

### 1. Road Construction Noise Model (RCNM)

A worst-case construction noise scenario was modeled using the Federal Highway Administration's Roadway Construction Noise Model (RCNM). RCNM utilizes standard noise emission levels for many different types of equipment and includes utilization percentage, impact, and shielding parameters. Modeling parameters and output are provided in Appendix B.

### 2. Federal Highway Administration (FHWA) Traffic Noise Prediction Model

In order to determine if project traffic would result in a substantial increase in ambient noise levels, Existing and Existing Plus Project noise levels along affected roadways were modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108, as modified for CNEL and the "Calveno" energy curves. This model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Adjustments are then made to the REMEL to account for total average daily trips (ADT), roadway classification, width, speed and truck mix, roadway grade and site conditions (hard or soft ground surface). Areas adjacent to all modeled roadways were assumed to be "hard sites" to predict worst-case, conservative noise levels. A hard site, such as pavement, is highly reflective and does not attenuate noise as quickly as grass or other soft sites. Possible reductions in noise levels due to intervening topography and vegetation were not accounted for in the analysis.

Project traffic volumes and vehicle mix were obtained from the project's traffic study (Fehr & Peers2015). Existing Plus Project traffic volumes were calculated by adding the proposed project trips to existing traffic volumes. The City of Riverside does not have a published Day/Evening/Night (D/E/N) split for use in acoustical studies. For existing conditions, road segments were assigned D/E/N splits recommended and published by the Riverside County Department of Industrial Hygiene for noise modeling. Vehicle speed was based on the posted speed limits and/or observation. FHWA worksheets are included in Appendix C.

### 3. SoundPLAN

The SoundPLAN model was utilized to model future worst case vehicle traffic and existing rail noise to asses potential transportation noise impacts to the proposed project.

Project traffic volumes and vehicle mix were obtained from the project's traffic study (Fehr & Peers 2015). The City of Riverside does not have a published Day/Evening/Night (D/E/N) split for use in acoustical studies. For existing conditions, road segments were assigned D/E/N splits recommended and published by the

Riverside County Department of Industrial Hygiene for noise modeling. Vehicle speed was based on the posted speed limits and/or observation.

In order to determine potential rail noise impacts, CREATE worksheets were completed to determine the anticipated noise level at the nearest residential building and then recreated in the SoundPLAN model in order to construct and cumulative noise graphic.

Train data used for the CREATE worksheet was taken from a U.S. Department of Transportation, Federal Railroad Ad Crossing Inventory Form. The CREATE worksheet and the Rail inventory sheet is included in Appendix D.

# VI. Impact Analysis

## A. Noise Impacts

This impact discussion analyzes the potential for project construction noise and operational noise to cause an exposure of persons to or generation of noise levels in excess of established City of Riverside noise standards related to construction noise, and transportation related noise impacts both to the proposed project and caused by the proposed project.

### 1. Construction Noise

Sensitive receptors that may be affected by project generated noise include single-family detached residential dwelling units located south and southeast of the project site, commercial establishments and a medical clinic located just south of the project site. These land uses may be affected by short-term noise impacts associated the transport of workers, the movement of construction materials to and from the project site and from ground demolition, clearing, excavation, grading, and building activities.

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. Equipment used on the site may be mobile or stationary. Mobile equipment (e.g., loaders, graders, dozers) would typically move around a construction site performing tasks in a recurring manner. Stationary equipment (e.g., air compressor, generator, concrete saw) operates in a given location for an extended period of time to perform continuous or periodic operations. Operational characteristics of heavy construction equipment are additionally typified by short periods of full power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

Typical noise sources and noise levels associated with construction activities are shown in Table 4. The loudest phase of construction is expected to be the site preparation phase which would include, concrete demolition, compacting, and excavating. Equipment and vehicles that may be used during site preparation would include hydra break ram or hoe-ram, backhoes, bulldozers, loaders, excavation equipment (e.g., graders and scrapers), and compaction equipment. Finishing activities may include the use of pneumatic hand tools, scrapers, concrete trucks, vibrators, and haul trucks.

A likely worst-case one-hour construction noise scenario was modeled to determine what construction noise levels would be at the nearest sensitive receptors (adjacent residential properties) using the FHWA Roadway Construction Noise Model (RCNM). The worst-case scenario included three pieces of equipment most likely to be operated simultaneously near the adjacent single-family detached residential dwelling units during the demolition/excavation phase (hydra break ram, backhoe, dozer, and dump truck). The equipment was modeled at a distances ranging between 25-200 feet from

the receptor. Unmitigated construction noise levels experienced at the sensitive receptors nearest to the project site could reach 82.6 dBA $L_{eq}$. The loudest piece of equipment that may be used on the project site (a jackhammer) operating at the property line could generate a maximum noise level of up to 94.9 $dBAL_{max}$ at a receptor within 25 feet. Mitigation requiring shielding is included in Section VII of this report. The resulting increases over ambient noise levels would be temporary in nature, and would not generate continuously high noise levels. Modeling parameters and output are provided in Appendix B.

**Consistency with Applicable Standards**

City of Riverside Municipal Code

As required by a mitigation measure found in Section VII of this report, project construction will not occur between the hours of 7:00 PM and 7:00 AM on week days or between 5:00 PM and 8:00 AM on Saturdays, or at any time on Sunday or federal holidays such that the sound therefrom creates a noise disturbance across a residential or commercial property line or at any time exceeds the maximum permitted noise level for the underlying land use category set forth in (Section 7.30), except for emergency work or by variance. Measures to reduce construction related noise impacts are included in Section VII of this report.

2. Noise Impacts to Off-Site Receptors Due to Project Generated Traffic

Existing and Existing Plus Project noise levels for each roadway segment analyzed in the traffic study prepared for the proposed project (Fehr & Peers 2015) were modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Project generated increases in ambient noise levels along affected road segments were then calculated. Modeling output is included in this report as Appendix C.

Existing traffic noise modeling resulted in noise levels ranging between 58.58 and 70.04 dBA $L_{eq}$ at 50 feet from the centerline of the affected road segments; and the Existing Plus Project traffic noise model resulted in noise levels ranging from 58.68 to 70.09 dBA $L_{eq}$ at 50 feet from the affected road segments.

**Consistency with Applicable Standards**

As shown in Table 5, in no case would project generated vehicle traffic cause an increase in the ambient noise levels that exceeds 0.1dB. As previously discussed increases in traffic noise due to the project's contribution will be considered to be "substantial" if project generated increases in noise levels cause an increase of 3 dBA CNEL or greater at a sensitive receptor and if: (1) the existing noise levels already exceed the residential land use compatibility standard for "normally acceptable" (60 dBA CNEL for single-family residential dwelling units and 65 dBA CNEL for multiple family residential dwelling units).

Project generated traffic would not result in substantial increases in ambient noise levels. No mitigation is required.

3. Noise Impacts to the Proposed Project Associated with Future Transportation Noise

**Transportation Noise**

Future transportation noise levels and noise contours were modeled in SoundPLAN and are shown on Figures 5 and 6. As shown on Figure 5, buildout transportation noise levels due to traffic on University Avenue, Mission Inn Avenue and the Union Pacific rail line located north of the project site. Unmitigated buildout traffic noise levels could reach up to 73 dBA CNEL and 98 dBA $L_{max}$at the facade of proposed residential buildings. Noise levels at the proposed outdoor recreation area are not expected to exceed 59.3 dBA CNEL. The 59.3 dBA CNEL noise level falls into the "normally acceptable" category for infill residential development and the 73 dBA CNEL falls into the category of what the City' exterior land use compatibility criteria (Table 3) considers to be "conditionally acceptable". As discussed previously, a matter of policy, the City supports new residential development within already urbanized areas where ambient noise levels may be higher than those experienced in neighborhoods located on the urban periphery. New construction is still required to comply with standards set forth in Title 24 of the State Health and Safety Code. Special insulation, windows and sealants should be utilized to ensure that interior noise levels meet Title 24 standard of 45 dBA CNEL.

Due to the proximity of an existing rail crossing at Mission Inn Avenue approximately 170 feet from the project site, the proposed residential dwelling units will be subject to crossing bells and train horns. Based on the measurement data, train horn noise is expected to reach up to 98 dBA Lmax at the project site. Although these noise events contribute very little to the 24 hour averaged and weighted noise level (CNEL) standard, they can be disturbing and would be loud enough to wake people from sleep unless mitigation is incorporated. A mitigation measure to require that potential residents receive a disclosure regarding how many trains pass by and at what time of day and that the horn noise will be audible in most of the proposed residential dwelling units.

**Consistency with Applicable Standards**

Title 24, California Building Code

Construction of the proposed project will be required to adhere to Title 24 which states that interior noise levels within multiple-family residential dwelling units generated by exterior noise sources shall not exceed 45 dBA Ldn/CNEL, with windows closed, in any habitable room for general residential uses. In order to ensure this standard is met, all exposed exterior wall assembly/window combinationsthat would be facing Mission Inn Avenue need to provide an exterior to interior noise reduction of at least 28 dB. Wall/window assemblies facing Commerce Street and the Railroad need to provide an exterior to interior reduction of at least 25 dB and window/wall assemblies facing University Avenue need to provide exterior to interior noise reduction of at least 23. Typical construction methods that can be utilized to achieve this noise reduction are presented items 1-8 in Table 6.
A measure requiring the developer to provide evidence that the proposed wall assembly/window combinations provide adequate exterior to interior noise reduction is included in Section VII of this report.

City of Riverside General Plan

As discussed previously, the City of Riverside land use compatibility guidelines set forth noise/land use compatibility criteria for residential land uses. The guidelines state that the proposed multiple family dwelling units would be "normally acceptable" in areas with noise levels up to 65 dBA CNEL and "conditionally acceptable" in areas with noise levels up to 75 dBA CNEL. The guidelines recommend that new construction occurs only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

As discussed above, exterior noise levels at the proposed residential buildings may reach up to 73 dBA CNEL. The above recommended exterior to interior noise reduction for wall/window assemblies should be implemented to be consistent with General Plan guidelines. Noise levels at the proposed outdoor recreation area are not expected to exceed 59.3 dBA CNEL and are consistent with General Plan guidelines.

## B. Vibration Impacts

This impact discussion analyzes the potential for the proposed project to cause an exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. Vibration levels in the project area may be influenced by construction activities, from train pass-bys and from the ongoing operations of the proposed project.

### Construction Related Vibration

1. Construction Equipment and Trucks

   Table 7 shows the peak particle velocities (PPV) of some common construction equipment and Table 8 shows typical human reactions to various levels of PPV as well as the effect of PPV on buildings. A vibration impact would generally be considered significant if it involves any construction-related or operations-related impacts in excess of 0.2 inches per second (in/sec) PPV.

   Vibratory equipment including loaded trucks, large bulldozers and a hoe-ram may be utilized during demolition activities that would include the tearing up of concrete. The most vibration-causing piece of equipment that will likely be used on-site is the vibratory roller. This piece of equipment may be annoying and have the potential to result in architectural damage to buildings 25 feet or closer to the equipment.

   Based on Caltrans data, haul trucks would not be anticipated to exceed 0.10 in/sec peak particle velocity (PPV) at 10 feet (Caltrans 2002). Predicted vibration levels at the nearest off-site and on-site structures, which are located in excess of 10 feet from the traveled roadway segments, would not be anticipated to exceed even the most conservative threshold of 0.2 inch/second PPV.
2. Consistency with Applicable Standards

Vibratory equipment may be annoying to people if operated within 25 feet of the existing adjacent single-family detached residential dwelling units. The equipment may also have the potential to result in architectural damage to buildings that are located within 25 feet of the equipment. Mitigation measures to reduce potential impacts to structures are presented in Section VII of this report.

**Rail Related Vibration**

1. Rail Pass-Bys

A noise and vibration study (included as Appendix E) was conducted for the proposed project by SSA Acoustics (2014). Ambient vibration levels due to typical activity on-site were measured at two locations on the site nearest the northwestern boundary of the site. The instrumentation utilized to conduct the vibration testing was a Larson Davis 2900 spectrum analyzer with an accelerator calibrated to 1 x 106 mG (mass times acceleration of gravity) on-site, prior to measurements. The accelerometer was temporarily adhered to rigid portions of the site (i.e., parking lot and sidewalk areas) to measure the vibration levels. Primary sources of vibration were attributable to vehicle activity nearby the site. This included passenger automobiles, as well as buses and trucks, although bus and truck activity was not observed to be frequent. Confirmation that the vibration measurements also included train pass-bys was provided via email communications (also included in Appendix E).

As shown in the graph attached to the SSA Acoustics report, measured maximum vibration events averaged over three train pass-by events reached up to 75 VdB at measurement site 1 and up to 51 VdB at measurement site 2. As shown in graphic titled Ambient Vibration Level Measurement at the end of Appendix E, on-site vibration measurements did not exceed 72 VdB between 4 Hz and 80 Hz. Ground borne vibration is not expected to exceed these FTA vibration thresholds. No vibration structural mitigation is required.

3. Consistency with Applicable Standards

According to United States Department of Transportation (DOT) Crossing Inventory Form dated March 1, 2014, documented 9 passenger trains and 105 freight trains pass by the project site during a 24-hour period. 52 freight train pass-bys occurred between the hours of 6:00 PM and 6:00 AM and 52 freight trains pass-bys between the hours of 6:00 PM and 6:00 AM. The DOT Crossing Inventory Form is included in Appendix D.

Considering the number of trains that pass by the project site and the fact that most are freight trains, the correct threshold to evaluate potential ground borne vibration impacts to the proposed project is 72 VdB (for more than 70 events per day) per the FTA Transit Noise and Vibration Impact Assessment Guidelines (2006). In addition, the FTA prescribes third-octave band limitations on vibration levels from 4 Hz to 80 Hz. On-site vibration measurements did not exceed 72 VdB between 4 Hz and 80 Hz. Ground borne vibration is not expected to exceed these FTA vibration thresholds. No vibration mitigation is required.

## Table 4

## Typical Construction Equipment Noise Levels[1]

| Type of Equipment | Sound Levels Measured (dBA at 50 ft.) | Suggested Maximum Sound Levels for Analysis (dBA at 50 ft.) |
|---|---|---|
| Rock Drills | 83-99 | 96 |
| Jack Hammers | 75-85 | 82 |
| Pneumatic Tools | 78-88 | 85 |
| Pumps | 74-84 | 80 |
| Dozers | 77-90 | 85 |
| Scrapers | 83-91 | 87 |
| Haul Trucks | 83-94 | 88 |
| Cranes | 79-86 | 82 |
| Portable Generators | 71-87 | 80 |
| Rollers | 75-82 | 80 |
| Tractors | 77-82 | 80 |
| Front-End Loaders | 77-90 | 86 |
| Hydraulic Backhoe | 81-90 | 86 |
| Hydraulic Excavators | 81-90 | 86 |
| Graders | 79-89 | 86 |
| Air Compressors | 76-89 | 86 |
| Trucks | 81-87 | 86 |

[1] Source: Bolt, Beranek & Newman; Noise Control for Buildings and Manufacturing Plants, 1987.

**Table 5**

**Comparison of Existing and Existing Plus Project Traffic Noise Levels**

| Roadway | Segment | Distance from roadway centerline to receiver (ft) | Modeled Noise Levels (dBA CNEL) | | | | |
|---|---|---|---|---|---|---|---|
| | | | Existing | Existing Plus Project | Increase | Exceeds "Normally Acceptable" Standard[1] | Substantial Increase |
| Commerce Street | University Avenue to Mission Inn Avenue | 50 | 58.58 | 58.68 | + 0.10 | NO | NO |
| Lime Street | 9th Street to University Avenue | 50 | 68.58 | 68.62 | 0.04 | YES | NO |
| Mission Inn Avenue | Vine Street to Commerce Street | 50 | 64.03 | 64.11 | + 0.08 | NO | NO |
| University Avenue | Lemon Street to Lime Street | 50 | 66.75 | 66.76 | 0.01 | YES | NO |
| | Park Avenue to Victoria Avenue | 50 | 70.02 | 70.05 | 0.03 | YES | NO |
| | Santa Fe Avenue to Commerce Street | 50 | 70.04 | 70.09 | + 0.05 | YES | NO |

[1] Please see Table 3 for normally acceptable criteria.

## Table 6

## Typical Noise Attenuation Methods to Insulate the Noise Receiver[1]

| Noise Level Reduction | Typical Mitigation Methods |
|---|---|
| 15-20 dBA | 1. Air conditioning or mechanical ventilation.<br>2. Double-paned glass.<br>3. Solid core doors with weather stripping and seals. |
| 20-25 dBA | *Mitigation 1, 2, and 3 plus*<br>4. Stucco or brick veneer exterior walls or wood siding w/one-half inch thick fiberboard underlayer.<br>5. Glass portions of windows/doors not to exceed 20 percent of wall.<br>6. Exterior vents facing noise source shall be baffled. |
| 25-30 dBA | *Mitigation 1 through 6 plus*<br>7. Interior sheetrock of exterior wall attached to studs by resilient channels or double walls.<br>8. Window assemblies, doors, wall construction materials, and insulation shall have a lab-tested STC rating of 30 or greater. |

[1] Source: City of San Diego General Plan, March 2008

## Table 7

## Construction Equipment Vibration Source Levels[1]

| Equipment | Peak Particle Velocity (PPV) | | |
|---|---|---|---|
| | at 25 ft. | at 50 ft. | at 100 ft. |
| Clam Shovel Drop (slurry wall) | **0.202** | 0.071 | 0.025 |
| Vibratory Roller | **0.210** | 0.074 | 0.026 |
| Hoe Ram | **0.089** | 0.031 | 0.011 |
| Large Bulldozer | **0.089** | 0.031 | 0.011 |
| Caisson Drilling | **0.089** | 0.031 | 0.011 |
| Loaded Trucks | 0.076 | 0.027 | 0.010 |
| Jackhammer | 0.035 | 0.012 | 0.004 |
| Small Bulldozer | 0.003 | 0.001 | 0.0004 |

[1] Source: Federal Transit Administration: Transit Noise and Vibration Impact Assessment, 2006.

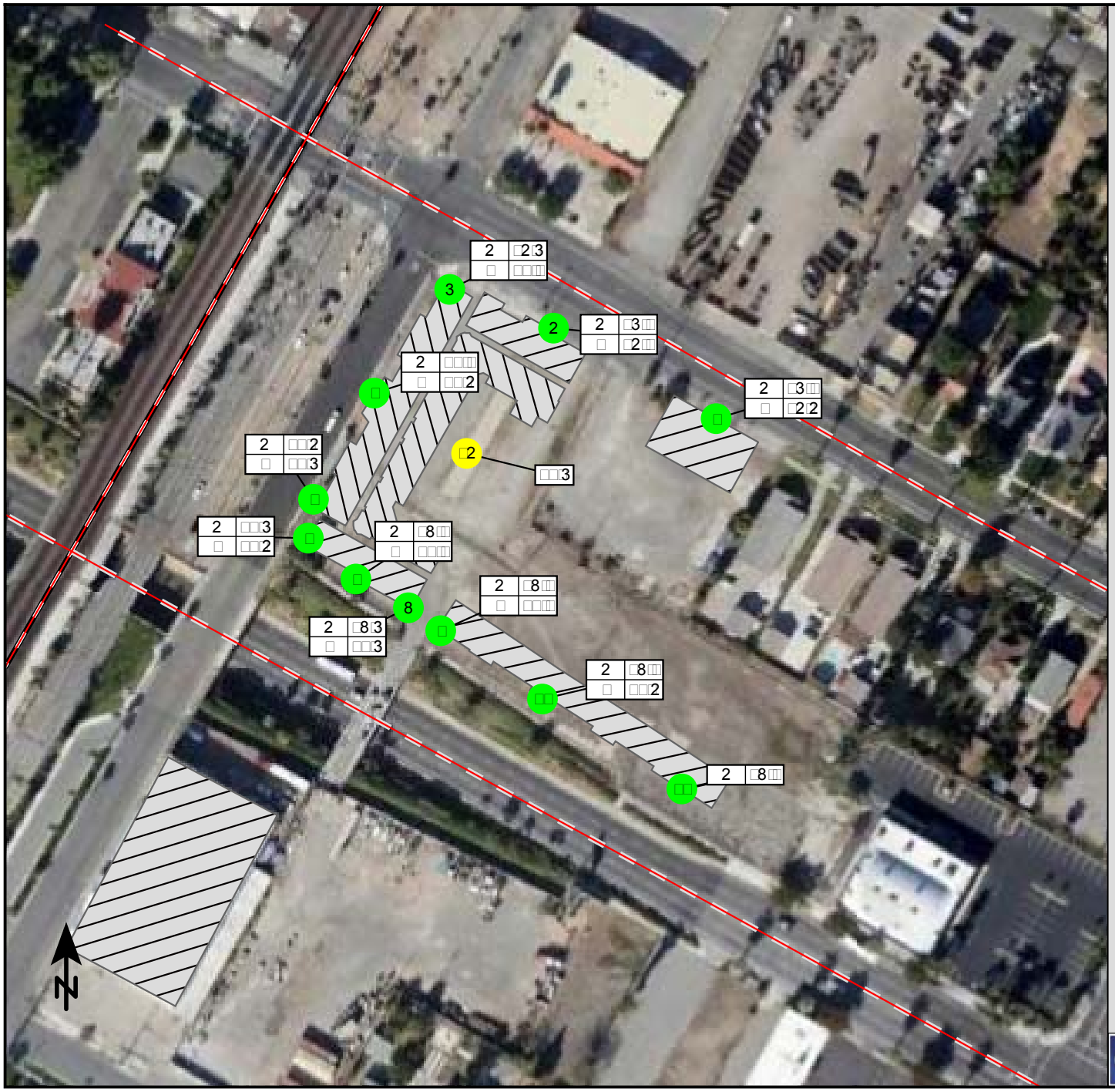
[2] Bold values are considered annoying to people.

## Table 8

## Typical Human Reaction and Effect on Buildings Due to Groundborne Vibration[1]

| Vibration Level<br>Peak Particle Velocity (PPV) | Community Noise Equivalent Level (CNEL) or Day-Night Level (Ldn), dB | Effect on Buildings |
|---|---|---|
| 0.006–0.019 in/sec | Threshold of perception, possibility of intrusion | Vibrations unlikely to cause damage of any type |
| 0.08 in/sec | Vibrations readily perceptible | Recommended upper level of vibration to which ruins and ancient monuments should be subjected |
| 0.10 in/sec | Level at which continuous vibration begins to annoy people | Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings |
| 0.20 in/sec | Vibrations annoying to people in buildings | Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings |
| 0.4–0.6 in/sec | Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges | Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage |

[1] Source: Caltrans, 2002



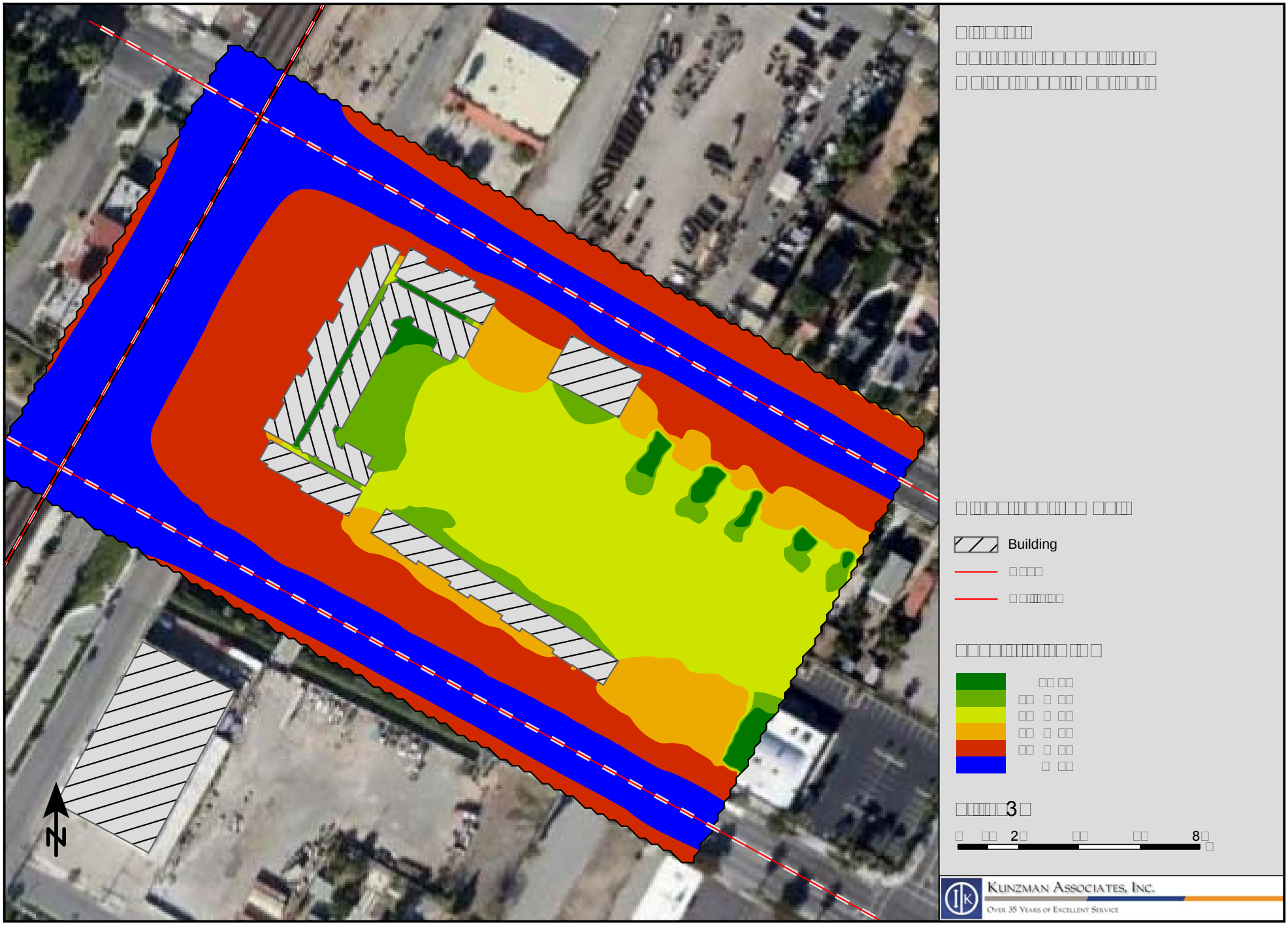

Building

2

8

Kunzman Associates, Inc.

Over 35 Years of Excellent Service


Building
3
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Kunzman Associates, Inc.
Over 35 Years of Excellent Service

## VII. Mitigation Measures

### A. Construction Mitigation

Project developers shall require by construction specifications that the following construction best management practices (BMPs) be implemented by contractors to reduce construction noise levels:

1. Two weeks prior to the commencement of construction, notification must be provided to surrounding land uses disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period. For the duration of construction activities, the construction manager shall serve as the contact person should noise levels become disruptive to local residents. A sign shall be posted at the project site with the contact phone number.

2. Prior to and during construction activities, ensure that construction equipment is properly muffled according to industry standards.

3. During construction activities, place noise-generating construction equipment and locate construction staging areas away from residences, where feasible.

4. Construction specifications shall show that construction staging areas along with the operation of earthmoving equipment on a project site within the project area will be located as far away from vibration-sensitive sites as possible. Construction specifications shall be included in the project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.

### B. Building Mitigation

1. Prior to building construction, the project proponent shall demonstrate to the City that all exposed residential exterior window/wall assemblies facing Mission Inn Avenue provide an exterior to interior noise reduction of at least 28 dB; window/wall assemblies facing Commerce Street and the Railroad provide an exterior to interior reduction of at least 25 dB; and window/wall assemblies facing University Avenue provide exterior to interior noise reduction of at least 23.4 dB.

2. Representative methods that can be utilized to achieve this noise reduction are presented items 1-8 in Table 6. All other exterior residential wall assemblies will need to implement measures similar to items 1-6 listed in Table 6 to achieve at least 20 dBA of exterior to interior noise reduction.

3. All future property managers at the project site shall be required to disclose to potential residents the number of trains that pass by per day and at what time of day they pass. They should also be required to inform potential residents that the train horn noise will be audible in most of the proposed residential dwelling units. Relatively current train inventory data can be found on the Federal Railroad Administration's website. More

specifically, data can currently be found at http://safetydata.fra.dot.gov/officeofsafety/publicsite/crossing/crossing.aspx.

# VIII. References


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## Appendices

**Appendix A – Larson Davis Model 820-SLM Output**

**Appendix B – RCNM Noise Modeling Output**

**Appendix C – FHWA-RD-77-108 Model Output**

**Appendix D – Create Rail Worksheet and FRA Train Inventory Report**

**Appendix E – Environmental Noise and Vibration Study, Mission Lofts**

# APPENDIX A

## Larson Davis Model 820-SLM Output

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.032 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 15:04:29 |
| Stop Time | Monday, 2015 April 13 15:14:29 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 82.5 | dB |
| LASmax | 2015 Apr 13 15:06:43 | 104.1 | dB |
| LApeak (max) | 2015 Apr 13 15:06:43 | 116.9 | dB |
| LASmin | 2015 Apr 13 15:04:35 | 56.7 | dB |
| LCSeq | | 88.9 | dB |
| LASeq | | 82.5 | dB |
| LCSeq - LASeq | | 6.4 | dB |
| LAIeq | | 84.6 | dB |
| LAeq | | 82.5 | dB |
| LAIeq - LAeq | | 2.2 | dB |
| LASE | | 110.2 | dB |
| EAS | | 11.75 | mPa²h |
| EAS8 | | 564.1 | mPa²h |
| EAS40 | | 2.8206 | Pa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS2.00 | 86.2 | dBA |
| LAS8.00 | 72.3 | dBA |
| LAS25.00 | 69.2 | dBA |
| LAS50.00 | 65.5 | dBA |
| LAS75.00 | 61.4 | dBA |
| LAS90.00 | 59.7 | dBA |

| | | |
|---|---|---|
| LAS > 85.0 dB (Exceedence Counts / Duration) | 2 / 18.0 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | 0.15 | % |
| Projected Dose | 7.16 | % |
| TWA (Projected) | 71.0 | dBA |
| TWA (t) | 43.1 | dBA |
| Lep (t) | 65.6 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 76.9 | 76.3 | 79.6 | 83.3 | 84.3 | 76.8 | 80.9 | 79.0 | 71.8 | 60.5 | 51.1 | 35.5 |
| LZSmax | 94.5 | 87.3 | 94.2 | 99.7 | 101.3 | 96.2 | 103.2 | 100.6 | 92.2 | 80.9 | 71.2 | 53.9 |
| LZSmin | 52.6 | 58.0 | 62.1 | 64.2 | 61.5 | 54.1 | 50.5 | 52.9 | 46.7 | 36.6 | 25.5 | 22.7 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 73.1 | 72.2 | 70.8 | 70.2 | 71.1 | 72.8 | 73.4 | 71.9 | 77.4 | 76.9 | 76.2 | 81.0 |
| LZSmax | 91.5 | 90.3 | 85.3 | 83.2 | 82.7 | 83.9 | 83.9 | 80.7 | 94.0 | 93.8 | 92.7 | 98.1 |
| LZSmin | 43.8 | 45.1 | 47.9 | 52.5 | 50.6 | 53.4 | 54.7 | 55.3 | 58.5 | 57.8 | 60.2 | 58.2 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 82.7 | 78.6 | 70.8 | 69.7 | 71.5 | 74.0 | 73.7 | 76.2 | 77.8 | 75.6 | 75.3 | 69.4 |
| LZSmax | 100.1 | 95.9 | 87.8 | 86.3 | 92.0 | 94.6 | 95.8 | 96.9 | 101.7 | 97.4 | 96.9 | 90.1 |
| LZSmin | 55.1 | 57.6 | 53.1 | 51.0 | 48.6 | 45.8 | 45.5 | 45.1 | 46.2 | 47.7 | 48.3 | 46.7 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 70.2 | 65.5 | 62.5 | 57.5 | 55.4 | 52.5 | 49.2 | 45.3 | 40.3 | 34.2 | 27.2 | 21.6 |
| LZSmax | 91.1 | 85.8 | 83.2 | 78.1 | 75.8 | 73.0 | 69.4 | 65.2 | 59.6 | 53.0 | 45.7 | 34.8 |
| LZSmin | 44.0 | 41.1 | 37.3 | 34.1 | 30.7 | 26.7 | 22.8 | 19.9 | 17.8 | 17.3 | 17.4 | 19.0 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.035 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 15:28:37 |
| Stop Time | Monday, 2015 April 13 15:38:37 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 62.4 | dB |
| LASmax | 2015 Apr 13 15:36:35 | 73.3 | dB |
| LApeak (max) | 2015 Apr 13 15:36:35 | 93.8 | dB |
| LASmin | 2015 Apr 13 15:35:27 | 54.6 | dB |
| LCSeq | | 72.9 | dB |
| LASeq | | 62.4 | dB |
| LCSeq - LASeq | | 10.5 | dB |
| LAIeq | | 64.6 | dB |
| LAeq | | 62.4 | dB |
| LAIeq - LAeq | | 2.2 | dB |
| LASE | | 90.2 | dB |
| EAS | | 115.2 | µPa²h |
| EAS8 | | 5.531 | mPa²h |
| EAS40 | | 27.65 | mPa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | | |
|---|---|---|---|
| LAS2.00 | | 68.0 | dBA |
| LAS8.00 | | 66.3 | dBA |
| LAS25.00 | | 63.2 | dBA |
| LAS50.00 | | 60.7 | dBA |
| LAS75.00 | | 58.4 | dBA |
| LAS90.00 | | 57.0 | dBA |
| | | | |
| LAS > 85.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | --- | % |
| Projected Dose | --- | % |
| TWA (Projected) | --- | dBA |
| TWA (t) | --- | dBA |
| Lep (t) | 45.6 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 71.5 | 67.3 | 69.0 | 68.8 | 67.3 | 61.8 | 58.1 | 58.6 | 53.7 | 46.3 | 43.4 | 29.1 |
| LZSmax | 86.7 | 78.1 | 78.6 | 82.9 | 84.2 | 73.4 | 66.7 | 70.1 | 67.5 | 60.9 | 62.7 | 45.0 |
| LZSmin | 53.1 | 59.0 | 60.1 | 60.6 | 57.7 | 53.2 | 49.0 | 50.8 | 45.3 | 33.7 | 25.1 | 22.7 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 68.3 | 66.4 | 64.7 | 63.2 | 62.7 | 61.4 | 64.4 | 64.7 | 63.5 | 63.6 | 64.2 | 64.3 |
| LZSmax | 81.8 | 82.2 | 79.4 | 74.6 | 74.8 | 70.8 | 76.8 | 73.8 | 76.3 | 73.8 | 78.3 | 82.9 |
| LZSmin | 45.9 | 48.2 | 48.4 | 51.8 | 53.3 | 52.0 | 53.3 | 55.1 | 53.5 | 55.2 | 54.3 | 52.8 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 62.9 | 63.5 | 60.4 | 59.1 | 56.5 | 54.2 | 54.1 | 53.1 | 52.9 | 54.2 | 54.5 | 52.7 |
| LZSmax | 82.3 | 81.9 | 77.2 | 72.8 | 68.5 | 63.7 | 64.2 | 64.6 | 62.2 | 64.8 | 67.3 | 63.1 |
| LZSmin | 52.5 | 53.4 | 50.4 | 49.2 | 48.0 | 45.7 | 43.8 | 44.1 | 44.5 | 46.0 | 46.1 | 44.6 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 50.8 | 48.9 | 45.9 | 43.4 | 40.7 | 39.2 | 40.3 | 39.6 | 33.4 | 27.0 | 22.7 | 19.9 |
| LZSmax | 65.5 | 62.3 | 60.0 | 58.4 | 55.9 | 54.2 | 59.0 | 59.8 | 54.2 | 43.9 | 40.6 | 27.4 |
| LZSmin | 43.0 | 39.9 | 35.8 | 31.5 | 27.8 | 24.5 | 22.9 | 18.7 | 17.0 | 16.9 | 17.5 | 19.0 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.036 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 15:40:59 |
| Stop Time | Monday, 2015 April 13 15:50:59 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 62.9 | dB |
| LASmax | 2015 Apr 13 15:50:48 | 75.4 | dB |
| LApeak (max) | 2015 Apr 13 15:47:45 | 99.3 | dB |
| LASmin | 2015 Apr 13 15:48:51 | 55.6 | dB |
| LCSeq | | 71.8 | dB |
| LASeq | | 62.9 | dB |
| LCSeq - LASeq | | 8.8 | dB |
| LAIeq | | 65.8 | dB |
| LAeq | | 62.9 | dB |
| LAIeq - LAeq | | 2.9 | dB |
| LASE | | 90.7 | dB |
| EAS | | 131.0 | µPa²h |
| EAS8 | | 6.290 | mPa²h |
| EAS40 | | 31.45 | mPa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS2.00 | 70.5 | dBA |
| LAS8.00 | 67.4 | dBA |
| LAS25.00 | 62.4 | dBA |
| LAS50.00 | 59.5 | dBA |
| LAS75.00 | 58.0 | dBA |
| LAS90.00 | 57.3 | dBA |

| | | |
|---|---|---|
| LAS > 85.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | --- | % |
| Projected Dose | --- | % |
| TWA (Projected) | --- | dBA |
| TWA (t) | --- | dBA |
| Lep (t) | 46.1 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 75.0 | 69.8 | 66.7 | 68.1 | 64.0 | 60.8 | 58.0 | 59.4 | 55.0 | 49.9 | 44.7 | 37.0 |
| LZSmax | 90.4 | 83.7 | 79.5 | 85.4 | 75.9 | 78.9 | 70.5 | 72.4 | 69.6 | 66.9 | 61.7 | 57.2 |
| LZSmin | 53.7 | 52.1 | 60.6 | 60.1 | 57.6 | 51.4 | 49.6 | 52.2 | 46.8 | 37.3 | 29.0 | 23.8 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 71.7 | 70.2 | 68.1 | 66.1 | 65.3 | 63.5 | 62.4 | 61.4 | 61.9 | 61.9 | 65.0 | 62.3 |
| LZSmax | 86.4 | 85.6 | 82.7 | 82.5 | 81.4 | 78.4 | 78.1 | 71.9 | 74.1 | 78.5 | 85.2 | 74.5 |
| LZSmin | 45.9 | 47.3 | 49.2 | 52.5 | 53.2 | 52.7 | 53.7 | 55.1 | 53.6 | 54.6 | 55.1 | 53.8 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 61.2 | 58.8 | 57.1 | 57.7 | 55.9 | 53.7 | 52.8 | 53.3 | 53.7 | 55.0 | 55.0 | 54.0 |
| LZSmax | 76.3 | 71.1 | 69.9 | 78.7 | 75.3 | 68.3 | 66.2 | 66.2 | 65.9 | 66.8 | 68.2 | 68.8 |
| LZSmin | 53.0 | 51.6 | 49.2 | 46.6 | 46.4 | 28.7 | 43.8 | 44.1 | 45.7 | 47.6 | 47.8 | 46.3 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 52.2 | 49.9 | 47.6 | 46.4 | 44.8 | 43.5 | 41.1 | 39.7 | 38.1 | 34.3 | 31.7 | 28.3 |
| LZSmax | 66.8 | 64.8 | 62.2 | 64.8 | 61.4 | 59.2 | 56.3 | 56.3 | 59.4 | 52.9 | 53.2 | 52.0 |
| LZSmin | 44.1 | 41.2 | 38.2 | 34.8 | 31.8 | 28.6 | 26.1 | 23.9 | 21.4 | 19.5 | 18.3 | 18.9 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.037 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 15:55:43 |
| Stop Time | Monday, 2015 April 13 16:05:43 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 60.8 | dB |
| LASmax | 2015 Apr 13 16:01:36 | 72.7 | dB |
| LApeak (max) | 2015 Apr 13 16:04:05 | 90.0 | dB |
| LASmin | 2015 Apr 13 16:03:29 | 54.5 | dB |
| LCSeq | | 72.6 | dB |
| LASeq | | 60.8 | dB |
| LCSeq - LASeq | | 11.8 | dB |
| LAIeq | | 61.9 | dB |
| LAeq | | 60.8 | dB |
| LAIeq - LAeq | | 1.2 | dB |
| LASE | | 88.6 | dB |
| EAS | | 79.85 | µPa²h |
| EAS8 | | 3.833 | mPa²h |
| EAS40 | | 19.17 | mPa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS2.00 | 66.5 | dBA |
| LAS8.00 | 64.0 | dBA |
| LAS25.00 | 60.9 | dBA |
| LAS50.00 | 58.9 | dBA |
| LAS75.00 | 57.4 | dBA |
| LAS90.00 | 56.0 | dBA |

| | | |
|---|---|---|
| LAS > 85.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | --- | % |
| Projected Dose | --- | % |
| TWA (Projected) | --- | dBA |
| TWA (t) | --- | dBA |
| Lep (t) | 44.0 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 72.3 | 67.8 | 68.7 | 69.2 | 66.3 | 60.6 | 57.0 | 57.0 | 51.3 | 44.2 | 38.3 | 29.5 |
| LZSmax | 88.9 | 81.9 | 85.2 | 83.6 | 80.9 | 75.1 | 70.7 | 70.7 | 58.9 | 52.4 | 48.7 | 45.4 |
| LZSmin | 52.7 | 57.1 | 60.3 | 61.5 | 57.2 | 52.0 | 48.3 | 51.2 | 46.6 | 36.3 | 28.8 | 23.4 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 69.3 | 67.5 | 65.6 | 64.1 | 62.8 | 62.0 | 61.4 | 63.0 | 66.1 | 66.5 | 63.9 | 62.0 |
| LZSmax | 85.8 | 82.5 | 82.8 | 77.6 | 79.2 | 73.0 | 73.5 | 78.8 | 84.7 | 83.2 | 78.7 | 76.7 |
| LZSmin | 43.8 | 46.4 | 46.9 | 48.5 | 50.5 | 51.7 | 53.5 | 55.0 | 53.0 | 54.9 | 55.8 | 54.5 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 61.1 | 63.3 | 59.1 | 57.7 | 55.6 | 53.1 | 53.2 | 51.2 | 51.9 | 53.4 | 52.5 | 50.6 |
| LZSmax | 79.3 | 78.7 | 78.8 | 74.2 | 68.1 | 65.4 | 68.7 | 63.8 | 66.4 | 69.4 | 64.4 | 57.8 |
| LZSmin | 51.6 | 53.0 | 48.5 | 47.6 | 43.5 | 45.1 | 43.4 | 42.6 | 43.9 | 46.0 | 46.5 | 45.7 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 48.7 | 46.0 | 43.1 | 40.8 | 39.2 | 37.5 | 35.6 | 33.1 | 30.1 | 26.6 | 24.0 | 22.1 |
| LZSmax | 57.9 | 53.7 | 52.2 | 49.4 | 48.4 | 46.0 | 45.2 | 44.9 | 42.5 | 40.8 | 43.7 | 39.5 |
| LZSmin | 43.9 | 41.3 | 37.2 | 33.7 | 30.7 | 28.2 | 26.3 | 23.5 | 20.5 | 18.5 | 17.9 | 19.2 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.038 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 16:10:26 |
| Stop Time | Monday, 2015 April 13 16:20:26 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 61.9 | dB |
| LASmax | 2015 Apr 13 16:13:05 | 73.6 | dB |
| LApeak (max) | 2015 Apr 13 16:13:05 | 85.9 | dB |
| LASmin | 2015 Apr 13 16:17:30 | 53.9 | dB |
| LCSeq | | 73.1 | dB |
| LASeq | | 61.9 | dB |
| LCSeq - LASeq | | 11.2 | dB |
| LAIeq | | 63.2 | dB |
| LAeq | | 61.9 | dB |
| LAIeq - LAeq | | 1.3 | dB |
| LASE | | 89.7 | dB |
| EAS | | 103.5 | µPa²h |
| EAS8 | | 4.970 | mPa²h |
| EAS40 | | 24.85 | mPa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS2.00 | 69.6 | dBA |
| LAS8.00 | 66.7 | dBA |
| LAS25.00 | 62.1 | dBA |
| LAS50.00 | 57.8 | dBA |
| LAS75.00 | 55.9 | dBA |
| LAS90.00 | 55.2 | dBA |

| | | |
|---|---|---|
| LAS > 85.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | --- | % |
| Projected Dose | --- | % |
| TWA (Projected) | --- | dBA |
| TWA (t) | --- | dBA |
| Lep (t) | 45.1 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 80.6 | 74.2 | 69.5 | 67.0 | 66.1 | 59.7 | 56.8 | 58.9 | 53.7 | 45.1 | 38.0 | 29.3 |
| LZSmax | 95.6 | 86.6 | 80.8 | 85.7 | 84.8 | 75.6 | 70.4 | 70.8 | 64.9 | 54.6 | 47.9 | 40.6 |
| LZSmin | 55.4 | 57.7 | 60.1 | 59.8 | 51.5 | 51.6 | 48.0 | 50.0 | 44.9 | 36.6 | 27.1 | 23.3 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 77.8 | 75.4 | 73.2 | 70.9 | 69.2 | 67.9 | 67.3 | 63.3 | 61.6 | 62.3 | 61.8 | 62.3 |
| LZSmax | 91.8 | 90.6 | 88.3 | 83.9 | 80.6 | 83.1 | 79.4 | 74.1 | 71.2 | 81.1 | 80.6 | 82.3 |
| LZSmin | 51.9 | 50.2 | 50.6 | 53.7 | 52.2 | 53.6 | 52.6 | 52.5 | 53.6 | 53.8 | 53.2 | 52.3 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 64.4 | 59.9 | 57.4 | 56.9 | 54.3 | 52.8 | 51.3 | 51.7 | 52.9 | 54.4 | 54.6 | 53.3 |
| LZSmax | 85.2 | 74.3 | 68.8 | 73.9 | 67.4 | 70.0 | 64.4 | 66.0 | 66.6 | 67.2 | 67.3 | 64.9 |
| LZSmin | 50.8 | 52.2 | 47.8 | 42.9 | 46.4 | 44.4 | 42.8 | 42.5 | 43.8 | 44.8 | 45.7 | 43.9 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 51.4 | 48.0 | 44.8 | 42.2 | 40.1 | 37.5 | 35.3 | 33.0 | 29.8 | 26.8 | 23.6 | 20.9 |
| LZSmax | 62.8 | 59.5 | 57.7 | 52.3 | 49.1 | 46.5 | 45.7 | 43.2 | 39.5 | 38.1 | 36.1 | 29.3 |
| LZSmin | 41.6 | 37.1 | 35.3 | 33.7 | 31.2 | 27.0 | 24.2 | 21.8 | 19.5 | 18.2 | 18.0 | 19.2 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.039 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 16:22:00 |
| Stop Time | Monday, 2015 April 13 16:32:00 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 63.9 | dB |
| LASmax | 2015 Apr 13 16:26:58 | 79.8 | dB |
| LApeak (max) | 2015 Apr 13 16:26:58 | 92.8 | dB |
| LASmin | 2015 Apr 13 16:24:04 | 52.2 | dB |
| LCSeq | | 72.7 | dB |
| LASeq | | 63.9 | dB |
| LCSeq - LASeq | | 8.8 | dB |
| LAIeq | | 66.2 | dB |
| LAeq | | 63.9 | dB |
| LAIeq - LAeq | | 2.3 | dB |
| LASE | | 91.7 | dB |
| EAS | | 164.6 | µPa²h |
| EAS8 | | 7.900 | mPa²h |
| EAS40 | | 39.50 | mPa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | | |
|---|---|---|---|
| LAS2.00 | | 72.5 | dBA |
| LAS8.00 | | 67.8 | dBA |
| LAS25.00 | | 63.1 | dBA |
| LAS50.00 | | 58.3 | dBA |
| LAS75.00 | | 55.6 | dBA |
| LAS90.00 | | 54.0 | dBA |
| | | | |
| LAS > 85.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / | 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | --- | % |
| Projected Dose | --- | % |
| TWA (Projected) | --- | dBA |
| TWA (t) | --- | dBA |
| Lep (t) | 47.1 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 77.2 | 72.1 | 67.5 | 68.4 | 65.7 | 59.2 | 60.9 | 60.4 | 55.2 | 48.0 | 46.7 | 32.8 |
| LZSmax | 88.6 | 85.1 | 79.3 | 86.1 | 82.2 | 77.4 | 79.9 | 75.5 | 68.4 | 61.9 | 69.5 | 47.9 |
| LZSmin | 56.2 | 57.7 | 57.5 | 58.7 | 55.2 | 47.4 | 46.8 | 47.7 | 42.5 | 36.7 | 28.2 | 23.2 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 74.0 | 72.2 | 70.3 | 69.0 | 67.1 | 65.2 | 63.4 | 62.2 | 62.6 | 61.7 | 62.1 | 65.8 |
| LZSmax | 86.5 | 84.7 | 84.2 | 83.0 | 79.3 | 77.3 | 76.4 | 76.5 | 76.9 | 75.8 | 78.4 | 85.7 |
| LZSmin | 51.1 | 49.9 | 50.5 | 51.4 | 50.7 | 51.8 | 42.9 | 52.2 | 51.7 | 53.3 | 52.6 | 51.3 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 62.9 | 60.1 | 56.3 | 54.4 | 52.7 | 55.6 | 54.8 | 56.8 | 56.5 | 56.1 | 56.3 | 54.2 |
| LZSmax | 82.1 | 77.0 | 73.4 | 70.7 | 64.0 | 77.1 | 72.6 | 76.4 | 76.4 | 72.9 | 72.3 | 68.2 |
| LZSmin | 50.9 | 49.4 | 46.0 | 43.2 | 42.2 | 28.4 | 40.7 | 41.6 | 41.9 | 43.5 | 43.3 | 41.6 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 52.5 | 50.1 | 47.1 | 44.5 | 43.0 | 41.4 | 46.0 | 36.6 | 34.6 | 31.1 | 26.0 | 22.1 |
| LZSmax | 67.3 | 64.0 | 60.7 | 58.7 | 56.3 | 55.6 | 69.6 | 50.4 | 54.0 | 47.6 | 40.4 | 37.2 |
| LZSmin | 39.6 | 37.1 | 35.3 | 33.3 | 32.1 | 29.5 | 25.4 | 22.4 | 19.9 | 18.2 | 17.8 | 19.1 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.041 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 16:49:39 |
| Stop Time | Monday, 2015 April 13 16:59:39 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 69.1 | dB |
| LASmax | 2015 Apr 13 16:55:31 | 79.3 | dB |
| LApeak (max) | 2015 Apr 13 16:49:48 | 95.3 | dB |
| LASmin | 2015 Apr 13 16:51:16 | 56.8 | dB |
| LCSeq | | 74.8 | dB |
| LASeq | | 69.1 | dB |
| LCSeq - LASeq | | 5.7 | dB |
| LAIeq | | 70.2 | dB |
| LAeq | | 69.1 | dB |
| LAIeq - LAeq | | 1.1 | dB |
| LASE | | 96.9 | dB |
| EAS | | 539.8 | µPa²h |
| EAS8 | | 25.91 | mPa²h |
| EAS40 | | 129.5 | mPa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS2.00 | 75.6 | dBA |
| LAS8.00 | 73.3 | dBA |
| LAS25.00 | 70.5 | dBA |
| LAS50.00 | 66.2 | dBA |
| LAS75.00 | 62.7 | dBA |
| LAS90.00 | 60.0 | dBA |

| | | |
|---|---|---|
| LAS > 85.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | --- | % |
| Projected Dose | --- | % |
| TWA (Projected) | --- | dBA |
| TWA (t) | --- | dBA |
| Lep (t) | 52.3 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 71.0 | 68.8 | 68.6 | 68.8 | 69.0 | 65.2 | 63.2 | 66.1 | 61.9 | 52.6 | 46.7 | 37.4 |
| LZSmax | 82.6 | 81.7 | 79.6 | 83.3 | 85.7 | 82.1 | 76.8 | 74.9 | 70.1 | 67.4 | 63.0 | 55.6 |
| LZSmin | 53.0 | 60.1 | 61.2 | 60.4 | 57.5 | 53.3 | 51.2 | 52.5 | 48.0 | 38.8 | 30.9 | 24.4 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 67.8 | 66.1 | 63.9 | 63.1 | 63.5 | 65.1 | 62.7 | 64.8 | 63.7 | 63.1 | 65.0 | 63.7 |
| LZSmax | 78.3 | 79.7 | 77.0 | 76.9 | 79.2 | 75.5 | 75.2 | 72.9 | 76.6 | 73.1 | 83.2 | 74.5 |
| LZSmin | 46.4 | 46.0 | 47.6 | 48.8 | 52.7 | 56.3 | 53.3 | 56.2 | 53.7 | 54.2 | 39.6 | 53.4 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 63.7 | 64.9 | 64.1 | 61.2 | 60.3 | 59.4 | 58.8 | 58.3 | 58.4 | 60.9 | 62.1 | 61.1 |
| LZSmax | 76.0 | 82.2 | 84.2 | 78.7 | 76.8 | 74.7 | 75.3 | 71.0 | 68.3 | 71.0 | 71.0 | 69.9 |
| LZSmin | 53.4 | 52.5 | 50.0 | 49.9 | 47.9 | 46.1 | 30.2 | 46.3 | 46.2 | 47.6 | 48.4 | 47.0 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 59.4 | 56.8 | 52.7 | 49.7 | 47.3 | 45.3 | 43.4 | 42.2 | 39.6 | 35.2 | 32.4 | 24.4 |
| LZSmax | 67.9 | 65.5 | 64.0 | 63.5 | 62.8 | 61.4 | 60.3 | 60.2 | 56.8 | 52.9 | 51.7 | 39.7 |
| LZSmin | 45.0 | 42.5 | 40.0 | 36.3 | 33.3 | 30.3 | 27.9 | 25.8 | 23.3 | 20.3 | 19.0 | 19.3 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

## General Information

| | |
|---|---|
| Serial Number | 03099 |
| Model | SoundTrack LxT® |
| Firmware Version | 2.206 |
| Filename | LxT_Data.043 |
| User | |
| Job Description | |
| Location | |

| | |
|---|---|
| Measurement Description | |
| Start Time | Monday, 2015 April 13 17:18:29 |
| Stop Time | Monday, 2015 April 13 17:28:29 |
| Duration | 00:10:00.0 |
| Run Time | 00:10:00.0 |
| Pause | 00:00:00.0 |
| Pre Calibration | Monday, 2015 April 13 14:59:31 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

## Overall Data

| | | | |
|---|---|---|---|
| LASeq | | 64.3 | dB |
| LASmax | 2015 Apr 13 17:24:58 | 85.3 | dB |
| LApeak (max) | 2015 Apr 13 17:24:58 | 101.6 | dB |
| LASmin | 2015 Apr 13 17:19:06 | 53.3 | dB |
| LCSeq | | 77.5 | dB |
| LASeq | | 64.3 | dB |
| LCSeq - LASeq | | 13.2 | dB |
| LAIeq | | 69.5 | dB |
| LAeq | | 64.3 | dB |
| LAIeq - LAeq | | 5.2 | dB |
| LASE | | 92.1 | dB |
| EAS | | 178.9 | µPa²h |
| EAS8 | | 8.585 | mPa²h |
| EAS40 | | 42.93 | mPa²h |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS2.00 | 71.1 | dBA |
| LAS8.00 | 65.8 | dBA |
| LAS25.00 | 62.5 | dBA |
| LAS50.00 | 58.5 | dBA |
| LAS75.00 | 56.0 | dBA |
| LAS90.00 | 54.9 | dBA |

| | | |
|---|---|---|
| LAS > 85.0 dB (Exceedence Counts / Duration) | 1 / 0.9 | s |
| LAS > 115.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Dose

| | | |
|---|---|---|
| Name | OSHA-2 | |
| Dose | 0.00 | % |
| Projected Dose | 0.15 | % |
| TWA (Projected) | 43.2 | dBA |
| TWA (t) | 15.3 | dBA |
| Lep (t) | 47.5 | dBA |

## Settings

| | | |
|---|---|---|
| Exchange Rate | 5 | dB |
| Threshold | 80.0 | dBA |
| Criterion Level | 90.0 | dBA |
| Criterion Duration | 8.0 | h |
| | | |
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRMLxT1L | |
| Microphone Correction | Off | |
| Integration Method | Exponential | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| | | |
| Under Range Limit | 26.3 | dB |
| Under Range Peak | 78.5 | dB |
| Noise Floor | 16.4 | dB |
| Overload | 122.2 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 73.3 | 71.2 | 71.5 | 76.3 | 68.4 | 62.2 | 63.3 | 58.4 | 54.9 | 47.8 | 37.6 | 27.8 |
| LZSmax | 86.0 | 80.5 | 82.5 | 90.6 | 79.8 | 82.8 | 87.7 | 78.2 | 73.0 | 62.7 | 52.5 | 48.6 |
| LZSmin | 55.0 | 59.5 | 60.8 | 58.5 | 55.2 | 49.5 | 47.8 | 50.2 | 44.1 | 33.6 | 24.8 | 22.8 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 69.7 | 69.0 | 67.4 | 67.0 | 66.6 | 65.9 | 66.2 | 67.4 | 66.6 | 69.7 | 71.9 | 72.6 |
| LZSmax | 83.9 | 83.5 | 81.9 | 80.9 | 77.0 | 77.4 | 77.4 | 78.4 | 83.2 | 88.1 | 89.4 | 88.9 |
| LZSmin | 46.9 | 45.1 | 48.5 | 52.2 | 54.0 | 51.3 | 50.9 | 54.1 | 54.3 | 53.6 | 52.4 | 50.4 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 66.2 | 61.9 | 57.5 | 56.8 | 56.1 | 59.0 | 58.2 | 61.1 | 53.9 | 54.2 | 54.7 | 51.5 |
| LZSmax | 78.8 | 75.0 | 70.5 | 70.7 | 74.7 | 82.1 | 82.2 | 86.2 | 74.3 | 73.1 | 75.5 | 70.1 |
| LZSmin | 50.3 | 50.1 | 47.5 | 46.0 | 43.9 | 42.2 | 40.9 | 42.0 | 44.4 | 45.4 | 45.6 | 43.8 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSeq | 52.8 | 48.6 | 47.1 | 45.1 | 42.6 | 38.9 | 35.0 | 32.4 | 28.9 | 24.8 | 21.6 | 21.2 |
| LZSmax | 72.6 | 64.6 | 62.0 | 61.6 | 57.6 | 53.2 | 51.1 | 49.0 | 47.2 | 43.8 | 42.5 | 43.6 |
| LZSmin | 41.7 | 38.5 | 34.9 | 31.6 | 28.0 | 24.1 | 21.4 | 19.5 | 18.1 | 17.4 | 17.6 | 19.0 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| Direct | 01 Jan 2007 00:21:41 | -24.8 |
| PRMLxT1L | 13 Apr 2015 14:59:31 | -28.6 |
| PRMLxT1L | 13 Apr 2015 14:59:12 | -28.7 |
| PRMLxT1L | 22 Mar 2015 11:23:30 | -28.6 |
| PRMLxT1L | 21 Mar 2015 15:00:56 | -28.6 |
| PRMLxT1L | 19 Mar 2015 12:06:27 | -28.5 |
| PRMLxT1L | 13 Mar 2015 09:35:46 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:59:52 | -28.5 |
| PRMLxT1L | 12 Mar 2015 20:53:12 | -28.5 |
| PRMLxT1L | 11 Feb 2015 13:40:13 | -28.5 |
| PRMLxT1L | 04 Feb 2015 15:44:42 | -28.6 |
| PRMLxT1L | 04 Feb 2015 15:44:28 | -28.6 |

# APPENDIX B

## RCNM Noise Modeling Output

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 5/19/2015
Case Description: Mission Lofts

---- Receptor #1 ----

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Residential | Residential | 65 | 65 | 45 |

| Description | Impact Device | Usage(%) | Equipment Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Hydra Break Ram | Yes | 10 | 90 | | 50 | 0 |
| Backhoe | No | 40 | | 77.6 | 100 | 0 |
| Dozer | No | 40 | | 81.7 | 200 | 0 |
| Dump Truck | No | 40 | | 76.5 | 25 | 0 |

Calculated (dBA)

| Equipment | *Lmax | Leq |
|---|---|---|
| Hydra Break Ram | 90 | 80 |
| Backhoe | 71.5 | 67.6 |
| Dozer | 69.6 | 65.6 |
| Dump Truck | 82.5 | 78.5 |
| **Total** | **90** | **82.6** |

*Calculated Lmax is the Loudest value.

# APPENDIX C

## FHWA-RD-77-108 Model Output

FHWA Sound32 Spreadsheet

**Existing Traffic Noise**

Project: **5962**

Road: **Commerce Street**

Segment: **University Ave to Mission Inn Ave**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 1743.00 |
| | | | | | | | | | | SPEED | 30.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 50.48 | 1.07 | 1.72 | 9.33 | 0.05 | 0.20 | 7.01 | 1.07 | 1.72 | % A | 92.00 |
| Speed in MPH | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 3.00 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 62.51 | 73.11 | 78.76 | 62.51 | 73.11 | 78.76 | 62.51 | 73.11 | 78.76 | % HT | 5.00 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 11.95 | -4.80 | -2.73 | 4.62 | -18.33 | -12.15 | 3.38 | -4.80 | -2.73 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **58.58** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 53.67 |
| LEQ | 49.40 | 43.24 | 50.96 | 42.06 | 29.71 | 41.54 | 40.82 | 43.24 | 50.96 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 53.67 | | EVENING LEQ | 44.95 | | NIGHT LEQ | 51.99 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Plus Project Traffic Noise**

Project: **5962**

Road: **Commerce Street**

Segment: **University Ave to Mission Inn Ave**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 2010.00 |
| | | | | | | | | | | SPEED | 30.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 58.88 | 1.07 | 1.72 | 10.88 | 0.05 | 0.20 | 8.18 | 1.07 | 1.72 | % A | 93.06 |
| Speed in MPH | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 2.60 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 62.51 | 73.11 | 78.76 | 62.51 | 73.11 | 78.76 | 62.51 | 73.11 | 78.76 | % HT | 4.34 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 12.62 | -4.80 | -2.73 | 5.29 | -18.33 | -12.15 | 4.05 | -4.80 | -2.73 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **58.68** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 53.93 |
| LEQ | 50.07 | 43.24 | 50.96 | 42.73 | 29.71 | 41.54 | 41.49 | 43.24 | 50.96 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 53.93 | | EVENING LEQ | 45.31 | | NIGHT LEQ | 52.04 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Traffic Noise**

Project: **5962**

Road: **Lime Street**

Segment: **9th St to University Ave**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 14283.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 413.65 | 8.73 | 14.07 | 76.43 | 0.39 | 1.61 | 57.43 | 8.73 | 14.07 | % A | 92.00 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 3.00 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 5.00 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 20.42 | 3.66 | 5.74 | 13.09 | -9.86 | -3.69 | 11.85 | 3.66 | 5.74 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **68.58** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 64.00 |
| LEQ | 60.46 | 53.42 | 60.71 | 53.13 | 39.89 | 51.29 | 51.88 | 53.42 | 60.71 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 64.00 | | EVENING LEQ | 55.44 | | NIGHT LEQ | 61.91 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Plus Project Traffic Noise**

Project: **5962**

Road: **Lime Street**

Segment: **9th St to University Ave**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 14922.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 433.76 | 8.73 | 14.07 | 80.15 | 0.39 | 1.61 | 60.23 | 8.73 | 14.07 | % A | 92.34 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 2.87 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 4.79 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 20.63 | 3.66 | 5.74 | 13.29 | -9.86 | -3.69 | 12.05 | 3.66 | 5.74 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **68.62** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 64.09 |
| LEQ | 60.67 | 53.42 | 60.71 | 53.33 | 39.89 | 51.29 | 52.09 | 53.42 | 60.71 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 64.09 | | EVENING LEQ | 55.56 | | NIGHT LEQ | 61.93 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Traffic Noise**

Project: **5962**

Road: **Mission Inn Avenue**

Segment: **Vine St to Commerce St**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 5008.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 145.04 | 3.06 | 4.93 | 26.80 | 0.14 | 0.56 | 20.14 | 3.06 | 4.93 | % A | 92.00 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 3.00 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 5.00 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 15.87 | -0.89 | 1.19 | 8.53 | -14.42 | -8.24 | 7.29 | -0.89 | 1.19 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **64.03** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 59.45 |
| LEQ | 55.91 | 48.87 | 56.16 | 48.57 | 35.34 | 46.74 | 47.33 | 48.87 | 56.16 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 59.45 | | EVENING LEQ | 50.89 | | NIGHT LEQ | 57.36 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Plus Project Traffic Noise**

Project: **5962**
Road: **Mission Inn Avenue**
Segment: **Vine St to Commerce St**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 5533.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 161.56 | 3.06 | 4.93 | 29.85 | 0.14 | 0.56 | 22.43 | 3.06 | 4.93 | % A | 92.76 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 2.72 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 4.53 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 16.34 | -0.89 | 1.19 | 9.00 | -14.42 | -8.24 | 7.76 | -0.89 | 1.19 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **64.11** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 59.66 |
| LEQ | 56.38 | 48.87 | 56.16 | 49.04 | 35.34 | 46.74 | 47.80 | 48.87 | 56.16 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 59.66 | | EVENING LEQ | 51.17 | | NIGHT LEQ | 57.41 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Traffic Noise**

Project: **0**

Road: **University Avenue**

Segment: **Lemon St to Lime St**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 14275.00 |
| | | | | | | | | | | SPEED | 25.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 413.42 | 8.73 | 14.06 | 76.39 | 0.39 | 1.61 | 57.40 | 8.73 | 14.06 | % A | 92.00 |
| Speed in MPH | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 3.00 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 59.44 | 71.09 | 77.24 | 59.44 | 71.09 | 77.24 | 59.44 | 71.09 | 77.24 | % HT | 5.00 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 21.88 | 5.12 | 7.20 | 14.55 | -8.41 | -2.23 | 13.30 | 5.12 | 7.20 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **66.75** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 61.51 |
| LEQ | 56.25 | 51.14 | 59.37 | 48.92 | 37.61 | 49.94 | 47.67 | 51.14 | 59.37 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 61.51 | | EVENING LEQ | 52.61 | | NIGHT LEQ | 60.22 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Plus Project Traffic Noise**

Project: **0**
Road: **University Avenue**
Segment: **Lemon St to Lime St**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 14631.00 |
| | | | | | | | | | | SPEED | 25.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 424.62 | 8.73 | 14.06 | 78.46 | 0.39 | 1.61 | 58.96 | 8.73 | 14.06 | % A | 92.19 |
| Speed in MPH | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 2.93 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 59.44 | 71.09 | 77.24 | 59.44 | 71.09 | 77.24 | 59.44 | 71.09 | 77.24 | % HT | 4.88 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 21.99 | 5.12 | 7.20 | 14.66 | -8.41 | -2.23 | 13.42 | 5.12 | 7.20 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **66.76** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 61.54 |
| LEQ | 56.36 | 51.14 | 59.37 | 49.03 | 37.61 | 49.94 | 47.79 | 51.14 | 59.37 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 61.54 | | EVENING LEQ | 52.66 | | NIGHT LEQ | 60.23 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Traffic Noise**

Project: **0**

Road: **University Avenue**

Segment: **Park Ave to Victoria Ave**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 19896.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 576.20 | 12.16 | 19.60 | 106.47 | 0.54 | 2.24 | 80.01 | 12.16 | 19.60 | % A | 92.00 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 3.00 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 5.00 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 21.86 | 5.10 | 7.18 | 14.53 | -8.43 | -2.25 | 13.28 | 5.10 | 7.18 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **70.02** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 65.44 |
| LEQ | 61.90 | 54.86 | 62.15 | 54.57 | 41.33 | 52.73 | 53.32 | 54.86 | 62.15 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 65.44 | | EVENING LEQ | 56.88 | | NIGHT LEQ | 63.35 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Plus Project Traffic Noise**

Project: **0**

Road: **University Avenue**

Segment: **Park Ave to Victoria Ave**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 20506.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 595.41 | 12.16 | 19.60 | 110.02 | 0.54 | 2.24 | 82.67 | 12.16 | 19.60 | % A | 92.24 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 2.91 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 4.85 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 22.00 | 5.10 | 7.18 | 14.67 | -8.43 | -2.25 | 13.43 | 5.10 | 7.18 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **70.05** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 65.50 |
| LEQ | 62.04 | 54.86 | 62.15 | 54.71 | 41.33 | 52.73 | 53.47 | 54.86 | 62.15 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 65.50 | | EVENING LEQ | 56.96 | | NIGHT LEQ | 63.36 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Traffic Noise**

Project: **0**

Road: **University Avenue**

Segment: **Santa Fe St to Commerce St**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 19986.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 578.81 | 12.22 | 19.69 | 106.95 | 0.54 | 2.25 | 80.37 | 12.22 | 19.69 | % A | 92.00 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 3.00 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 5.00 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 21.88 | 5.12 | 7.20 | 14.55 | -8.41 | -2.23 | 13.30 | 5.12 | 7.20 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **70.04** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 65.46 |
| LEQ | 61.92 | 54.88 | 62.17 | 54.59 | 41.35 | 52.75 | 53.34 | 54.88 | 62.17 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 65.46 | | EVENING LEQ | 56.90 | | NIGHT LEQ | 63.37 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

FHWA Sound32 Spreadsheet

**Existing Plus Project Traffic Noise**

Project: **0**

Road: **University Avenue**

Segment: **Santa Fe St to Commerce St**

| | DAYTIME | | | EVENING | | | NIGHTTIME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | AUTOS | M.TRUCKS | H.TRUCKS | ADT | 21162.00 |
| | | | | | | | | | | SPEED | 35.00 |
| | | | | | | | | | | DISTANCE | 50.00 |
| INPUT PARAMETERS | | | | | | | | | | | |
| Vehicles per hour | 615.83 | 12.22 | 19.69 | 113.79 | 0.54 | 2.25 | 85.51 | 12.22 | 19.69 | % A | 92.44 |
| Speed in MPH | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | 35.00 | | |
| Left angle | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | -90.00 | | |
| Right angle | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | % MT | 2.83 |
| NOISE CALCULATIONS | | | | | | | | | | | |
| Reference levels | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | 65.11 | 74.83 | 80.05 | % HT | 4.72 |
| ADJUSTMENTS | | | | | | | | | | | |
| Flow | 22.15 | 5.12 | 7.20 | 14.81 | -8.41 | -2.23 | 13.57 | 5.12 | 7.20 | | |
| Distance | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 | LEFT | -90.00 |
| Finite Roadway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | RIGHT | 90.00 |
| Barrier | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Grade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | CNEL | **70.09** |
| Constant | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | -25.00 | DAY LEQ | 65.58 |
| LEQ | 62.19 | 54.88 | 62.17 | 54.85 | 41.35 | 52.75 | 53.61 | 54.88 | 62.17 | Day hour | 89.00 |
| | | | | | | | | | | Absorbtive? | no |
| | DAY LEQ | 65.58 | | EVENING LEQ | 57.06 | | NIGHT LEQ | 63.40 | | Use hour? | no |
| | | | | | | | | | | GRADE dB | 0.00 |

**APPENDIX D**

**Create Rail Worksheet and FRA Train Inventory Report**

**Noise Model Based on Federal Transit Adminstration General Transit Noise Assessment**
**Developed for Chicago Create Project**
**Copyright 2006, HMMH Inc.**
**Case:** [illegible]

| RESULTS | | | |
|---|---|---|---|
| **Noise Source** | **Ldn (dB)** | **Leq - daytime (dB)** | **Leq - nighttime (dB)** |
| **All Sources** | [illegible]8 | [illegible]2 | [illegible]2 |
| [illegible] | [illegible] | [illegible] | 32 |
| [illegible]2 | [illegible] | [illegible]8 | [illegible] |
| [illegible]3 | 38 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible]8 |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible]8 | [illegible] | [illegible] | [illegible] |

***Enter noise receiver land use category below.***

| LAND USE CATEGORY | |
|---|---|
| [illegible]2 [illegible]3 [illegible] | 2 |

***Enter data for up to 8 noise sources below - see reference list for source numbers.***

| NOISE SOURCE PARAMETERS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Source 1** | | **Source 2** | | **Source 3** | | **Source 4** | | **Source 5** | | **Source 6** | |
| **Source Num.** | [illegible] | 2 | [illegible] | [illegible] | [illegible] | 3 | [illegible] | [illegible] | [illegible] | 2 | | |
| **Distance (source to receiver)** | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | |
| **Daytime Hours (7 AM - 10 PM)** | [illegible]<br>[illegible]<br>[illegible] | 3[illegible]<br>[illegible]<br>[illegible] | [illegible]<br>[illegible]<br>[illegible] | 3[illegible]<br>3[illegible]<br>[illegible] | [illegible]<br>[illegible]<br>[illegible] | 3[illegible]<br>[illegible]<br>[illegible] | [illegible]<br>[illegible]<br>[illegible] | 3[illegible]<br>3[illegible]<br>[illegible] | [illegible]<br>[illegible]<br>[illegible] | [illegible]<br>[illegible]8333<br>2 | [illegible]<br>[illegible]<br>[illegible] | |
| **Nighttime Hours (10 PM - 7 AM)** | [illegible]<br>[illegible]<br>[illegible] | | [illegible]<br>[illegible]<br>[illegible] | [illegible]<br>[illegible]33<br>[illegible] | [illegible]<br>[illegible]<br>[illegible] | | [illegible]<br>[illegible]<br>[illegible] | [illegible]<br>[illegible]33<br>[illegible] | [illegible]<br>[illegible]<br>[illegible] | [illegible]<br>[illegible]8333<br>2 | [illegible]<br>[illegible]<br>[illegible] | |
| **Wheel Flats?** | | | | | [illegible] | | [illegible] | | | | | |
| **Jointed Track?** | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | |
| **Embedded Track?** | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | |
| **Aerial Structure?** | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | |
| **Barrier Present?** | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | |
| **Intervening Rows of of Buildings** | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | |

| SOURCE REFERENCE LIST | |
|---|---|
| **Source** | **Number** |
| [illegible] | [illegible] |
| [illegible] | 2 |
| [illegible] | 3 |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | 8 |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible]2 |
| [illegible] | [illegible]3 |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible]8 |
| [illegible] | [illegible] |
| [illegible] | 2[illegible] |
| [illegible] | 2[illegible] |
| [illegible] | 22 |
| [illegible] | 23 |

# U. S. DOT CROSSING INVENTORY FORM

**DEPARTMENT OF TRANSPORTATION**
FEDERAL RAILROAD ADMINISTRATION

**OMB No. 2130-0017**

Instructions for the initial reporting of the following types of new or previously unreported crossings: For public highway-rail grade crossings, complete the entire inventory Form. For private highway-rail grade crossings, complete the Header, Parts I and II, and the Submission Information section. For public pathway grade crossings (including pedestrian station grade crossings), complete the Header, Parts I and II, and the Submission Information section. For Private pathway grade crossings, complete the Header, Parts I and II, and the Submission Information section. For grade-separated highway-rail or pathway crossings (including pedestrian station crossings), complete the Header, Part I, and the Submission Information section. For changes to existing data, complete the Header, Part I Items 1-3, and the Submission Information section, in addition to the updated data fields. Note: For private crossings only, Part I Item 20 and Part III Item 2.K. are required unless otherwise noted. An asterisk * denotes an optional field.

**A. Revision Date** *(MM/DD/YYYY)*: 03 / 01 / 2014

**B. Reporting Agency**: ☒ Railroad ☐ Transit ☐ State ☐ Other

**C. Reason for Update** *(Select only one)*: ☒ Change in Data ☐ New Crossing ☐ Closed ☐ No Train Traffic ☐ Quiet Zone Update ☐ Re-Open ☐ Date Change Only ☐ Change in Primary Operating RR ☐ Admin. Correction

**D. DOT Crossing Inventory Number**: 026485X

## Part I: Location and Classification Information

**1. Primary Operating Railroad**: BNSF Railway Company [BNSF]

**2. State**: CALIFORNIA

**3. County**: RIVERSIDE

**4. City / Municipality**: ☒ In ☐ Near RIVERSIDE

**5. Street/Road Name & Block Number**: MISSION INN AVE *(Street/Road Name)* | * *(Block Number)*

**6. Highway Type & No.**:

**7. Do Other Railroads Operate a Separate Track at Crossing?** ☐ Yes ☒ No
If Yes, Specify RR: ____, ____, ____, ____

**8. Do Other Railroads Operate Over Your Track at Crossing?** ☒ Yes ☐ No
If Yes, Specify RR: UP, ____, ____, ATK

**9. Railroad Division or Region**: ☐ None CALIFORNIA

**10. Railroad Subdivision or District**: ☐ None SAN BERNARDINO

**11. Branch or Line Name**: ☐ None SAN BERN-REDO J

**12. RR Milepost**: ____ | 0009.80 | ____ *(prefix)* | *(nnnn.nnn)* | *(suffix)*

**13. Line Segment** *: 7602

**14. Nearest RR Timetable Station** *: ARLINGTON

**15. Parent RR** *(if applicable)*: ☐ N/A

**16. Crossing Owner** *(if applicable)*: ☐ N/A

**17. Crossing Type**: ☒ Public ☐ Private

**18. Crossing Purpose**: ☒ Highway ☐ Pathway, Ped. ☐ Station, Ped.

**19. Crossing Position**: ☒ At Grade ☐ RR Under ☐ RR Over

**20. Public Access** *(if Private Crossing)*: ☐ Yes ☐ No

**21. Type of Train**: ☐ Freight ☐ Transit ☐ Intercity Passenger ☐ Shared Use Transit ☒ Commuter ☐ Tourist/Other

**22. Average Passenger Train Count Per Day**: ☐ Less Than One Per Day ☒ Number Per Day 9

**23. Type of Land Use**: ☐ Open Space ☐ Farm ☐ Residential ☒ Commercial ☐ Industrial ☐ Institutional ☐ Recreational ☐ RR Yard

**24. Is there an Adjacent Crossing with a Separate Number?**: ☐ Yes ☐ No If Yes, Provide Crossing Number ____

**25. Quiet Zone** *(FRA provided)*: ☒ No ☐ 24 Hr ☐ Partial ☐ Chicago Excused Date Established ____

**26. HSR Corridor ID**: ____ ☐ N/A

**27. Latitude in decimal degrees** *(WGS84 std: nn.nnnnnnn)*: 33.9787419

**28. Longitude in decimal degrees** *(WGS84 std: -nnn.nnnnnnn)*: -117.3676040

**29. Lat/Long Source**: ☒ Actual ☐ Estimated

**30.A. Railroad Use** *:

**31.A. State Use** *:

**30.B. Railroad Use** *:

**31.B. State Use** *:

**30.C. Railroad Use** *:

**31.C. State Use** *:

**30.D. Railroad Use** *:

**31.D. State Use** *:

**32.A. Narrative** *(Railroad Use)* *:

**32.B. Narrative** *(State Use)* *:

**33. Emergency Notification Telephone No.** *(posted)*: 800-832-5452

**34. Railroad Contact** *(Telephone No.)*: 817-352-1549

**35. State Contact** *(Telephone No.)*: 415-703-3722

## Part II: Railroad Information

1. Estimated Number of Daily Train Movements

1.A. Total Day Thru Trains *(6 AM to 6 PM)*: 53

1.B. Total Night Thru Trains *(6 PM to 6 AM)*: 52

1.C. Total Switching Trains: 0

1.D. Total Transit Trains: ____

1.E. Check if Less Than One Movement Per Day ☐
How many trains per week? ____

2. Year of Train Count Data *(YYYY)*: ____

3. Speed of Train at Crossing
3.A. Maximum Timetable Speed *(mph)*: 60
3.B. Typical Speed Range Over Crossing *(mph)* From 1 to 60

4. Type and Count of Tracks
Main 3 Siding ____ Yard ____ Transit ____ Industry ____

5. Train Detection *(Main Track only)*
☐ Constant Warning Time ☐ Motion Detection ☐ AFO ☐ PTC ☒ DC ☐ Other ☐ None

6. Is Track Signaled? ☒ Yes ☐ No

7.A. Event Recorder ☐ Yes ☐ No

7.B. Remote Health Monitoring ☐ Yes ☐ No

# U. S. DOT CROSSING INVENTORY FORM

| A. Revision Date *(MM/DD/YYYY)* 03/01/2014 | PAGE 2 | D. Crossing Inventory Number *(7 char.)* 026485X |
|---|---|---|

## Part III: Highway or Pathway Traffic Control Device Information

1. Are there Signs or Signals? ☒ Yes ☐ No

**2. Types of Passive Traffic Control Devices associated with the Crossing**

2.A. Crossbuck Assemblies *(count)* 0

2.B. STOP Signs *(R1-1) (count)* 0

2.C. YIELD Signs *(R1-2) (count)*

2.D. Advance Warning Signs *(Check all that apply; include count)* ☐ None
☒ W10-1 _____ ☐ W10-3 _____ ☐ W10-11 _____
☐ W10-2 _____ ☐ W10-4 _____ ☐ W10-12 _____

2.E. Low Ground Clearance Sign *(W10-5)*
☐ Yes *(count_____)*
☐ No

2.F. Pavement Markings
☒ Stop Lines ☐ Dynamic Envelope
☒ RR Xing Symbols ☐ None

2.G. Channelization Devices/Medians
☐ All Approaches ☐ Median
☐ One Approach ☐ None

2.H. EXEMPT Sign *(R15-3)*
☐ Yes
☐ No

2.I. ENS Sign *(I-13)* Displayed
☐ Yes
☐ No

2.J. Other MUTCD Signs ☒ Yes ☐ No
Specify Type _____ Count 2
Specify Type _____ Count 0
Specify Type _____ Count _____

2.K. Private Crossing Signs *(if private)*
☐ Yes ☐ No

2.L. LED Enhanced Signs *(List types)*

**3. Types of Train Activated Warning Devices at the Grade Crossing *(specify count of each device for all that apply)***

3.A. Gate Arms *(count)*
Roadway 2
Pedestrian _____

3.B. Gate Configuration
☐ 2 Quad ☐ Full *(Barrier)* Resistance
☐ 3 Quad
☐ 4 Quad ☐ Median Gates

3.C. Cantilevered *(or Bridged)* Flashing Light Structures *(count)*
Over Traffic Lane 0 ☐ Incandescent
Not Over Traffic Lane 0 ☐ LED

3.D. Mast Mounted Flashing Lights *(count of masts)* 2
☐ Incandescent ☐ LED
☐ Back Lights Included ☐ Side Lights Included

3.E. Total Count of Flashing Light Pairs 0

3.F. Installation Date of Current Active Warning Devices: *(MM/YYYY)*
_____/_____ ☐ Not Required

3.G. Wayside Horn
☐ Yes Installed on *(MM/YYYY)* _____/_____
☐ No

3.H. Highway Traffic Signals Controlling Crossing
☐ Yes ☒ No

3.I. Bells *(count)* 2

3.J. Non-Train Active Warning
☐ Flagging/Flagman ☐ Manually Operated Signals ☐ Watchman ☐ Floodlighting ☐ None

3.K. Other Flashing Lights or Warning Devices
Count 0 Specify type _____

4.A. Does nearby Hwy Intersection have Traffic Signals?
☐ Yes ☐ No

4.B. Hwy Traffic Signal Interconnection
☐ Not Interconnected
☐ For Traffic Signals
☐ For Warning Signs

4.C. Hwy Traffic Signal Preemption
☐ Simultaneous
☐ Advance

5. Highway Traffic Pre-Signals
☐ Yes ☐ No
Storage Distance * _____
Stop Line Distance * _____

6. Highway Monitoring Devices *(Check all that apply)*
☐ Yes - Photo/Video Recording
☐ Yes – Vehicle Presence Detection
☐ None

## Part IV: Physical Characteristics

1. Traffic Lanes Crossing Railroad ☐ One-way Traffic ☐ Two-way Traffic ☐ Divided Traffic
Number of Lanes 4

2. Is Roadway/Pathway Paved? ☒ Yes ☐ No

3. Does Track Run Down a Street? ☐ Yes ☒ No

4. Is Crossing Illuminated? *(Street lights within approx. 50 feet from nearest rail)* ☐ Yes ☐ No

5. Crossing Surface *(on Main Track, multiple types allowed)* Installation Date * *(MM/YYYY)* _____/_____ Width * _____ Length * _____
☐ 1 Timber ☐ 2 Asphalt ☐ 3 Asphalt and Timber ☐ 4 Concrete ☐ 5 Concrete and Rubber ☒ 6 Rubber ☐ 7 Metal
☐ 8 Unconsolidated ☐ 9 Composite ☐ 10 Other *(specify)* _____

6. Intersecting Roadway within 500 feet?
☒ Yes ☐ No If Yes, Approximate Distance *(feet)* -75

7. Smallest Crossing Angle
☐ 0° – 29° ☐ 30° – 59° ☒ 60° - 90°

8. Is Commercial Power Available? *
☒ Yes ☐ No

## Part V: Public Highway Information

1. Highway System
☐ (01) Interstate Highway System
☐ (02) Other Nat Hwy System (NHS)
☐ (03) Federal AID, Not NHS
☒ (08) Non-Federal Aid

2. Functional Classification of Road at Crossing
☐ (0) Rural ☒ (1) Urban
☐ (1) Interstate ☐ (5) Major Collector
☐ (2) Other Freeways and Expressways
☒ (3) Other Principal Arterial ☐ (6) Minor Collector
☐ (4) Minor Arterial ☐ (7) Local

3. Is Crossing on State Highway System?
☐ Yes ☒ No

4. Highway Speed Limit
_____ MPH
☐ Posted ☐ Statutory

5. Linear Referencing System *(LRS Route ID)* *

6. LRS Milepost *

7. Annual Average Daily Traffic *(AADT)*
Year 1989 AADT 012000

8. Estimated Percent Trucks
20 %

9. Regularly Used by School Buses?
☐ Yes ☒ No Average Number per Day 0

10. Emergency Services Route
☐ Yes ☐ No

## Submission Information - *This information is used for administrative purposes and is not available on the public website.*

Submitted by _____ Organization _____ Phone _____ Date _____

Public reporting burden for this information collection is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed and completing and reviewing the collection of information. According to the Paperwork Reduction Act of 1995, a federal agency may not conduct or sponsor, and a person is not required to, nor shall a person be subject to a penalty for failure to comply with, a collection of information unless it displays a currently valid OMB control number. The valid OMB control number for information collection is 2130-0017. Send comments regarding this burden estimate or any other aspect of this collection, including for reducing this burden to: Information Collection Officer, Federal Railroad Administration, 1200 New Jersey Ave. SE, MS-25 Washington, DC 20590.

**APPENDIX E**

**Environmental Noise and Vibration Study, Mission Lofts**

# Environmental Noise and Vibration Study

## Mission Lofts

Riverside, CA

**Submitted to:**
KTGY Group, Inc.
Mission Lofts, LLC

**Prepared by:**
SSA Acoustics, LLP
222 Etruria Street, Suite 100
Seattle, Washington 98109

February 24, 2014

# Table of Contents

I. Introduction ..... 3

II. Design Criteria ..... 4

A. Noise Standards ..... 4
B. FTA Vibration Limits ..... 5

III. Noise and Vibration Measurements ..... 5

A. Measurement Description – Environmental Noise ..... 5
B. Measurement Locations – Environmental Noise ..... 5
C. Measurement Results – Environmental Noise ..... 5
D. Measurement Description – Vibration Levels ..... 7
E. Measurement Locations – Vibration Levels ..... 7
F. Measurement Results – Vibration Levels ..... 8

IV. Discussion & Recommendations ..... 9

V. Summary ..... 10

# I. Introduction

This report summarizes our environmental noise study for the Mission Lofts project in Riverside, CA. The purpose of the study is to quantify the existing and future noise environment and vibration levels at the proposed site, compare it with applicable City and State standards, and propose conceptual mitigation as necessary. For those readers who are not familiar with the fundamental concepts of environmental acoustics, please refer to Appendix A.

The site is located at the intersection of University Avenue and Commerce Street on a site that is currently vacant. The intent is to develop the site for multi-family residential dwellings. The site is located to the east of commuter and freight rail lines, south and north of commercial properties and west of residential housing. See Figure 1 for an overview of the site, with adjacencies noted.

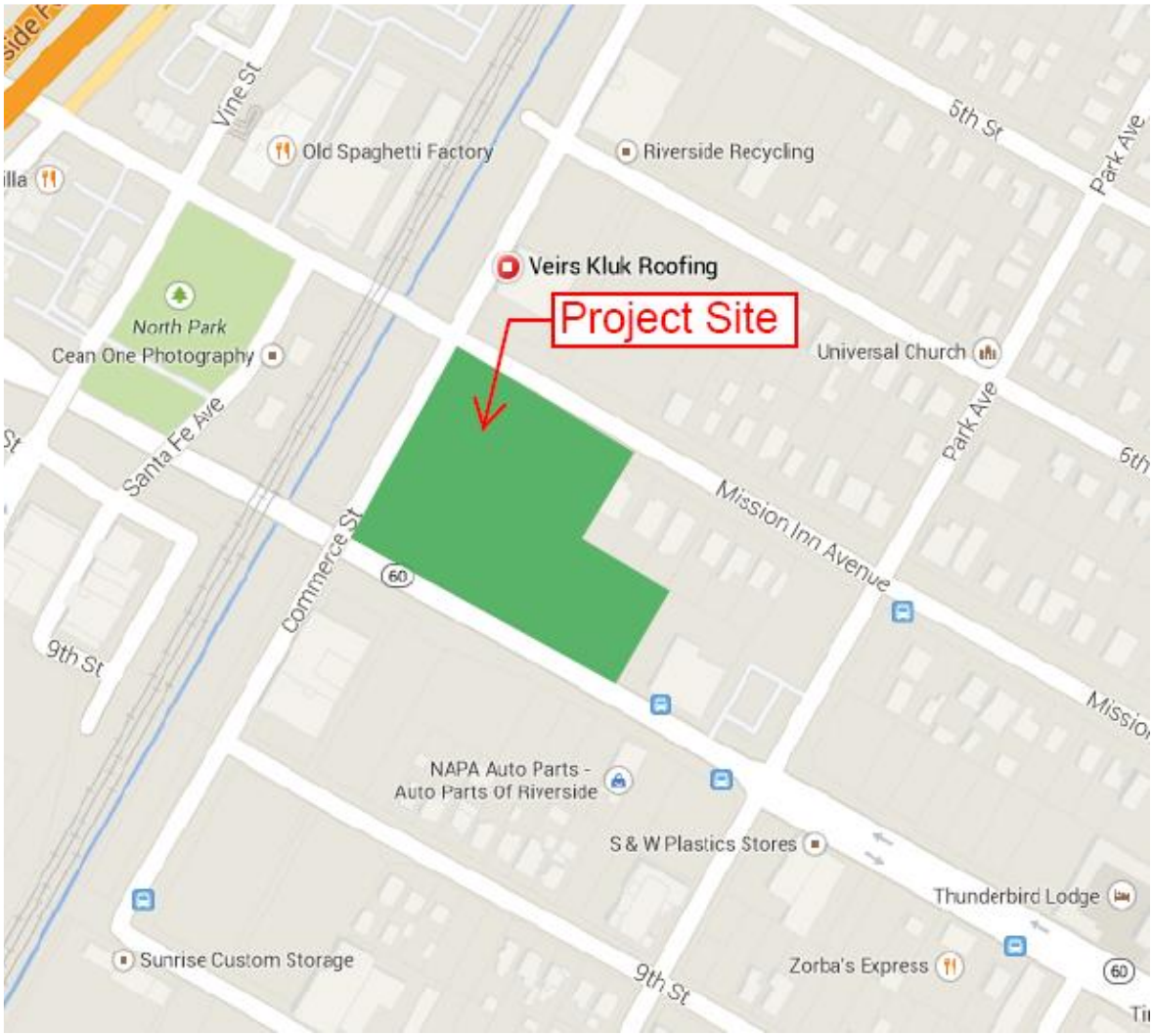



**Figure 1 – Mission Lofts Site Location**

# II. Design Criteria

## A. Noise Standards

Noise levels recommended by the Federal Government are given in a report[1] written by the Federal Interagency on Urban Noise (FICUN). The recommended noise levels and corresponding land uses documented in the FICUN report, in agreement with HUD guidelines, are as follows:

| *Exterior Noise levels $L_{dn}$* | *Recommended Land Use* |
|---|---|
| 0-55 dBA | Residential without restrictions. |
| 55-65 dBA | Residential property generally acceptable. The guidelines note that some people may find noise levels in this category objectionable, but considering the cost of mitigating measures, these noise levels are generally acceptable for residential use. |
| 65-75 dBA | Generally unacceptable for residential use. Acceptable for commercial use. Residential use in this environment requires special construction techniques to achieve a minimum Noise Level Reduction (NLR) of 25 dB for noise levels between 65 dBA and 70 dBA and a NLR of 30 dB for noise levels between 70 dBA and 75 dBA. |

| *Interior Noise levels $L_{dn}$ (windows closed)* | *Recommended Land Use* |
|---|---|
| Less than 45 dBA | Acceptable for residential use. |
| Greater than 45 dBA | Unacceptable for residential use. |

California Building Code (CBC)

For this project, California Building Code includes requirements for interior noise levels in habitable rooms o fmulti-family housing. In summary, the CBC requires an interior noise level no higher than a DNL of 45 dB. Projects exposed to an exterior DNL of 65 dB, or greater, require an acoustical analysis showing that the proposed design will limit interior levels to the prescribed allowable interior level. If windows must be closed to meet this requirement, then the “design for the structure must also specify a ventilation or air-conditioning system to provide a habitable interior environment.”

[1] “Guidelines for Considering Noise in Land Use Planning and Control”, Federal Interagency Committee on Urban Noise, June 1980.

## B. FTA Vibration Limits

The Federal Transportation Association Guidance Manual for Transit Noise and Vibration Impact Assessment suggests that the ground-borne vibration velocity should not exceed 80 VdB for infrequent events (fewer than 70 per day) and 72 VdB for frequent events (more than 70 per day) to minimize potential vibration impacts. In addition, the FTA prescribes third-octave band limitations on vibration levels from 4 Hz to 80 Hz. These limit spectra are used in our evaluations, below.

# III. Noise and Vibration Measurements

## A. Measurement Description – Environmental Noise

To quantify the existing noise environment, we conducted one 24-hour environmental noise measurement and multiple short-term measurements on the site in conjunction with placing a monitor on the site for a 24-hour period. Long-term noise monitoring was recorded hourly from approximately 1:00PM on Tuesday, February 10th through 1:00 PM on Wednesday, February 11th, 2014. The short-term measurements were then compared with the long-term measurement to determine how sound levels vary across the site.

The sound levels at the long-term environmental noise monitoring location were measured using a Larson-Davis Model 820 precision integrating sound level meter. The short term noise levels were measured using a Larson-Davis Model 2800 spectrum analyzer. All instruments used meet the American National Standards Institute (ANSI) requirements for a Type 1 instrument.

## B. Measurement Locations – Environmental Noise

Short term measurements were made at several locations throughout the site, including locations along the top of University Avenue, Mission Inn Avenue, and Commerce Street. The long term noise monitor was deployed on the west side along Commerce Street to record the worst case of combined noise from traffic and rail sources.

## C. Measurement Results – Environmental Noise

The predominant noise sources at the project site are vehicle noise from these roads and rail traffic for commuter and freight. Other community noise sources include activity noise in the neighboring commercial properties.

The results of the 24-hr noise monitor measurement are presented in the attached graph as hourly $L_{EQ}$ measurements. The calculated $L_{DN}$ value as a result of these $L_{EQ}$ measurements is 60 dBA.

In addition to long term environmental noise monitoring as described above, we conducted several short term noise measurements of ambient levels, the results of which are shown below. These measurements were made under typical ambient conditions, with vehicles and airplanes passing as usual. Typical events include a steady stream of traffic on University Avenue, as well as train passages.

**Table 1 - Short Term Ambient Noise Measurements**

| Location | $L_{eq}$ (dBA) |
|---|---|
| **S1** | 48 |
| **S2** | 52 |
| **S3** | 61 |
| **S4** | 63 |

The ambient levels shown in Table 1 are mapped in Figure 2, below.

**Figure 2 – Measured Ambient Levels in dBA**

In addition to the ambient noise measurements, we measured sound levels due to two train passages. These levels were made on the west side of the site. The measured

levels due to these two events exceeded the typical ambient levels at this location, but did not exceed 65 dBA.

## D. Measurement Description – Vibration Levels

Ambient vibration levels due to typical activity on site were measured in two locations on site. These measurements were also conducted during the same period.

The instrumentation utilized to conduct the vibration testing was a Larson Davis 2900 spectrum analyzer with an accelerator calibrated to 1 x $10^6$ mG on site, prior to measurements. The accelerometer was temporarily adhered to rigid portions of the site (i.e. parking lot and sidewalk areas) to measure the vibration levels.

## E. Measurement Locations – Vibration Levels

Ambient vibration levels due to typical activity on site were measured in two locations on site, as shown in Figure 3.

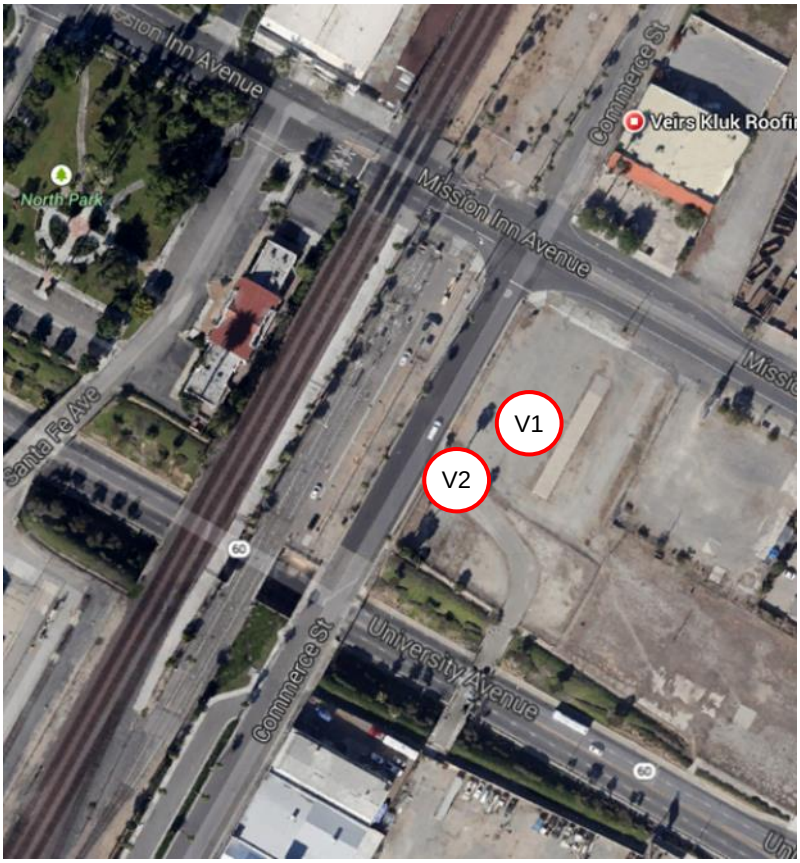



**Figure 3 - Vibration Monitoring Locations**

| | |
|---|---|
| **V1** | **East border of site in parking lot** |
| **V2** | **West side, Gravel Road** |

## F. Measurement Results – Vibration Levels

Primary sources of vibration are attributable to vehicle activity nearby the site. This included passenger automobiles, as well as buses and trucks, although bus and truck activity was not observed to be frequent. As both roads flanking the site are main roads, there was a steady stream of traffic during the measurements.

Results of vibration measurements at both locations are compared to FTA criteria for residences on the attached graph. This figure shows the VdB maximum, or the maximum instantaneous vibration velocity level measured while on site. As can be seen from the figure, these levels are below the limits prescribed by the FTA for residences.

# IV. Discussion & Recommendations

The planned multi-family residences would currently be exposed to a DNL of 60 dBA as documented by the measurements completed at the site. Short term measurements on the property varied by no more than 2 dBA and should be taken as approximately equal to the long term measurement.

The measured DNL on site falls within the category of generally unacceptable for residential use, according to the HUD guidelines outlined in the design criteria above. If this property is to be developed for residential use, special acoustic construction as outlined below will be required to meet the interior noise goal of 45 dBA. To comply with this goal, a noise reduction level (NLR) of 20 dB; however, we typically recommend a factor of safety of 3-5 dB be included to account for deficiencies in construction and atypical noise events not observed on site.

In summary, the following table shows the required minimum Sound Transmission Class (STC) ratings of the major building envelope elements to meet an NLR of 25 dB. Further information on recommended constructions to achieve this goal is presented in Appendix C. Either the assemblies shown in the appendix can be used, or alternative assemblies can be specified based on the STC ratings provided.

| | ***NLR = 30 dB*** |
|---|---|
| **Building Element** | **Required STC** |
| Exterior Walls | 35 |
| Windows | 30 |

Vibration levels are currently below perceptible limits as outlined by the FTA. No further action is required to attenuate current levels of vibration.

# V. Summary

Environmental noise and ambient vibration levels were measured for the site. These levels indicate that higher levels of exterior sound isolation constructions will be required to ensure that the site will be acoustically acceptable for multi-family residential development. These minimum constructions are outlined above.

Please do not hesitate to contact us with any questions or comments.

Sincerely,
SSA Acoustics, LLP

**William Stewart**
**Managing Partner**

SSA ACOUSTICS, LLP
222 Etruria St, Suite 100
Seattle, WA 98109
(206) 839-0819 – P
(206) 839-0824 – F

## Appendix A. Descriptors

To better understand this report we present a brief overview regarding sound and vibration properties, descriptors, and terms.

Human exposure to noise is typically measured as an **A-weighted sound level** in units of decibels, symbolized as dBA. The A-weighting is a frequency-specific weighting that corresponds approximately to the sensitivity of human hearing at the various frequencies.

Sound levels vary significantly, depending on location and activities. Locations near highways or urban arterials may be 70 dBA, whereas quiet rural areas may be 40 dBA. People normally experience sound levels between about 30 and 90 dBA, depending on their activity. For example, a nearby noisy vehicle, radio or power tool may produce 90 dBA; normal conversation is about 55 to 65 dBA; and a bedroom or quiet office is about 30 to 40 dBA.

Loudness is judged by an average listener to double for each 10 dBA increase in sound level. For example, 60 dBA is judged to be twice as loud as 50 dBA and four times as loud as 40 dBA.

When measuring noise that is fluctuating over time it is common practice to use a descriptor called **equivalent A-weighted sound level, Leq**. The Leq is that constant sound level in dBA, which contains the same amount of sound energy over a given time period as the measured fluctuating noise. Descriptors that are commonly used to describe noise from the environmental noise are the Leq(h), the 24-hour Leq and the Ldn. The Leq(h) is the average sound in dBA over a one hour period during the day or night. The 24-hour Leq is the average sound in dBA over a 24 hour period calculated using the hourly Leqs. The Ldn is a 24-hour average with a 10 decibel penility added to the hourly leqs between 10 pm and 7 am. These are the most common references in Federal and State regulations.

This survey contains measurements including **octave band data**. Using filter sets, sound can be segmented into various bandwidths. Typical octave-band filter sets provide filters with the following geometric-mean frequencies: 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16000 Hz. Typical 1/3 octave band filtering further divides each octave band into three divisions covering 1/3 the original band. Under ASTM standards the bands are from 125 Hz to 4000 Hz for transmission loss values. Calculations and evaluation of floor and wall performances within this report were completed using both octave band and 1/3 octave band data. Because a wall performance differs with frequency, an octave band spectrum enables predictions that are much more accurate than using a single overall value for the events recorded. From octave band data performance values such as STC, IIC and NC can be derived.

**DNL** - The Daytime Nighttime Noise Level (DNL), descriptor has been established by the EPA's Office of Noise Control as the value to use for human exposure to environmental noise. This descriptor is based on hourly sound averages during a 24-hour period. These hourly values are averaged with an additional penalty of 10 decibels assigned to the hours between 10 pm and 7 am.

## Appendix B. Criteria

**STC/TL** Considering the acoustic performance of a building element such as a wall or floor, the ability of the system to block the transmission of sound waves is important. The **sound transmission loss (TL)** of a material or building partition is a measure of sound isolation ability. Since TL is very frequency dependent, it is generally reported in the third octave frequency bands between, as a minimum, 125 Hz and 4,000 Hz. As a convenience, a single number rating method has been developed which allows a single value to be given to a transmission loss spectrum. This rating is referred to as the **sound transmission class (STC)** rating which has been defined in the American Society for Testing and Materials (ASTM) Standard E413. This standard defines a procedure for determining the STC rating for a TL spectrum by fitting a contour to the one-third octave band TL data.

**FSTC** **STCs** are conducted under ideal laboratory conditions. Comparable field performance depends on building design and careful attention to detail and workmanship. In order to test the TL properties of a material in the field ASTM established test methods for a "field" STC or **FSTC.** The measurement technique generally follows the procedures of ASTM designation: E336. Measured TL levels were compared with standard TL contours per ASTM designation: E413. The highest STC contour, which matches the measured TL, is the Field Sound Transmission Class rating for the test partition. Under Massachusetts State Building Code there is no allowance for field testing to document the correct construction of the particular wall type. Faulty installation, flanking paths and/or penetrations are part of the overall performance and are included as part of the field measurement.

**NIC** Where flanking paths for noise cannot be isolated to establish an accurate Field Sound Transmission Class (FSTC) of a building element, noise reduction data can be treated to yield a single number called the noise isolation class (NIC). An NIC is similar to an FSTC in that the higher the number the better the wall performance. It closely represents the overall decibel reduction achieved by the assembly. Because the NIC represents the sound-isolating performance of the field-tested situation only, NIC values may not apply to an identical construction in another building where room absorption and other factors may be different.

# Appendix C. Construction Recommendations for a Noise Level Reduction of 25 dB

***Exterior Walls:***

1. Exterior walls shall have a laboratory sound transmission class rating of at least STC-35, *or;*

2. Stud wall shall be at least 4 inches in nominal depth and shall be finished on the outside with solid sheathing under an approved exterior wall finish.

    a. Install one layer of 5/8" GWB on the inside of the exterior wall. If the exterior wall finish is siding on sheathing, then two layers of 5/8" GWB should be used.

    b. Install continuous composition board, plywood or gypsum board sheathing at least 3/4" thick on the outside of the exterior walls.

    c. Sheathing panels shall be covered on the exterior with overlapping building paper.

    d. R-19 or better insulation shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.

*Roofs and Ceilings:*

1. Combined roof and ceiling construction shall have a laboratory sound transmission class rating of at least STC-44, *or;*

    a. With an attic or rafter space at least 6" deep, and with a ceiling below, the roof shall consist of ¾" composition board, plywood, or gypsum board sheathing topped by roofing as required.

        i. Gypsum board ceiling shall be at least 5/8" thick. The ceiling shall be substantially airtight with a minimum of penetrations.

        ii. Minimum R-30 glass fiber or mineral wool insulation shall be provided above the ceiling between the joists.

    b. Open beam roof construction shall follow the energy insulation standard method for batt insulation, except use 1" plywood decking with shakes or other suitable roofing material.

2. Window or dome skylights shall have a laboratory sound transmission class rating of at least STC-30.

***Exterior Windows:***

1. Windows shall have a laboratory sound transmission class rating of at least STC-30.

    a. The following window construction is rated as STC-30: ¼" glass ½" airspace-3/16" glass.

2. Double glazed windows shall employ fixed sash or weather-stripped, operable sash. The sash shall be rigid and weather-stripped with material that is compressed airtight when the window is closed so as to conform to ASTM E-283-65-T.

3. Glass in windows shall be sealed in an airtight non-hardening sealant or in a soft elastomer gasket or gasket tape.

4. Perimeter of window frames shall be sealed air-tight to the exterior wall.

***Exterior Doors:***

1. Metal or wood exterior doors shall have a laboratory sound transmission class rating of at least STC-33, *or;*

    a. Provide storm door in front of exterior door. Storm door shall be separated from exterior door by at least 3".

    b. Exterior door shall be solid core wood or insulated hollow metal at least 1-3/4" thick.

    c. Glass over 2 square feet in area in metal or wood exterior doors shall be at least 3/16" thick.

2. Double glazed sliding doors shall a laboratory sound transmission class rating of at least STC-33, *or;*

    a. Glass panes shall be separated by a minimum of ½" airspace.

    b. Each pane shall be at least 3/16" thick and shall not be of equal thickness.

3. The perimeter of the door frames shall be sealed airtight to the exterior wall.

4. Glass in doors shall be sealed in an airtight non-hardening sealant or in a soft elastomer gasket or gasket tape.

***Ventilation:***

1. Inlet and discharge openings shall be fitted with 20 gauge steel transfer ducts. Ducts shall be lined with 1 inch-thick duct liner, at least five feet in length, and have one 90° bend.

2. Gravity vent openings in attics shall be as close to code minimum in number and size, as practical.

    a. Gravity vent openings shall be fitted with 3 feet-long transfer ducts lined with 1 inch-thick duct liner. Each duct shall have a lined 90° bend such that there is no line of sight from the exterior through the duct into the attic.

3. Bathroom, laundry, and similar exhaust ducts connecting interior space to outside shall contain at least 10 feet of ductwork lined with 1 inch-thick duct liner. Exhaust ducts less than 10 feet in length shall be fully lined and should be properly air-sealed. Each duct shall be provided with a 90° bend lined with 1 inch-thick duct liner such that there is no line of sight through the duct from the venting cross-section to the room opening cross-section.

4. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a self-closing damper and have a 90° bend.

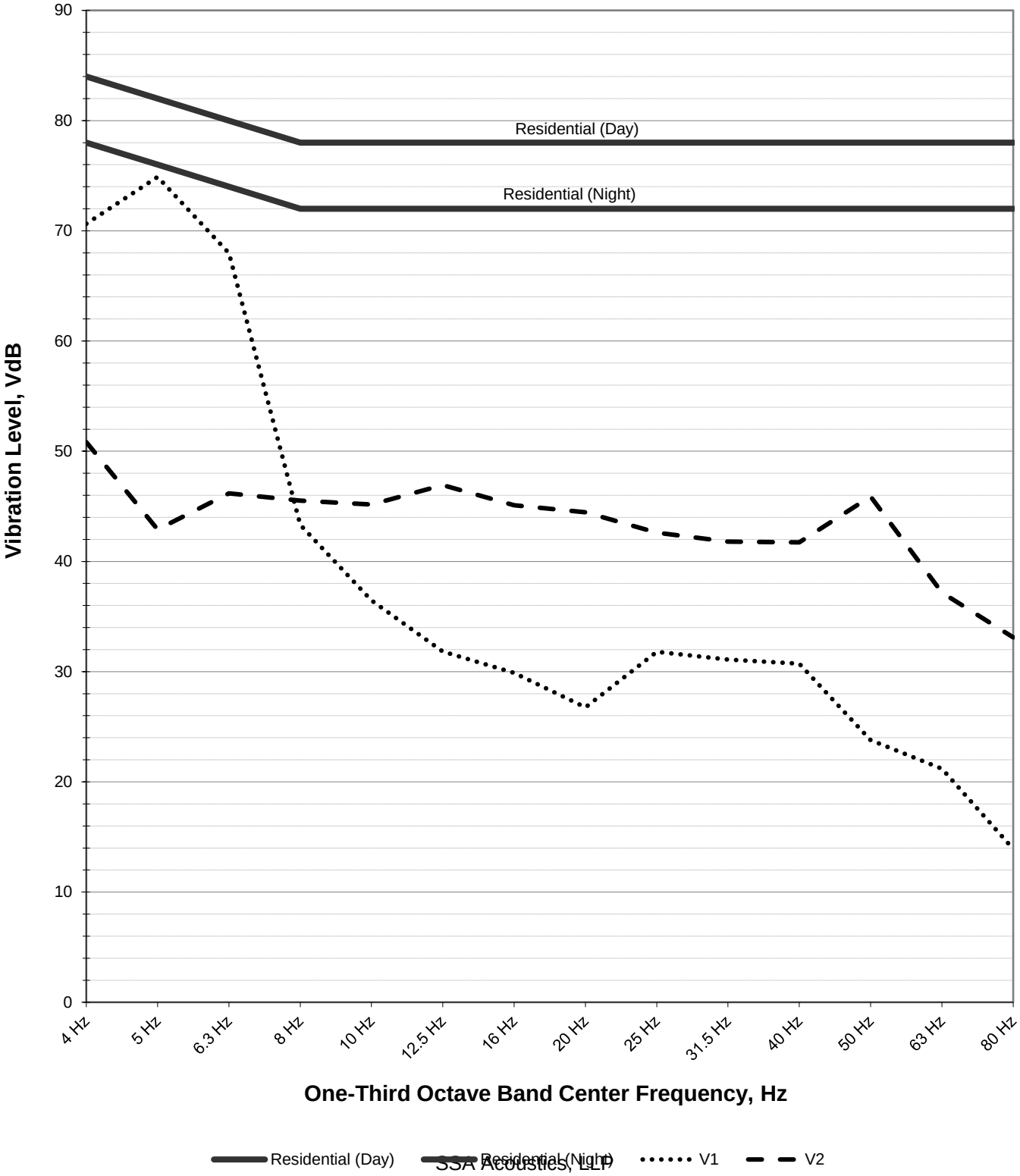
***Air Leakage:***

The following locations shall be sealed, caulked, gasketed, or weather-stripped to limit or eliminate air leakage:

1. Exterior joints around window and door frames between the window or door frame and the framing.
2. Openings between walls and foundations.
3. Between the wall sole plate and the rough flooring.
4. Openings at penetrations of utility services through walls, floor, and roofs.
5. Between wall panels at corners.

## Mission Lofts

### Ambient Vibration Level Measurement





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## Roma Stromberg

**From:** [illegible]
**Sent:** [illegible]2[illegible]2[illegible]23[illegible]
**To:** [illegible]
**Subject:** [illegible]

Hi Roma,

The measurements included in our report are peak level measurements made during train passages averaged for three events. This is the design level exposure that can be used for mitigation. Thanks, Bill

**William Stewart**
Managing Partner
**SSA Acoustics, LLP**
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D: 206.915.4181
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---

**From:** Roma Stromberg [mailto:roma@traffic-engineer.com]
**Sent:** Wednesday, May 20, 2015 8:15 AM
**To:** Bill Stewart
**Cc:** 'Eliza Laws'; 'Carl Ballard'
**Subject:** Mission Lofts Noise and Vibration Study

Good Morning Bill. I am assisting in the environmental documentation for the Mission Lofts and have a question for you regarding some vibration measurements that were taken as part of the study (attached). Although there is an existing rail line with at least 105 trips per 24/hour period located 175 feet north of the site, the text in report does not mention that any rail pass-bys were measured during the vibration measurement (see page 8). I also could not find the measurement period referenced in order to make an assumption that rail was included. Could you please let me know whether rail pass-bys were included? I would also appreciate it if you could describe for me what is represented by each of the lines in the ambient measurement (vibration) graph located at the end of the report. My goal is to find the on-site vibration level during a freight train pass-by. Thanks a bunch.

Regards,

**Roma Stromberg** | Senior Associate
**Kunzman Associates, Inc. | CBE / MBE / RBE / SBE**
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P: (714) 973-8383 x 206

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# Appendix G

# Transportation Impact Analysis

# Mission Lofts

# Transportation Impact Analysis

# Draft Report

**Prepared for:**
**REALM**

April 2015

OC15-0371

FEHR PEERS
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## Table of Contents

**1.0 EXECUTIVE SUMMARY ..... 8**

**2.0 INTRODUCTION ..... 9**

2.1 Purpose and Objectives ..... 9
2.2 Site Location and Study Area ..... 9
2.3 Development Project Description ..... 10
2.4 Analysis Scenarios ..... 10

**3.0 ANALYSIS METHODOLOGIES ..... 13**

3.1 Level of Service Criteria ..... 13
3.1.1 Intersection Level of Service ..... 13
3.1.2 Roadway Segment Level of Service ..... 14
3.2 Performance Criteria and Thresholds of Significance ..... 15
3.2.1 City of Riverside Performance Criteria ..... 15
3.2.2 Thresholds of Significance ..... 16

**4.0 AREA CONDITIONS ..... 18**

4.1 Study Area Intersections and Roadway Segments ..... 18
4.2 Existing Traffic Controls and Intersection Geometrics ..... 18
4.3 Existing Traffic Volumes ..... 21
4.4 Existing Delay and Level of Service ..... 24
4.4.1 Existing Intersection Operations ..... 24
4.4.2 Existing Roadway Segment Operations ..... 25
4.4.3 Existing Freeway Speeds ..... 25
4.5 Existing Bicycle, Pedestrian, and Transit Facilities ..... 27
4.5.1 Existing Bicycle Facilities ..... 27
4.5.2 Existing Pedestrian Facilities ..... 28
4.5.3 Existing Transit Facilities ..... 28

**5.0 PROJECT FUTURE TRAFFIC ..... 30**

5.1 Project Traffic ..... 30
5.1.1 Project Trip Generation ..... 30

5.1.2 Project Trip Distribution ..... 31
5.2 Existing Plus Project (2016) ..... 31
5.2.1 Ambient Growth Rate ..... 31
5.2.2 Existing Plus Project Traffic Volumes ..... 31
5.2.3 Existing Plus Project Level of Service ..... 31
5.2.4 Signal Warrant Analysis ..... 35
5.2.5 Impact Assessment ..... 36
5.3 Cumulative (2016) With and Without Project ..... 38
5.3.1 Other Approved or Proposed Development Projects ..... 38
5.3.2 Trip Generation for Other Approved or Proposed Development Projects ..... 38
5.3.3 Trip Distribution and Assignment of Other Development Projects ..... 40
5.3.4 Cumulative (2016) No Project Traffic Volumes and Level of Service ..... 40
5.3.5 Cumulative (2016) Plus Project Traffic Volumes and Level of Service ..... 43
5.3.6 Signal Warrant Analysis ..... 47
5.3.7 Impact Assessment ..... 47
5.4 Build-Out (2025) With and Without Project Traffic ..... 48
5.4.1 Description of Methodology ..... 48
5.4.2 Trip Generation, Distribution, and Assignment of Other Development Projects ..... 48
5.4.3 Build-Out (2025) No Project Traffic Volumes and Level of Service ..... 49
5.4.4 Build-Out (2025) Plus Project Traffic Volumes and Level of Service ..... 51
5.4.5 Signal Warrant Analysis ..... 55
5.4.6 Impact Assessment ..... 55

**6.0 MITIGATION MEASURES ..... 56**

6.1 Existing (2015) Plus Project ..... 56
6.2 Cumulative (2016) Plus Project ..... 56
6.3 Build-Out (2025) Plus Project ..... 56

**7.0 FINDINGS AND RECOMMENDATIONS ..... 57**

7.1 Improvements ..... 57
7.1.1 Proposed Improvements for Existing Plus Project Conditions ..... 57
7.1.2 Proposed Improvements for Cumulative Plus Project Conditions ..... 57
7.1.3 Proposed Improvements for Build-Out Plus Project Conditions ..... 57

7.2 Circulation and Site Access Recommendations ..... 57
7.2.1 On-Site Site Access ..... 57
7.2.2 Off-Site Site Access ..... 59

**8.0 PARKING DEMAND STUDY ..... 60**

8.1.1 City Code Requirements ..... 60
8.1.2 Transit Access ..... 60
8.1.3 Transit Oriented Developments (todS) ..... 60
8.1.4 National Parking Demand Research ..... 61
8.1.5 Transit Oriented Development Parking Research ..... 62
8.1.6 Southern California Parking Demand Research ..... 63
8.1.7 Recommended Project Parking Rate ..... 66

**9.0 LANE AND STRIPING STUDY ..... 67**

9.1.1 Access from University Avenue ..... 67
9.1.2 Access from Mission Inn Avenue and 9th Street ..... 67

# Appendices

Appendix A: Approved Scoping Agreement

Appendix B: Existing Traffic Counts

Appendix C: Existing (2015) Level of Service and Synchro Worksheets

Appendix D: Existing Plus Project (2016) Level of Service and Synchro Worksheets

Appendix E: Cumulative (2016) No Project Level of Service and Synchro Worksheets

Appendix F: Cumulative (2016) PLus Project Level of Service and Synchro Worksheets

Appendix G: Build-Out (2025) No Project Level of Service and Synchro Worksheets

Appendix H: Build-Out (2025) Plus Project Level of Service and Synchro Worksheets

Appendix I: Traffic Signal Warrants

## List of Figures

Figure 2-1 – Project Study Area ..... 11
Figure 2-2 – Project Site Plan ..... 12
Figure 4-1 – Existing (2015) Traffic Controls, Intersection Geometrics and Traffic Volumes ..... 22
Figure 4-2 – Copy of GP Circulation Element ..... 23
Figure 5-1 – Project Trip Distribution ..... 32
Figure 5-2 – Project Trip Assignment ..... 33
Figure 5-3 – Existing Plus Project (2016) Traffic Controls, Intersection Geometrics and Peak Hour Traffic Volumes ..... 37
Figure 5-4 – Locations of Other Approved or Proposed Development Projects ..... 39
Figure 5-5 – Cumulative (2016) No Project Traffic Controls, Intersection Geometrics and Peak Hour Traffic Volumes ..... 41
Figure 5-6 – Cumulative (2016) Plus Project Traffic Controls, Intersection Geometrics and Peak Hour Traffic Volumes ..... 44
Figure 5-7 – Build-Out (2025) No Project Traffic Controls, Intersection Geometrics and Peak Hour Traffic Volumes ..... 50
Figure 5-8 – Build-Out (2025) Plus Project Traffic Controls, Intersection Geometrics and Peak Hour Traffic Volumes ..... 52
Figure 8-1 – Parking Ratio Comparison. ..... 66
Figure 9-1 – University Avenue Driveway Access Exhibit ..... 68

## List of Tables

Table 3-1 Intersection Level of Service Criteria ..... 14
Table 3-2 City of Riverside Roadway Capacity(1) ..... 15
Table 3-3 Thresholds of significance for unsignalized intersections ..... 17
Table 4-1 Intersection Level of Sevice: Existing (2015) Conditions ..... 24
Table 4-2 Roadway Level of Sevice: Existing (2015) Conditions ..... 25
Table 5-1 Trip Generation Rates ..... 30
Table 5-2 Trip Generation Estimates ..... 31
Table 5-3 Intersection Level of Sevice: Existing Plus Project (2016) Conditions ..... 34
Table 5-4 Roadway Level of Sevice: Existing Plus Project (2016) Conditions ..... 35
Table 5-5 Approved or Proposed Development Projects List (2016) ..... 38
Table 5-6 Trip Generation Estimates for Other Development Projects (2016) ..... 40
Table 5-7 Intersection Level of Sevice: Cumulative (2016) No Project Conditions ..... 42
Table 5-8 Roadway Level of Sevice: Cumulative (2016) No Project Conditions ..... 43
Table 5-9 Intersection Level of Sevice: Cumulative (2016) Plus Project Conditions ..... 45
Table 5-10 Roadway Level of Sevice: Cumulative (2016) Plus Project Conditions ..... 46
Table 5-11 Trip Generation Estimates for Other Development Projects (2025) ..... 48
Table 5-12 Intersection Level of Sevice: Build-Out (2025) No Project Conditions ..... 49
Table 5-13 Roadway Level of Sevice: Build-Out (2025) No Project Conditions ..... 51
Table 5-14 Intersection Level of Sevice: Build-Out (2025) Plus Project Conditions ..... 53
Table 5-15 Roadway Level of Sevice: Build-Out (2025) Plus Project Conditions ..... 54
Table 7-1 Intersection Level of Sevice: Project Access Driveways ..... 58
Table 8-1 ULI Parking Ratios ..... 61
Table 8-2 CUTR Parking Ratios ..... 62
Table 8-3 Parking Ratios in TODs Across The United States ..... 63
Table 8-4 Parking Occupancy Counts ..... 65
Table 8-5 Mission Lofts Parking Demand by Unit Type ..... 65

# 1.0 EXECUTIVE SUMMARY

Fehr & Peers has completed a transportation assessment for the proposed Mission Lofts project in Riverside, California. This Traffic Impact Analysis (TIA) was developed based on the requirements within the City of Riverside Traffic Impact Analysis Preparation Guide, (December 2014)

The proposed project consists of 212 apartments to be located on a site that is currently vacant. The project has a planned opening year of 2015. The project site is bisected by University Avenue and connected by a pedestrian bridge over University Avenue. The northern site (Project Site 1) contains all of the apartment units and 45% of the supplied on-site parking. Project Site 1 proposes to provide access driveways to Mission Inn Avenue and University Avenue. The southern site (Project Site 2), contains the remaining parking supply. Project Site 2 proposes to provide an access driveway at the existing intersection of 9$^{th}$ Street and the Metrolink parking lot driveway. The project site is adjacent to the Riverside Downtown Metrolink Station and is considered a Transit Oriented Development.

Future traffic forecasts were developed for each scenario identified below through the use of ambient growth rates and the City of Riverside's General Plan 2025 traffic demand model. The evaluation assessed 9 study intersections, two proposed driveways, and six study roadway segments. Intersections were evaluated using the Synchro level of service analysis software and is consistent with Highway Capacity Manual (HCM) 2010 methodologies.

As part of Fehr & Peers' assessment, the following scenarios were evaluated:

- Existing (2015) Conditions
- Existing Plus Project (2016) Conditions
- Cumulative (2016) Conditions
- Cumulative (2016) Plus Project Conditions
- Build Out (2025) Conditions
- Build Out (2025) Plus Project Conditions

The results of the traffic analysis indicate that none of the study locations were significantly impacted by the proposed project traffic. The proposed driveway on University Avenue is forecasted to operate at LOS F during the PM peak hour under Build Out (2025) Plus Project Conditions. The project sponsor should ensure that there is enough space for vehicles to queue in anticipation of a congested southbound left turn movement.

# 2.0 INTRODUCTION

## 2.1 PURPOSE AND OBJECTIVES

The purpose of the report is to summarize the findings of the transportation analyses completed for the proposed residential development project located on the north east and south east corners of University Avenue and Commerce Street and to identify needed improvements to ensure study area intersections operate at an acceptable level of service. This Transportation Impact Analysis (TIA) was developed based on the requirements within the City of Riverside Traffic Impact Analysis Preparation Guide, (December 2014) and input from the City of Riverside.

The objectives include the following:

- Document existing traffic, bicycle, pedestrian, and transit conditions within the study area.
- Evaluate traffic conditions at Project Completion (2016) and General Plan Build-Out (2025)
- Determine if any transportation improvements are needed to achieve the City of Riverside level of service requirements.
- Discuss the adequacy pf site access and on-site circulation.
- Discuss the adequacy of the proposed on-site parking
- Discuss impacts to non-motorized travel.

The approved Scoping Agreement is included in Appendix A.

## 2.2 SITE LOCATION AND STUDY AREA

The proposed project site is vacant and located within the City of Riverside at the northeast and southeast corners of the Commerce Street and University Avenue intersection. This location is east of State Route (SR)-91 and the railroad tracks and west of I-215 and the University of California, Riverside.

The project study area was established based on discussions with staff at the City of Riverside and covers the area adjacent to the project which would be utilized by project traffic. The project study area is shown on Figure 2-1.

## 2.3 DEVELOPMENT PROJECT DESCRIPTION

The proposed project consists of 212 apartments to be located on a site that is currently vacant. The project site is currently zoned as a Business and Manufacturing Park Zone and General Industrial. The proposed project will require the site to be rezoned to Multiple-Family Residential. The gross site area for the proposed development is 4.69 acres. The project site plan is shown on Figure 2-2 and has a planned opening year of 2015.

The project site is bisected by University Avenue and connected by a pedestrian bridge over University Avenue. The northern site, referred to as Project Site 1 in this study, contains all of the apartment units and 45% of the supplied on-site parking. Project Site 1 proposes to provide access driveways to Mission Inn Avenue (Driveway 1) and University Avenue (Driveway 2). The southern site, referred to as Project Site 2 in this study, contains the remaining parking supply. Project Site 2 proposes to provide an access driveway at the existing intersection of 9$^{th}$ Street and the Metrolink parking lot driveway.

The project site is located adjacent to the Riverside Downtown Metrolink Station. Given the site's close proximity to transit access, it is considered a transit oriented development (TOD).

## 2.4 ANALYSIS SCENARIOS

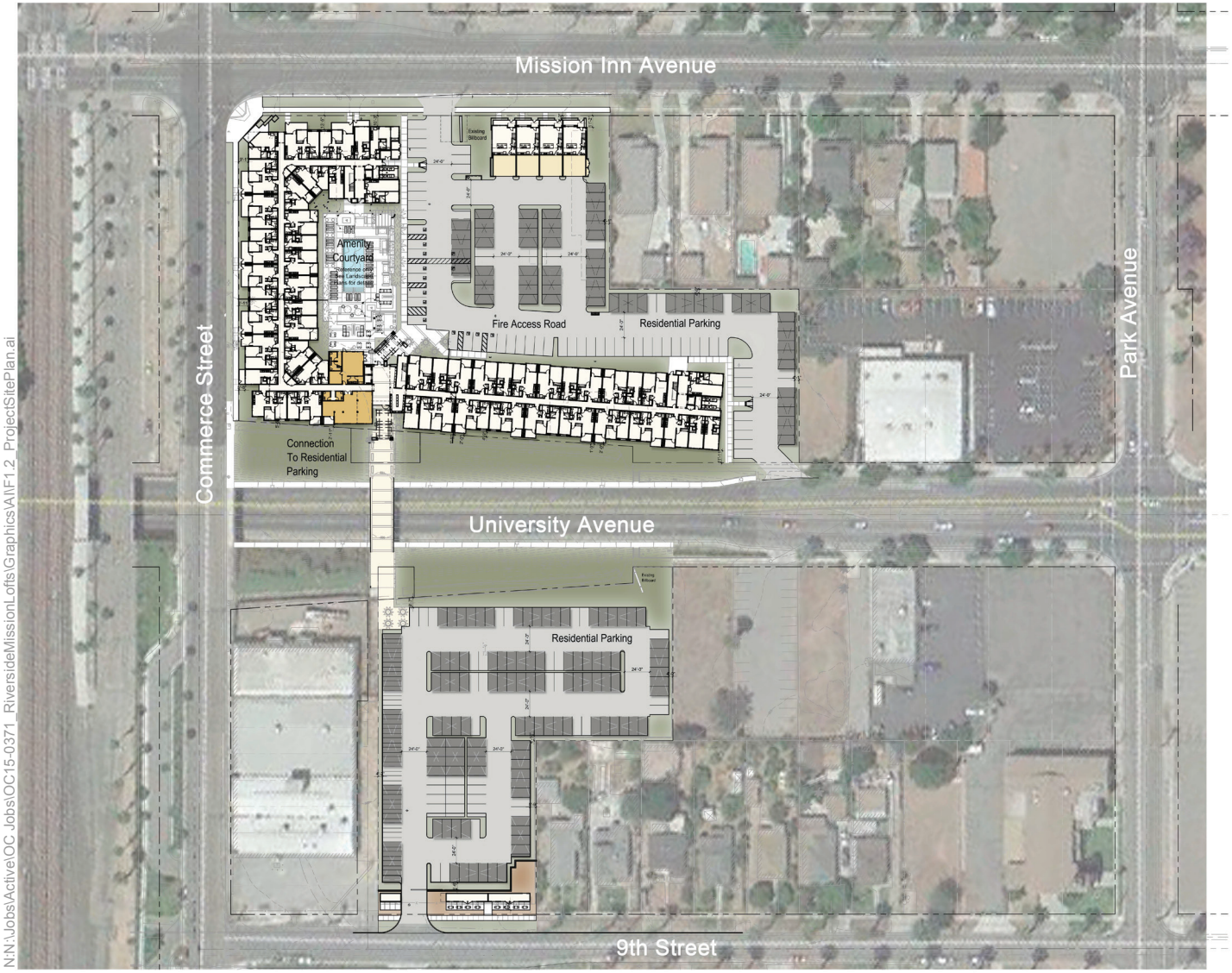
To identify significant project impacts, the following six scenarios were evaluated:

- Existing (2015) – Consists of existing traffic counts collected in the study area in February 2015.
- Existing Plus Project (2016) – Consists of applying an ambient growth rate of 2% per year to the existing traffic counts until the assumed opening year, then adding traffic generated by the proposed project. Also known as Existing Plus Ambient Plus Project or Project Completion.
- Cumulative (2016) – Consists of applying an ambient growth rate of 2% per year to the existing traffic counts until the assumed opening year, then adding traffic generated by other approved and/or pending projects in the study area.
- Cumulative (2016) Plus Project – Consists of adding traffic generated by the proposed project to the Cumulative (2016) scenario.
- Build Out (2025) – Consists of traffic volumes based on the City of Riverside's General Plan 2025 traffic model. Growth rates were developed from link-level daily traffic volumes (provided by the City staff) and existing 24-hour roadway segment counts. These growth rates were then applied to existing traffic counts collected in the study area and added with traffic generated by other approved and/or pending projects.
- Build Out (2025) Plus Project – Consists of adding traffic generated by the proposed project to the Build Out (2025) scenario.

# Study Intersections  Analyzed Segments  Driveways

Figure 2-1

## Project Study Area




| Project Data | | | |
|---|---|---|---|
| Project | Mission Lofts<br>Riverside, CA | | |
| Site Area Information | | | |
| Parcel North | Gross Site Area | 3.16 AC | |
| Parcel South | Gross Site Area | 1.53 AC | |
| Total | Gross Site Area | 4.69 AC | |
| | Total Dwelling Units | 212 DU | |
| | Density | 45.2 DU/AC | |

| Building Plan Summary | Type V Construction |
|---|---|
| Building A | 4 Story Residential on Grade |
| Building B | 2 Story Residential on Grade |
| Building A | 208 DU |
| Building B | 4 DU |
| **Total** | **212 DU** |

| Unit Plan | Unit Type | Gross SF | Total | Percent |
|---|---|---|---|---|
| Plan 0-1 | Studio | 459 | 51 | 24.1% |
| Plan 0-2 | Studio | 639 | 1 | 0.5% |
| Plan 1-0 | 1 Bd / 1 Ba | 624 | 16 | 7.5% |
| Plan 1-1 | 1 Bd / 1 Ba | 657 | 4 | 1.9% |
| Plan 1-2 | 1 Bd / 1 Ba | 661 | 52 | 24.5% |
| Plan 1-3 | 1 Bd / 1 Ba | 739 | 2 | 0.9% |
| Plan 1-4 | 1 Bd / 1 Ba | 828 | 3 | 1.4% |
| Plan 2-0 | 2 Bd / 2 Ba | 888 | 73 | 34.4% |
| Plan 2-1 | 2 Bd / 2 Ba | 952 | 6 | 2.8% |
| Plan 2-2 | 2 Bd / 2 Ba | 1,177 | 4 | 1.9% |
| **Totals** | | | **212** | **100%** |
| Average Unit Size | | 709 SF | | |
| Studio Plan | | | 52 | 25% |
| 1 Bedroom Plan | | | 77 | 36% |
| 2 Bedroom Plan | | | 83 | 39% |
| Totals | | | 212 | 100% |

| Residential Parking Provided | |
|---|---|
| Parcel North Parking | |
| Covered Parking | 67 stalls |
| Open Parking | 79 stalls |
| Total Parcel North Parking | 146 stalls |
| Parcel South Parking | |
| Covered Parking | 124 stalls |
| Open Parking | 50 stalls |
| Total Parcel South Parking | 174 stalls |
| Total Covered Parking | 191 stalls |
| Total Open Parking | 129 stalls |
| **Total Stalls Provided** | **320 stalls** |
| **Parking Ratio** | **1.51 stalls per unit** |

Carport Parking

N:N:\Jobs\Active\OC_Jobs\OC15-0371_RiversideMissionLofts\Graphics\A\F1.2_ProjectSitePlan.ai

Figure 2-2

# Project Site Plan

# 3.0 ANALYSIS METHODOLOGIES

## 3.1 LEVEL OF SERVICE CRITERIA

### 3.1.1 INTERSECTION LEVEL OF SERVICE

Fehr & Peers' analysis of intersections employs a methodology based on empirical research conducted by the Transportation Research Board (TRB) and other authorities. Signalized and unsignalized intersection operations were evaluated using methodologies provided in Highway Capacity Manual (HCM) 2010 (TRB) and are consistent with the City of Riverside Traffic Impact Analysis Preparation Guide, (December 2014) requirements.

The HCM 2010 methodology for signalized and all-way stop-controlled intersections estimates the average control delay for the vehicle at the intersection. For side-street stop-controlled intersections, the methodology estimates the control delays for each turning movement and identifies the delay for the longest delayed approach (if there is a shared lane, delay is averaged for all turning movements from that lane). After the quantitative delay estimates are complete, the methodology assigns a qualitative letter grade that represents the operations of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). LOS E represents at-capacity operations. Descriptions of the LOS letter grades for signalized and unsignalized intersections are provided in Table 3-1.

The Synchro 8 software package was used to facilitate the HCM 2010 calculations. A base saturation flow rate of 1900 pc/hr/ln was assumed per the City of Riverside Traffic Impact Analysis Preparation Guide, (December 2014). Existing traffic signal timing parameters from timing sheets were used for signalized intersections wherever possible. Peak hour factors were measured as part of the data collection process and are used in the analysis.

**TABLE 3-1**
**INTERSECTION LEVEL OF SERVICE CRITERIA**

| Level of Service | Description | Signalized Delay (Seconds) | Unsignalized Delay (Seconds) |
|---|---|---|---|
| A | Progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay. | ≤ 10.0 | ≤ 10.0 |
| B | Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay. | > 10.0 to 20.0 | > 10.0 to 15.0 |
| C | Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping. | > 20.0 to 35.0 | > 15.0 to 25.0 |
| D | The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable. | > 35.0 to 55.0 | > 25.0 to 35.0 |
| E | This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. | > 55.0 to 80.0 | > 35.0 to 50.0 |
| F | This level is considered unacceptable with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels. | > 80.0 | > 50.0 |

Source: *Highway Capacity Manual* (Transportation Research Board, 2010).

### 3.1.2 ROADWAY SEGMENT LEVEL OF SERVICE

Roadway segment operations are evaluated by comparing the project traffic volumes to the level of service thresholds identified in the City of Riverside traffic impact analysis guidelines. The roadway capacity tables are provided below in Table 3-2.

**TABLE 3-2**
**CITY OF RIVERSIDE ROADWAY CAPACITY(1)**

| Roadway Classification | Number of Lanes | Two-Way Traffic Volume (ADT)(2) | | |
|---|---|---|---|---|
| | | Service Level C | Service Level D | Service Level E |
| Local | 2 | 2,500-2,799 | 2,800-3,099 | 3,100+ |
| Collector (66' or 80') | 2 | 9,900-11,199 | 11,200-12,499 | 12,500+ |
| Arterial(3) | 2 | 14,400-16,199 | 16,200-17,999 | 18,000+ |
| Arterial (88') | 4 | 16,800-19,399 | 19,400-21,199 | 22,000+ |
| Arterial (100') | 4 | 26,200-29,599 | 29,600-32,999 | 33,000+ |
| Arterial (120') | 6 | 38,700-44,099 | 44,100-49,499 | 49,500+ |
| Arterial (144') | 8 | 50,600-57,799 | 57,800-64,999 | 65,000+ |

Source: *City of Riverside Traffic Impact Analysis Preparation Guide, December 2014*
Notes:
(1) All capacity figures are based on optimum conditions and are intended as guidelines for planning purposes
(2) Maximum two-way ADT values are based on the 1999 Modified Highway Capacity Manual Level of Service Tables
(3) Two-lane roadways designated as future arterials that conform to arterial design standards for vertical and horizontal alignments are analyzed as arterials.

## 3.2 PERFORMANCE CRITERIA AND THRESHOLDS OF SIGNIFICANCE

### 3.2.1 CITY OF RIVERSIDE PERFORMANCE CRITERIA

The City of Riverside Level of Service standards are described in Exhibit F of the City of Riverside Traffic Impact Analysis Preparation Guide, (December 2014):

City of Riverside allows Level of Service (LOS) D to be used as the acceptable threshold for the study intersections and roadways of Collector or higher classification. For projects in conformance with the General Plan, a significant impact occurs at a study intersection when the peak hour LOS falls below D or E per CCM-2.3 as noted below. For projects that propose uses or intensities above that contained in the General Plan, a significant impact at a study intersection occurs when the addition of project related trips

causes either peak hour LOS to degrade from acceptable (LOS A through D) to unacceptable levels (E or F) or the peak hour delay to increase as follows:

| | | |
|---|---|---|
| LOS A/B | = | By 10.0 seconds |
| LOS C | = | By 8.0 seconds |
| LOS D | = | By 5.0 seconds |
| LOS E | = | By 2.0 seconds |
| LOS F | = | By 1.0 seconds |

Policy CCM-2.3:

Maintain LOS D or better on Arterial Streets wherever possible. At key locations, such as City Arterials that are used by regional freeway bypass traffic and at heavily traveled freeway interchanges, allow LOS E at peak hours as the acceptable standard on a case-by-case basis.

For unsignalized intersections, a significant impact at a study location occurs when the above criteria is satisfied in addition to meeting the requirements for a traffic signal based on a traffic signal warrant analysis.

### 3.2.2 THRESHOLDS OF SIGNIFICANCE

Based on the performance criteria stated above, a significant impact would occur if project related traffic causes the following:

**Signalized Intersections**

- The level of service at a City of Riverside intersection degrades from LOS D or better to LOS E or LOS F; or
- The delay at a study intersection in the City of Riverside increases, as noted below:
    - LOS A/B = By 10.0 seconds
    - LOS C = By 8.0 seconds
    - LOS D = By 5.0 seconds
    - LOS E = By 2.0 seconds
    - LOS F = By 1.0 seconds

**Unsignalized Intersections**

- The level of service criteria for a significant impact as described for signalized intersections is satisfied; and
- The peak hour warrant for traffic signal installation is satisfied.

Table 3-3 shows how significant impacts are classified for unsignalized locations.

**TABLE 3-3**
**THRESHOLDS OF SIGNIFICANCE FOR UNSIGNALIZED INTERSECTIONS**

| LOS Criteria Met for Significant Impact | Satisfies Traffic Signal Warrant | Significant Impact? |
|---|---|---|
| No | No | No |
| **Yes** | No | No |
| No | **Yes** | No |
| **Yes** | **Yes** | **Yes** |

**Roadway Segments**

- The level of service on a roadway segment degrades from LOS D or better to LOS E or F; or
- The project increases the V/C ratio of the roadway segment by more than 0.02.

# 4.0 AREA CONDITIONS

## 4.1 STUDY AREA INTERSECTIONS AND ROADWAY SEGMENTS

Nine (9) study intersections were identified for this analysis based on Fehr & Peers knowledge of the study area and input from staff at the City of Riverside. These locations are listed below and are shown on Figure 2-1.

1. SR-91 Westbound Off Ramp and Mission Inn Avenue
2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue
3. Lime Street and University Avenue
4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue
5. Lime Street and 9th Street
6. Commerce Street and Mission Inn Avenue
7. Lime Street and 10th Street/SR-91 Westbound On Ramp
8. Park Avenue and University Avenue
9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1

Six (6) roadway segments were identified for this analysis. The locations are listed below and shown on Figure 4-2.

1. University Avenue between Lemon Street and Lime Street
2. Lime Street between 9th Street and University Avenue
3. Mission Inn Avenue between Vine Street and Commerce Street
4. University Avenue between Santa Fe Street and Commerce Street
5. Commerce Street between University Avenue and Mission Inn Avenue
6. University Avenue between Park Avenue and Victoria Avenue

## 4.2 EXISTING TRAFFIC CONTROLS AND INTERSECTION GEOMETRICS

Figure 4-1 identifies the existing roadway conditions for the study area. The existing intersection traffic controls and geometrics are also identified.

Regional access to the project site is provided by I-215 and SR-91. Local access is provided by University Avenue, Lime Street, Mission Inn Avenue, and other roadways including 10th Street and Commerce Street. Roadways in the study area are classified per the City of Riverside General Plan and described in detail below.

**Regional Roads**

Interstate 215 (I-215): Interstate 215 is an interstate highway that runs in the north-south direction from Murrieta at the southern terminus to San Bernardino at the northern terminus. I-215 is located directly north of the project site and is a 6 lane facility (3 in each direction). Access is provided via SR-91.

State Route 91 (SR-91): State Route 91 is a major east-west freeway within Southern California and runs from Vermont Avenue in Gardena to Riverside at the junction of State Route 60 and Interstate 215. SR-91 is located directly west of the project site and is a 6 lane facility (3 in each direction). Access is provided via I-215 and multiple on ramps throughout Riverside.

**Local Access Roads**

University Avenue: University Avenue is classified as a 100 foot Arterial from Mt. Rubidoux Drive to Park Avenue includes the project frontage. In addition, University Avenue is classified as a 110 foot Arterial from Park Avenue to Kansas Ave and as a 100 foot Arterial from Kansas Avenue to Canyon Crest Drive. University Avenue is classified as a scenic boulevard with parkways in the City of Riverside's General Plan. Adjacent to the project site, University Avenue has two lanes in each direction with no median, but it has a median east of Park Avenue. It runs east-west and is directly south of Project Site 1 and directly north of Project Site 2. There is no on-street parking allowed on University Avenue, but there are Class 2 Bikeways. East of SR-91, the speed limit on University Avenue is 35 miles per hour and west of SR-91, the speed limit ranges from 25 to 40 miles per hour.

Commerce Street: Adjacent to the project site, Commerce Street is classified as a local street in the City of Riverside's General Plan. Commerce Street has one travel lane in each direction and has no median. This roadway runs in the northeast-southwest direction and is located directly west of the project site. On-street parking is allowed next to the project site. There is no posted speed limit.

Mission Inn Avenue: Mission Inn Avenue is classified as a 100 foot Arterial between Mt. Rubidoux Drive and Park Avenue, which is the section the project site is located, and as a 110 foot Arterial between the Riverside City Limit and Mt. Rubidoux Drive. Mission Inn Avenue consists of one travel lane in each direction separated by a two way left turn lane and runs in the east-west direction. On-street parking is permitted on Mission Inn Avenue. The speed limit is 35 miles per hour next to the project site and is 25 miles per hour from Market Street to Lime Street.

Park Avenue: Park Avenue is classified as a 66 foot Arterial between University Avenue and its terminus north of 3rd Street and is a local street south of University Avenue. Park Avenue consists of one travel lane in each direction and there is no median. This roadway runs in the northeast-southeast direction and is located east of the project site. On-street parking is permitted only on the eastern side of the street north of Mission Inn Avenue. There is no posted speed limit.

9th Street: 9th Street is classified as a local street in the City of Riverside General Plan and runs between Mt. Rubidoux Drive and Chestnut Street, Market Street and SR-91, and Commerce Street and Kansas Avenue. It consists of one travel lane in each direction and has no median. This roadway runs in the east-west direction and the portion between Commerce Street and Kansas Avenue is adjacent to the southern side of the project site while the portion of 9th Street between Market Street and SR-91 is a part of a study intersection with Lime Street. On-street parking is permitted on 9th Street. There is no posted speed limit.

10th Street: Between Market Street and the SR-91 Westbound On Ramp, 10th Street is classified as an 88 foot Arterial in the City of Riverside General Plan. This roadway has one travel lane in each direction with no median and on-street parking is permitted. 10th Street runs in the east-west direction and is located west of the project site. There is no posted speed limit. There is a separate portion of 10th Street located south of the project site between Commerce Street and Kansas Avenue that is classified as a local street. This portion has one travel lane in each direction with no median, allows on-street parking, and has no posted speed limit.

Lime Street: Lime Street is classified as an 88 foot Arterial in the City of Riverside General Plan. It runs in the northeast-southwest direction and is located west of the project site. Lime Street consists of two lanes in each direction and there is no median. There is no on-street parking allowed on Lime Street. The speed limit is 35 miles per hour.

Mulberry Street: Mulberry Street is classified as a local street between Mission Inn Avenue and University Avenue. It runs in the northeast-southwest direction and is a one-way street to the southwest direction. The SR-91 Eastbound On-Ramp is located at the northern end of Mulberry Street and the SR-91 Eastbound Off-Ramp is located at the southern end of Mulberry Street. On-street parking is permitted for two hours on the west side of Mulberry Street. There is no posted speed limit.

Lemon Street: Lemon Street is classified as a local street in the City of Riverside General Plan. It runs in the northeast-southwest direction and is located west of the project site. Lemon Street consists of two one-way lanes in the northeast direction and there is no median. On-street parking is permitted. The posted speed limit is 30 miles per hour.

Vine Street: Vine Street is classified as a local street in the City of Riverside General Plan. It runs in the northeast-southwest direction and is located west of the project site. Vine Street consists of one lane in the each direction and there is no median except south of Jack B. Clarke Street. On-street parking is permitted between Mission Inn Avenue and 3rd Street. The posted speed limit is 25 miles per hour.

Victoria Avenue: Victoria Avenue is classified as a local street in the City of Riverside General Plan. It runs in the northeast-southwest direction and is located southeast of the project site. Victoria Avenue consists of one lane in the each direction and there is no median near the project site. On-street parking is permitted. The posted speed limit is 25 miles per hour when children are present.

## 4.3 EXISTING TRAFFIC VOLUMES

Fehr & Peers collected existing traffic counts in February 2015 at study intersections during the morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak hours. 24-Hour roadway segment counts were also collected at this time.

Figure 4-1 summarizes the existing intersection turning movement volumes for the AM and PM peak hour and is used to represent Existing Conditions. Existing traffic count data is provided in Appendix B.

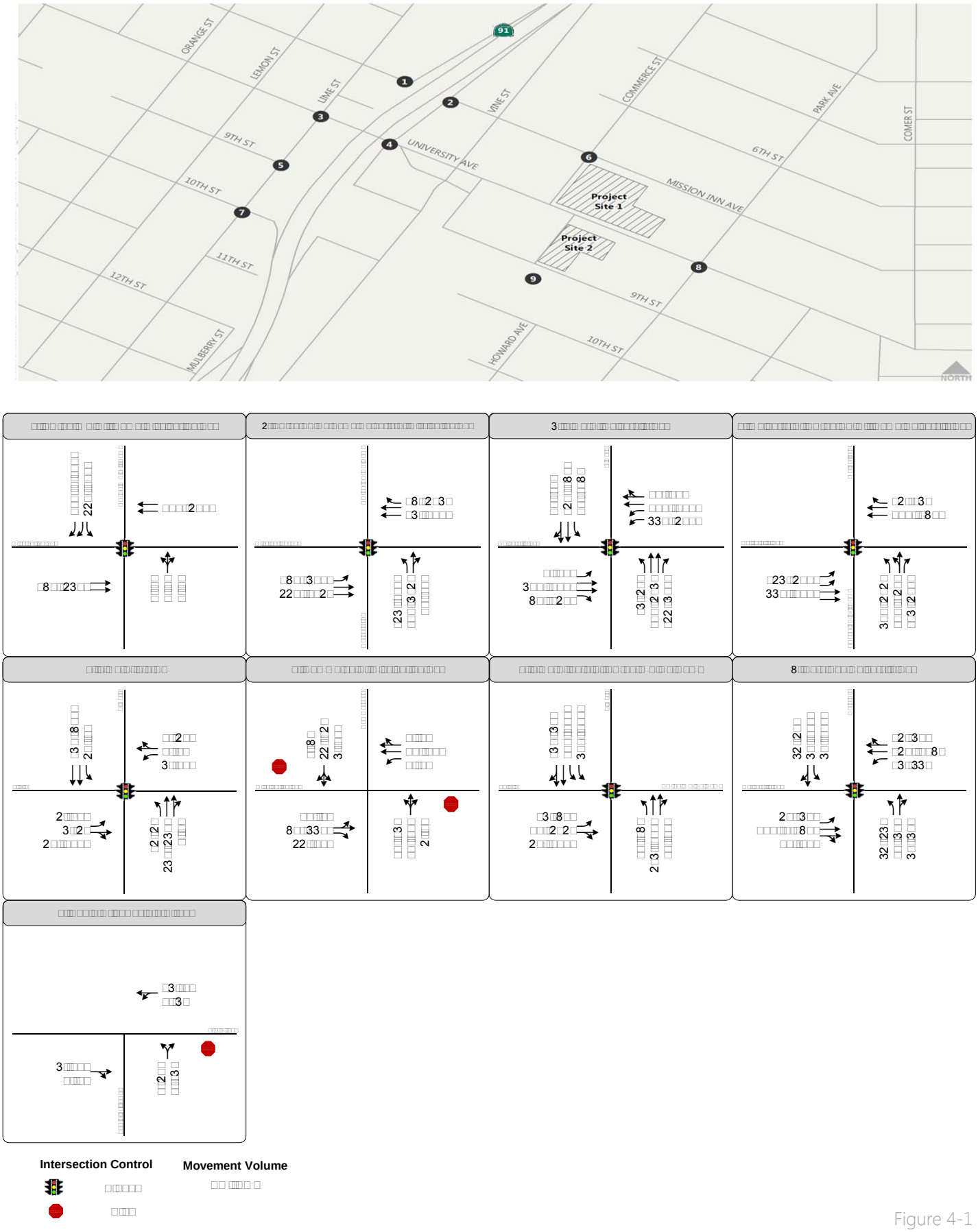
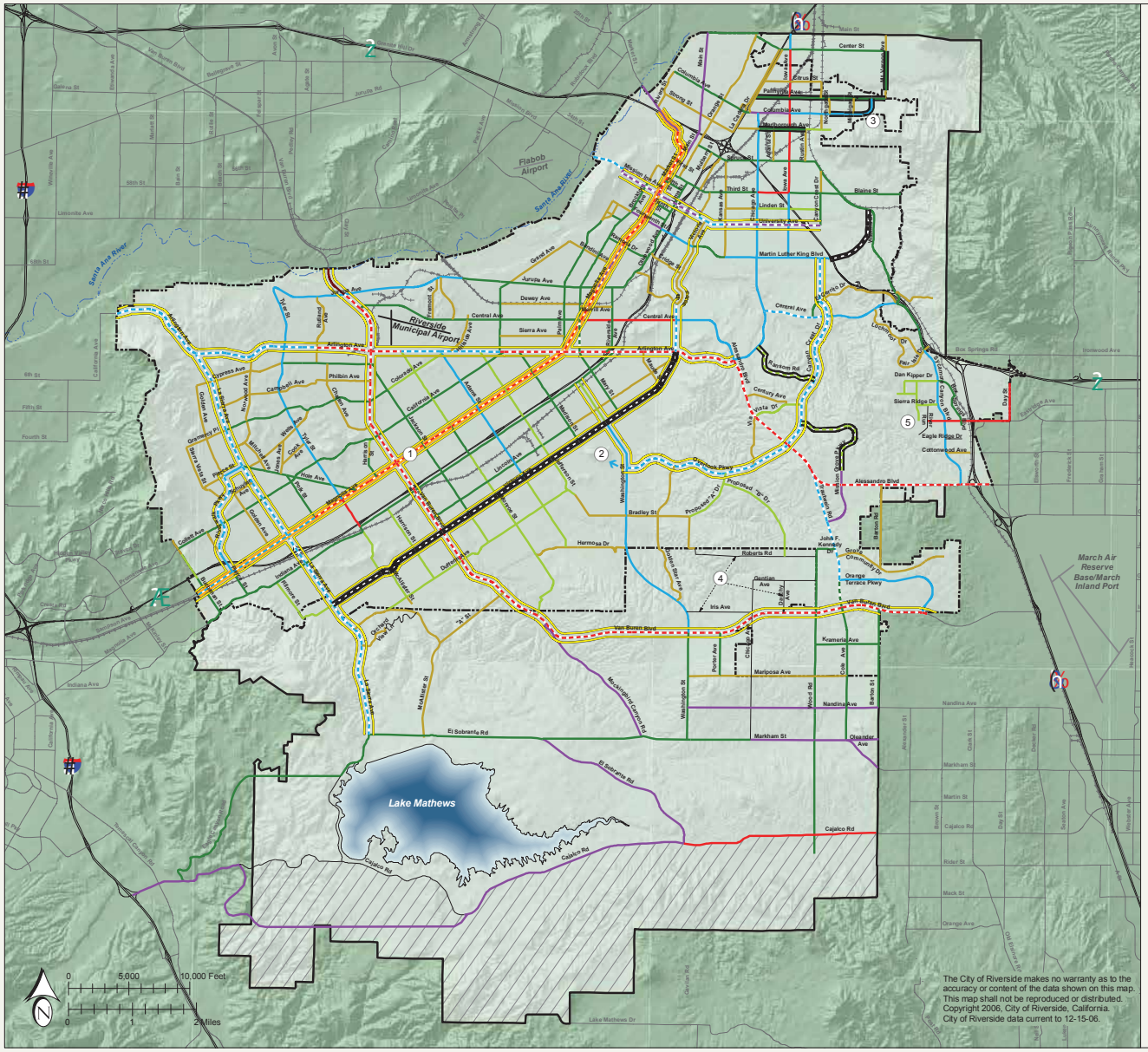



Figure 4-1

Traffic Controls, Intersection Geometrics, and Peak Hour Traffic Volumes
Existing (2015)




CITY OF RIVERSIDE
GENERAL PLAN 2025

**LEGEND**

| | | |
|---|---|---|
| | 66 FT LOCAL | 2 LANES * |
| | 66 FT COLLECTOR | 2 LANES |
| | 80 FT COLLECTOR | 2 LANES |
| | 88 FT ARTERIAL | 4 LANES |
| | 100 FT ARTERIAL | 4 LANES |
| | 110 FT ARTERIAL | 4 LANES |
| | 120 FT ARTERIAL | 6 LANES |
| | 144 FT ARTERIAL | 8 LANES |

SCENIC BOULEVARD
REQUIRES SPECIAL LANDSCAPING, ADDITIONAL RIGHT-OF-WAY MAY BE REQUIRED.

SPECIAL BOULEVARD
TWO-LANE DIVIDED ROADWAY OF VARIABLE GEOMETRIC DESIGN

SPECIAL BOULEVARD
VARIABLE WIDTHS AND DESIGN, CONTACT PUBLIC WORKS FOR DETAIL. SEE OBJECTIVE CCM-3 AND POLICIES CCM-3.1 THROUGH CCM-3.5.

PARKWAYS
FOR INFORMATION ON PARKWAYS SEE LAND USE ELEMENT.

CETAP CORRIDOR AREA
CORRIDOR OPTIONS SUBJECT TO SPECIAL STUDY.

RIVERSIDE CITY BOUNDARY

RIVERSIDE PROPOSED SPHERE OF INFLUENCE

**NOTE:**

* LOCAL STREETS ARE NOT SHOWN ON THIS PLAN EXCEPT WHERE NEEDED FOR CLARITY.

1. MAGNOLIA AVENUE SHALL BE A SPECIAL BLVD, WITH 4 LANES EASTERLY OF HARRISON STREET.
2. OVERLOOK PARKWAY SHALL BE A 2-LANE, 110-FOOT ARTERIAL WITH A WIDE MEDIAN PARKWAY. THE ALIGNMENT OF OVERLOOK PARKWAY WESTERLY OF WASHINGTON IS NOT YET DETERMINED PENDING PREPARATION OF SPECIFIC PLAN LEVEL STUDY.
3. COLUMBIA AVENUE IS SHOWN BY HUNTER BUSINESS PARK SPECIFIC PLAN AS A 134-FOOT ARTERIAL. ACTUAL STREET WIDTH, DUE TO RAILROAD OVERCROSSING , WILL BE DETERMINED BY PUBLIC WORKS.
4. THESE STREETS SHALL BE 66-FOOT LOCAL ROADWAYS SERVING AS ALTERNATE ROUTES.
5. THE STREETS IN SYCAMORE CANYON BUSINESS PARK SPECIFIC PLAN VARY IN SIZE. SEE THE SPECIFIC PLAN FOR DETAILS.

SOURCE: CITY OF RIVERSIDE

Figure CCM-4
**MASTER PLAN OF ROADWAYS**

Figure 4-2

Copy of the General Plan Circulation Element

## 4.4 EXISTING DELAY AND LEVEL OF SERVICE

### 4.4.1 EXISTING INTERSECTION OPERATIONS

Existing traffic volumes and lane configurations collected in the field were used to evaluate operations at the study intersections for existing AM and PM peak hour conditions. The results are summarized in Table 4-1. The Existing LOS report is provided in Appendix C.

**TABLE 4-1**
**INTERSECTION LEVEL OF SEVICE:**
**EXISTING (2015) CONDITIONS**

| Intersection | Control | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Delay | LOS | Delay | LOS |
| 1. SR-91 Westbound Off Ramp and Mission Inn Avenue | Signalized | 12.7 | B | 17.4 | B |
| 2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue | Signalized | 22.7 | C | 23.8 | C |
| 3. Lime Street and University Avenue | Signalized | 29.7 | C | 30.1 | C |
| 4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue | Signalized | 11.5 | B | 10.6 | B |
| 5. Lime Street and 9th Street | Signalized | 5.5 | A | 5.2 | A |
| 6. Commerce Street and Mission Inn Avenue | Side-Street Stop[1] | 10.1 | B | 14.5 | B |
| 7. Lime Street and 10th Street/SR-91 Westbound On Ramp | Signalized | 11.8 | B | 22.7 | C |
| 8. Park Avenue and University Avenue | Signalized | 11.8 | B | 17.0 | B |
| 9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 0.0 | A | 8.9 | A |

Notes:
1. Worst case movement delay is reported for side-street stop controlled intersections.

Source: Fehr & Peers, 2015

As shown in Table 4-1, all of the study intersections currently operate acceptably during the peak hours.

### 4.4.2 EXISTING ROADWAY SEGMENT OPERATIONS

Existing roadway segment operations are summarized in Table 4-2. Level-of-service values are based on the roadway capacity tables provided in Section 3.1.2.

**TABLE 4-2**
**ROADWAY LEVEL OF SEVICE:**
**EXISTING (2015) CONDITIONS**

| Roadway | Segment | Average Daily Traffic Volume | V/C[1] | LOS |
|---|---|---|---|---|
| 1. University Avenue | Between Lemon Street and Lime Street | 14,275 | 0.43 | C |
| 2. Lime Street | Between 9th Street and University Avenue | 14,283 | 0.65 | C |
| 3. Mission Inn Avenue | Between Vine Street and Commerce Street | 5,008 | 0.15 | C |
| 4. University Avenue | Between Santa Fe Street and Commerce Street | 19,986 | 0.61 | C |
| 5. Commerce Street | Between University Avenue and Mission Inn Avenue | 1,743 | 0.56 | C |
| 6. University Avenue | Between Park Avenue and Victoria Avenue | 19,896 | 0.60 | C |

Notes:
1. V/C is reported for informational purposes only. LOS is based on Table 3-1 in Section 3.1.1 according to the City of Riverside Traffic Impact Analysis Guidelines.

Source: Fehr & Peers, 2015

As shown in Table 4-2, all of the study roadway segments currently operate acceptably.

### 4.4.3 EXISTING FREEWAY SPEEDS

We have observed heavier levels of congestion in the area due to on-going construction on SR-91 when vehicles use University Avenue as a cut-through route. We utilized the INRIX database to report the level of congestion on SR-91 and SR-215 during the AM and PM peak hours the day the intersection counts were conducted. INIRX aggregates data from multiple sources into a package of data and reports, primarily focused on speed data. The data is presented below as level of congestion, which is defined as percentage of free flow speed. The congestion plots show low levels of congestion in the AM peak hour and and some

heavier congestion during the PM peak hour. However, this level of congestion is typical at this interchange and is not considered severe.

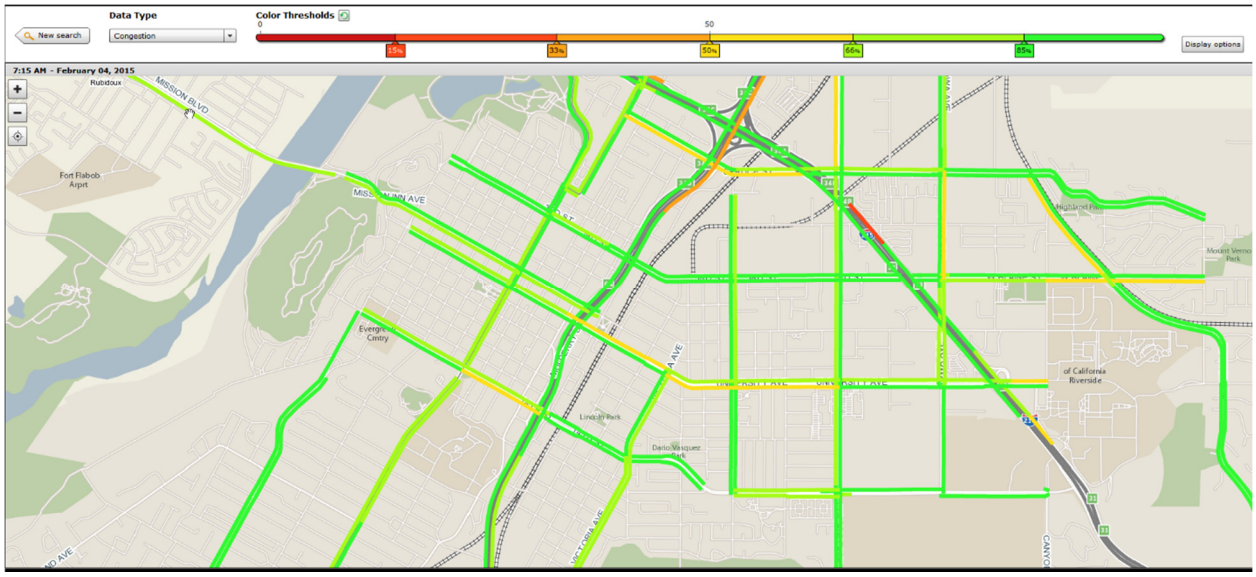



*Image 4 – 1 INRIX AM Peak Speed Data*

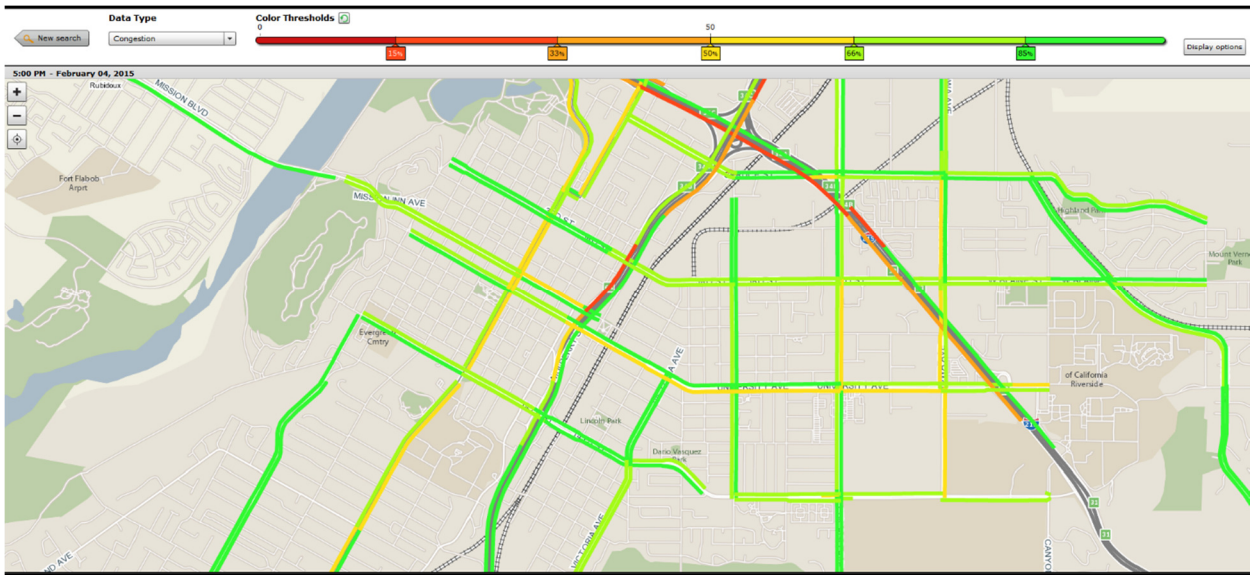



*Image 4-2 INRIX PM Peak Speed Data*

# 4.5 EXISTING BICYCLE, PEDESTRIAN, AND TRANSIT FACILITIES

## 4.5.1 EXISTING BICYCLE FACILITIES

Bicycle facilities are classified as follows:

**Class I - Bike Path or Bike Trail:**

Class I facilities are bicycle trails or paths that are essentially off street and separated from automobiles. They are a minimum of eight feet in width for two-way travel and include bike lane signage and designated street crossings where needed. A Class I Bike Path may parallel a roadway (within the parkway) or may be a completely separate right-of-way that meanders through a neighborhood or along a flood control channel or utility right-of-way.

**Class II - Bike Lane:**

Class II Bike Lanes can be either located next to a curb or parking lane. If located next to a curb, a minimum width of five feet is recommended. However, a Bike Lane adjacent to a parking lane can be four feet in width. Bike Lanes are exclusively for the use of bicycles and include bike lane signage, special lane lines, and pavement markings.

**Class III – Bike Route:**

This is a street providing for shared use by motor vehicles and bicyclists. While bicyclists have no exclusive use or priority, signage – both by the side of the street and stenciled on the roadway surface – alerts motorists to bicyclists sharing the roadway space and denotes that the street is an official bike route.

**Class IV – Cycle Track:**

Class IV bikeways are cycle tracks or separated bikeways that provide a right-of-way designated exclusively for bicycle travel adjacent to a roadway and are protected from vehicular traffic via separations (e.g. grade separation, flexible posts, inflexible physical barriers, on-street parking).

Near the project study area, Class II Bike Lanes currently exist along University Avenue east of Commerce Street.

The City of Riverside has a Bicycle Master Plan which was adopted in May 2007. It proposes bicycle lane/route facilities along Lime Street and University Avenue west of Commerce Street.

### 4.5.2 EXISTING PEDESTRIAN FACILITIES

Pedestrian facilities are generally complete in the immediate vicinity of the project site except on Commerce Street, where sidewalks are generally lacking or discontinuous.

### 4.5.3 EXISTING TRANSIT FACILITIES

The Riverside Transit Agency (RTA) provides local and regional transit service for the City of Riverside. Currently, eight RTA bus routes provide access to and from the project site.

- Route 1 (UCR to W. Corona Metrolink Station) – This route runs between the West Corona Metrolink Station and the University of California, Riverside (UCR) at Bannockburn and serves the Riverside Downtown Terminal, the Riverside-Downtown Metrolink Station, the Galleria at Tyler, and the Corona Transit Center. It runs between approximately 4:00 AM and 11:00 PM on weekdays, 5:30 AM and 11:00PM on Saturdays, and 6:00 AM and 10:00 AM on Sundays. Headways vary between 15 and 30 minutes.
- Route 10 (Big Springs & Watkins to Galleria at Tyler) – This route runs between the Galleria at Tyler and Big Springs & Watkins and serves the Brockton Arcade, the Riverside Downtown Terminal, and RTA Offices. It runs between approximately 5:30 AM and 10:00 PM on weekdays, 8:00 AM and 7:30 PM on Saturdays, and 8:30 AM and 7:00 PM on Sundays. Headways vary between 30 and 60 minutes.
- Route 14 (Galleria at Tyler to Loma Linda VA Hospital) – This route runs between the Galleria at Tyler to Riverside Downtown Terminal to Loma Linda VA Hospital and serves the Riverside Medical Clinic, Riverside Community College, and the California School for the Deaf. It runs between approximately 5:30 AM and 8:30 PM on weekdays and 7:00 AM and 7:30 PM on weekends. Headways vary between 60 and 70 minutes.
- Route 16 (Riverside Downtown Terminal to Moreno Valley Mall) – This route runs between the Riverside Downtown Terminal to Moreno Valley Mall and serves UCR, the Canyon Crest Towne Center, and the Canyon Springs Plaza. It runs between approximately 4:00 AM and 11:00 PM on weekdays, 6:00 AM and 10:00 PM on Saturdays, and 6:00 AM and 8:00 AM on Sundays. Headways vary between 25 and 30 minutes.
- Route 22 (Riverside Downtown Terminal to Lake Elsinore Outlet Center) – This route runs between the Riverside Downtown Terminal to the Lake Elsinore Outlet Center and serves Lake Elsinore, Mead Valley, and Woodcrest. It runs between approximately 5:00 AM and 10:30 PM on weekdays, 6:00 AM and 8:00 PM on Saturdays, and 6:00 AM and 8:00 PM on Sundays. Headways are generally 60 minutes.

- Route 208 – This route runs between the Riverside Downtown Terminal to the Promenade Mall in Temecula and serves Murrieta, Sun City, Perris, and Moreno Valley. It runs between approximately 4:00 AM and 9:15 PM on weekdays. Headways vary between 30 and 60 minutes.
- Route 210/Sunline 220 (Riverside Downtown Terminal to Palm Desert) – This route runs between the Riverside Downtown Terminal to Palm Desert and serves Riverside City Hall and the Riverside County Administration Building. It runs between approximately 4:00 AM and 10:00 PM on weekdays. Headways vary between 30 and 60 minutes.
- Route 212 – This route runs between the Riverside Downtown Terminal to Mt. San Jacinto College and serves Riverside City Hall, the Riverside County Administration Building, and Hemet Valley Mall. It runs between approximately 4:00 AM and 8:00 PM on weekdays. Headways vary between 30 and 50 minutes.
- A future express bus service on University Avenue in proposed by RTA. The City is also undergoing a streetcar feasibility study along University Avenue.

**Train Routes**

- Amtrak Southwest Chief – This route runs between Chicago and Los Angeles and has stops in Arizona, New Mexico, Colorado, Kansas, Missouri, and Iowa. It stops in Riverside daily at approximately 5:53 AM and 7:33 PM.
- Metrolink Riverside Line – This route runs between the Riverside-Downtown Metrolink Station and Los Angeles Union Station and has stops in Pedley, East Ontario, Downtown Pomona, Industry, and Montebello/Commerce. It runs between approximately 4:45 AM and 8:00 PM on weekdays. Headways vary between 30 and 60 minutes.
- Metrolink 91 Line – This route runs between the Riverside-Downtown Metrolink Station and Los Angeles Union Station via Fullerton and has stops in Riverside-La Sierra, Corona, Fullerton, Buena Park, and Norwalk/Santa Fe Springs. It runs between approximately 5:30 AM and 7:00 AM on weekdays and between 7:40 AM and 10:40 AM and 3:15 PM and 8:55 PM on weekends. Headways vary between 30 and 120 minutes.
- Metrolink Inland Empire–Orange County Line – This route runs between San Bernardino and Oceanside and has stops in Riverside, Corona, Orange, Santa Ana, Tustin, Irvine, San Juan Capistrano, and San Clemente. It runs between approximately 5:00 AM and 8:00 PM on weekdays and between 7:30 AM and 7:15 AM on weekends. Headways vary between 30 and 90 minutes.

# 5.0 PROJECT FUTURE TRAFFIC

This section identifies the methodology utilized to calculate future traffic volumes within the study area for the future analysis scenarios. It then provides the intersection and roadway segment operations for those future analysis scenarios, signal warrant analysis, and impact assessment.

## 5.1 PROJECT TRAFFIC

### 5.1.1 PROJECT TRIP GENERATION

Traffic volumes expected to be generated by the proposed project during the AM peak hour, PM peak hour and on a daily basis were estimated using rates provided in the Trip Generation Manual, 9th Edition published by the Institute of Transportation Engineers (ITE). For the AM peak hour, the Peak Hour of Adjacent Street Traffic (One Hour between 7 and 9 AM) rate was used. For the PM peak hour, the Peak Hour of Adjacent Street Traffic (One Hour between 4 and 6 PM) rate was used.

Table 5-1 and Table 5-2 summarizes the anticipated daily, AM, and PM peak hour of trips generated by the proposed project.

**TABLE 5-1**
**TRIP GENERATION RATES**

| Land Use | ITE Code | Unit | Daily Rate | AM Peak Rate | | | PM Peak Rate | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Rate | In | Out | Rate | In | Out |
| Apartment | 220 | Dwelling Units | 6.65 | 0.51 | 20% | 86% | 0.62 | 65% | 35% |

Source: *Trip Generation, 9th Edition (Institute of Transportation Engineers, 2012)*

**TABLE 5-2**
**TRIP GENERATION ESTIMATES**

| Land Use | ITE Code | Size | Unit | Daily Trips | AM Peak Rate | | | PM Peak Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | In | Out | Total | In | Out | Total |
| Apartment | 220 | 212 | Dwelling Units | 1,410 | 22 | 86 | 108 | 85 | 46 | 131 |
| | | | **Total** | **1,410** | **22** | **86** | **108** | **85** | **46** | **131** |

Source: Fehr & Peers, 2015

### 5.1.2 PROJECT TRIP DISTRIBUTION

The project trip distribution has been reviewed and approved by City of Riverside staff and is shown on Figure 5-1. Project trip assignment is shown on Figure 5-2.

## 5.2 EXISTING PLUS PROJECT (2016)

### 5.2.1 AMBIENT GROWTH RATE

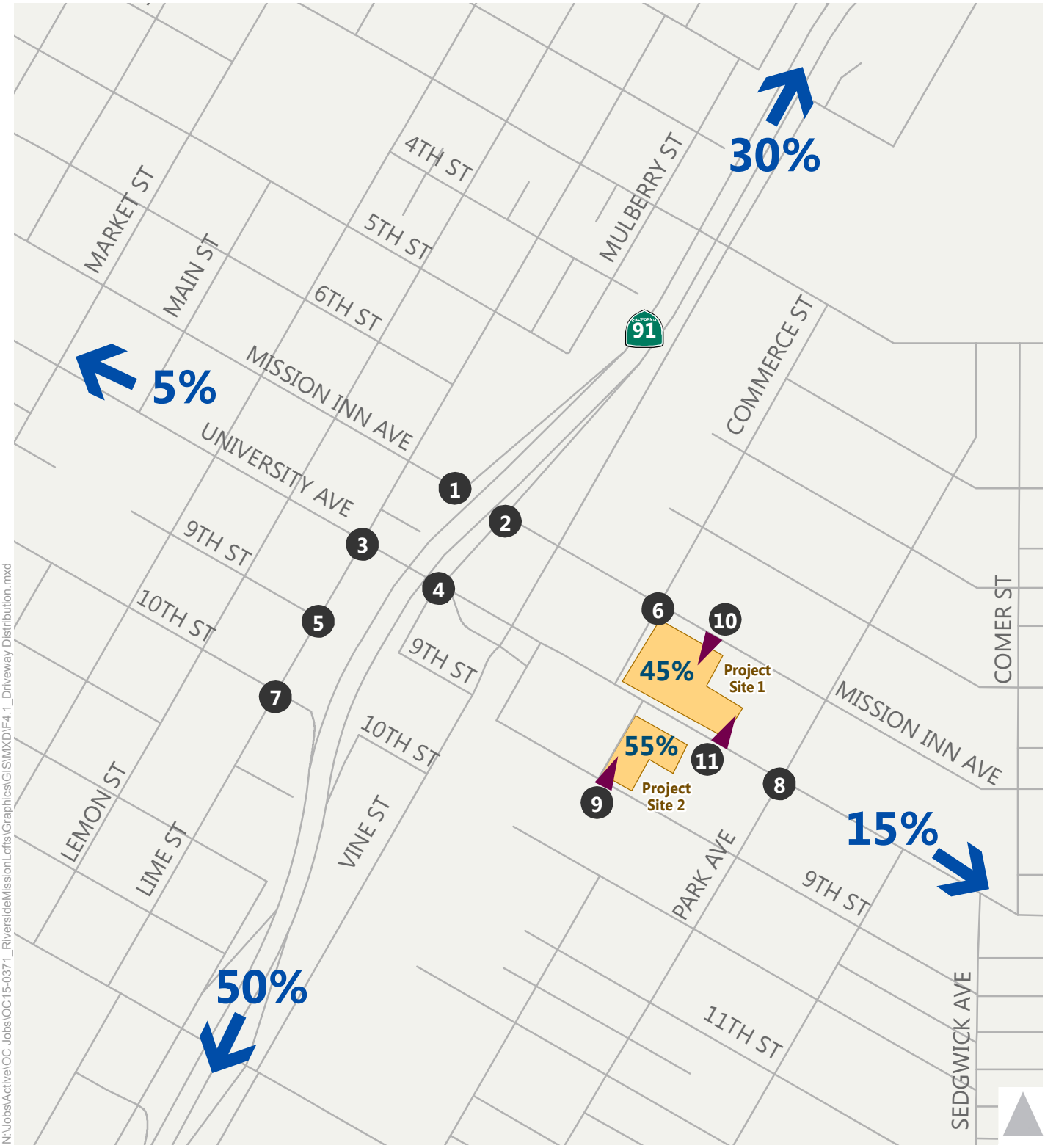
A 2% ambient growth rate has been used in this study to account for traffic not attributed to the project or other planned developments within the study area to derive year 2016 ambient growth traffic volumes. The City of Riverside staff has previously reviewed and approved this rate.

### 5.2.2 EXISTING PLUS PROJECT TRAFFIC VOLUMES

Existing Plus Project (2016) traffic volumes are forecasted by combining existing traffic volumes with the ambient growth rate and project traffic volumes. Figure 5-3 shows the Existing Plus Project (2016) AM and PM peak hour volumes.

### 5.2.3 EXISTING PLUS PROJECT LEVEL OF SERVICE

The results of the Existing Plus Project (2016) intersection operations are summarized in Table 5-3. The corresponding LOS reports are provided in Appendix D.



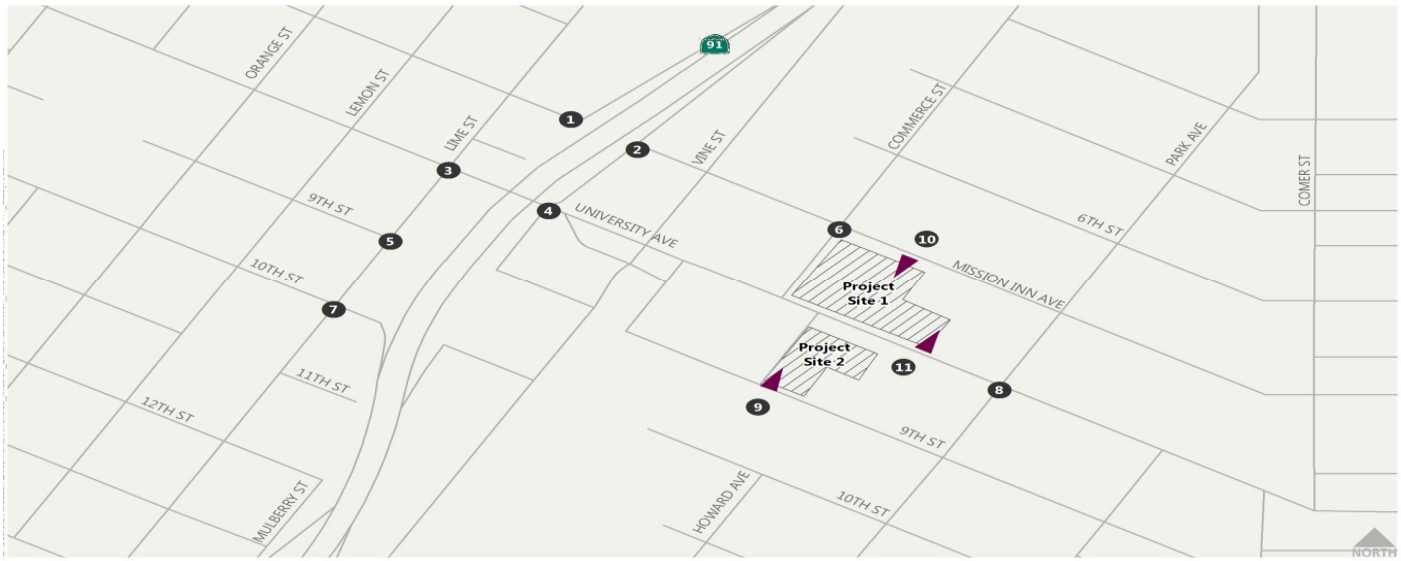

Trip Distribution

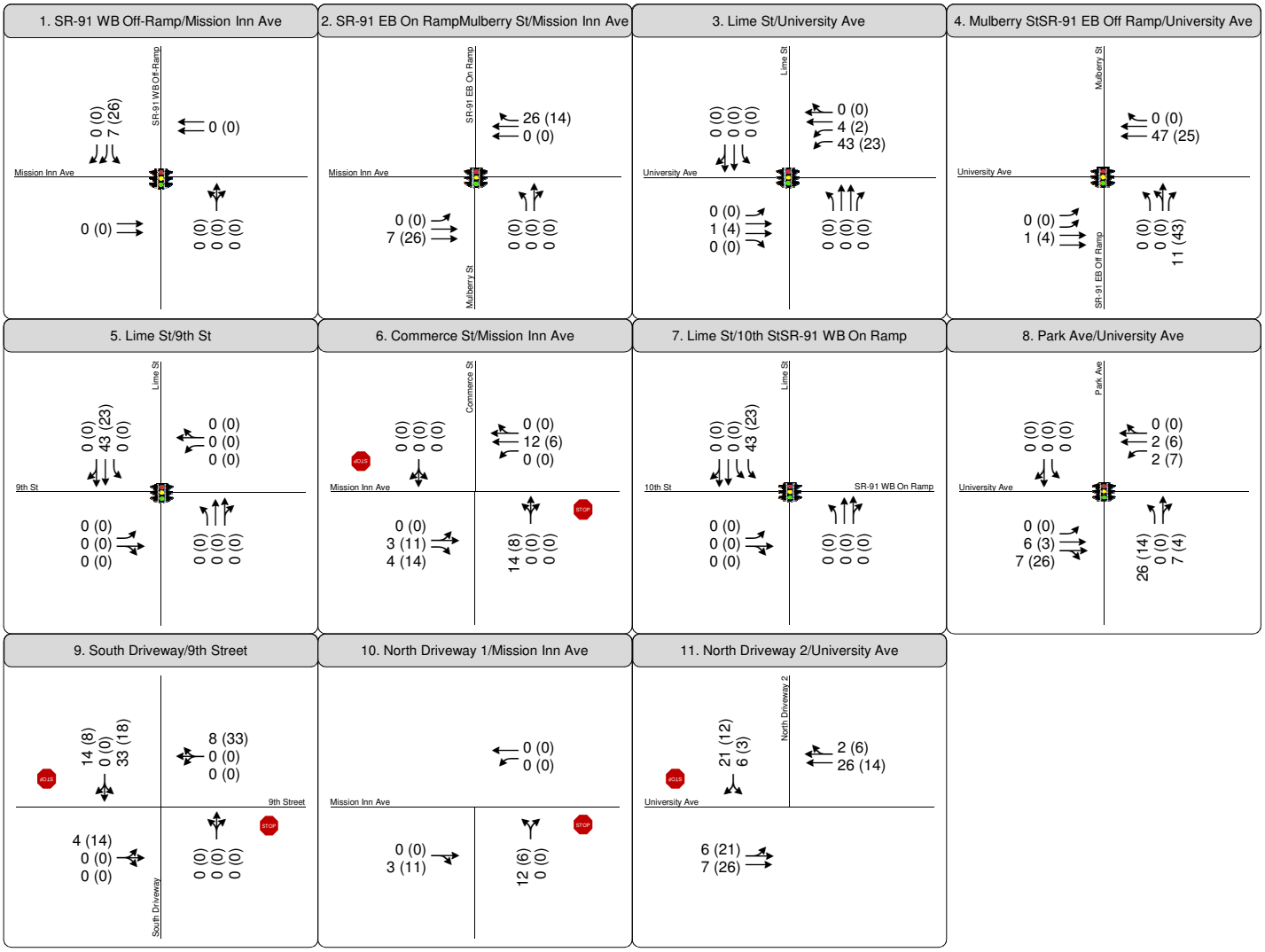
Study Intersections

Driveways

Figure 5-1

Mission Lofts Driveway Distribution




**Intersection Control**

Signal

Stop

**Movement Volume**

AM (PM)

Figure 5-2

## Project Trip Assignment

**TABLE 5-3**
**INTERSECTION LEVEL OF SEVICE:**
**EXISTING PLUS PROJECT (2016) CONDITIONS**

| Intersection | Control | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Delay | LOS | Delay | LOS |
| 1. SR-91 Westbound Off Ramp and Mission Inn Avenue | Signalized | 13.0 | B | 18.4 | B |
| 2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue | Signalized | 22.8 | C | 24.0 | C |
| 3. Lime Street and University Avenue | Signalized | 30.6 | C | 31.0 | C |
| 4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue | Signalized | 12.0 | B | 11.4 | B |
| 5. Lime Street and 9th Street | Signalized | 5.4 | A | 5.5 | A |
| 6. Commerce Street and Mission Inn Avenue | Side-Street Stop[1] | 10.4 | B | 15.6 | C |
| 7. Lime Street and 10th Street/SR-91 Westbound On Ramp | Signalized | 12.1 | B | 24.0 | C |
| 8. Park Avenue and University Avenue | Signalized | 12.2 | B | 18.4 | B |
| 9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 9.2 | A | 9.4 | A |
| 10. Mission Inn Avenue and Project Site 1 Driveway 1 | Side-Street Stop[1] | 9.6 | A | 11.2 | B |
| 11. University Avenue and Project Site 1 Driveway 2 | Side-Street Stop[1] | 14.1 | B | 17.3 | C |

Notes:
1. Worst case movement delay is reported for side-street stop controlled intersections.

Source: Fehr & Peers, 2015

As shown in Table 5-3, all of the study intersections operate acceptably during the peak hours in the Existing Plus Project (2016) scenario.

Roadway segment operations are summarized in Table 5-4. Level-of-service values are based on the roadway capacity tables provided in Section 3.1.2.

**TABLE 5-4**
**ROADWAY LEVEL OF SEVICE:**
**EXISTING PLUS PROJECT (2016) CONDITIONS**

| Roadway | Segment | Average Daily Traffic Volume | V/C[1] | LOS |
|---|---|---|---|---|
| 1. University Avenue | Between Lemon Street and Lime Street | 14,631 | 0.44 | C or better |
| 2. Lime Street | Between 9th Street and University Avenue | 14,922 | 0.68 | C or better |
| 3. Mission Inn Avenue | Between Vine Street and Commerce Street | 5,533 | 0.17 | C |
| 4. University Avenue | Between Santa Fe Street and Commerce Street | 21,162 | 0.64 | C |
| 5. Commerce Street | Between University Avenue and Mission Inn Avenue | 2,010 | 0.65 | C |
| 6. University Avenue | Between Park Avenue and Victoria Avenue | 20,506 | 0.62 | C |

Notes:
2. V/C is reported for informational purposes only. LOS is based on Table 3-1 in Section 3.1.1 according to the City of Riverside Traffic Impact Analysis Guidelines.

Source: Fehr & Peers, 2015

As shown in Table 5-4, all of the study roadway segments operate acceptably in the Existing Plus Project (2016) scenario.

### 5.2.4 SIGNAL WARRANT ANALYSIS

A peak hour traffic signal warrant[1] was prepared for the unsignalized intersection at Commerce Street and Mission Inn Avenue to identify if the intersection satisfies the peak hour volume warrant for traffic signal

[1] This analysis is intended to examine the general correlation between the planned level of future development and the need to install new traffic signals. It estimates future development-generated traffic compared against a sub-set of the standard traffic signal warrants recommended in the Federal Highway Administration Manual on Uniform Traffic Control Devices and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured, rather than forecast, traffic data and a thorough study of traffic and roadway

installation. The results indicate that a warrant is not satisfied for the AM or PM peak hour in the Existing Plus Project (2016) scenario. Technical calculations are provided in Appendix I.

## 5.2.5 IMPACT ASSESSMENT

### 5.2.5.1 Intersection and Roadway Impacts

Based on the performance criteria and thresholds of significance provided in Section 3.2.2, the project does not significantly impact any of the analyzed study intersections in the Existing Plus Project (2016) scenario.

### 5.2.5.2 Pedestrian, Bicycle, and Transit Impacts

The project will not conflict with any of the proposed bicycle facilities on University Avenue or Lime Street. The project pedestrian bridge may interfere with potential streetcar alignments and may require special treatment.

Since the proposed project does not significantly impact any existing pedestrian, bicycle, or transit facilities; nor does the proposed project conflict with any plans related to such facilitates in the Existing Plus Project (2016) scenario.

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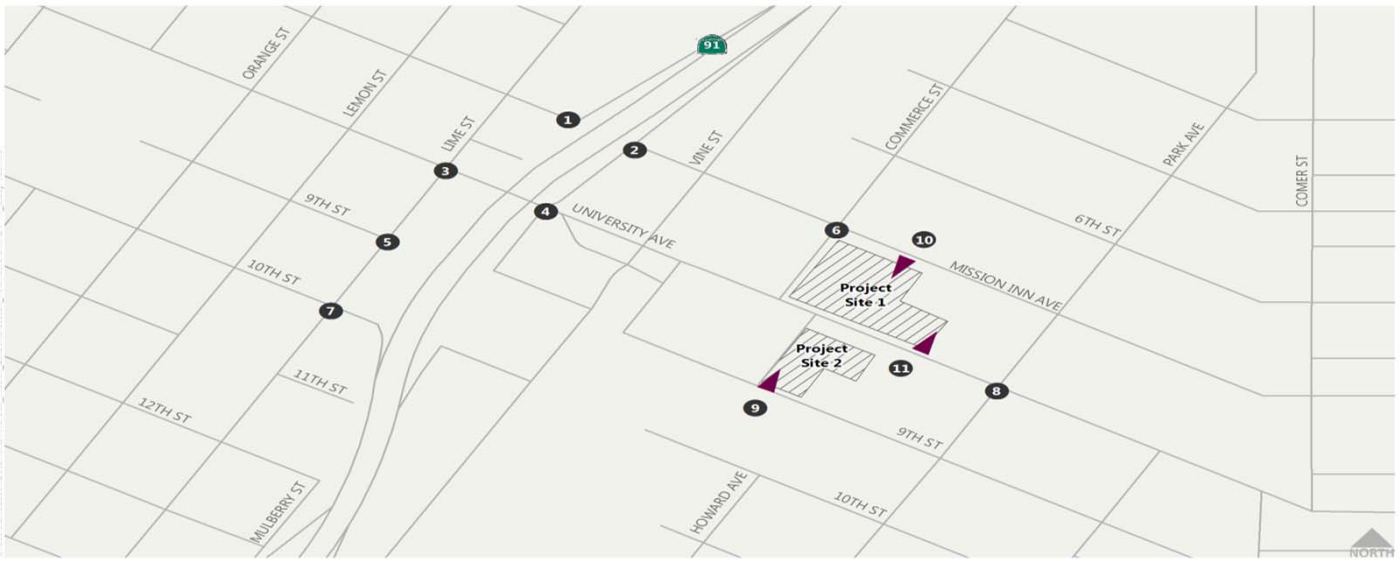
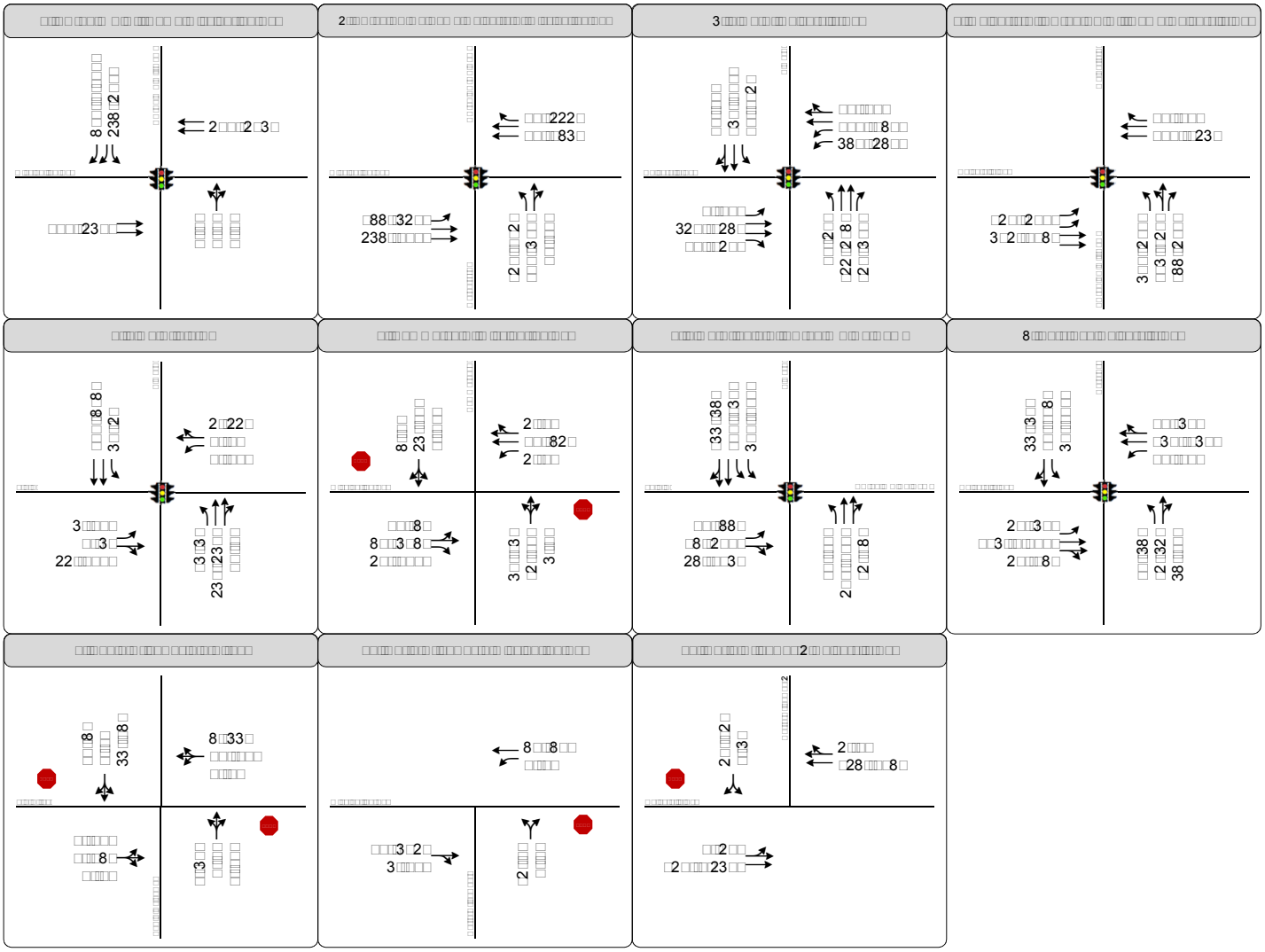
conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. The City of Riverside should undertake regular monitoring of actual traffic conditions and accident data, and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.



**Intersection Control**

**Movement Volume**

Figure 5-3

Traffic Controls, Intersection Geometrics, and Peak Hour Traffic Volumes
Existing Plus Project (2016)

## 5.3 CUMULATIVE (2016) WITH AND WITHOUT PROJECT

### 5.3.1 OTHER APPROVED OR PROPOSED DEVELOPMENT PROJECTS

A list of approved or proposed development projects within the vicinity of the proposed project study area was provided by staff at the City of Riverside. The location and description of other approved or proposed development projects are provided on Figure 5-4 and Table 5-5.

**TABLE 5-5**
**APPROVED OR PROPOSED DEVELOPMENT PROJECTS LIST (2016)**

| ID | Name | Location | Description |
|---|---|---|---|
| 1 | Centerpointe Residential | Near the intersection of First Street and Market Street | 125 unit residential development, no retail component |
| 2 | Imperial Hardware | Near the intersection of University Avenue and Main Street | 96 units residential, 10,000 square feet of retail |
| 3 | Riverside Community Hospital Expansion | Near the intersection of Market Street and 14th Street | New 215,000 square foot 7 story hospital bed tower, which includes 105 new licensed beds, 35 intensive care patient rooms and 70 medical and surgical patient rooms |
| 4 | El Pollo Loco | 2200 University Avenue | Refurbish and addition of a drive-through |

Source: City of Riverside Staff, 2015

### 5.3.2 TRIP GENERATION FOR OTHER APPROVED OR PROPOSED DEVELOPMENT PROJECTS

Trip generation for other approved or proposed development projects is provided in Table 5-6. Wherever possible, trip generation was taken from the project's related technical and/or environmental document. In other cases, trip generation was calculated using the latest version of the Institute of Transportation Engineer's Trip Generation Handbook.

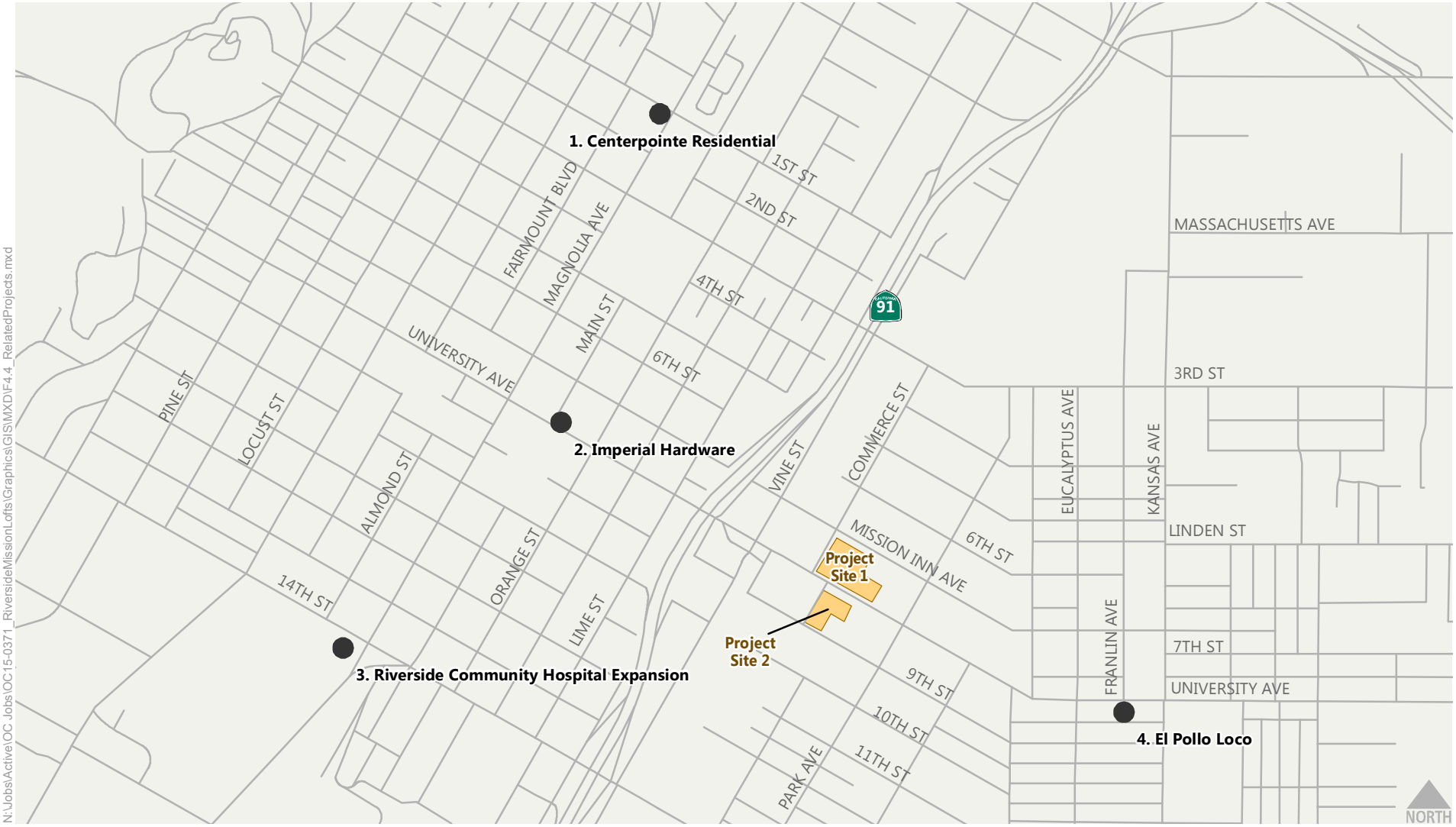



Figure 5-4

Locations of Other Approved or Proposed Development Projects

**TABLE 5-6**
**TRIP GENERATION ESTIMATES FOR OTHER DEVELOPMENT PROJECTS (2016)**

| Cumulative Project | Daily Trips | AM Peak Rate | | | PM Peak Rate | | |
|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total |
| 1. Centerpointe Residential | 831 | 13 | 51 | 64 | 51 | 27 | 78 |
| 2. Imperial Hardware | 1,065 | 16 | 43 | 59 | 57 | 40 | 97 |
| 3. Riverside Community Hospital Expansion (Phase 1 Only) | 2,446 | 179 | 70 | 249 | 88 | 180 | 268 |
| 4. El Pollo Loco Drive-Thru Expansion | 0 | 0 | 10 | 3 | 7 | 6 | 13 |
| **Total** | 4,342 | 208 | 174 | 375 | 203 | 253 | 456 |

Source:
[1],[2],[4]: *Trip Generation, 9th Edition (Institute of Transportation Engineers, 2012)*
[3]: *Riverside Community Hospital Expansion Project EIR* (Dudek, February 2014)

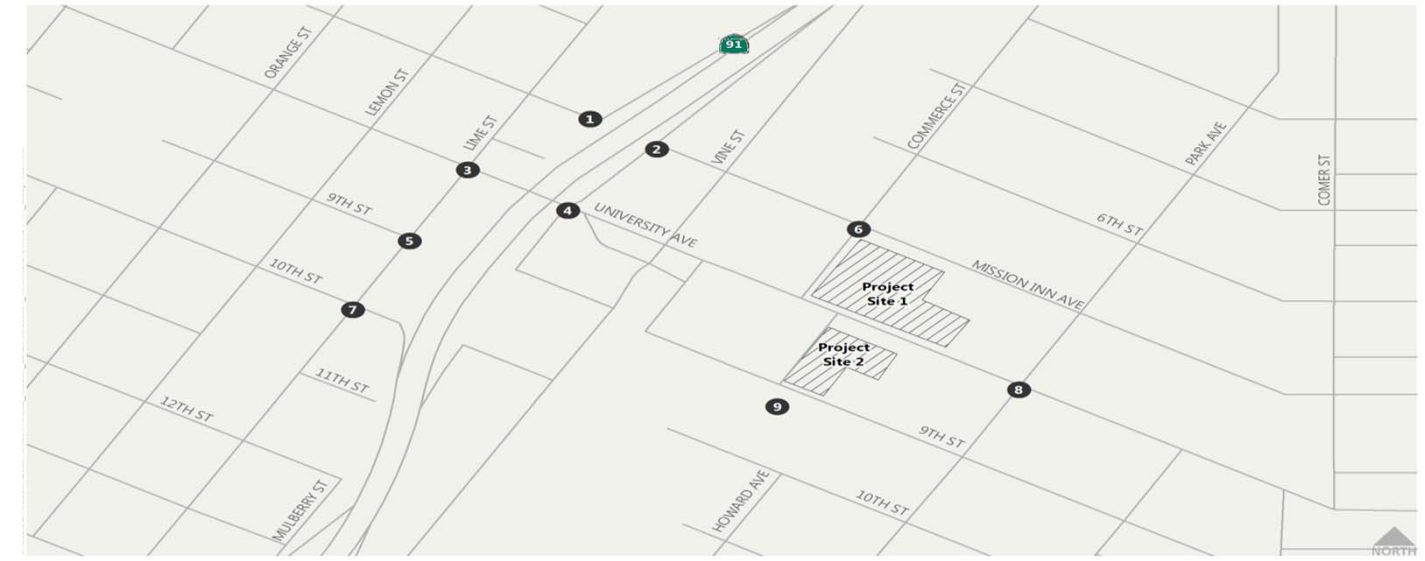
### 5.3.3 TRIP DISTRIBUTION AND ASSIGNMENT OF OTHER DEVELOPMENT PROJECTS

Wherever possible, trip distribution for other approved or proposed development projects was taken from the projects relevant technical and/or environmental documents. In other cases, trip distribution was estimated based on available technical and/or environmental documents for similar projects and knowledge of the study area.

### 5.3.4 CUMULATIVE (2016) NO PROJECT TRAFFIC VOLUMES AND LEVEL OF SERVICE

The Cumulative (2016) No Project scenario consists of applying an ambient growth rate of 2% per year to the existing traffic counts for one year, then adding traffic generated by other approved and/or pending projects in the study area. Figure 5-5 provides the AM and PM peak hour volumes for the Cumulative (2016) No Project scenario.

The results of the Cumulative (2016) No Project intersection operations are summarized in Table 5-7. The corresponding LOS reports are provided in Appendix E.



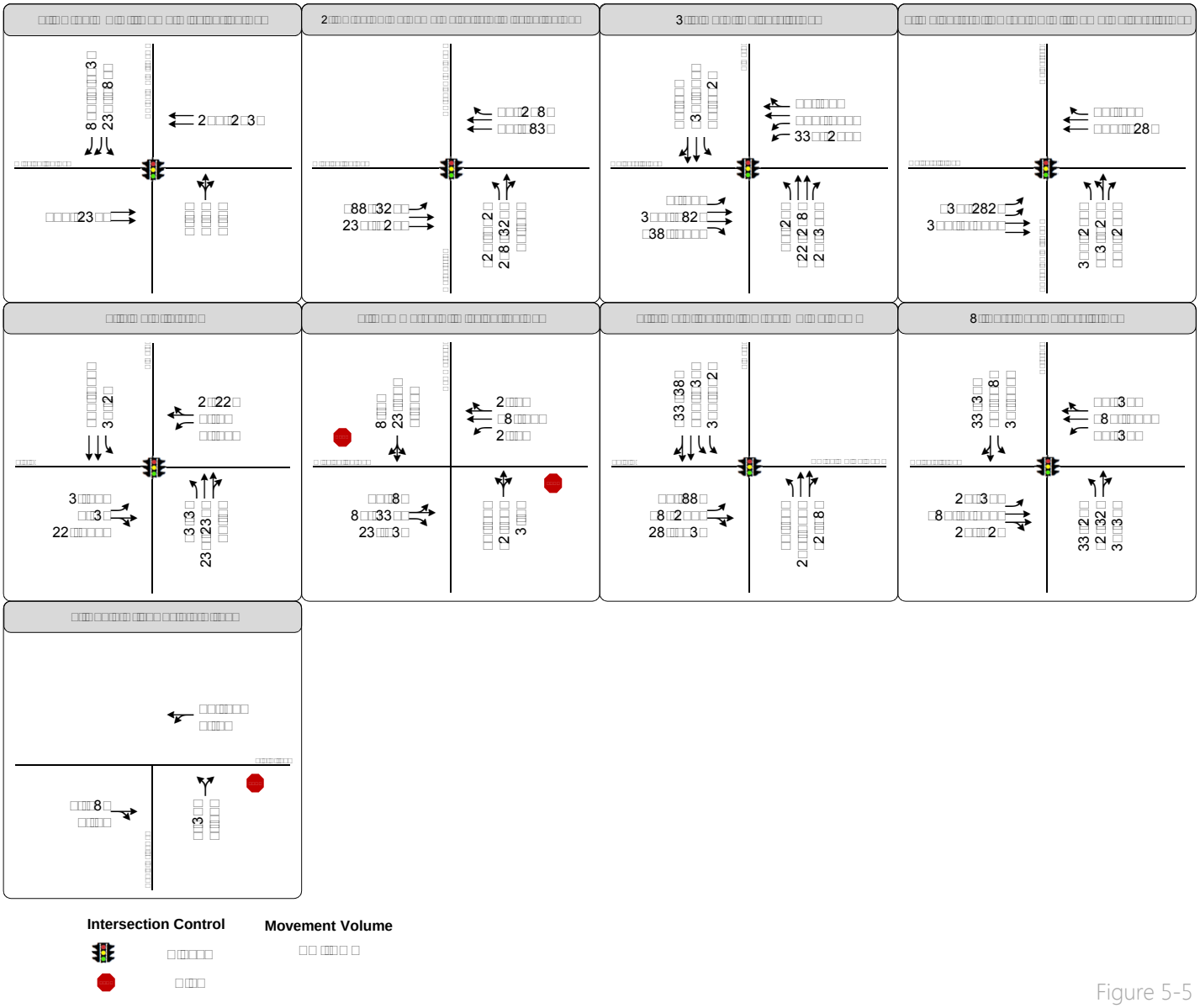




Figure 5-5

Traffic Controls, Intersection Geometrics, and Peak Hour Traffic Volumes
Cumulative (2016)

**TABLE 5-7**
**INTERSECTION LEVEL OF SEVICE:**
**CUMULATIVE (2016) NO PROJECT CONDITIONS**

| Intersection | Control | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Delay | LOS | Delay | LOS |
| 1. SR-91 Westbound Off Ramp and Mission Inn Avenue | Signalized | 12.7 | B | 17.5 | B |
| 2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue | Signalized | 23.2 | C | 25.9 | C |
| 3. Lime Street and University Avenue | Signalized | 31.2 | C | 32.0 | C |
| 4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue | Signalized | 12.3 | B | 11.8 | B |
| 5. Lime Street and 9th Street | Signalized | 5.4 | A | 5.5 | A |
| 6. Commerce Street and Mission Inn Avenue | Side-Street Stop[1] | 10.2 | B | 14.9 | B |
| 7. Lime Street and 10th Street/SR-91 Westbound On Ramp | Signalized | 12.1 | B | 24.3 | C |
| 8. Park Avenue and University Avenue | Signalized | 11.7 | B | 18.2 | B |
| 9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 0.0 | A | 8.9 | A |

Notes:
1. Worst case movement delay is reported for side-street stop controlled intersections.

Source: Fehr & Peers, 2015

As shown in Table 5-7, all of the study intersections operate acceptably during the peak hours in the Cumulative (2016) No Project scenario.

Roadway segment operations are summarized in Table 5-8. Level-of-service values are based on the roadway capacity tables provided in Section 3.1.2.

**TABLE 5-8**
**ROADWAY LEVEL OF SEVICE:**
**CUMULATIVE (2016) NO PROJECT CONDITIONS**

| Roadway | Segment | Average Daily Traffic Volume | V/C[1] | LOS |
|---|---|---|---|---|
| 1. University Avenue | Between Lemon Street and Lime Street | 16,479 | 0.50 | C |
| 2. Lime Street | Between 9th Street and University Avenue | 15,044 | 0.68 | C |
| 3. Mission Inn Avenue | Between Vine Street and Commerce Street | 5,109 | 0.15 | C |
| 4. University Avenue | Between Santa Fe Street and Commerce Street | 21,036 | 0.64 | C |
| 5. Commerce Street | Between University Avenue and Mission Inn Avenue | 1,778 | 0.57 | C |
| 6. University Avenue | Between Park Avenue and Victoria Avenue | 20,944 | 0.63 | C |

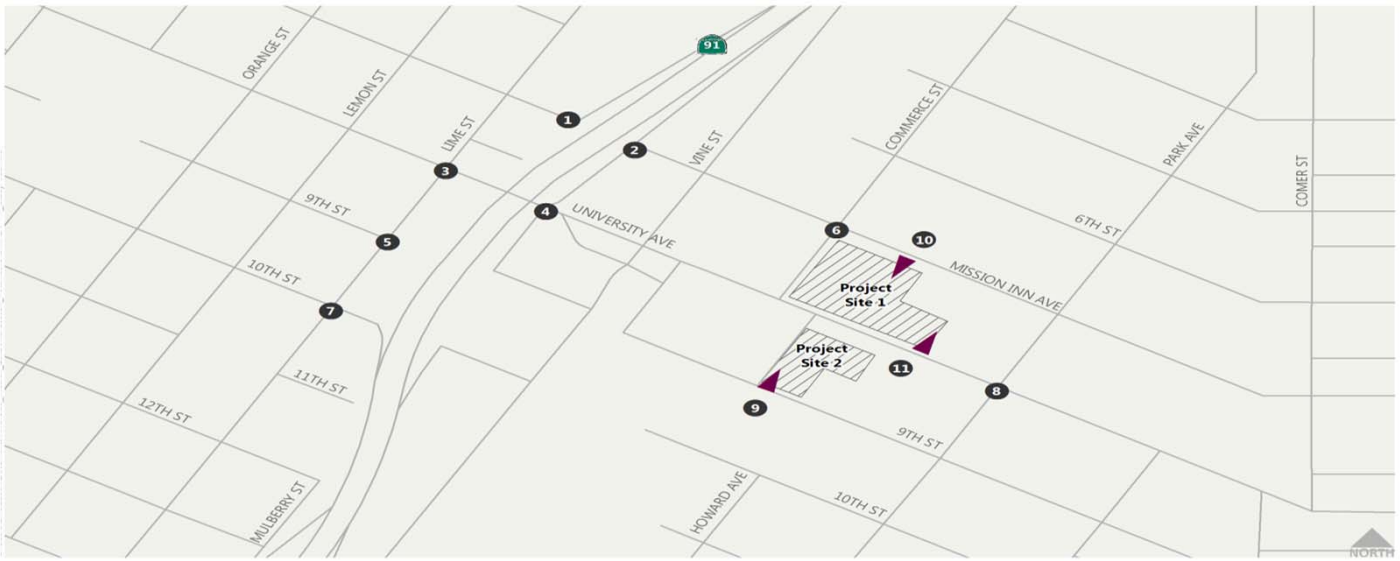
Notes:
1. V/C is reported for informational purposes only. LOS is based on Table 3-1 in Section 3.1.1 according to the City of Riverside Traffic Impact Analysis Guidelines.

Source: Fehr & Peers, 2015

As shown in Table 5-8, all of the study roadway segments operate acceptably in the Cumulative (2016) No Project scenario.

### 5.3.5 CUMULATIVE (2016) PLUS PROJECT TRAFFIC VOLUMES AND LEVEL OF SERVICE

The Cumulative (2016) Plus Project scenario consists of adding traffic generated by the proposed project to the Cumulative (2016) No Project scenario. Figure 5-6 provides the AM and PM peak hour volumes for the Cumulative (2016) Plus Project scenario.



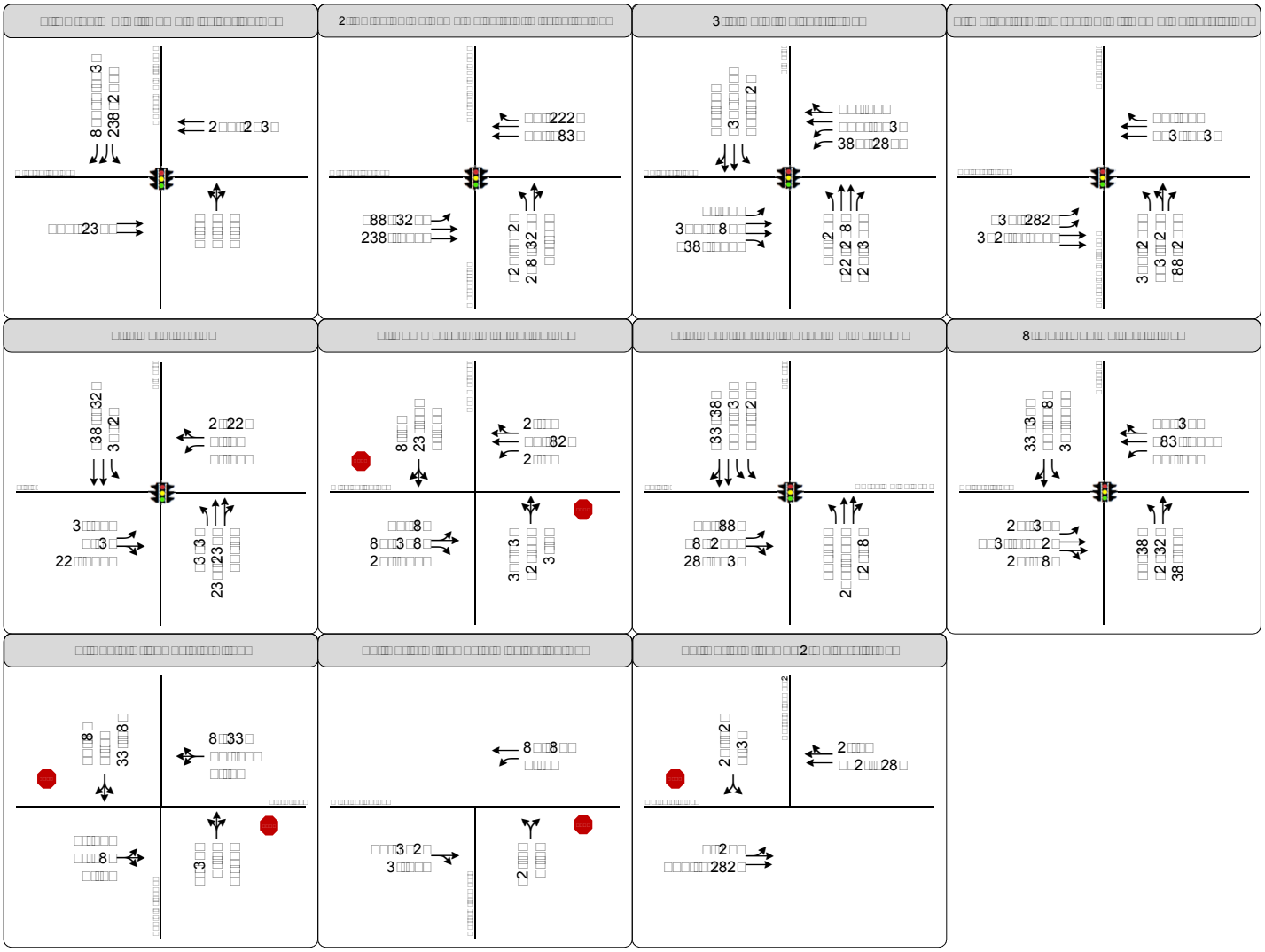




Figure 5-6

Traffic Controls, Intersection Geometrics, and Peak Hour Traffic Volumes
Cumulative Plus Project (2016)

The results of the Cumulative (2016) Plus Project intersection operations are summarized in Table 5-9. The corresponding LOS reports are provided in Appendix F.

**TABLE 5-9**
**INTERSECTION LEVEL OF SEVICE:**
**CUMULATIVE (2016) PLUS PROJECT CONDITIONS**

| Intersection | Control | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Delay | LOS | Delay | LOS |
| 1. SR-91 Westbound Off Ramp and Mission Inn Avenue | Signalized | 13.0 | B | 18.4 | B |
| 2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue | Signalized | 23.1 | C | 25.4 | C |
| 3. Lime Street and University Avenue | Signalized | 31.7 | C | 32.5 | C |
| 4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue | Signalized | 12.6 | B | 12.2 | B |
| 5. Lime Street and 9th Street | Signalized | 5.3 | A | 5.5 | A |
| 6. Commerce Street and Mission Inn Avenue | Side-Street Stop[1] | 10.4 | B | 15.6 | C |
| 7. Lime Street and 10th Street/SR-91 Westbound On Ramp | Signalized | 12.3 | B | 24.9 | C |
| 8. Park Avenue and University Avenue | Signalized | 12.2 | B | 19.2 | B |
| 9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 9.0 | A | 9.4 | A |
| 10. Mission Inn Avenue and Project Site 1 Driveway 1 | Side-Street Stop[1] | 9.6 | A | 11.2 | B |
| 11. University Avenue and Project Site 1 Driveway 2 | Side-Street Stop[1] | 14.7 | B | 18.2 | C |

Notes:
1. Worst case movement delay is reported for side-street stop controlled intersections.

Source: Fehr & Peers, 2015

As shown in Table 5-9, all of the study intersections operate acceptably during the peak hours in the Cumulative (2016) Plus Project scenario.

Roadway segment operations are summarized in Table 5-10. Level-of-service values are based on the roadway capacity tables provided in Section 3.1.2.

**TABLE 5-10**
**ROADWAY LEVEL OF SEVICE:**
**CUMULATIVE (2016) PLUS PROJECT CONDITIONS**

| Roadway | Segment | Average Daily Traffic Volume | V/C[1] | LOS |
|---|---|---|---|---|
| 1. University Avenue | Between Lemon Street and Lime Street | 16,549 | 0.50 | C |
| 2. Lime Street | Between 9th Street and University Avenue | 15,397 | 0.70 | C |
| 3. Mission Inn Avenue | Between Vine Street and Commerce Street | 5,533 | 0.17 | C |
| 4. University Avenue | Between Santa Fe Street and Commerce Street | 21,812 | 0.66 | C |
| 5. Commerce Street | Between University Avenue and Mission Inn Avenue | 2,010 | 0.65 | C |
| 6. University Avenue | Between Park Avenue and Victoria Avenue | 21,156 | 0.64 | C |

Notes:
1. V/C is reported for informational purposes only. LOS is based on Table 3-1 in Section 3.1.1 according to the City of Riverside Traffic Impact Analysis Guidelines.

Source: Fehr & Peers, 2015

As shown in Table 5-10, all of the study roadway segments operate acceptably in the Cumulative (2016) Plus Project scenario.

## 5.3.6 SIGNAL WARRANT ANALYSIS

A peak hour traffic signal warrant[2] assessment was prepared for the unsignalized intersection at Commerce Street and Mission Inn Avenue and the results indicate that a warrant is not satisfied for the AM or PM peak hour under both the Cumulative (2016) No Project scenario and Cumulative (2016) Plus Project scenario. Technical calculations are provided in Appendix I.

## 5.3.7 IMPACT ASSESSMENT

### 5.3.7.1 Intersection and Roadway Impacts

Based on the performance criteria and thresholds of significance provided in Section 3.2.2, the project does not significantly impact any of the analyzed study intersections in the Cumulative (2016) Plus Project scenario.

### 5.3.7.2 Pedestrian, Bicycle, and Transit Impacts

The project will not conflict with any of the proposed bicycle facilities on University Avenue or Lime Street. The project pedestrian bridge may interfere with potential streetcar alignments and may require special treatment.

The proposed project does not significantly impact any existing pedestrian, bicycle, or transit facilities; nor does the proposed project conflict with any plans related to such facilitates in the Cumulative (2016) Plus Project scenario.

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[2] This analysis is intended to examine the general correlation between the planned level of future development and the need to install new traffic signals. It estimates future development-generated traffic compared against a sub-set of the standard traffic signal warrants recommended in the Federal Highway Administration Manual on Uniform Traffic Control Devices and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured, rather than forecast, traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. The City of Riverside should undertake regular monitoring of actual traffic conditions and accident data, and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

## 5.4 BUILD-OUT (2025) WITH AND WITHOUT PROJECT TRAFFIC

### 5.4.1 DESCRIPTION OF METHODOLOGY

Staff at the City of Riverside provided link-level build-out traffic projections from the City's General Plan 2025 traffic model. The traffic projections were compared to the existing roadway segment counts collected as part of this project and an average annual growth rate of 2.18% was derived based on the direction of staff at the City of Riverside. To provide a conservative analysis, traffic assignment from other approved or proposed development projects were added in addition to the 2.18% annual growth rate. The raw model outputs and the growth rate calculations are provided in Appendix J.

### 5.4.2 TRIP GENERATION, DISTRIBUTION, AND ASSIGNMENT OF OTHER DEVELOPMENT PROJECTS

The trip generation, distribution, and assignment for other development projects in the Build-out (2025) scenario are the same as the Cumulative (2016) scenario, with the exception of one project. For the Build-out (2025) scenario, the Riverside Community Hospital Expansion project has a higher trip generation due to increased land use intensity. Trip generation for other approved or proposed development projects is provided in Table 5-11

**TABLE 5-11**
**TRIP GENERATION ESTIMATES FOR OTHER DEVELOPMENT PROJECTS (2025)**

| Cumulative Project | Daily Trips | AM Peak Rate | | | PM Peak Rate | | |
|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total |
| 1. Centerpointe Residential | 831 | 13 | 51 | 64 | 51 | 27 | 78 |
| 2. Imperial Hardware | 1065 | 16 | 43 | 59 | 57 | 40 | 97 |
| 3. Riverside Community Hospital Expansion (Phase 1 and Phase 2) | 5,777 | 337 | 125 | 463 | 176 | 383 | 559 |
| 4. El Pollo Loco | 0 | 0 | 10 | 3 | 7 | 6 | 13 |
| **Total** | 7,673 | 366 | 229 | 596 | 291 | 456 | 747 |

Source:
[1],[2],[4]: *Trip Generation, 9th Edition (Institute of Transportation Engineers, 2012)*
[3]: *Riverside Community Hospital Expansion Project EIR* (Dudek, February 2014)

The trip distribution for the approved or proposed development projects in the 2025 study year remains the same as the 2016 study year.

### 5.4.3 BUILD-OUT (2025) NO PROJECT TRAFFIC VOLUMES AND LEVEL OF SERVICE

Figure 5-7 provides the AM and PM peak hour volumes for the Build-Out (2025) No Project scenario.

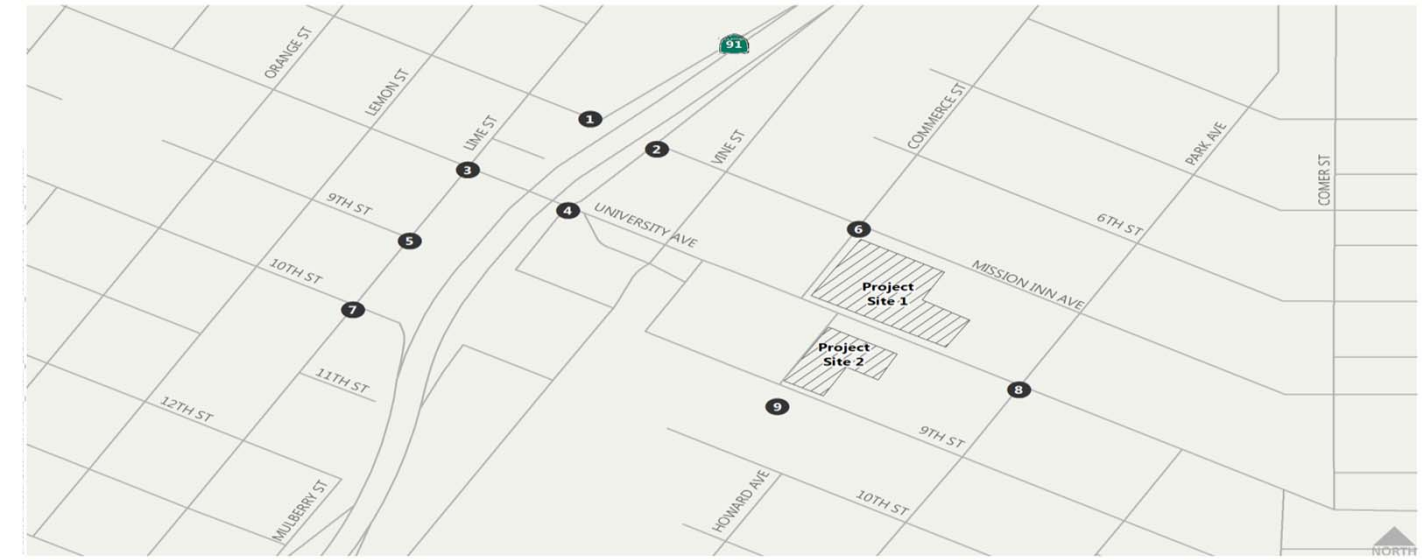
The results of the Build-Out (2025) No Project intersection operations are summarized in Table 5-12. The Corresponding LOS reports are provided in Appendix G.

**TABLE 5-12**
**INTERSECTION LEVEL OF SEVICE:**
**BUILD-OUT (2025) NO PROJECT CONDITIONS**

| Intersection | Control | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Delay | LOS | Delay | LOS |
| 1. SR-91 Westbound Off Ramp and Mission Inn Avenue | Signalized | 13.6 | B | 18.3 | B |
| 2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue | Signalized | 19.3 | B | 23.8 | C |
| 3. Lime Street and University Avenue | Signalized | 29.3 | C | 45.9 | D |
| 4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue | Signalized | 15.1 | B | 16.2 | B |
| 5. Lime Street and 9th Street | Signalized | 4.8 | A | 10.7 | B |
| 6. Commerce Street and Mission Inn Avenue | Side-Street Stop[1] | 10.6 | B | 18.3 | C |
| 7. Lime Street and 10th Street/SR-91 Westbound On Ramp | Signalized | 13.6 | B | 39.4 | D |
| 8. Park Avenue and University Avenue | Signalized | 11.9 | B | 23.9 | C |
| 9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 0.0 | A | 9.1 | A |

Notes:
1. Worst case movement delay is reported for side-street stop controlled intersections.

Source: Fehr & Peers, 2015



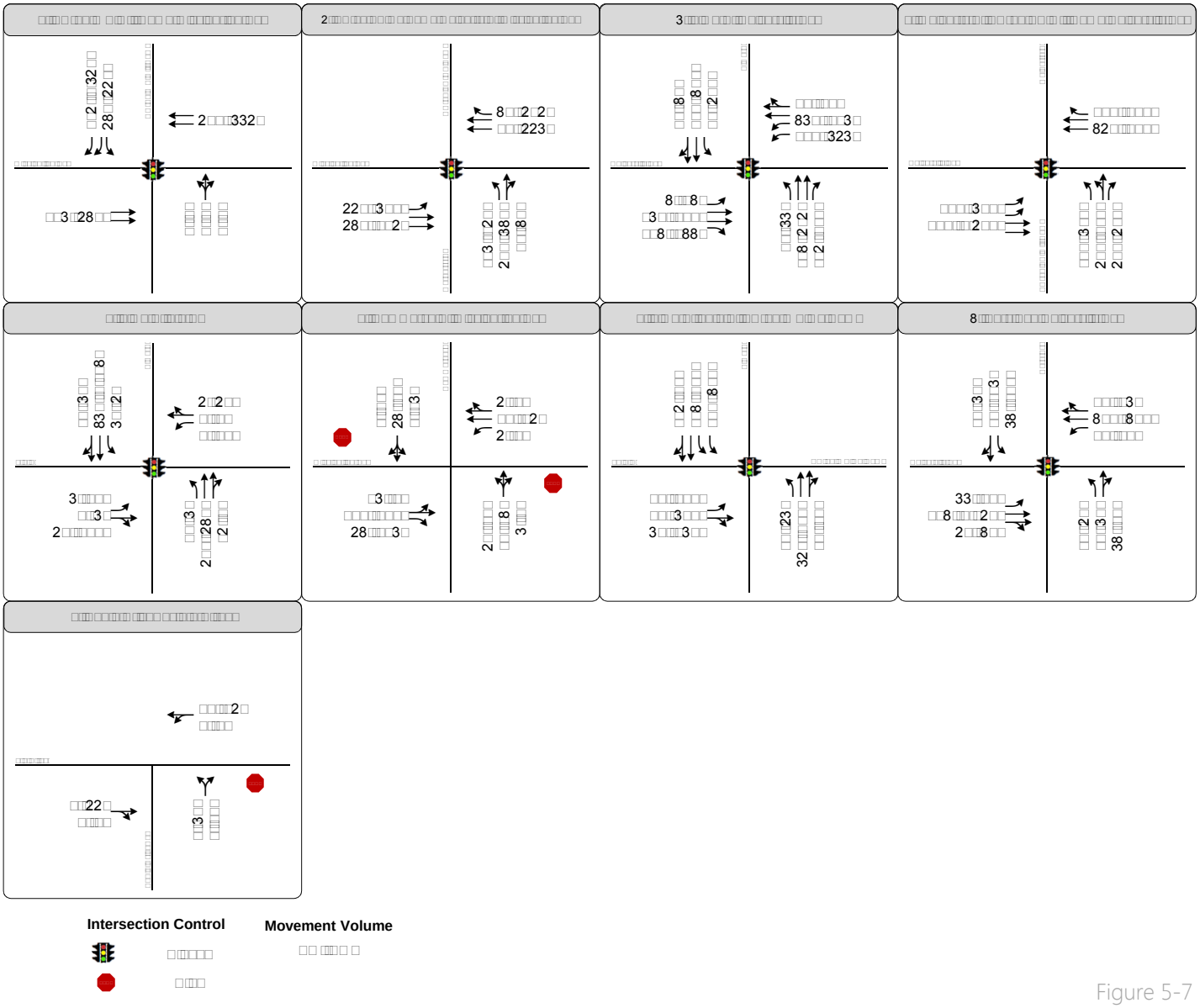




Figure 5-7

Traffic Controls, Intersection Geometrics, and Peak Hour Traffic Volumes
Build-Out (2025)

As shown in Table 5-12, all of the study intersections operate acceptably during the peak hours in the Build-Out (2025) No Project scenario.

Roadway segment operations are summarized in Table 5-13. Level-of-service values are based on the roadway capacity tables provided in Section 3.1.2.

**TABLE 5-13**
**ROADWAY LEVEL OF SEVICE:**
**BUILD-OUT (2025) NO PROJECT CONDITIONS**

| Roadway | Segment | Average Daily Traffic Volume | V/C[1] | LOS |
|---|---|---|---|---|
| 1. University Avenue | Between Lemon Street and Lime Street | 20,295 | 0.62 | C |
| 2. Lime Street | Between 9th Street and University Avenue | 18,196 | 0.83 | C |
| 3. Mission Inn Avenue | Between Vine Street and Commerce Street | 6,214 | 0.19 | C |
| 4. University Avenue | Between Santa Fe Street and Commerce Street | 26,113 | 0.79 | C |
| 5. Commerce Street | Between University Avenue and Mission Inn Avenue | 2,163 | 0.70 | C |
| 6. University Avenue | Between Park Avenue and Victoria Avenue | 26,001 | 0.79 | C |

Notes:
1. V/C is reported for informational purposes only. LOS is based on Table 3-1 in Section 3.1.1 according to the City of Riverside Traffic Impact Analysis Guidelines.

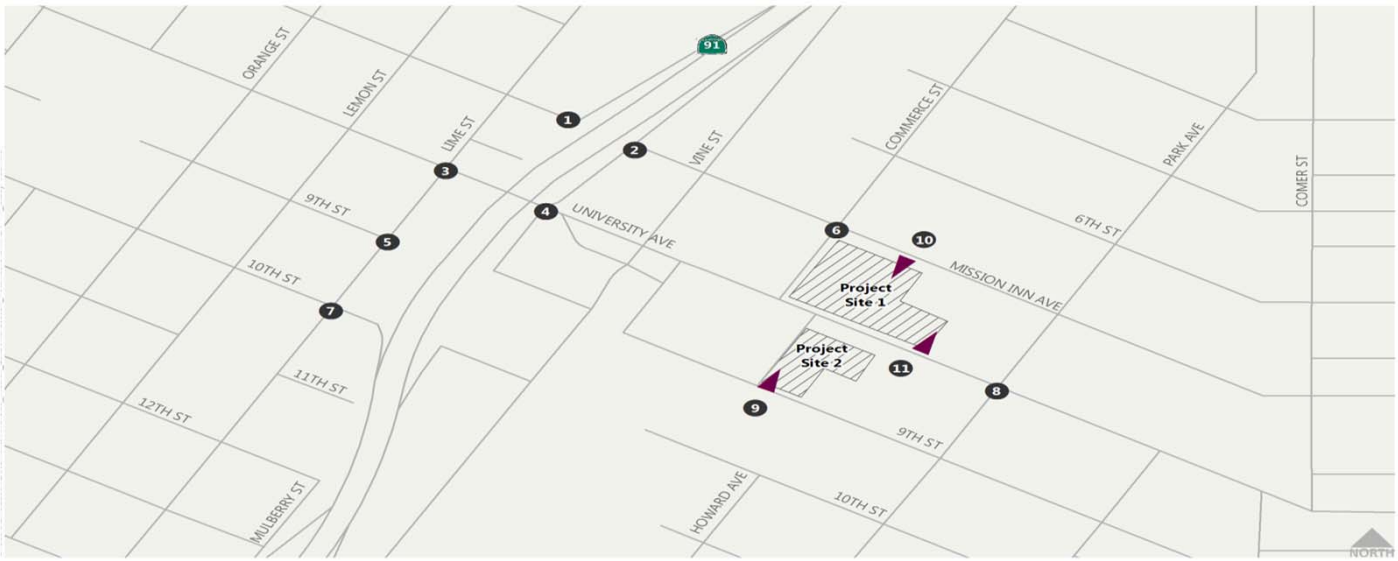
Source: Fehr & Peers, 2015

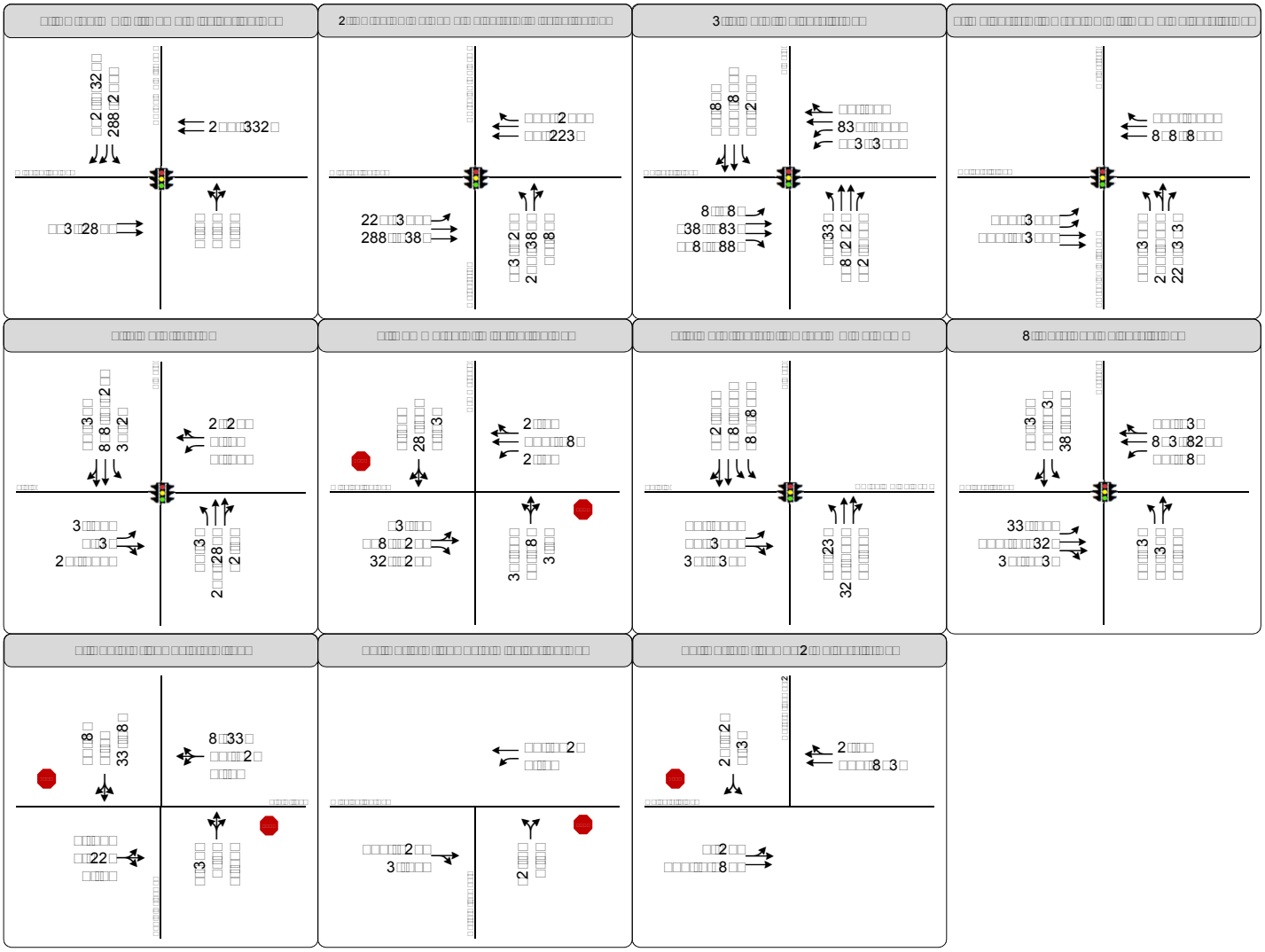
As shown in Table 5-13, all of the study roadway segments operate acceptably in the Build-Out (2025) No Project scenario.

### 5.4.4 BUILD-OUT (2025) PLUS PROJECT TRAFFIC VOLUMES AND LEVEL OF SERVICE

Figure 5-8 provides the AM and PM peak hour volumes for the Build-Out (2025) Plus Project scenario.

The results of the Build-Out (2025) Plus Project intersection operations are summarized in Table 5-14. The Corresponding LOS reports are provided in Appendix H.



**Intersection Control**

**Movement Volume**

Figure 5-8

Traffic Controls, Intersection Geometrics, and Peak Hour Traffic Volumes
Build-Out Plus Project (2025)

**TABLE 5-14**
**INTERSECTION LEVEL OF SEVICE:**
**BUILD-OUT (2025) PLUS PROJECT CONDITIONS**

| Intersection | Control | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Delay | LOS | Delay | LOS |
| 1. SR-91 Westbound Off Ramp and Mission Inn Avenue | Signalized | 13.9 | B | 19.2 | B |
| 2. Mulberry Street/SR-91 Eastbound On Ramp and Mission Inn Avenue | Signalized | 19.2 | B | 23.5 | C |
| 3. Lime Street and University Avenue | Signalized | 30.0 | C | 47.2 | D |
| 4. Mulberry Street/SR-91 Eastbound Off Ramp and University Avenue | Signalized | 15.5 | B | 16.6 | B |
| 5. Lime Street and 9th Street | Signalized | 4.7 | A | 6.2 | A |
| 6. Commerce Street and Mission Inn Avenue | Side-Street Stop[1] | 10.9 | B | 19.5 | C |
| 7. Lime Street and 10th Street/SR-91 Westbound On Ramp | Signalized | 13.9 | B | 42.2 | D |
| 8. Park Avenue and University Avenue | Signalized | 12.4 | B | 24.8 | C |
| 9. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 9.0 | A | 9.5 | A |
| 10. Mission Inn Avenue and Project Site 1 Driveway 1 | Side-Street Stop[1] | 9.8 | A | 11.8 | B |
| 11. University Avenue and Project Site 1 Driveway 2 | Side-Street Stop[1] | 18.2 | C | >50.0 | F |

Notes:
1. Worst case movement delay is reported for side-street stop controlled intersections.

Source: Fehr & Peers, 2015

As shown in Table 5-14, all of the study intersections operate acceptably during the peak hours in the Build-Out (2025) Plus Project scenario.

Roadway segment operations are summarized in Table 5-15. Level-of-service values are based on the roadway capacity tables provided in Section 3.1.2.

**TABLE 5-15**
**ROADWAY LEVEL OF SEVICE:**
**BUILD-OUT (2025) PLUS PROJECT CONDITIONS**

| Roadway | Segment | Average Daily Traffic Volume | V/C[1] | LOS |
|---|---|---|---|---|
| 1. University Avenue | Between Lemon Street and Lime Street | 20,365 | 0.62 | C |
| 2. Lime Street | Between 9th Street and University Avenue | 18,549 | 0.84 | C |
| 3. Mission Inn Avenue | Between Vine Street and Commerce Street | 6,638 | 0.20 | C |
| 4. University Avenue | Between Santa Fe Street and Commerce Street | 26,889 | 0.81 | C |
| 5. Commerce Street | Between University Avenue and Mission Inn Avenue | 2,395 | 0.77 | C |
| 6. University Avenue | Between Park Avenue and Victoria Avenue | 26,213 | 0.79 | C |

Notes:
1. V/C is reported for informational purposes only. LOS is based on Table 3-1 in Section 3.1.1 according to the City of Riverside Traffic Impact Analysis Guidelines.

Source: Fehr & Peers, 2015

As shown in Table 5-15, all of the study roadway segments operate acceptably in the Build-Out (2025) Plus Project scenario.

## 5.4.5 SIGNAL WARRANT ANALYSIS

A peak hour traffic signal warrant[3] was prepared for the unsignalized intersection at Commerce Street and Mission Inn Avenue and the results indicate that a warrant is not satisfied for the AM or PM peak hour under both the Build-Out (2025) No Project scenario and Build-Out (2025) Plus Project scenario. Technical calculations are provided in Appendix I.

## 5.4.6 IMPACT ASSESSMENT

### 5.4.6.1 Intersection and Roadway Impacts

Based on the performance criteria and thresholds of significance provided in Section 3.2.2, the project does not significantly impact any of the analyzed study intersections in the Build-Out (2025) Plus Project scenario.

### 5.4.6.2 Pedestrian, Bicycle, and Transit Impacts

The project will not conflict with any of the existing or proposed bicycle facilities on University Avenue or Lime Street. The project pedestrian bridge may interfere with potential streetcar alignments and may require special treatment.

An existing bus stop is located less than 100 feet east of the proposed driveway on University Avenue. The project sponsor should ensure that transit access or operations are not

The proposed project does not significantly impact any existing pedestrian, bicycle, or transit facilities; nor does the proposed project conflict with any plans related to such facilitates in the Build-Out (2025) Plus Project scenario.

---

[3] This analysis is intended to examine the general correlation between the planned level of future development and the need to install new traffic signals. It estimates future development-generated traffic compared against a sub-set of the standard traffic signal warrants recommended in the Federal Highway Administration Manual on Uniform Traffic Control Devices and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured, rather than forecast, traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. The City of Riverside should undertake regular monitoring of actual traffic conditions and accident data, and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

# 6.0 MITIGATION MEASURES

## 6.1 EXISTING (2015) PLUS PROJECT

As discussed in Section 4.0, the project does not significantly impact any of the analyzed locations under Existing (2015) Plus Project Conditions, therefore no mitigation measures are required.

## 6.2 CUMULATIVE (2016) PLUS PROJECT

As discussed in Section 4.0, the project does not significantly impact any of the analyzed locations under Cumulative (2016) Plus Project Conditions, therefore no mitigation measures are required.

## 6.3 BUILD-OUT (2025) PLUS PROJECT

As discussed in Section 4.0, the project does not significantly impact any of the analyzed locations under Build-Out (2025) Plus Project Conditions, therefore no mitigation measures are required.

# 7.0 FINDINGS AND RECOMMENDATIONS

## 7.1 IMPROVEMENTS

### 7.1.1 PROPOSED IMPROVEMENTS FOR EXISTING PLUS PROJECT CONDITIONS

No off-site improvements are required.

### 7.1.2 PROPOSED IMPROVEMENTS FOR CUMULATIVE PLUS PROJECT CONDITIONS

No off-site improvements are required.

### 7.1.3 PROPOSED IMPROVEMENTS FOR BUILD-OUT PLUS PROJECT CONDITIONS

No off-site improvements are required.

## 7.2 CIRCULATION AND SITE ACCESS RECOMMENDATIONS

### 7.2.1 ON-SITE SITE ACCESS

To evaluate project site access, the delay and level of service for the project access driveways were evaluated and are shown in Table 7-1.

**TABLE 7-1**
**INTERSECTION LEVEL OF SEVICE:**
**PROJECT ACCESS DRIVEWAYS**

| Intersection | Control | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Delay | LOS | Delay | LOS |
| ***Existing (2015) Plus Project Conditions*** | | | | | |
| 1. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 9.2 | A | 9.4 | A |
| 2. Mission Inn Avenue and Project Site 1 Driveway 1 | Side-Street Stop[1] | 9.6 | A | 11.2 | B |
| 3. University Avenue and Project Site 1 Driveway 2 | Side-Street Stop[1] | 14.1 | B | 17.3 | C |
| ***Cumulative (2016) Plus Project Conditions*** | | | | | |
| 1. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 9.0 | A | 9.4 | A |
| 2. Mission Inn Avenue and Project Site 1 Driveway 1 | Side-Street Stop[1] | 9.6 | A | 11.2 | B |
| 3. University Avenue and Project Site 1 Driveway 2 | Side-Street Stop[1] | 14.7 | B | 18.2 | C |
| ***Build-Out (2025) Plus Project Conditions*** | | | | | |
| 1. 9th Street and Metrolink Driveway/Project Site 2 Driveway 1 | Side-Street Stop[1] | 9.0 | A | 9.5 | A |
| 2. Mission Inn Avenue and Project Site 1 Driveway 1 | Side-Street Stop[1] | 9.8 | A | 11.8 | B |
| 3. University Avenue and Project Site 1 Driveway 2 | Side-Street Stop[1] | 18.2 | C | **>50.0** | **F** |

Notes:
1. Worst case movement delay is reported for side-street stop controlled intersections.
2. Intersection operations below acceptable standards are highlighted in bold.

Source: Fehr & Peers, 2015

As shown in Table 7-1, the access driveways operate at LOS C or better except for University Avenue at the Project Site 1 Driveway 2 which is forecast to operate at LOS F under Build-Out (2025) Plus Project

Conditions. A peak hour traffic signal warrant[4] was prepared for the intersection for the Build-Out (2025) Plus Project scenario volumes to identify if a traffic signal may be warranted. Technical calculations are provided in Appendix I.

The intersection of University Avenue at Project Site 1 Driveway 2 does not meet signal warrant in either peak hour due to the low egress volumes. The project applicant should ensure that adequate storage for egressing vehicles so that vehicles circulating on-site do not spill back to University Avenue.

### 7.2.2 OFF-SITE SITE ACCESS

No off-site improvements are required as mitigation for this project.

[4] This analysis is intended to examine the general correlation between the planned level of future development and the need to install new traffic signals. It estimates future development-generated traffic compared against a sub-set of the standard traffic signal warrants recommended in the Federal Highway Administration Manual on Uniform Traffic Control Devices and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured, rather than forecast, traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. The City of Riverside should undertake regular monitoring of actual traffic conditions and accident data, and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

# 8.0 PARKING DEMAND STUDY

The project proposes to provide 320 parking spaces at 1.5 parking spaces per dwelling unit (sp/du), which is less than the amount based on an application of parking rates in the City of Riverside Municipal Code. Given the unique qualities of the project, the purpose of this study is to determine an appropriate parking ratio for the project as an alternative to the strict application of the City Code. Empirical data from national research on residential parking demand, research on parking in TODs, as well as the results of a parking study conducted at a residential development in Corona, California, were used to develop alternative parking estimates for the project.

## 8.1.1 CITY CODE REQUIREMENTS

The City of Riverside Municipal requires that 1.5 sp/du with one bedroom and 2 sp/du with two or more bedrooms. The project proposes to contain 129 one bedroom units and 83 two bedroom units. According to the code, the project is required to supply 360 parking spaces at 1.7 parking spaces per dwelling unit.

## 8.1.2 TRANSIT ACCESS

The project site is located directly to the east of the Riverside Downtown Metrolink Station, just across 9th Street. This station is served by the Los Angeles Union Station and San Bernardino Lines of the Metrolink commuter rail which as well as Los Angeles Union Station and San Bernardino Lines of the Amtrak rail. Headways for each line range from 30 to 120 minutes.

## 8.1.3 TRANSIT ORIENTED DEVELOPMENTS (TODS)

Given that the project will be immediately adjacent to the transit center, it can be considered a transit oriented development (TOD). Residents of TODs typically drive less than residents of traditional developments, and may be less likely to own a car, or at least less likely to own a second car per household, as was shown in the Caltrans Transportation Grant funded study *Travel Characteristics of Transit-Oriented Development in California, Lund, Cervero and Willson, 2004*.

However, because the zoning code applies to the City in its entirety, which is a mixture of suburban and urban areas, the Code's requirements may not be well suited for the project because it is served by multi-modal transit, and is in walking distance to employment, retail, and entertainment destinations. Research from the above Caltrans study shows that TODs and projects in walking distance of downtown uses show peak parking demand well below the minimum off-street spaces required by most suburban zoning codes.

Additionally, TODs and projects in downtowns tend to attract young single people and older couples whose children have left home. Therefore, the need for larger units with higher parking requirements is reduced. This leads to increased demand for one-bedroom units (occupied by one person) and more use of two-bedroom units by a single person who uses the second bedroom as a study, home office, weekend bedroom for a child under a shared custody arrangement, or a guest bedroom for an occasional visitor. All of the above factors influence the size of units (with more small units being built), the density of habitation (with more single people occupying a one- or two-bedroom unit) and therefore, the amount of parking needed to serve the new demographic.

### 8.1.4 NATIONAL PARKING DEMAND RESEARCH

The Urban Land Institute (ULI) sponsored a national study in 1984 that established a basic methodology for analyzing parking demand in mixed-use developments and districts and developed averages for parking rates by land use. The national study (*Shared Parking, Second Edition*) was updated in 2004 in partnership with the International Council of Shopping Centers (ICSC). The study analyzed a wide variety of land uses nationally, including residential uses, and developed parking demand rates appropriate for each particular land use. The residential ratios from the ULI study, were, in part, derived from research from the Institute of Traffic Engineers' (ITE) *Parking Generation, Third Edition*. The recommended ratios for residential uses are as displayed in Table 8-1.

**TABLE 8-1**
**ULI PARKING RATIOS**

| Land Use | Ratio[1] |
|---|---|
| Residential, Rental | 1.5 sp/du per unit |
| | 0.15 guest sp/du |
| | **1.65 sp/du total** |
| Residential, Owned | 1.7 sp/du |
| | 0.15 guest sp/du |
| | **1.85 sp/du total** |

Notes:
1. sp/du = spaces per dwelling unit.

Source: *Shared Parking, Second Edition,* Urban Land Institute, 2004

While the ratios derived from the ULI research are applicable to residential uses in mixed-use developments, the developments studied were suburban locations not served by transit. Therefore, given the proximity to

transit, as well as being located adjacent to Downtown, the Mission Lofts site is likely to experience parking demand below these ratios. Additionally, as detailed in Section 8.1.6, data collected in Southern California indicates that, regionally, residential parking demand is lower than these national averages.

### 8.1.5 TRANSIT ORIENTED DEVELOPMENT PARKING RESEARCH

Transit oriented developments are a recent development phenomena, and as such, are a growing area of research The best available information on parking demand for residential TODs comes from parking ratios. While these ratios do not represent an empirical measure of parking demand, they do provide a record of negotiations between planners and developers.

*Parking Policy for Transit-Oriented Development: Lessons for Cities, Transit Agencies, and Developers,* published in the *Journal of Public Transportation* by the Center for Urban Transportation Research (CUTR) in 2005, contains one of the most comprehensive reviews of parking spaces provided for residential buildings near rail transit stations. The findings for 26 Residential TOD buildings in California are summarized in Table 8-2.

**TABLE 8-2**
**CUTR PARKING RATIOS**

| Location | Sites Studied | Ratio[1] |
|---|---|---|
| BART/Pleasant Hill | **4** | 1.08 sp/du |
| Metro Blue Line/Long Beach | **2** | 1.25 sp/du |
| BART/South Alameda County | **4** | 1.31 sp/du |
| Caltrain | **3** | 1.35 sp/du |
| Other heavy and light rail | **11** | 1.42 sp/du |
| San Diego Trolley/Mission Valley | **2** | 1.92 sp/du |

Notes:
1. sp/du = spaces per dwelling unit.

Source: *Journal of Public Transportation,* Center for Urban Transportation Research, 2005

Table 8-3 details the results of TOD parking studies compiled in 2008 by Fehr & Peers. While the provision of parking varies between TODs, in general, the average parking ratio per unit in TODs in both suburban and urban locations is substantially lower (1.0 to 1.3 sp/du compared with 1.7 sp/du) than what the Code would require for the Mission Lofts project.

**TABLE 8-3**
**PARKING RATIOS IN TODS ACROSS THE UNITED STATES**

| Location | Ratio[1] Within TOD | Ratio[1] Outside TOD |
|---|---|---|
| ***Suburban Areas*** | | |
| Arlignton, VA | 1.0 sp/du (high rise)<br>2.0 sp/du (townhouse) | 1.1 sp/du (high rise) |
| Atlanta (Lindbergh), GA | 1.0-1.9 sp/du | 1 sp/br |
| Dallas (Mockingbird), TX | 1.2 sp/du | –- |
| Miami (Dadeland South), FL | 1.0 sp/du | 1.5 sp/du (1 bedroom)<br>1.8 sp/du (2 bedrooms)<br>2.0 sp/du (3 bedrooms) |
| Pleasant Hill, CA | 1.35 sp/du | 1.75 sp/du |
| ***Average*** | ***1.3 sp/du*** | ***1.5 sp/du*** |
| ***Urban Areas*** | | |
| Chapel Hill, NC[2] | 0.7 – 1.7 sp/du (multi-family)<br>1.0 – 2.0 sp/du (single family) | 1.0 – 2.5 sp/du (multi-family)<br>2.0 – 3.0 sp/du (single family) |
| Oakland (Fruitvale), CA | 0.5 sp/du | 1.0 – 2.0 sp/du |
| Long Beach (Pacific Court), CA | 1.0 sp/du (studio)<br>2.0 sp/du (1+ bedrooms) | 1.3 sp/du (studio)<br>2.3 sp/du (1+ bedrooms) |
| ***Urban Areas – AVERAGE*** | ***1.0 sp/du*** | ***1.9 sp/du*** |

Notes:
1. Rates given as per unit unless otherwise specified.
2. Range given is minimum – maximum.
3. sp/du = spaces per dwelling unit
4. sp/br = spaces per bedroom

Source: Fehr & Peers, July 2008

### 8.1.6 SOUTHERN CALIFORNIA PARKING DEMAND RESEARCH

In addition to compiling TOD parking ratio data, Fehr & Peers has conducted a residential parking demand survey at a similar location in Southern California, which provides empirical data on the actual usage of parking in residential developments comparable to the Mission Lofts project.

#### 8.1.6.1 Methodology

For the survey, the residential development was visited late at night, and the number of vehicles parked, as well as the total number of parking spaces in the facility, were recorded. Parking demand is calculated by dividing the observed maximum number of parked vehicles by the number of occupied dwelling units in the development. Late nights were surveyed because pilot surveys indicated that this time period was the peak for parking occupancy in residential developments as people typically work during the day and are less likely to go out for leisure activities late at night on weekday evenings.

#### 8.1.6.2 Study Location

The site was selected from a list of candidates after discussions with the City of Riverside Planning Department. The survey was conducted in Corona, California less than a half mile from the North Main Corona Metro Station. The survey site is in an urban area that is well served by transit, similar is nature to the proposed Mission Lofts site. The survey site provides parking for residents in an open lot and does not contain garages. The survey location shared its dwelling unit breakdown and occupancy level with us. For this study the project is to remain anonymous.

The survey site contains 404 apartment units with the following breakdown:

- 214 one bedroom units
- 169 two bedroom units
- 21 three bedroom units
- 404 total units

The survey site provides the following parking:

- 275 numbered spaces
- 238 guest spaces
- 14 handicapped spaces
- 138 garages
- 665 total spaces at 1.6 sp/du

#### 8.1.6.3 Data Collection

The surveys were conducted on Wednesday March 18, 2015 and Sunday March 22, 2015 at 11:00PM. The City of Riverside Planning Department deemed these days to be the most likely to be at peak occupancy. During the time of the survey, the development residences were 95% occupied. Since personal garages were closed at the time of the study, a conservative estimate was assumed that garages were 95% occupied. The results of the study are summarized in Table 8-4.

**TABLE 8-4**
**PARKING OCCUPANCY COUNTS**

| Time, Day | Numbered Spaces | Handicapped Spaces | Guest Spaces | Garages | Total | Percent Occupancy |
|---|---|---|---|---|---|---|
| Total Spaces Provided | 275 | 14 | 238 | 138 | **665** | - |
| 11:00PM, Wednesday | 211 | 13 | 234 | 131 | **589** | 89% |
| 11:00PM, Sunday | 216 | 13 | 238 | 131 | **598** | 90% |

Source: Fehr & Peers, March 2015

The comparable site cite contains three bedroom units and no studio units while the Mission Lofts site contains no three bedroom units but does contain studio units. Three bedroom units will have a higher parking demand than studio units so parking demand by unit type was developed in order to make a direct comparison between the two sites. The City of Riverside Municipal Code parking supply requirements (1.5 sp/du for studio and one bedroom units, two sp/du for two and three bedroom units) were applied to the comparable site to determine the estimated utilization rate based on the distribution of occupied units. These utilization rates were applied to the Mission Lofts project to determine the parking demand by unit type as shown in Table 8-5. At full occupancy, the parking demand at the Mission Lofts site is estimated to be 323 spaces at 1.5 sp/du.

**TABLE 8-5**
**MISSION LOFTS PARKING DEMAND BY UNIT TYPE**

| Unit Type | Parking Utilization Rate | Mission Lofts Units | Parking Demand (spaces) |
|---|---|---|---|
| Studio | 1.35 | 52 | 70 |
| 1 BR | 1.35 | 77 | 104 |
| 2 BR | 1.79 | 83 | 149 |
| 3 BR | 1.79 | - | - |
| **Total** | - | **212** | **323** |

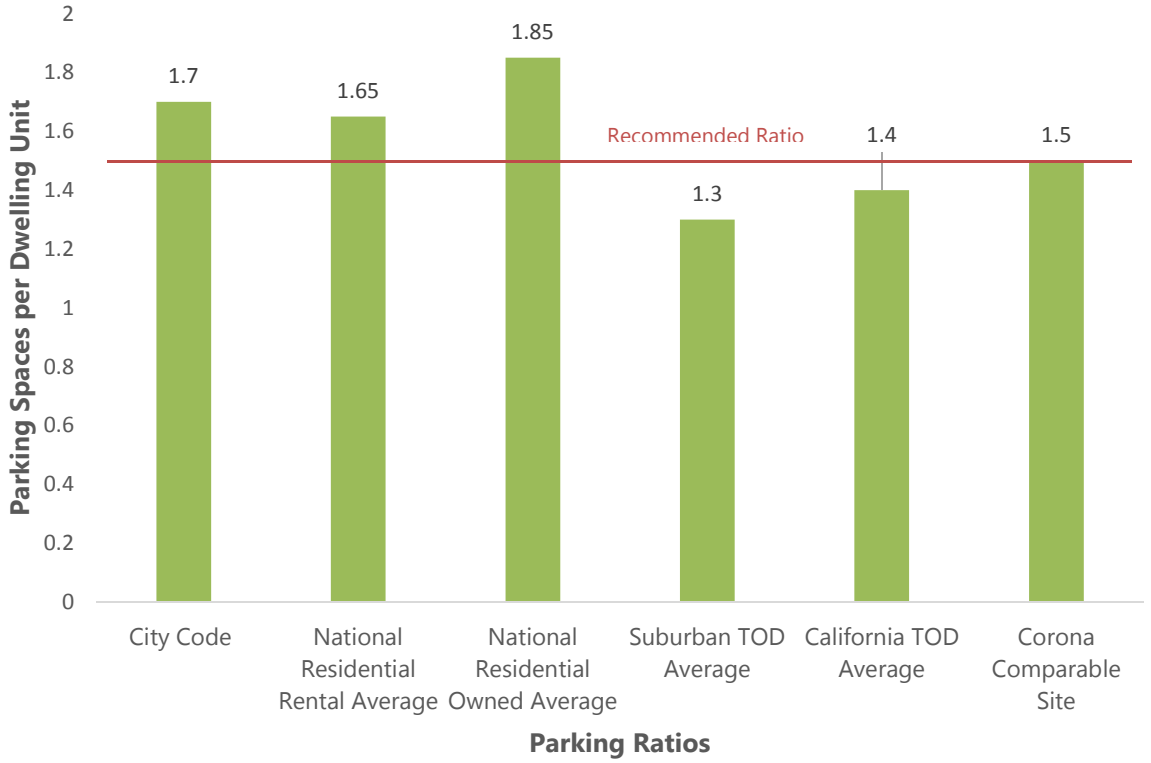
Source: Fehr & Peers, March 2015

### 8.1.7 RECOMMENDED PROJECT PARKING RATE

Based on the range of parking ratios detailed in research on TODs and the empirical parking demand found at the comparable development in Southern California, a reduction to the required parking ratios found in the City of Riverside Municipal Code would be appropriate given the nature of the Mission Lofts development.

Figure 8-1 summarizes the ratios derived from the parking studies previously discussed and compares them to the City of Riverside Municipal Code and the recommended parking ratio for the Mission Lofts project. Based on all of the available data, the parking demand at the Mission Lofts project is projected to be 1.5 sp/du, inclusive of on-site parking. As shown in Figure 8-1, a ratio of 1.5 sp/du is consistent with most local and TOD data points. A 1.5 sp/du parking ratio requires a minimum of 318 parking spaces on-site and the Mission Lofts project proposes to provide 320 parking spaces.

**Figure 8-1 Parking Ratio Comparison**



# 9.0 LANE AND STRIPING STUDY

The City of Riverside identified a need for a Lane and Striping Study to address access control at the three proposed driveways. Fehr & Peers worked with the City to develop striping concepts that detail modifications to existing striping on roads adjacent to the project.

## 9.1.1 ACCESS FROM UNIVERSITY AVENUE

The proposed driveway from University Avenue is in the same location as an existing driveway. Due to high speeds on University Avenue and higher traffic volumes than under existing conditions, striping modifications need to be made to accommodate the eastbound left turn movement into the project site. Fehr & Peers worked with the City of Riverside Public Works Department to develop a proposed striping plan that provides a two-way left turn lane to access the site. Figure 9-1 details the proposed striping layout required to fit the two-way left turn lane.

## 9.1.2 ACCESS FROM MISSION INN AVENUE AND 9$^{TH}$ STREET

The access driveways from Mission Inn Avenue and 9$^{th}$ Street will not require any striping modifications. A driveway from Mission Inn Avenue already exists at the proposed driveway location and the striping is consistent with other driveways on Mission Inn Avenue. The project sponsor should note that after the installation of new curb and gutter, any striping that is ruined or removed shall be reinstalled. There is no existing striping on 9$^{th}$ Street and the intersection of 9$^{th}$ Street, the proposed access driveway and the Metrolink parking lot access driveway would function acceptably without the installation of new striping.

CADD FILE: W:\Orange County N Drive\PROJECTS\3315\3371_Riverside Mission Lofts\Graphics\ACAD\LaneStripingStudy.dwg
Apr 03, 2015

Figure 9-1

University Avenue Driveway Access Striping Exhibit

# APPENDIX A: APPROVED SCOPING AGREEMENT

*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. P14-0045, P14-0046, P14-0047, P14-0048, P14-0049
Related Cases -
SP No. _____
EIR No. _____
GPA No. _____
CZ No. _____
Project Name: Mission Lofts
Project Location: North East and South East Corner of University Ave & Commerce St
Project Description: 212 Apartments

| | Consultant | Developer |
|---|---|---|
| Name: | Fehr & Peers | REALM |
| Address: | 8141 E. Kaiser Blvd. | 1201 Dove St, Suite 520 |
| | Anaheim, CA 92808 | Newport Beach, CA 92660 |
| Telephone: | (714)941-8800 | (949) 975-1122 |

**A. Trip Generation Source:** ITE *Trip Generation Manual*, 9th edition

Existing Land Use: Vacant
Existing Zoning: BMP, I
Total Daily Trips: 0

Proposed Land Use: Residential - Apartments
Proposed Zoning: Multiple-Family Residential

| | In | Out | Total |
|---|---|---|---|
| AM Trips | 22 | 86 | 108 |
| PM Trips | 85 | 46 | 131 |

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 30 % S 50 % E 15 % W 5 %
(See attached exhibit for detailed assignment)

**C. Background Traffic**

Project Completion Year: 2016 Annual Ambient Growth Rate: 2 %
Other area projects to be included: _____

***Please contact Planning Division or use the most recently provided data***

Model/Forecast methodology if required Riverside General Plan Buildout 2025 ADT Forecast Growth

**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. SR-91 WB Off Ramp & Mission Inn Ave
2. Lime St & University Ave
3. Mulberry St/SR-91 EB On Ramp & Mission Inn Ave
4. Mulberry St/SR-91 EB Off Ramp & University Ave
5. 10th St/SR-91 WB On Ramp & Lime St
6. Park Ave & University Ave
7. Lime St & 9th St
8. Commerce St & Mission Inn Ave
9. 9th St & Metrolink Driveway/Proposed Project Driveway

**F. Study Roadway Segments (For Build-out Studies):**

1. University Ave btwn Lemon St & Lime St
2. Lime St btwn 9th St & University Ave
3. Mission Inn Ave btwn Vine St & Commerce St
4. University Ave btwn Santa Fe St & Commerce St
5. Commerce St btwn University Ave & Mission Inn Ave
6. University Ave btwn Park Ave & Victoria Ave
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)

_____

_____

**Recommended by:**

Consultant's Representative — Date: 2/25/15

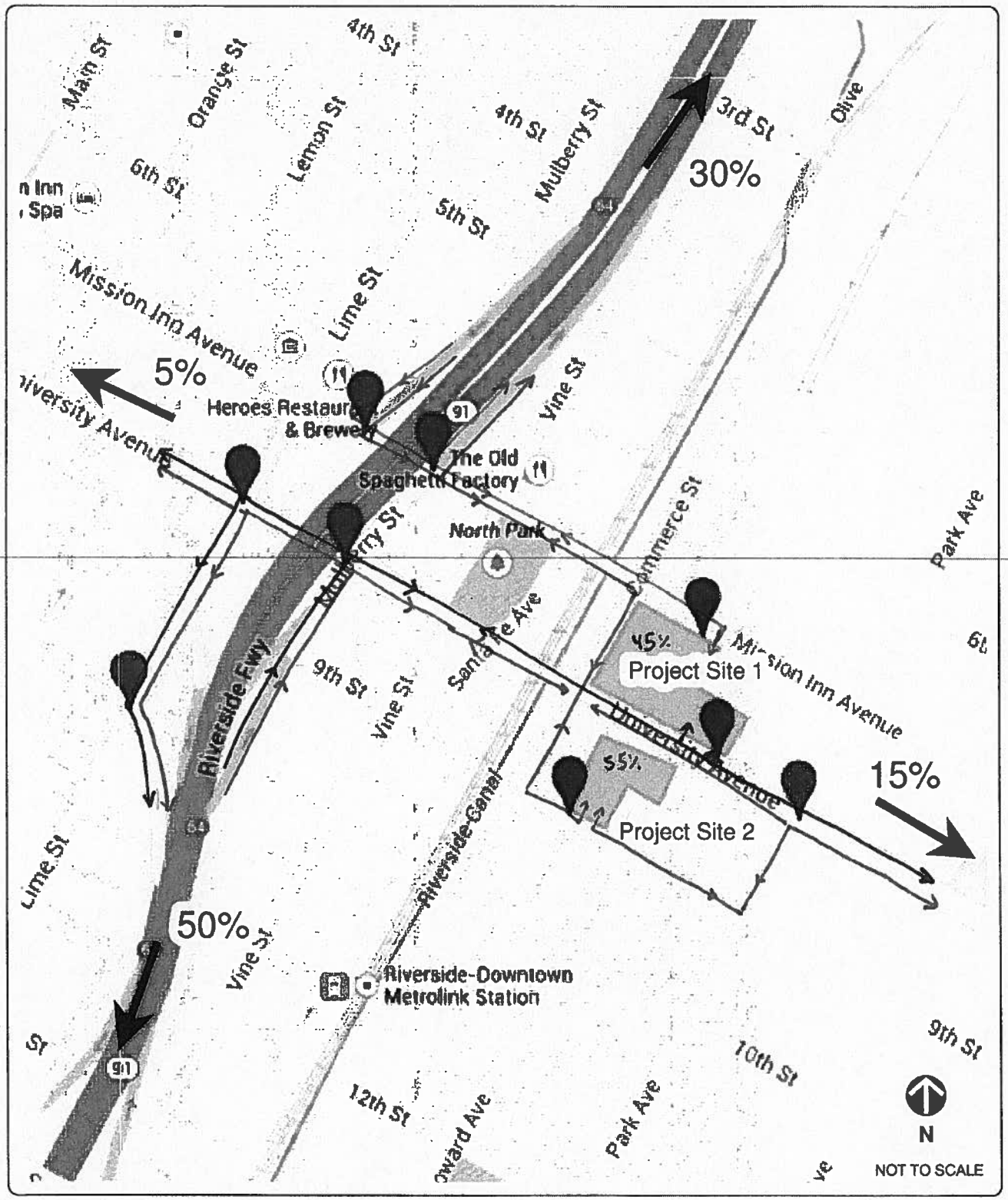
Scoping Agreement Submitted on — Date

Scoping Agreement Resubmitted on — Date

**Approved Scoping Agreement:**

City of Riverside
Traffic Engineering Division — Date: 2/25/15

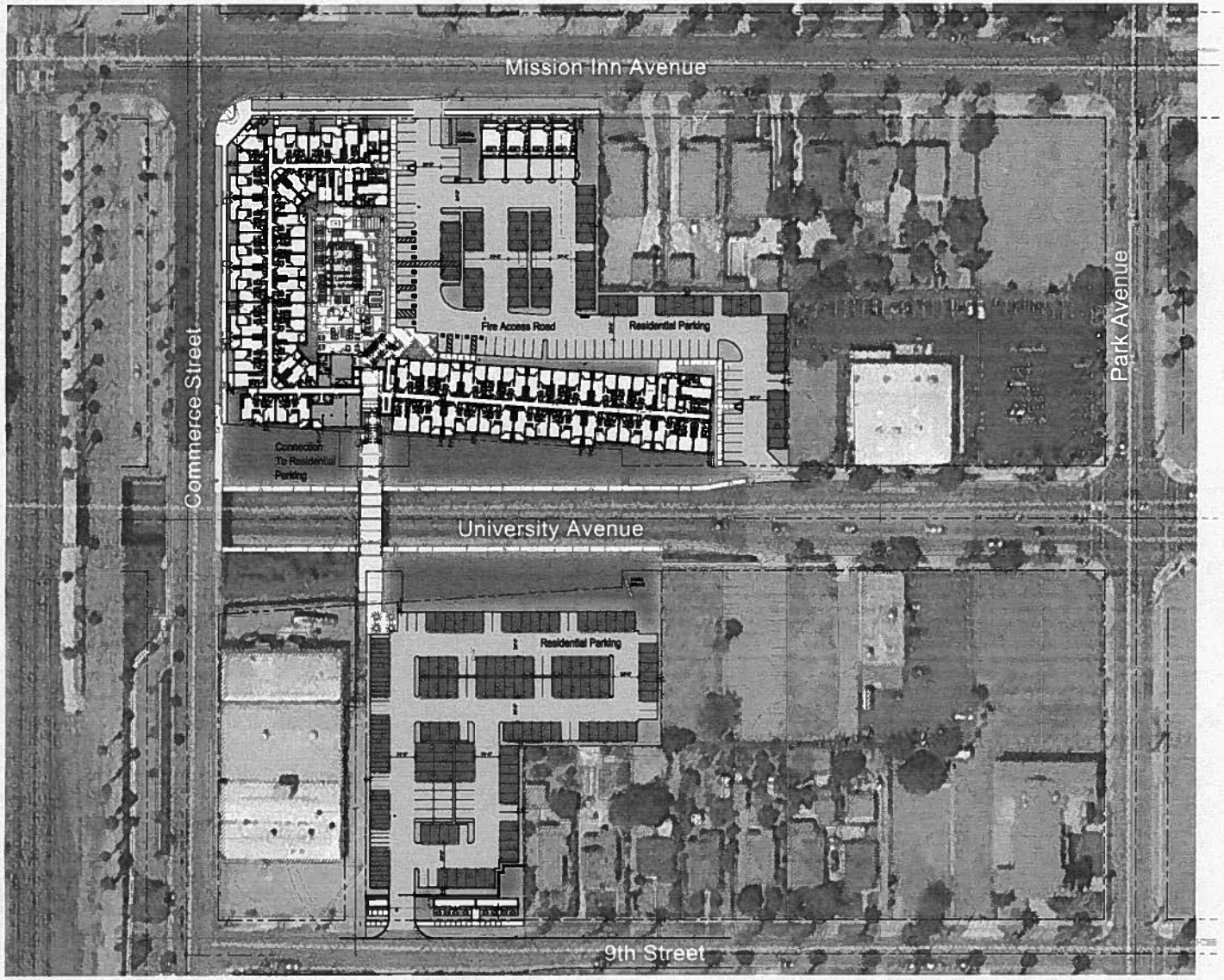
cc: Planning Division




FEHR PEERS

**Local Project Trip Distribution**

**FIGURE 2**




| Project Data | | | |
|---|---|---|---|
| Project | Mission Lofts<br>Riverside, CA | | |
| Site Area Information | | | |
| Parcel North | Gross Site Area | | 3.16 AC |
| Parcel South | Gross Site Area | | 1.53 AC |
| Total | Gross Site Area | 4.69 AC | |
| | Total Dwelling Units | 212 DU | |
| | Density | 45.2 DU/AC | |

| Building Plan Summary | | Type V Construction |
|---|---|---|
| Building A | | 4 Story Residential on Grade |
| Building B | | 2 Story Residential on Grade |
| Building A | | 208 DU |
| Building B | | 4 DU |
| Total | | 212 DU |

| Unit Plan | Unit Type | Gross SF | Total | Percent |
|---|---|---|---|---|
| Plan 0-1 | Studio | 459 | 51 | 24.1% |
| Plan 0-2 | Studio | 639 | 1 | 0.5% |
| Plan 1-0 | 1 Bd / 1 Ba | 624 | 16 | 7.5% |
| Plan 1-1 | 1 Bd / 1 Ba | 657 | 4 | 1.9% |
| Plan 1-2 | 1 Bd / 1 Ba | 661 | 52 | 24.5% |
| Plan 1-3 | 1 Bd / 1 Ba | 739 | 2 | 0.9% |
| Plan 1-4 | 1 Bd / 1 Ba | 828 | 3 | 1.4% |
| Plan 2-0 | 2 Bd / 2 Ba | 888 | 73 | 34.4% |
| Plan 2-1 | 2 Bd / 2 Ba | 962 | 6 | 2.8% |
| Plan 2-2 | 2 Bd / 2 Ba | 1,177 | 4 | 1.9% |
| Totals | | | 212 | 100% |
| Average Unit Size | | 709 SF | | |
| Studio Plan | | | 52 | 25% |
| 1 Bedroom Plan | | | 77 | 36% |
| 2 Bedroom Plan | | | 83 | 39% |
| Totals | | | 212 | 100% |

| Residential Parking Provided | |
|---|---|
| Parcel North Parking | |
| Covered Parking | 67 stalls |
| Open Parking | 79 stalls |
| Total Parcel North Parking | 146 stalls |
| Parcel South Parking | |
| Covered Parking | 124 stalls |
| Open Parking | 50 stalls |
| Total Parcel South Parking | 174 stalls |
| Total Covered Parking | 191 stalls |
| Total Open Parking | 129 stalls |
| Total Stalls Provided | 320 stalls |
| Parking Ratio | 1.51 stalls per unit |

Carport Parking

0 20 40 80

# MISSION LOFTS

**Mission Lofts LLC**
1201 Dove Street, Suite 250
Newport Beach, CA 92660
949.975.1122

# ARCHITECTURAL SITE PLAN

RIVERSIDE, CA

KTGY # 2012-0471 10.30.2014

# SP1.0

**KTGY Group, Inc.**
**Architecture+Planning**
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com

## Paul Herrmann

**From:** Norton, Brian <BNorton@riversideca.gov>
**Sent:** Monday, February 23, 2015 4:06 PM
**To:** Paul Herrmann
**Subject:** RE: Mission lofts

Paul, I apologize regarding the time frame, here are the projects located within proximity to the Mission Lofts project;

1. Centerpointe residential – 125 units, no retail, located generally at the intersection of First and Market Street

2. Imperial Hardware – 96 units residential, 10,000 square feet retail, generally located at the intersection of University Avenue and Main Street

3. Riverside Community Hospital – New 215,500 square foot 7 story hospital bed tower, which includes 105 new licensed beds, 35 intensive care patient rooms and 70 medical and surgical patient rooms (2014-2017). Generally located at the intersection of Market Street and 14th.

4. El Pollo Loco – Refurbish and addition of a drive-thru. Located at 2200 University Avenue.

Thank You –

Brian

# APPENDIX B: EXISTING TRAFFIC COUNTS

# ITM Peak Hour Summary

Prepared by:

NDS

## *SR-91 WB Off Ramp and Mission Inn Ave , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible]3[illegible] |

### Peak Hour Summary

### Southbound Approach

SR-91 WB Off Ramp

| Lanes | 2 | 0 | 1 | | |
|---|---|---|---|---|---|
| AM | 1054 | 0 | 177 | 0 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 795 | 0 | 226 | 0 | PM |

Mission Inn Ave

### Eastbound Approach

| | AM | NOON | PM |
|---|---|---|---|
| | 1251 | 0 | 1062 |
| 0 | 0 | 0 | 0 |
| 2 | 231 | 0 | 486 |
| 0 | 0 | 0 | 0 |
| Lanes | AM | NOON | PM |

### CONTROL

Signalized

### Westbound Approach

| | AM | NOON | PM | Lanes |
|---|---|---|---|---|
| | 0 | 0 | 0 | 0 |
| | 197 | 0 | 267 | 2 |
| | 0 | 0 | 0 | 0 |
| | 408 | 0 | 712 | |
| | AM | NOON | PM | |

### Northbound Approach

| | | | | |
|---|---|---|---|---|
| AM | 0 | 0 | 0 | 0 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 0 | 0 | 0 | PM |
| | | 0 | 0 | 0 | Lanes |

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

| | North Leg | |
|---|---|---|
| AM | 1231 | 0 |
| NOON | 0 | 0 |
| PM | 1021 | 0 |

| | AM | NOON | PM |
|---|---|---|---|
| West Leg | 1251 | 0 | 1062 |
| | 231 | 0 | 486 |
| East Leg | 197 | 0 | 267 |
| | 408 | 0 | 712 |

| | | |
|---|---|---|
| AM | 0 | 0 |
| NOON | 0 | 0 |
| PM | 0 | 0 |

South Leg

## Total Volume Per Leg

| | North Leg |
|---|---|
| AM | 1231 |
| NOON | 0 |
| PM | 1021 |

| | AM | NOON | PM |
|---|---|---|---|
| West Leg | 1482 | 0 | 1548 |
| East Leg | 605 | 0 | 979 |

| | |
|---|---|
| AM | 0 |
| NOON | 0 |
| PM | 0 |

South Leg

# ITM Peak Hour Summary

Prepared by:

NDS

## *Mulberry St/SR-91 EB On Ramp and Mission Inn Ave , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible]2 |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible] |

### Peak Hour Summary

### Southbound Approach

Mulberry St/SR-91 EB On Ramp

| Lanes | 0 | 0 | 0 | | |
|---|---|---|---|---|---|
| AM | 0 | 0 | 0 | 443 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 0 | 0 | 824 | PM |

### Eastbound Approach

Mission Inn Ave

| Lanes | AM | NOON | PM |
|---|---|---|---|
| | 196 | 0 | 279 |
| 1 | 184 | 0 | 319 |
| 2 | 226 | 0 | 412 |
| 0 | 0 | 0 | 0 |

### Westbound Approach

| Lanes | AM | NOON | PM |
|---|---|---|---|
| 0 | 68 | 0 | 203 |
| 2 | 73 | 0 | 179 |
| 0 | 0 | 0 | 0 |
| | 285 | 0 | 477 |

### CONTROL

Signalized

### Northbound Approach

| Lanes | 1 | .5 | .5 | |
|---|---|---|---|---|
| AM | 0 | 123 | 191 | 59 |
| NOON | 0 | 0 | 0 | 0 |
| PM | 0 | 100 | 302 | 65 |

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

| | North Leg | East Leg | South Leg | West Leg |
|---|---|---|---|---|
| AM | 0 | 141 | 0 | 196 |
| | 443 | 382 | 373 | 279 |
| NOON | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 |
| PM | 0 | 285 | 0 | 410 |
| | 824 | 477 | 467 | 731 |

## Total Volume Per Leg

| | North Leg | East Leg | South Leg | West Leg |
|---|---|---|---|---|
| AM | 443 | 426 | 373 | 606 |
| NOON | 0 | 0 | 0 | 0 |
| PM | 824 | 859 | 467 | 1010 |

# ITM Peak Hour Summary

Prepared by:

NDS

## *Lime St and University Ave , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible]3 |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible]3[illegible] |

### Peak Hour Summary

### Southbound Approach

Lime St

| Lanes | 0 | 2 | 1 | | |
|---|---|---|---|---|---|
| AM | 44 | 626 | 49 | 174 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 55 | 680 | 168 | 266 | PM |

### Eastbound Approach

University Ave

| Lanes | AM | NOON | PM |
|---|---|---|---|
| | 657 | 0 | 558 |
| 1 | 6 | 0 | 14 |
| 2 | 316 | 0 | 709 |
| 1 | 89 | 0 | 124 |

### Westbound Approach

| Lanes | AM | NOON | PM |
|---|---|---|---|
| 0 | 49 | 0 | 49 |
| 2 | 600 | 0 | 477 |
| 2 | 330 | 0 | 260 |
| | 487 | 0 | 1248 |

### CONTROL

Signalized

### Northbound Approach

| | | | | | |
|---|---|---|---|---|---|
| AM | 1045 | 13 | 119 | 122 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 1064 | 26 | 203 | 371 | PM |
| | | 1 | 2 | 1 | Lanes |

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

| | AM | NOON | PM |
|---|---|---|---|
| North Leg | 719 | 0 | 903 |
| | 174 | 0 | 266 |
| East Leg | 979 | 0 | 786 |
| | 487 | 0 | 1248 |
| South Leg | 1045 | 0 | 1064 |
| | 254 | 0 | 600 |
| West Leg | 657 | 0 | 558 |
| | 411 | 0 | 847 |

## Total Volume Per Leg

| | AM | NOON | PM |
|---|---|---|---|
| North Leg | 893 | 0 | 1169 |
| East Leg | 1466 | 0 | 2034 |
| South Leg | 1299 | 0 | 1664 |
| West Leg | 1068 | 0 | 1405 |

# ITM Peak Hour Summary

Prepared by:

NDS

***Mulberry St/SR-91 EB Off Ramp and University Ave , Riverside***

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible]3[illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible] |

## Peak Hour Summary

### Southbound Approach

Mulberry St/SR-91 EB Off Ramp

| Lanes | 0 | 0 | 0 | | |
|---|---|---|---|---|---|
| AM | 0 | 0 | 0 | 384 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 0 | 0 | 478 | PM |

### Eastbound Approach

University Ave

| | AM | NOON | PM |
|---|---|---|---|
| | 971 | 0 | 788 |
| 1 | 123 | 0 | 264 |
| 2 | 334 | 0 | 974 |
| 0 | 0 | 0 | 0 |
| Lanes | AM | NOON | PM |

### Westbound Approach

| | AM | NOON | PM | Lanes |
|---|---|---|---|---|
| | 92 | 0 | 93 | 1 |
| | 600 | 0 | 586 | 2 |
| | 0 | 0 | 0 | 0 |
| | 507 | 0 | 1183 | |
| | AM | NOON | PM | |

**CONTROL**

Signalized

### Northbound Approach

| | | | | |
|---|---|---|---|---|
| AM | 0 | 371 | 169 | 173 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 202 | 121 | 209 | PM |
| | | 1.5 | .5 | 1 | Lanes |

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

| North Leg | | |
|---|---|---|
| 0 | 384 | AM |
| 0 | 0 | NOON |
| 0 | 478 | PM |

| West Leg | | | East Leg | | |
|---|---|---|---|---|---|
| AM | NOON | PM | | | |
| 971 | 0 | 788 | 692 | 0 | 679 |
| 457 | 0 | 1238 | 507 | 0 | 1183 |
| | | | AM | NOON | PM |

| South Leg | | |
|---|---|---|
| 0 | 713 | AM |
| 0 | 0 | NOON |
| 0 | 532 | PM |

## Total Volume Per Leg

| North Leg | | |
|---|---|---|
| 384 | | AM |
| 0 | | NOON |
| 478 | | PM |

| West Leg | | | East Leg | | |
|---|---|---|---|---|---|
| AM | NOON | PM | | | |
| 1428 | 0 | 2026 | 1199 | 0 | 1862 |
| | | | AM | NOON | PM |

| South Leg | |
|---|---|
| 713 | AM |
| 0 | NOON |
| 532 | PM |

# ITM Peak Hour Summary

Prepared by:

NDS

## *Commerce St and Mission Inn Ave , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible] |

### Peak Hour Summary

### Southbound Approach

Commerce St

| Lanes | 0 | 1 | 0 | | |
|---|---|---|---|---|---|
| AM | 7 | 22 | 3 | 22 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 8 | 52 | 10 | 25 | PM |

### Mission Inn Ave

### Eastbound Approach

| | AM | NOON | PM |
|---|---|---|---|
| | 99 | 0 | 135 |
| 0 | 10 | 0 | 7 |
| 1 | 84 | 0 | 330 |
| 1 | 22 | 0 | 91 |
| Lanes | AM | NOON | PM |

### CONTROL

2-Way Stop (NB/SB)

### Westbound Approach

| | AM | NOON | PM | Lanes |
|---|---|---|---|---|
| | 1 | 0 | 4 | 0 |
| | 76 | 0 | 74 | 1 |
| | 1 | 0 | 4 | 0 |
| | 89 | 0 | 345 | |
| | AM | NOON | PM | |

### Northbound Approach

| | | | | |
|---|---|---|---|---|
| AM | 45 | 16 | 11 | 2 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 147 | 53 | 14 | 5 | PM |
| | | 0 | 1 | 0 | Lanes |

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

| | AM | NOON | PM |
|---|---|---|---|
| North Leg | 32 | 0 | 70 |
| | 22 | 0 | 25 |
| East Leg | 99 | 0 | 135 |
| | 116 | 0 | 428 |
| West Leg | 78 | 0 | 82 |
| | 89 | 0 | 345 |
| South Leg | 45 | 0 | 147 |
| | 29 | 0 | 72 |

## Total Volume Per Leg

| | AM | NOON | PM |
|---|---|---|---|
| North Leg | 54 | 0 | 95 |
| West Leg | 215 | 0 | 563 |
| East Leg | 167 | 0 | 427 |
| South Leg | 74 | 0 | 219 |

# ITM Peak Hour Summary

Prepared by:

NDS

## *Lime St and 10th St/SR-91 WB On Ramp , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible]3[illegible] |

### Peak Hour Summary

### Southbound Approach

Lime St

| Lanes | 0 | 2 | 2 | | |
|---|---|---|---|---|---|
| AM | 130 | 441 | 317 | 276 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 37 | 519 | 654 | 492 | PM |

### 10th St/SR-91 WB On Ramp

### Eastbound Approach

| | AM | NOON | PM |
|---|---|---|---|
| | 187 | 0 | 55 |
| 1 | 13 | 0 | 86 |
| 1 | 76 | 0 | 242 |
| 0 | 27 | 0 | 110 |
| Lanes | AM | NOON | PM |

### CONTROL

Signalized

### Westbound Approach

| AM | NOON | PM | Lanes |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 404 | 0 | 943 | |
| AM | NOON | PM | |

### Northbound Approach

| | | | | |
|---|---|---|---|---|
| AM | 468 | 57 | 263 | 11 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 629 | 18 | 406 | 47 | PM |
| | | 1 | 2 | 0 | Lanes |

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

| | AM | NOON | PM |
|---|---|---|---|
| North Leg | 888 | 0 | 1210 |
| | 276 | 0 | 492 |
| West Leg | 187 | 0 | 55 |
| | 116 | 0 | 438 |
| East Leg | 0 | 0 | 0 |
| | 404 | 0 | 943 |
| South Leg | 468 | 0 | 629 |
| | 331 | 0 | 471 |

## Total Volume Per Leg

| | AM | NOON | PM |
|---|---|---|---|
| North Leg | 1164 | 0 | 1702 |
| West Leg | 303 | 0 | 493 |
| East Leg | 404 | 0 | 943 |
| South Leg | 799 | 0 | 1100 |

# ITM Peak Hour Summary

Prepared by:

NDS

## *Park Ave and University Ave , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible]3[illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible] |

### Peak Hour Summary

### Southbound Approach

Park Ave

| Lanes | 0 | 1 | 1 | | |
|---|---|---|---|---|---|
| AM | 32 | 39 | 30 | 119 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 29 | 115 | 160 | 100 | PM |

### Eastbound Approach

University Ave

| | AM | NOON | PM |
|---|---|---|---|
| | 688 | 0 | 670 |
| 1 | 26 | 0 | 35 |
| 2 | 457 | 0 | 1081 |
| 0 | 19 | 0 | 70 |
| Lanes | AM | NOON | PM |

### Westbound Approach

| | AM | NOON | PM | Lanes |
|---|---|---|---|---|
| | 52 | 0 | 34 | 0 |
| | 624 | 0 | 618 | 2 |
| | 13 | 0 | 33 | 1 |
| | 517 | 0 | 1277 | |
| | AM | NOON | PM | |

**CONTROL**

Signalized

### Northbound Approach

| | | | | |
|---|---|---|---|---|
| AM | 71 | 32 | 41 | 30 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 218 | 23 | 31 | 36 | PM |
| | | 1 | 1 | 0 | Lanes |

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

| North Leg | | |
|---|---|---|
| 101 | 119 | AM |
| 0 | 0 | NOON |
| 304 | 100 | PM |

| West Leg | | | East Leg | | |
|---|---|---|---|---|---|
| AM | NOON | PM | | | |
| 688 | 0 | 670 | 689 | 0 | 685 |
| 502 | 0 | 1186 | 517 | 0 | 1277 |
| | | | AM | NOON | PM |

| South Leg | | |
|---|---|---|
| 71 | 103 | AM |
| 0 | 0 | NOON |
| 218 | 90 | PM |

## Total Volume Per Leg

| North Leg |
|---|
| 220 |
| 0 |
| 404 |

| West Leg | | | East Leg | | |
|---|---|---|---|---|---|
| AM | NOON | PM | | | |
| 1190 | 0 | 1856 | 1206 | 0 | 1962 |
| | | | AM | NOON | PM |

| South Leg |
|---|
| 174 |
| 0 |
| 308 |

# ITM Peak Hour Summary

Prepared by:

NDS

## *Mulberry St/SR-91 EB Off Ramp and University Ave/Jack B Clarke Way , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]8[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible] |

### Peak Hour Summary

### Southbound Approach

Mulberry St/SR-91 EB Off Ramp

| | Lanes 0 | 0 | 0 | | |
|---|---|---|---|---|---|
| AM | 0 | 0 | 0 | 0 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 0 | 0 | 0 | PM |

University Ave/Jack B Clarke Way

### Eastbound Approach

| Lanes | AM | NOON | PM |
|---|---|---|---|
| | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 1 | 35 | 0 | 30 |

### Westbound Approach

| AM | NOON | PM | Lanes |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 41 | 0 | 36 | |

### CONTROL

Signalized

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

### Northbound Approach

| | | | | |
|---|---|---|---|---|
| AM | 35 | 0 | 0 | 41 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 30 | 0 | 0 | 36 | PM |
| | | 0 | 0 | 0 | Lanes |

## Total Ins & Outs

| | North Leg | |
|---|---|---|
| AM | 0 | 0 |
| NOON | 0 | 0 |
| PM | 0 | 0 |

| | AM | NOON | PM |
|---|---|---|---|
| West Leg | 0 | 0 | 0 |
| | 35 | 0 | 30 |
| East Leg | 0 | 0 | 0 |
| | 41 | 0 | 36 |

| | | |
|---|---|---|
| AM | 35 | 41 |
| NOON | 0 | 0 |
| PM | 30 | 36 |

South Leg

## Total Volume Per Leg

| | North Leg |
|---|---|
| AM | 0 |
| NOON | 0 |
| PM | 0 |

| | AM | NOON | PM |
|---|---|---|---|
| West Leg | 35 | 0 | 30 |
| East Leg | 41 | 0 | 36 |

| | South Leg |
|---|---|
| AM | 76 |
| NOON | 0 |
| PM | 66 |

Prepared by NDS/ATD

# VOLUME

## University Ave Bet. Lemon St & Lime St

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_002

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 7,427 | 6,848 | 14,275 |

| AM Period | NB | SB | EB | | WB | | TOTAL | | PM Period | NB | SB | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | | | 17 | | 20 | | 37 | | 12:00 | | | 131 | | 104 | | 235 | |
| 00:15 | | | 18 | | 17 | | 35 | | 12:15 | | | 134 | | 104 | | 238 | |
| 00:30 | | | 13 | | 11 | | 24 | | 12:30 | | | 121 | | 128 | | 249 | |
| 00:45 | | | 14 | 62 | 7 | 55 | 21 | 117 | 12:45 | | | 138 | 524 | 131 | 467 | 269 | 991 |
| 01:00 | | | 14 | | 12 | | 26 | | 13:00 | | | 120 | | 124 | | 244 | |
| 01:15 | | | 19 | | 6 | | 25 | | 13:15 | | | 117 | | 135 | | 252 | |
| 01:30 | | | 13 | | 7 | | 20 | | 13:30 | | | 128 | | 164 | | 292 | |
| 01:45 | | | 19 | 65 | 12 | 37 | 31 | 102 | 13:45 | | | 119 | 484 | 121 | 544 | 240 | 1028 |
| 02:00 | | | 12 | | 7 | | 19 | | 14:00 | | | 123 | | 107 | | 230 | |
| 02:15 | | | 5 | | 7 | | 12 | | 14:15 | | | 101 | | 113 | | 214 | |
| 02:30 | | | 4 | | 6 | | 10 | | 14:30 | | | 130 | | 104 | | 234 | |
| 02:45 | | | 10 | 31 | 10 | 30 | 20 | 61 | 14:45 | | | 143 | 497 | 110 | 434 | 253 | 931 |
| 03:00 | | | 3 | | 5 | | 8 | | 15:00 | | | 133 | | 139 | | 272 | |
| 03:15 | | | 11 | | 5 | | 16 | | 15:15 | | | 130 | | 116 | | 246 | |
| 03:30 | | | 9 | | 5 | | 14 | | 15:30 | | | 126 | | 114 | | 240 | |
| 03:45 | | | 6 | 29 | 13 | 28 | 19 | 57 | 15:45 | | | 135 | 524 | 132 | 501 | 267 | 1025 |
| 04:00 | | | 6 | | 6 | | 12 | | 16:00 | | | 168 | | 113 | | 281 | |
| 04:15 | | | 15 | | 8 | | 23 | | 16:15 | | | 153 | | 112 | | 265 | |
| 04:30 | | | 16 | | 8 | | 24 | | 16:30 | | | 164 | | 133 | | 297 | |
| 04:45 | | | 21 | 58 | 13 | 35 | 34 | 93 | 16:45 | | | 169 | 654 | 145 | 503 | 314 | 1157 |
| 05:00 | | | 17 | | 17 | | 34 | | 17:00 | | | 183 | | 141 | | 324 | |
| 05:15 | | | 21 | | 16 | | 37 | | 17:15 | | | 156 | | 131 | | 287 | |
| 05:30 | | | 22 | | 14 | | 36 | | 17:30 | | | 181 | | 129 | | 310 | |
| 05:45 | | | 24 | 84 | 20 | 67 | 44 | 151 | 17:45 | | | 152 | 672 | 104 | 505 | 256 | 1177 |
| 06:00 | | | 46 | | 22 | | 68 | | 18:00 | | | 156 | | 87 | | 243 | |
| 06:15 | | | 43 | | 30 | | 73 | | 18:15 | | | 129 | | 112 | | 241 | |
| 06:30 | | | 52 | | 36 | | 88 | | 18:30 | | | 104 | | 100 | | 204 | |
| 06:45 | | | 60 | 201 | 52 | 140 | 112 | 341 | 18:45 | | | 129 | 518 | 94 | 393 | 223 | 911 |
| 07:00 | | | 69 | | 98 | | 167 | | 19:00 | | | 92 | | 92 | | 184 | |
| 07:15 | | | 68 | | 116 | | 184 | | 19:15 | | | 64 | | 83 | | 147 | |
| 07:30 | | | 81 | | 114 | | 195 | | 19:30 | | | 86 | | 63 | | 149 | |
| 07:45 | | | 88 | 306 | 143 | 471 | 231 | 777 | 19:45 | | | 66 | 308 | 76 | 314 | 142 | 622 |
| 08:00 | | | 95 | | 122 | | 217 | | 20:00 | | | 74 | | 66 | | 140 | |
| 08:15 | | | 85 | | 106 | | 191 | | 20:15 | | | 55 | | 69 | | 124 | |
| 08:30 | | | 89 | | 95 | | 184 | | 20:30 | | | 68 | | 84 | | 152 | |
| 08:45 | | | 101 | 370 | 112 | 435 | 213 | 805 | 20:45 | | | 53 | 250 | 53 | 272 | 106 | 522 |
| 09:00 | | | 94 | | 105 | | 199 | | 21:00 | | | 62 | | 73 | | 135 | |
| 09:15 | | | 79 | | 95 | | 174 | | 21:15 | | | 56 | | 49 | | 105 | |
| 09:30 | | | 112 | | 105 | | 217 | | 21:30 | | | 53 | | 44 | | 97 | |
| 09:45 | | | 103 | 388 | 98 | 403 | 201 | 791 | 21:45 | | | 33 | 204 | 29 | 195 | 62 | 399 |
| 10:00 | | | 118 | | 94 | | 212 | | 22:00 | | | 33 | | 29 | | 62 | |
| 10:15 | | | 112 | | 113 | | 225 | | 22:15 | | | 45 | | 38 | | 83 | |
| 10:30 | | | 110 | | 102 | | 212 | | 22:30 | | | 41 | | 30 | | 71 | |
| 10:45 | | | 105 | 445 | 84 | 393 | 189 | 838 | 22:45 | | | 30 | 149 | 26 | 123 | 56 | 272 |
| 11:00 | | | 119 | | 95 | | 214 | | 23:00 | | | 28 | | 39 | | 67 | |
| 11:15 | | | 124 | | 107 | | 231 | | 23:15 | | | 24 | | 15 | | 39 | |
| 11:30 | | | 144 | | 105 | | 249 | | 23:30 | | | 22 | | 28 | | 50 | |
| 11:45 | | | 124 | 511 | 101 | 408 | 225 | 919 | 23:45 | | | 19 | 93 | 13 | 95 | 32 | 188 |
| TOTALS | | | | 2550 | | 2502 | | **5052** | TOTALS | | | | 4877 | | 4346 | | **9223** |
| SPLIT % | | | | 50.5% | | 49.5% | | **35.4%** | SPLIT % | | | | 52.9% | | 47.1% | | **64.6%** |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 7,427 | 6,848 | 14,275 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM Peak Hour** | | | 11:30 | 07:15 | **11:30** | **PM Peak Hour** | | | 16:45 | 12:45 | **16:45** |
| **AM Pk Volume** | | | 533 | 495 | **947** | **PM Pk Volume** | | | 689 | 554 | **1235** |
| **Pk Hr Factor** | | | 0.925 | 0.865 | **0.951** | **Pk Hr Factor** | | | 0.941 | 0.845 | **0.953** |
| **7 - 9 Volume** | 0 | 0 | 676 | 906 | **1582** | **4 - 6 Volume** | 0 | 0 | 1326 | 1008 | **2334** |
| **7 - 9 Peak Hour** | | | 08:00 | 07:15 | **07:30** | **4 - 6 Peak Hour** | | | 16:45 | 16:30 | **16:45** |
| **7 - 9 Pk Volume** | 0 | 0 | 370 | 495 | **834** | **4 - 6 Pk Volume** | 0 | 0 | 689 | 550 | **1235** |
| **Pk Hr Factor** | 0.000 | 0.000 | 0.916 | 0.865 | **0.903** | **Pk Hr Factor** | 0.000 | 0.000 | 0.941 | 0.948 | **0.953** |

Prepared by NDS/ATD

# VOLUME

## Lime St Bet. 9th St & University Ave

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_003

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 3,767 | 10,516 | 0 | 0 | 14,283 |

| AM Period | NB | | SB | | EB | | WB | | TOTAL | | PM Period | NB | | SB | | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | 8 | | 35 | | | | | | 43 | | **12:00** | 87 | | 170 | | | | | | 257 | |
| **00:15** | 10 | | 23 | | | | | | 33 | | **12:15** | 76 | | 149 | | | | | | 225 | |
| **00:30** | 3 | | 29 | | | | | | 32 | | **12:30** | 65 | | 148 | | | | | | 213 | |
| **00:45** | 4 | 25 | 15 | 102 | | | | | 19 | 127 | **12:45** | 94 | 322 | 162 | 629 | | | | | 256 | 951 |
| **01:00** | 6 | | 26 | | | | | | 32 | | **13:00** | 64 | | 164 | | | | | | 228 | |
| **01:15** | 6 | | 22 | | | | | | 28 | | **13:15** | 63 | | 161 | | | | | | 224 | |
| **01:30** | 3 | | 31 | | | | | | 34 | | **13:30** | 71 | | 165 | | | | | | 236 | |
| **01:45** | 1 | 16 | 32 | 111 | | | | | 33 | 127 | **13:45** | 63 | 261 | 158 | 648 | | | | | 221 | 909 |
| **02:00** | 2 | | 30 | | | | | | 32 | | **14:00** | 78 | | 170 | | | | | | 248 | |
| **02:15** | 5 | | 16 | | | | | | 21 | | **14:15** | 67 | | 166 | | | | | | 233 | |
| **02:30** | 1 | | 14 | | | | | | 15 | | **14:30** | 81 | | 164 | | | | | | 245 | |
| **02:45** | 8 | 16 | 10 | 70 | | | | | 18 | 86 | **14:45** | 99 | 325 | 200 | 700 | | | | | 299 | 1025 |
| **03:00** | 3 | | 13 | | | | | | 16 | | **15:00** | 86 | | 193 | | | | | | 279 | |
| **03:15** | 9 | | 9 | | | | | | 18 | | **15:15** | 78 | | 180 | | | | | | 258 | |
| **03:30** | 10 | | 10 | | | | | | 20 | | **15:30** | 102 | | 182 | | | | | | 284 | |
| **03:45** | 4 | 26 | 26 | 58 | | | | | 30 | 84 | **15:45** | 87 | 353 | 198 | 753 | | | | | 285 | 1106 |
| **04:00** | 1 | | 20 | | | | | | 21 | | **16:00** | 79 | | 216 | | | | | | 295 | |
| **04:15** | 4 | | 30 | | | | | | 34 | | **16:15** | 52 | | 208 | | | | | | 260 | |
| **04:30** | 4 | | 37 | | | | | | 41 | | **16:30** | 92 | | 202 | | | | | | 294 | |
| **04:45** | 8 | 17 | 46 | 133 | | | | | 54 | 150 | **16:45** | 56 | 279 | 225 | 851 | | | | | 281 | 1130 |
| **05:00** | 5 | | 50 | | | | | | 55 | | **17:00** | 100 | | 228 | | | | | | 328 | |
| **05:15** | 5 | | 45 | | | | | | 50 | | **17:15** | 62 | | 229 | | | | | | 291 | |
| **05:30** | 8 | | 62 | | | | | | 70 | | **17:30** | 73 | | 222 | | | | | | 295 | |
| **05:45** | 10 | 28 | 57 | 214 | | | | | 67 | 242 | **17:45** | 38 | 273 | 168 | 847 | | | | | 206 | 1120 |
| **06:00** | 12 | | 63 | | | | | | 75 | | **18:00** | 70 | | 194 | | | | | | 264 | |
| **06:15** | 18 | | 68 | | | | | | 86 | | **18:15** | 62 | | 134 | | | | | | 196 | |
| **06:30** | 16 | | 91 | | | | | | 107 | | **18:30** | 45 | | 132 | | | | | | 177 | |
| **06:45** | 22 | 68 | 107 | 329 | | | | | 129 | 397 | **18:45** | 41 | 218 | 110 | 570 | | | | | 151 | 788 |
| **07:00** | 33 | | 108 | | | | | | 141 | | **19:00** | 39 | | 121 | | | | | | 160 | |
| **07:15** | 37 | | 172 | | | | | | 209 | | **19:15** | 42 | | 95 | | | | | | 137 | |
| **07:30** | 70 | | 211 | | | | | | 281 | | **19:30** | 34 | | 113 | | | | | | 147 | |
| **07:45** | 87 | 227 | 181 | 672 | | | | | 268 | 899 | **19:45** | 22 | 137 | 95 | 424 | | | | | 117 | 561 |
| **08:00** | 43 | | 154 | | | | | | 197 | | **20:00** | 32 | | 114 | | | | | | 146 | |
| **08:15** | 49 | | 149 | | | | | | 198 | | **20:15** | 36 | | 84 | | | | | | 120 | |
| **08:30** | 35 | | 179 | | | | | | 214 | | **20:30** | 25 | | 75 | | | | | | 100 | |
| **08:45** | 31 | 158 | 155 | 637 | | | | | 186 | 795 | **20:45** | 23 | 116 | 99 | 372 | | | | | 122 | 488 |
| **09:00** | 52 | | 132 | | | | | | 184 | | **21:00** | 26 | | 104 | | | | | | 130 | |
| **09:15** | 47 | | 142 | | | | | | 189 | | **21:15** | 32 | | 101 | | | | | | 133 | |
| **09:30** | 64 | | 134 | | | | | | 198 | | **21:30** | 14 | | 101 | | | | | | 115 | |
| **09:45** | 80 | 243 | 143 | 551 | | | | | 223 | 794 | **21:45** | 13 | 85 | 64 | 370 | | | | | 77 | 455 |
| **10:00** | 58 | | 115 | | | | | | 173 | | **22:00** | 16 | | 86 | | | | | | 102 | |
| **10:15** | 54 | | 140 | | | | | | 194 | | **22:15** | 8 | | 51 | | | | | | 59 | |
| **10:30** | 58 | | 122 | | | | | | 180 | | **22:30** | 16 | | 53 | | | | | | 69 | |
| **10:45** | 58 | 228 | 140 | 517 | | | | | 198 | 745 | **22:45** | 15 | 55 | 44 | 234 | | | | | 59 | 289 |
| **11:00** | 65 | | 145 | | | | | | 210 | | **23:00** | 9 | | 43 | | | | | | 52 | |
| **11:15** | 59 | | 145 | | | | | | 204 | | **23:15** | 8 | | 47 | | | | | | 55 | |
| **11:30** | 76 | | 140 | | | | | | 216 | | **23:30** | 4 | | 43 | | | | | | 47 | |
| **11:45** | 66 | 266 | 134 | 564 | | | | | 200 | 830 | **23:45** | 4 | 25 | 27 | 160 | | | | | 31 | 185 |
| **TOTALS** | | 1318 | | 3958 | | | | | | **5276** | **TOTALS** | | 2449 | | 6558 | | | | | | **9007** |
| **SPLIT %** | | 25.0% | | 75.0% | | | | | | **36.9%** | **SPLIT %** | | 27.2% | | 72.8% | | | | | | **63.1%** |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 3,767 | 10,516 | 0 | 0 | 14,283 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM Peak Hour** | 11:30 | 07:15 | | | **07:15** | **PM Peak Hour** | 14:45 | 16:45 | | | **16:45** |
| **AM Pk Volume** | 305 | 718 | | | **955** | **PM Pk Volume** | 365 | 904 | | | **1195** |
| **Pk Hr Factor** | 0.876 | 0.851 | | | **0.850** | **Pk Hr Factor** | 0.895 | 0.987 | | | **0.911** |
| **7 - 9 Volume** | 385 | 1309 | 0 | 0 | **1694** | **4 - 6 Volume** | 552 | 1698 | 0 | 0 | **2250** |
| **7 - 9 Peak Hour** | 07:30 | 07:15 | | | **07:15** | **4 - 6 Peak Hour** | 16:30 | 16:45 | | | **16:45** |
| **7 - 9 Pk Volume** | 249 | 718 | 0 | 0 | **955** | **4 - 6 Pk Volume** | 310 | 904 | 0 | 0 | **1195** |
| **Pk Hr Factor** | 0.716 | 0.851 | 0.000 | 0.000 | **0.850** | **Pk Hr Factor** | 0.775 | 0.987 | 0.000 | 0.000 | **0.911** |

Prepared by NDS/ATD

# VOLUME

## Mission Inn Ave Bet. Vine St & Commerce St

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_004

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 3,284 | 1,724 | 5,008 |

| AM Period | NB | SB | EB | | WB | | TOTAL | | PM Period | NB | SB | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | | | 9 | | 4 | | 13 | | 12:00 | | | 40 | | 30 | | 70 | |
| 00:15 | | | 11 | | 3 | | 14 | | 12:15 | | | 44 | | 37 | | 81 | |
| 00:30 | | | 9 | | 3 | | 12 | | 12:30 | | | 33 | | 31 | | 64 | |
| 00:45 | | | 10 | 39 | 1 | 11 | 11 | 50 | 12:45 | | | 48 | 165 | 23 | 121 | 71 | 286 |
| 01:00 | | | 9 | | 3 | | 12 | | 13:00 | | | 43 | | 25 | | 68 | |
| 01:15 | | | 7 | | 3 | | 10 | | 13:15 | | | 38 | | 18 | | 56 | |
| 01:30 | | | 2 | | 4 | | 6 | | 13:30 | | | 34 | | 26 | | 60 | |
| 01:45 | | | 20 | 38 | 10 | 20 | 30 | 58 | 13:45 | | | 40 | 155 | 20 | 89 | 60 | 244 |
| 02:00 | | | 11 | | 3 | | 14 | | 14:00 | | | 37 | | 29 | | 66 | |
| 02:15 | | | 6 | | 1 | | 7 | | 14:15 | | | 43 | | 21 | | 64 | |
| 02:30 | | | 0 | | 2 | | 2 | | 14:30 | | | 82 | | 23 | | 105 | |
| 02:45 | | | 2 | 19 | 5 | 11 | 7 | 30 | 14:45 | | | 68 | 230 | 32 | 105 | 100 | 335 |
| 03:00 | | | 1 | | 1 | | 2 | | 15:00 | | | 61 | | 33 | | 94 | |
| 03:15 | | | 1 | | 2 | | 3 | | 15:15 | | | 67 | | 25 | | 92 | |
| 03:30 | | | 5 | | 6 | | 11 | | 15:30 | | | 61 | | 21 | | 82 | |
| 03:45 | | | 2 | 9 | 1 | 10 | 3 | 19 | 15:45 | | | 78 | 267 | 40 | 119 | 118 | 386 |
| 04:00 | | | 2 | | 6 | | 8 | | 16:00 | | | 66 | | 21 | | 87 | |
| 04:15 | | | 4 | | 5 | | 9 | | 16:15 | | | 96 | | 26 | | 122 | |
| 04:30 | | | 9 | | 9 | | 18 | | 16:30 | | | 77 | | 28 | | 105 | |
| 04:45 | | | 12 | 27 | 7 | 27 | 19 | 54 | 16:45 | | | 107 | 346 | 20 | 95 | 127 | 441 |
| 05:00 | | | 3 | | 10 | | 13 | | 17:00 | | | 82 | | 56 | | 138 | |
| 05:15 | | | 12 | | 10 | | 22 | | 17:15 | | | 91 | | 65 | | 156 | |
| 05:30 | | | 12 | | 20 | | 32 | | 17:30 | | | 127 | | 34 | | 161 | |
| 05:45 | | | 18 | 45 | 9 | 49 | 27 | 94 | 17:45 | | | 79 | 379 | 34 | 189 | 113 | 568 |
| 06:00 | | | 30 | | 16 | | 46 | | 18:00 | | | 79 | | 29 | | 108 | |
| 06:15 | | | 17 | | 19 | | 36 | | 18:15 | | | 103 | | 31 | | 134 | |
| 06:30 | | | 15 | | 12 | | 27 | | 18:30 | | | 74 | | 22 | | 96 | |
| 06:45 | | | 22 | 84 | 14 | 61 | 36 | 145 | 18:45 | | | 64 | 320 | 27 | 109 | 91 | 429 |
| 07:00 | | | 30 | | 24 | | 54 | | 19:00 | | | 52 | | 25 | | 77 | |
| 07:15 | | | 22 | | 22 | | 44 | | 19:15 | | | 64 | | 24 | | 88 | |
| 07:30 | | | 26 | | 25 | | 51 | | 19:30 | | | 46 | | 18 | | 64 | |
| 07:45 | | | 17 | 95 | 35 | 106 | 52 | 201 | 19:45 | | | 31 | 193 | 10 | 77 | 41 | 270 |
| 08:00 | | | 45 | | 25 | | 70 | | 20:00 | | | 35 | | 20 | | 55 | |
| 08:15 | | | 29 | | 11 | | 40 | | 20:15 | | | 34 | | 13 | | 47 | |
| 08:30 | | | 26 | | 33 | | 59 | | 20:30 | | | 22 | | 13 | | 35 | |
| 08:45 | | | 11 | 111 | 28 | 97 | 39 | 208 | 20:45 | | | 25 | 116 | 9 | 55 | 34 | 171 |
| 09:00 | | | 14 | | 27 | | 41 | | 21:00 | | | 23 | | 18 | | 41 | |
| 09:15 | | | 33 | | 20 | | 53 | | 21:15 | | | 24 | | 17 | | 41 | |
| 09:30 | | | 30 | | 17 | | 47 | | 21:30 | | | 24 | | 10 | | 34 | |
| 09:45 | | | 26 | 103 | 18 | 82 | 44 | 185 | 21:45 | | | 18 | 89 | 11 | 56 | 29 | 145 |
| 10:00 | | | 23 | | 10 | | 33 | | 22:00 | | | 16 | | 5 | | 21 | |
| 10:15 | | | 46 | | 19 | | 65 | | 22:15 | | | 15 | | 9 | | 24 | |
| 10:30 | | | 61 | | 32 | | 93 | | 22:30 | | | 17 | | 7 | | 24 | |
| 10:45 | | | 55 | 185 | 17 | 78 | 72 | 263 | 22:45 | | | 13 | 61 | 2 | 23 | 15 | 84 |
| 11:00 | | | 34 | | 32 | | 66 | | 23:00 | | | 18 | | 9 | | 27 | |
| 11:15 | | | 46 | | 27 | | 73 | | 23:15 | | | 9 | | 4 | | 13 | |
| 11:30 | | | 46 | | 30 | | 76 | | 23:30 | | | 15 | | 3 | | 18 | |
| 11:45 | | | 30 | 156 | 25 | 114 | 55 | 270 | 23:45 | | | 10 | 52 | 4 | 20 | 14 | 72 |
| TOTALS | | | | 911 | | 666 | | 1577 | TOTALS | | | | 2373 | | 1058 | | 3431 |
| SPLIT % | | | | 57.8% | | 42.2% | | 31.5% | SPLIT % | | | | 69.2% | | 30.8% | | 68.5% |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 3,284 | 1,724 | 5,008 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| AM Peak Hour | | | 10:15 | 11:45 | 10:30 | PM Peak Hour | | | 16:45 | 17:00 | 16:45 |
| AM Pk Volume | | | 196 | 123 | 304 | PM Pk Volume | | | 407 | 189 | 582 |
| Pk Hr Factor | | | 0.803 | 0.831 | 0.817 | Pk Hr Factor | | | 0.801 | 0.727 | 0.904 |
| 7 - 9 Volume | 0 | 0 | 206 | 203 | 409 | 4 - 6 Volume | 0 | 0 | 725 | 284 | 1009 |
| 7 - 9 Peak Hour | | | 07:30 | 07:15 | 07:45 | 4 - 6 Peak Hour | | | 16:45 | 17:00 | 16:45 |
| 7 - 9 Pk Volume | 0 | 0 | 117 | 107 | 221 | 4 - 6 Pk Volume | 0 | 0 | 407 | 189 | 582 |
| Pk Hr Factor | 0.000 | 0.000 | 0.650 | 0.764 | 0.789 | Pk Hr Factor | 0.000 | 0.000 | 0.801 | 0.727 | 0.904 |

Prepared by NDS/ATD

# VOLUME

University Ave Bet. Santa Fe St & Commerce St

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_005

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 10,410 | 9,576 | 19,986 |

| AM Period | NB | SB | EB | | WB | | TOTAL | | PM Period | NB | SB | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | | | 26 | | 26 | | 52 | | 12:00 | | | 164 | | 170 | | 334 | |
| 00:15 | | | 21 | | 25 | | 46 | | 12:15 | | | 183 | | 157 | | 340 | |
| 00:30 | | | 30 | | 18 | | 48 | | 12:30 | | | 146 | | 162 | | 308 | |
| 00:45 | | | 23 | 100 | 23 | 92 | 46 | 192 | 12:45 | | | 181 | 674 | 176 | 665 | 357 | 1339 |
| 01:00 | | | 21 | | 21 | | 42 | | 13:00 | | | 173 | | 161 | | 334 | |
| 01:15 | | | 10 | | 14 | | 24 | | 13:15 | | | 157 | | 173 | | 330 | |
| 01:30 | | | 22 | | 13 | | 35 | | 13:30 | | | 149 | | 161 | | 310 | |
| 01:45 | | | 23 | 76 | 21 | 69 | 44 | 145 | 13:45 | | | 144 | 623 | 155 | 650 | 299 | 1273 |
| 02:00 | | | 27 | | 16 | | 43 | | 14:00 | | | 143 | | 161 | | 304 | |
| 02:15 | | | 16 | | 7 | | 23 | | 14:15 | | | 159 | | 144 | | 303 | |
| 02:30 | | | 9 | | 5 | | 14 | | 14:30 | | | 156 | | 141 | | 297 | |
| 02:45 | | | 9 | 61 | 9 | 37 | 18 | 98 | 14:45 | | | 167 | 625 | 142 | 588 | 309 | 1213 |
| 03:00 | | | 5 | | 17 | | 22 | | 15:00 | | | 161 | | 152 | | 313 | |
| 03:15 | | | 9 | | 7 | | 16 | | 15:15 | | | 175 | | 161 | | 336 | |
| 03:30 | | | 12 | | 16 | | 28 | | 15:30 | | | 193 | | 151 | | 344 | |
| 03:45 | | | 5 | 31 | 12 | 52 | 17 | 83 | 15:45 | | | 220 | 749 | 159 | 623 | 379 | 1372 |
| 04:00 | | | 8 | | 19 | | 27 | | 16:00 | | | 237 | | 176 | | 413 | |
| 04:15 | | | 12 | | 29 | | 41 | | 16:15 | | | 221 | | 142 | | 363 | |
| 04:30 | | | 21 | | 42 | | 63 | | 16:30 | | | 244 | | 170 | | 414 | |
| 04:45 | | | 20 | 61 | 50 | 140 | 70 | 201 | 16:45 | | | 239 | 941 | 145 | 633 | 384 | 1574 |
| 05:00 | | | 23 | | 43 | | 66 | | 17:00 | | | 289 | | 180 | | 469 | |
| 05:15 | | | 33 | | 65 | | 98 | | 17:15 | | | 308 | | 182 | | 490 | |
| 05:30 | | | 31 | | 75 | | 106 | | 17:30 | | | 284 | | 159 | | 443 | |
| 05:45 | | | 47 | 134 | 63 | 246 | 110 | 380 | 17:45 | | | 254 | 1135 | 159 | 680 | 413 | 1815 |
| 06:00 | | | 54 | | 62 | | 116 | | 18:00 | | | 273 | | 152 | | 425 | |
| 06:15 | | | 61 | | 86 | | 147 | | 18:15 | | | 223 | | 154 | | 377 | |
| 06:30 | | | 70 | | 101 | | 171 | | 18:30 | | | 192 | | 116 | | 308 | |
| 06:45 | | | 79 | 264 | 96 | 345 | 175 | 609 | 18:45 | | | 166 | 854 | 121 | 543 | 287 | 1397 |
| 07:00 | | | 91 | | 118 | | 209 | | 19:00 | | | 171 | | 130 | | 301 | |
| 07:15 | | | 100 | | 141 | | 241 | | 19:15 | | | 167 | | 104 | | 271 | |
| 07:30 | | | 138 | | 170 | | 308 | | 19:30 | | | 103 | | 106 | | 209 | |
| 07:45 | | | 177 | 506 | 177 | 606 | 354 | 1112 | 19:45 | | | 101 | 542 | 94 | 434 | 195 | 976 |
| 08:00 | | | 102 | | 147 | | 249 | | 20:00 | | | 108 | | 107 | | 215 | |
| 08:15 | | | 116 | | 151 | | 267 | | 20:15 | | | 88 | | 99 | | 187 | |
| 08:30 | | | 115 | | 139 | | 254 | | 20:30 | | | 90 | | 80 | | 170 | |
| 08:45 | | | 102 | 435 | 124 | 561 | 226 | 996 | 20:45 | | | 82 | 368 | 79 | 365 | 161 | 733 |
| 09:00 | | | 111 | | 121 | | 232 | | 21:00 | | | 85 | | 80 | | 165 | |
| 09:15 | | | 117 | | 135 | | 252 | | 21:15 | | | 81 | | 90 | | 171 | |
| 09:30 | | | 138 | | 122 | | 260 | | 21:30 | | | 74 | | 69 | | 143 | |
| 09:45 | | | 110 | 476 | 120 | 498 | 230 | 974 | 21:45 | | | 59 | 299 | 51 | 290 | 110 | 589 |
| 10:00 | | | 123 | | 120 | | 243 | | 22:00 | | | 55 | | 77 | | 132 | |
| 10:15 | | | 114 | | 123 | | 237 | | 22:15 | | | 47 | | 53 | | 100 | |
| 10:30 | | | 131 | | 121 | | 252 | | 22:30 | | | 37 | | 61 | | 98 | |
| 10:45 | | | 125 | 493 | 134 | 498 | 259 | 991 | 22:45 | | | 46 | 185 | 54 | 245 | 100 | 430 |
| 11:00 | | | 151 | | 138 | | 289 | | 23:00 | | | 47 | | 41 | | 88 | |
| 11:15 | | | 119 | | 158 | | 277 | | 23:15 | | | 52 | | 39 | | 91 | |
| 11:30 | | | 172 | | 134 | | 306 | | 23:30 | | | 35 | | 23 | | 58 | |
| 11:45 | | | 170 | 612 | 156 | 586 | 326 | 1198 | 23:45 | | | 32 | 166 | 27 | 130 | 59 | 296 |
| TOTALS | | | | 3249 | | 3730 | | 6979 | TOTALS | | | | 7161 | | 5846 | | 13007 |
| SPLIT % | | | | 46.6% | | 53.4% | | 34.9% | SPLIT % | | | | 55.1% | | 44.9% | | 65.1% |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 10,410 | 9,576 | 19,986 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Peak Hour | | | 11:30 | 07:30 | 11:45 | PM Peak Hour | | | 17:00 | 17:00 | 17:00 |
| AM Pk Volume | | | 689 | 645 | 1308 | PM Pk Volume | | | 1135 | 680 | 1815 |
| Pk Hr Factor | | | 0.941 | 0.911 | 0.962 | Pk Hr Factor | | | 0.921 | 0.934 | 0.926 |
| 7 - 9 Volume | 0 | 0 | 941 | 1167 | 2108 | 4 - 6 Volume | 0 | 0 | 2076 | 1313 | 3389 |
| 7 - 9 Peak Hour | | | 07:30 | 07:30 | 07:30 | 4 - 6 Peak Hour | | | 17:00 | 17:00 | 17:00 |
| 7 - 9 Pk Volume | 0 | 0 | 533 | 645 | 1178 | 4 - 6 Pk Volume | 0 | 0 | 1135 | 680 | 1815 |
| Pk Hr Factor | 0.000 | 0.000 | 0.753 | 0.911 | 0.832 | Pk Hr Factor | 0.000 | 0.000 | 0.921 | 0.934 | 0.926 |

Prepared by NDS/ATD

# VOLUME

## Commerce St Bet. University Ave & Mission Inn Ave

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_006

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 649 | 1,094 | 0 | 0 | 1,743 |

| AM Period | NB | | SB | | EB | | WB | | TOTAL | | PM Period | NB | | SB | | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 3 | | 1 | | | | | | 4 | | 12:00 | 9 | | 8 | | | | | | 17 | |
| 00:15 | 1 | | 2 | | | | | | 3 | | 12:15 | 12 | | 9 | | | | | | 21 | |
| 00:30 | 1 | | 2 | | | | | | 3 | | 12:30 | 6 | | 10 | | | | | | 16 | |
| 00:45 | 0 | 5 | 2 | 7 | | | | | 2 | 12 | 12:45 | 11 | 38 | 15 | 42 | | | | | 26 | 80 |
| 01:00 | 0 | | 3 | | | | | | 3 | | 13:00 | 9 | | 9 | | | | | | 18 | |
| 01:15 | 0 | | 1 | | | | | | 1 | | 13:15 | 10 | | 8 | | | | | | 18 | |
| 01:30 | 0 | | 1 | | | | | | 1 | | 13:30 | 8 | | 8 | | | | | | 16 | |
| 01:45 | 2 | 2 | 1 | 6 | | | | | 3 | 8 | 13:45 | 7 | 34 | 13 | 38 | | | | | 20 | 72 |
| 02:00 | 0 | | 5 | | | | | | 5 | | 14:00 | 9 | | 12 | | | | | | 21 | |
| 02:15 | 1 | | 2 | | | | | | 3 | | 14:15 | 6 | | 14 | | | | | | 20 | |
| 02:30 | 0 | | 0 | | | | | | 0 | | 14:30 | 9 | | 27 | | | | | | 36 | |
| 02:45 | 0 | 1 | 0 | 7 | | | | | 0 | 8 | 14:45 | 11 | 35 | 37 | 90 | | | | | 48 | 125 |
| 03:00 | 0 | | 1 | | | | | | 1 | | 15:00 | 8 | | 31 | | | | | | 39 | |
| 03:15 | 1 | | 0 | | | | | | 1 | | 15:15 | 10 | | 26 | | | | | | 36 | |
| 03:30 | 3 | | 1 | | | | | | 4 | | 15:30 | 11 | | 28 | | | | | | 39 | |
| 03:45 | 1 | 5 | 0 | 2 | | | | | 1 | 7 | 15:45 | 9 | 38 | 31 | 116 | | | | | 40 | 154 |
| 04:00 | 2 | | 0 | | | | | | 2 | | 16:00 | 6 | | 34 | | | | | | 40 | |
| 04:15 | 1 | | 2 | | | | | | 3 | | 16:15 | 10 | | 26 | | | | | | 36 | |
| 04:30 | 4 | | 3 | | | | | | 7 | | 16:30 | 7 | | 23 | | | | | | 30 | |
| 04:45 | 5 | 12 | 17 | 22 | | | | | 22 | 34 | 16:45 | 27 | 50 | 43 | 126 | | | | | 70 | 176 |
| 05:00 | 4 | | 3 | | | | | | 7 | | 17:00 | 9 | | 26 | | | | | | 35 | |
| 05:15 | 5 | | 10 | | | | | | 15 | | 17:15 | 34 | | 25 | | | | | | 59 | |
| 05:30 | 10 | | 9 | | | | | | 19 | | 17:30 | 14 | | 36 | | | | | | 50 | |
| 05:45 | 5 | 24 | 12 | 34 | | | | | 17 | 58 | 17:45 | 17 | 74 | 23 | 110 | | | | | 40 | 184 |
| 06:00 | 7 | | 26 | | | | | | 33 | | 18:00 | 10 | | 22 | | | | | | 32 | |
| 06:15 | 11 | | 5 | | | | | | 16 | | 18:15 | 19 | | 22 | | | | | | 41 | |
| 06:30 | 4 | | 9 | | | | | | 13 | | 18:30 | 8 | | 18 | | | | | | 26 | |
| 06:45 | 10 | 32 | 25 | 65 | | | | | 35 | 97 | 18:45 | 23 | 60 | 14 | 76 | | | | | 37 | 136 |
| 07:00 | 11 | | 18 | | | | | | 29 | | 19:00 | 5 | | 19 | | | | | | 24 | |
| 07:15 | 7 | | 10 | | | | | | 17 | | 19:15 | 5 | | 19 | | | | | | 24 | |
| 07:30 | 7 | | 13 | | | | | | 20 | | 19:30 | 7 | | 9 | | | | | | 16 | |
| 07:45 | 16 | 41 | 10 | 51 | | | | | 26 | 92 | 19:45 | 4 | 21 | 7 | 54 | | | | | 11 | 75 |
| 08:00 | 6 | | 13 | | | | | | 19 | | 20:00 | 10 | | 6 | | | | | | 16 | |
| 08:15 | 5 | | 10 | | | | | | 15 | | 20:15 | 4 | | 8 | | | | | | 12 | |
| 08:30 | 9 | | 13 | | | | | | 22 | | 20:30 | 5 | | 7 | | | | | | 12 | |
| 08:45 | 4 | 24 | 7 | 43 | | | | | 11 | 67 | 20:45 | 4 | 23 | 6 | 27 | | | | | 10 | 50 |
| 09:00 | 12 | | 11 | | | | | | 23 | | 21:00 | 10 | | 6 | | | | | | 16 | |
| 09:15 | 7 | | 8 | | | | | | 15 | | 21:15 | 4 | | 3 | | | | | | 7 | |
| 09:30 | 8 | | 12 | | | | | | 20 | | 21:30 | 3 | | 3 | | | | | | 6 | |
| 09:45 | 4 | 31 | 5 | 36 | | | | | 9 | 67 | 21:45 | 4 | 21 | 1 | 13 | | | | | 5 | 34 |
| 10:00 | 6 | | 12 | | | | | | 18 | | 22:00 | 1 | | 4 | | | | | | 5 | |
| 10:15 | 9 | | 14 | | | | | | 23 | | 22:15 | 3 | | 4 | | | | | | 7 | |
| 10:30 | 10 | | 14 | | | | | | 24 | | 22:30 | 2 | | 4 | | | | | | 6 | |
| 10:45 | 7 | 32 | 18 | 58 | | | | | 25 | 90 | 22:45 | 1 | 7 | 5 | 17 | | | | | 6 | 24 |
| 11:00 | 8 | | 14 | | | | | | 22 | | 23:00 | 3 | | 0 | | | | | | 3 | |
| 11:15 | 7 | | 14 | | | | | | 21 | | 23:15 | 0 | | 0 | | | | | | 0 | |
| 11:30 | 11 | | 12 | | | | | | 23 | | 23:30 | 0 | | 2 | | | | | | 2 | |
| 11:45 | 9 | 35 | 9 | 49 | | | | | 18 | 84 | 23:45 | 1 | 4 | 3 | 5 | | | | | 4 | 9 |
| TOTALS | | 244 | | 380 | | | | | | 624 | TOTALS | | 405 | | 714 | | | | | | 1119 |
| SPLIT % | | 39.1% | | 60.9% | | | | | | 35.8% | SPLIT % | | 36.2% | | 63.8% | | | | | | 64.2% |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 649 | 1,094 | 0 | 0 | 1,743 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Peak Hour | 07:00 | 06:45 | | | 06:45 | PM Peak Hour | 16:45 | 16:45 | | | 16:45 |
| AM Pk Volume | 41 | 66 | | | 101 | PM Pk Volume | 84 | 130 | | | 214 |
| Pk Hr Factor | 0.641 | 0.660 | | | 0.721 | Pk Hr Factor | 0.618 | 0.756 | | | 0.764 |
| 7 - 9 Volume | 65 | 94 | 0 | 0 | 159 | 4 - 6 Volume | 124 | 236 | 0 | 0 | 360 |
| 7 - 9 Peak Hour | 07:00 | 07:00 | | | 07:00 | 4 - 6 Peak Hour | 16:45 | 16:45 | | | 16:45 |
| 7 - 9 Pk Volume | 41 | 51 | 0 | 0 | 92 | 4 - 6 Pk Volume | 84 | 130 | 0 | 0 | 214 |
| Pk Hr Factor | 0.641 | 0.708 | 0.000 | 0.000 | 0.793 | Pk Hr Factor | 0.618 | 0.756 | 0.000 | 0.000 | 0.764 |

Prepared by NDS/ATD

# VOLUME

## University Ave Bet. Park Ave & Victoria Ave

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_009

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 10,367 | 9,529 | 19,896 |

| AM Period | NB | SB | EB | | WB | | TOTAL | | PM Period | NB | SB | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | | | 30 | | 32 | | 62 | | 12:00 | | | 159 | | 188 | | 347 | |
| 00:15 | | | 26 | | 29 | | 55 | | 12:15 | | | 170 | | 133 | | 303 | |
| 00:30 | | | 19 | | 22 | | 41 | | 12:30 | | | 165 | | 151 | | 316 | |
| 00:45 | | | 26 | 101 | 19 | 102 | 45 | 203 | 12:45 | | | 167 | 661 | 161 | 633 | 328 | 1294 |
| 01:00 | | | 23 | | 18 | | 41 | | 13:00 | | | 137 | | 157 | | 294 | |
| 01:15 | | | 15 | | 21 | | 36 | | 13:15 | | | 138 | | 157 | | 295 | |
| 01:30 | | | 27 | | 8 | | 35 | | 13:30 | | | 146 | | 138 | | 284 | |
| 01:45 | | | 26 | 91 | 14 | 61 | 40 | 152 | 13:45 | | | 143 | 564 | 128 | 580 | 271 | 1144 |
| 02:00 | | | 28 | | 13 | | 41 | | 14:00 | | | 164 | | 163 | | 327 | |
| 02:15 | | | 16 | | 9 | | 25 | | 14:15 | | | 147 | | 148 | | 295 | |
| 02:30 | | | 10 | | 6 | | 16 | | 14:30 | | | 167 | | 140 | | 307 | |
| 02:45 | | | 9 | 63 | 11 | 39 | 20 | 102 | 14:45 | | | 189 | 667 | 165 | 616 | 354 | 1283 |
| 03:00 | | | 9 | | 8 | | 17 | | 15:00 | | | 183 | | 165 | | 348 | |
| 03:15 | | | 11 | | 12 | | 23 | | 15:15 | | | 194 | | 169 | | 363 | |
| 03:30 | | | 8 | | 15 | | 23 | | 15:30 | | | 182 | | 172 | | 354 | |
| 03:45 | | | 6 | 34 | 13 | 48 | 19 | 82 | 15:45 | | | 209 | 768 | 137 | 643 | 346 | 1411 |
| 04:00 | | | 13 | | 24 | | 37 | | 16:00 | | | 224 | | 162 | | 386 | |
| 04:15 | | | 10 | | 27 | | 37 | | 16:15 | | | 216 | | 134 | | 350 | |
| 04:30 | | | 21 | | 47 | | 68 | | 16:30 | | | 247 | | 154 | | 401 | |
| 04:45 | | | 18 | 62 | 45 | 143 | 63 | 205 | 16:45 | | | 239 | 926 | 172 | 622 | 411 | 1548 |
| 05:00 | | | 26 | | 52 | | 78 | | 17:00 | | | 340 | | 161 | | 501 | |
| 05:15 | | | 32 | | 73 | | 105 | | 17:15 | | | 328 | | 194 | | 522 | |
| 05:30 | | | 40 | | 57 | | 97 | | 17:30 | | | 293 | | 171 | | 464 | |
| 05:45 | | | 49 | 147 | 70 | 252 | 119 | 399 | 17:45 | | | 280 | 1241 | 144 | 670 | 424 | 1911 |
| 06:00 | | | 53 | | 82 | | 135 | | 18:00 | | | 237 | | 154 | | 391 | |
| 06:15 | | | 72 | | 85 | | 157 | | 18:15 | | | 229 | | 147 | | 376 | |
| 06:30 | | | 62 | | 89 | | 151 | | 18:30 | | | 190 | | 112 | | 302 | |
| 06:45 | | | 77 | 264 | 109 | 365 | 186 | 629 | 18:45 | | | 151 | 807 | 126 | 539 | 277 | 1346 |
| 07:00 | | | 88 | | 117 | | 205 | | 19:00 | | | 165 | | 114 | | 279 | |
| 07:15 | | | 88 | | 141 | | 229 | | 19:15 | | | 152 | | 117 | | 269 | |
| 07:30 | | | 127 | | 180 | | 307 | | 19:30 | | | 113 | | 118 | | 231 | |
| 07:45 | | | 155 | 458 | 175 | 613 | 330 | 1071 | 19:45 | | | 114 | 544 | 103 | 452 | 217 | 996 |
| 08:00 | | | 115 | | 152 | | 267 | | 20:00 | | | 102 | | 98 | | 200 | |
| 08:15 | | | 115 | | 143 | | 258 | | 20:15 | | | 90 | | 98 | | 188 | |
| 08:30 | | | 109 | | 140 | | 249 | | 20:30 | | | 70 | | 99 | | 169 | |
| 08:45 | | | 99 | 438 | 119 | 554 | 218 | 992 | 20:45 | | | 88 | 350 | 95 | 390 | 183 | 740 |
| 09:00 | | | 105 | | 103 | | 208 | | 21:00 | | | 92 | | 95 | | 187 | |
| 09:15 | | | 98 | | 109 | | 207 | | 21:15 | | | 97 | | 111 | | 208 | |
| 09:30 | | | 106 | | 122 | | 228 | | 21:30 | | | 86 | | 78 | | 164 | |
| 09:45 | | | 101 | 410 | 104 | 438 | 205 | 848 | 21:45 | | | 70 | 345 | 58 | 342 | 128 | 687 |
| 10:00 | | | 144 | | 117 | | 261 | | 22:00 | | | 63 | | 78 | | 141 | |
| 10:15 | | | 112 | | 133 | | 245 | | 22:15 | | | 49 | | 55 | | 104 | |
| 10:30 | | | 128 | | 130 | | 258 | | 22:30 | | | 42 | | 74 | | 116 | |
| 10:45 | | | 121 | 505 | 119 | 499 | 240 | 1004 | 22:45 | | | 48 | 202 | 45 | 252 | 93 | 454 |
| 11:00 | | | 128 | | 130 | | 258 | | 23:00 | | | 54 | | 44 | | 98 | |
| 11:15 | | | 129 | | 138 | | 267 | | 23:15 | | | 41 | | 40 | | 81 | |
| 11:30 | | | 149 | | 134 | | 283 | | 23:30 | | | 37 | | 29 | | 66 | |
| 11:45 | | | 143 | 549 | 127 | 529 | 270 | 1078 | 23:45 | | | 38 | 170 | 34 | 147 | 72 | 317 |
| TOTALS | | | | 3122 | | 3643 | | 6765 | TOTALS | | | | 7245 | | 5886 | | 13131 |
| SPLIT % | | | | 46.1% | | 53.9% | | 34.0% | SPLIT % | | | | 55.2% | | 44.8% | | 66.0% |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 10,367 | 9,529 | 19,896 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Peak Hour | | | 11:45 | 07:30 | 11:45 | PM Peak Hour | | | 17:00 | 16:45 | 17:00 |
| AM Pk Volume | | | 637 | 650 | 1236 | PM Pk Volume | | | 1241 | 698 | 1911 |
| Pk Hr Factor | | | 0.937 | 0.903 | 0.890 | Pk Hr Factor | | | 0.913 | 0.899 | 0.915 |
| 7 - 9 Volume | 0 | 0 | 896 | 1167 | 2063 | 4 - 6 Volume | 0 | 0 | 2167 | 1292 | 3459 |
| 7 - 9 Peak Hour | | | 07:30 | 07:30 | 07:30 | 4 - 6 Peak Hour | | | 17:00 | 16:45 | 17:00 |
| 7 - 9 Pk Volume | 0 | 0 | 512 | 650 | 1162 | 4 - 6 Pk Volume | 0 | 0 | 1241 | 698 | 1911 |
| Pk Hr Factor | 0.000 | 0.000 | 0.826 | 0.903 | 0.880 | Pk Hr Factor | 0.000 | 0.000 | 0.913 | 0.899 | 0.915 |

Prepared by NDS/ATD

# VOLUME

## Lime St Bet. Mission Inn Ave & 6th St

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_001

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 3,107 | 4,338 | 0 | 0 | 7,445 |

| AM Period | NB | | SB | | EB | | WB | | TOTAL | | PM Period | NB | | SB | | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | 8 | | 14 | | | | | | 22 | | **12:00** | 43 | | 64 | | | | | | 107 | |
| **00:15** | 11 | | 8 | | | | | | 19 | | **12:15** | 44 | | 58 | | | | | | 102 | |
| **00:30** | 5 | | 8 | | | | | | 13 | | **12:30** | 36 | | 55 | | | | | | 91 | |
| **00:45** | 3 | 27 | 10 | 40 | | | | | 13 | 67 | **12:45** | 50 | 173 | 79 | 256 | | | | | 129 | 429 |
| **01:00** | 5 | | 3 | | | | | | 8 | | **13:00** | 60 | | 74 | | | | | | 134 | |
| **01:15** | 4 | | 5 | | | | | | 9 | | **13:15** | 48 | | 68 | | | | | | 116 | |
| **01:30** | 1 | | 5 | | | | | | 6 | | **13:30** | 59 | | 77 | | | | | | 136 | |
| **01:45** | 3 | 13 | 4 | 17 | | | | | 7 | 30 | **13:45** | 50 | 217 | 66 | 285 | | | | | 116 | 502 |
| **02:00** | 3 | | 9 | | | | | | 12 | | **14:00** | 45 | | 75 | | | | | | 120 | |
| **02:15** | 1 | | 6 | | | | | | 7 | | **14:15** | 50 | | 84 | | | | | | 134 | |
| **02:30** | 3 | | 3 | | | | | | 6 | | **14:30** | 50 | | 83 | | | | | | 133 | |
| **02:45** | 3 | 10 | 5 | 23 | | | | | 8 | 33 | **14:45** | 62 | 207 | 80 | 322 | | | | | 142 | 529 |
| **03:00** | 1 | | 3 | | | | | | 4 | | **15:00** | 45 | | 72 | | | | | | 117 | |
| **03:15** | 3 | | 4 | | | | | | 7 | | **15:15** | 67 | | 77 | | | | | | 144 | |
| **03:30** | 6 | | 3 | | | | | | 9 | | **15:30** | 62 | | 106 | | | | | | 168 | |
| **03:45** | 6 | 16 | 3 | 13 | | | | | 9 | 29 | **15:45** | 57 | 231 | 100 | 355 | | | | | 157 | 586 |
| **04:00** | 1 | | 5 | | | | | | 6 | | **16:00** | 50 | | 101 | | | | | | 151 | |
| **04:15** | 6 | | 9 | | | | | | 15 | | **16:15** | 49 | | 96 | | | | | | 145 | |
| **04:30** | 8 | | 7 | | | | | | 15 | | **16:30** | 65 | | 105 | | | | | | 170 | |
| **04:45** | 9 | 24 | 13 | 34 | | | | | 22 | 58 | **16:45** | 74 | 238 | 106 | 408 | | | | | 180 | 646 |
| **05:00** | 12 | | 10 | | | | | | 22 | | **17:00** | 74 | | 113 | | | | | | 187 | |
| **05:15** | 11 | | 15 | | | | | | 26 | | **17:15** | 80 | | 132 | | | | | | 212 | |
| **05:30** | 9 | | 10 | | | | | | 19 | | **17:30** | 54 | | 113 | | | | | | 167 | |
| **05:45** | 18 | 50 | 14 | 49 | | | | | 32 | 99 | **17:45** | 70 | 278 | 107 | 465 | | | | | 177 | 743 |
| **06:00** | 11 | | 20 | | | | | | 31 | | **18:00** | 44 | | 96 | | | | | | 140 | |
| **06:15** | 19 | | 22 | | | | | | 41 | | **18:15** | 42 | | 79 | | | | | | 121 | |
| **06:30** | 19 | | 18 | | | | | | 37 | | **18:30** | 37 | | 69 | | | | | | 106 | |
| **06:45** | 32 | 81 | 22 | 82 | | | | | 54 | 163 | **18:45** | 44 | 167 | 59 | 303 | | | | | 103 | 470 |
| **07:00** | 38 | | 45 | | | | | | 83 | | **19:00** | 36 | | 73 | | | | | | 109 | |
| **07:15** | 29 | | 46 | | | | | | 75 | | **19:15** | 33 | | 56 | | | | | | 89 | |
| **07:30** | 58 | | 57 | | | | | | 115 | | **19:30** | 33 | | 39 | | | | | | 72 | |
| **07:45** | 59 | 184 | 72 | 220 | | | | | 131 | 404 | **19:45** | 28 | 130 | 38 | 206 | | | | | 66 | 336 |
| **08:00** | 50 | | 49 | | | | | | 99 | | **20:00** | 31 | | 53 | | | | | | 84 | |
| **08:15** | 56 | | 40 | | | | | | 96 | | **20:15** | 42 | | 52 | | | | | | 94 | |
| **08:30** | 64 | | 42 | | | | | | 106 | | **20:30** | 20 | | 33 | | | | | | 53 | |
| **08:45** | 61 | 231 | 36 | 167 | | | | | 97 | 398 | **20:45** | 28 | 121 | 38 | 176 | | | | | 66 | 297 |
| **09:00** | 44 | | 45 | | | | | | 89 | | **21:00** | 32 | | 54 | | | | | | 86 | |
| **09:15** | 43 | | 33 | | | | | | 76 | | **21:15** | 28 | | 29 | | | | | | 57 | |
| **09:30** | 46 | | 44 | | | | | | 90 | | **21:30** | 31 | | 19 | | | | | | 50 | |
| **09:45** | 35 | 168 | 43 | 165 | | | | | 78 | 333 | **21:45** | 21 | 112 | 29 | 131 | | | | | 50 | 243 |
| **10:00** | 41 | | 55 | | | | | | 96 | | **22:00** | 25 | | 38 | | | | | | 63 | |
| **10:15** | 47 | | 39 | | | | | | 86 | | **22:15** | 10 | | 17 | | | | | | 27 | |
| **10:30** | 38 | | 44 | | | | | | 82 | | **22:30** | 10 | | 27 | | | | | | 37 | |
| **10:45** | 37 | 163 | 66 | 204 | | | | | 103 | 367 | **22:45** | 12 | 57 | 20 | 102 | | | | | 32 | 159 |
| **11:00** | 48 | | 68 | | | | | | 116 | | **23:00** | 15 | | 20 | | | | | | 35 | |
| **11:15** | 28 | | 55 | | | | | | 83 | | **23:15** | 8 | | 11 | | | | | | 19 | |
| **11:30** | 51 | | 68 | | | | | | 119 | | **23:30** | 4 | | 15 | | | | | | 19 | |
| **11:45** | 49 | 176 | 72 | 263 | | | | | 121 | 439 | **23:45** | 6 | 33 | 6 | 52 | | | | | 12 | 85 |
| **TOTALS** | | 1143 | | 1277 | | | | | | **2420** | **TOTALS** | | 1964 | | 3061 | | | | | | **5025** |
| **SPLIT %** | | 47.2% | | 52.8% | | | | | | **32.5%** | **SPLIT %** | | 39.1% | | 60.9% | | | | | | **67.5%** |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 3,107 | 4,338 | 0 | 0 | 7,445 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM Peak Hour** | 08:00 | 11:00 | | | **11:30** | **PM Peak Hour** | 16:30 | 17:00 | | | **16:30** |
| **AM Pk Volume** | 231 | 263 | | | **449** | **PM Pk Volume** | 293 | 465 | | | **749** |
| **Pk Hr Factor** | 0.902 | 0.913 | | | **0.928** | **Pk Hr Factor** | 0.916 | 0.881 | | | **0.883** |
| **7 - 9 Volume** | 415 | 387 | 0 | 0 | **802** | **4 - 6 Volume** | 516 | 873 | 0 | 0 | **1389** |
| **7 - 9 Peak Hour** | 08:00 | 07:15 | | | **07:30** | **4 - 6 Peak Hour** | 16:30 | 17:00 | | | **16:30** |
| **7 - 9 Pk Volume** | 231 | 224 | 0 | 0 | **441** | **4 - 6 Pk Volume** | 293 | 465 | 0 | 0 | **749** |
| **Pk Hr Factor** | 0.902 | 0.778 | 0.000 | 0.000 | **0.842** | **Pk Hr Factor** | 0.916 | 0.881 | 0.000 | 0.000 | **0.883** |

Prepared by NDS/ATD

# VOLUME

## Mission Inn Ave Bet. Park St & Comer Ave

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_007

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 2,351 | 1,128 | 3,479 |

| AM Period | NB | SB | EB | | WB | | TOTAL | | PM Period | NB | SB | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | | | 2 | | 0 | | 2 | | 12:00 | | | 31 | | 22 | | 53 | |
| 00:15 | | | 6 | | 3 | | 9 | | 12:15 | | | 33 | | 17 | | 50 | |
| 00:30 | | | 5 | | 0 | | 5 | | 12:30 | | | 39 | | 18 | | 57 | |
| 00:45 | | | 5 | 18 | 1 | 4 | 6 | 22 | 12:45 | | | 29 | 132 | 18 | 75 | 47 | 207 |
| 01:00 | | | 3 | | 1 | | 4 | | 13:00 | | | 32 | | 28 | | 60 | |
| 01:15 | | | 5 | | 3 | | 8 | | 13:15 | | | 30 | | 25 | | 55 | |
| 01:30 | | | 2 | | 0 | | 2 | | 13:30 | | | 39 | | 20 | | 59 | |
| 01:45 | | | 1 | 11 | 2 | 6 | 3 | 17 | 13:45 | | | 23 | 124 | 19 | 92 | 42 | 216 |
| 02:00 | | | 6 | | 1 | | 7 | | 14:00 | | | 25 | | 21 | | 46 | |
| 02:15 | | | 4 | | 0 | | 4 | | 14:15 | | | 33 | | 20 | | 53 | |
| 02:30 | | | 3 | | 1 | | 4 | | 14:30 | | | 37 | | 17 | | 54 | |
| 02:45 | | | 2 | 15 | 0 | 2 | 2 | 17 | 14:45 | | | 52 | 147 | 16 | 74 | 68 | 221 |
| 03:00 | | | 2 | | 1 | | 3 | | 15:00 | | | 54 | | 25 | | 79 | |
| 03:15 | | | 0 | | 0 | | 0 | | 15:15 | | | 40 | | 15 | | 55 | |
| 03:30 | | | 0 | | 3 | | 3 | | 15:30 | | | 49 | | 22 | | 71 | |
| 03:45 | | | 1 | 3 | 2 | 6 | 3 | 9 | 15:45 | | | 51 | 194 | 23 | 85 | 74 | 279 |
| 04:00 | | | 2 | | 1 | | 3 | | 16:00 | | | 52 | | 15 | | 67 | |
| 04:15 | | | 3 | | 3 | | 6 | | 16:15 | | | 64 | | 19 | | 83 | |
| 04:30 | | | 5 | | 4 | | 9 | | 16:30 | | | 64 | | 21 | | 85 | |
| 04:45 | | | 9 | 19 | 4 | 12 | 13 | 31 | 16:45 | | | 59 | 239 | 22 | 77 | 81 | 316 |
| 05:00 | | | 5 | | 6 | | 11 | | 17:00 | | | 95 | | 25 | | 120 | |
| 05:15 | | | 6 | | 12 | | 18 | | 17:15 | | | 79 | | 15 | | 94 | |
| 05:30 | | | 5 | | 13 | | 18 | | 17:30 | | | 89 | | 23 | | 112 | |
| 05:45 | | | 5 | 21 | 8 | 39 | 13 | 60 | 17:45 | | | 77 | 340 | 14 | 77 | 91 | 417 |
| 06:00 | | | 11 | | 9 | | 20 | | 18:00 | | | 61 | | 21 | | 82 | |
| 06:15 | | | 7 | | 13 | | 20 | | 18:15 | | | 63 | | 6 | | 69 | |
| 06:30 | | | 11 | | 11 | | 22 | | 18:30 | | | 33 | | 13 | | 46 | |
| 06:45 | | | 7 | 36 | 14 | 47 | 21 | 83 | 18:45 | | | 47 | 204 | 10 | 50 | 57 | 254 |
| 07:00 | | | 13 | | 13 | | 26 | | 19:00 | | | 34 | | 13 | | 47 | |
| 07:15 | | | 13 | | 11 | | 24 | | 19:15 | | | 30 | | 12 | | 42 | |
| 07:30 | | | 20 | | 23 | | 43 | | 19:30 | | | 24 | | 13 | | 37 | |
| 07:45 | | | 31 | 77 | 28 | 75 | 59 | 152 | 19:45 | | | 29 | 117 | 13 | 51 | 42 | 168 |
| 08:00 | | | 41 | | 27 | | 68 | | 20:00 | | | 26 | | 9 | | 35 | |
| 08:15 | | | 21 | | 19 | | 40 | | 20:15 | | | 20 | | 6 | | 26 | |
| 08:30 | | | 20 | | 19 | | 39 | | 20:30 | | | 14 | | 6 | | 20 | |
| 08:45 | | | 33 | 115 | 12 | 77 | 45 | 192 | 20:45 | | | 18 | 78 | 11 | 32 | 29 | 110 |
| 09:00 | | | 30 | | 9 | | 39 | | 21:00 | | | 7 | | 6 | | 13 | |
| 09:15 | | | 32 | | 15 | | 47 | | 21:15 | | | 18 | | 3 | | 21 | |
| 09:30 | | | 23 | | 19 | | 42 | | 21:30 | | | 17 | | 8 | | 25 | |
| 09:45 | | | 26 | 111 | 15 | 58 | 41 | 169 | 21:45 | | | 15 | 57 | 4 | 21 | 19 | 78 |
| 10:00 | | | 19 | | 9 | | 28 | | 22:00 | | | 13 | | 5 | | 18 | |
| 10:15 | | | 28 | | 19 | | 47 | | 22:15 | | | 16 | | 4 | | 20 | |
| 10:30 | | | 25 | | 21 | | 46 | | 22:30 | | | 13 | | 7 | | 20 | |
| 10:45 | | | 22 | 94 | 14 | 63 | 36 | 157 | 22:45 | | | 6 | 48 | 3 | 19 | 9 | 67 |
| 11:00 | | | 31 | | 20 | | 51 | | 23:00 | | | 12 | | 1 | | 13 | |
| 11:15 | | | 28 | | 18 | | 46 | | 23:15 | | | 5 | | 2 | | 7 | |
| 11:30 | | | 36 | | 23 | | 59 | | 23:30 | | | 5 | | 2 | | 7 | |
| 11:45 | | | 25 | 120 | 18 | 79 | 43 | 199 | 23:45 | | | 9 | 31 | 2 | 7 | 11 | 38 |
| TOTALS | | | | 640 | | 468 | | 1108 | TOTALS | | | | 1711 | | 660 | | 2371 |
| SPLIT % | | | | 57.8% | | 42.2% | | 31.8% | SPLIT % | | | | 72.2% | | 27.8% | | 68.2% |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 0 | 0 | 2,351 | 1,128 | 3,479 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Peak Hour | | | 11:45 | 07:30 | 07:30 | PM Peak Hour | | | 17:00 | 13:00 | 17:00 |
| AM Pk Volume | | | 128 | 97 | 210 | PM Pk Volume | | | 340 | 92 | 417 |
| Pk Hr Factor | | | 0.821 | 0.866 | 0.772 | Pk Hr Factor | | | 0.895 | 0.821 | 0.869 |
| 7 - 9 Volume | 0 | 0 | 192 | 152 | 344 | 4 - 6 Volume | 0 | 0 | 579 | 154 | 733 |
| 7 - 9 Peak Hour | | | 08:00 | 07:30 | 07:30 | 4 - 6 Peak Hour | | | 17:00 | 16:15 | 17:00 |
| 7 - 9 Pk Volume | 0 | 0 | 115 | 97 | 210 | 4 - 6 Pk Volume | 0 | 0 | 340 | 87 | 417 |
| Pk Hr Factor | 0.000 | 0.000 | 0.701 | 0.866 | 0.772 | Pk Hr Factor | 0.000 | 0.000 | 0.895 | 0.870 | 0.869 |

Prepared by NDS/ATD

# VOLUME

## Lime St Bet. 11th St & 12th St

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_008

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 3,343 | 4,096 | 0 | 0 | 7,439 |

| AM Period | NB | | SB | | EB | | WB | | TOTAL | | PM Period | NB | | SB | | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | 10 | | 5 | | | | | | 15 | | **12:00** | 65 | | 67 | | | | | | 132 | |
| **00:15** | 9 | | 4 | | | | | | 13 | | **12:15** | 50 | | 81 | | | | | | 131 | |
| **00:30** | 2 | | 3 | | | | | | 5 | | **12:30** | 58 | | 78 | | | | | | 136 | |
| **00:45** | 4 | 25 | 3 | 15 | | | | | 7 | 40 | **12:45** | 55 | 228 | 74 | 300 | | | | | 129 | 528 |
| **01:00** | 10 | | 4 | | | | | | 14 | | **13:00** | 44 | | 66 | | | | | | 110 | |
| **01:15** | 7 | | 6 | | | | | | 13 | | **13:15** | 47 | | 58 | | | | | | 105 | |
| **01:30** | 2 | | 4 | | | | | | 6 | | **13:30** | 45 | | 67 | | | | | | 112 | |
| **01:45** | 4 | 23 | 5 | 19 | | | | | 9 | 42 | **13:45** | 49 | 185 | 62 | 253 | | | | | 111 | 438 |
| **02:00** | 5 | | 14 | | | | | | 19 | | **14:00** | 41 | | 70 | | | | | | 111 | |
| **02:15** | 4 | | 8 | | | | | | 12 | | **14:15** | 43 | | 62 | | | | | | 105 | |
| **02:30** | 2 | | 5 | | | | | | 7 | | **14:30** | 49 | | 70 | | | | | | 119 | |
| **02:45** | 8 | 19 | 8 | 35 | | | | | 16 | 54 | **14:45** | 89 | 222 | 94 | 296 | | | | | 183 | 518 |
| **03:00** | 5 | | 3 | | | | | | 8 | | **15:00** | 73 | | 73 | | | | | | 146 | |
| **03:15** | 9 | | 9 | | | | | | 18 | | **15:15** | 63 | | 60 | | | | | | 123 | |
| **03:30** | 6 | | 12 | | | | | | 18 | | **15:30** | 71 | | 85 | | | | | | 156 | |
| **03:45** | 8 | 28 | 6 | 30 | | | | | 14 | 58 | **15:45** | 45 | 252 | 68 | 286 | | | | | 113 | 538 |
| **04:00** | 12 | | 4 | | | | | | 16 | | **16:00** | 57 | | 103 | | | | | | 160 | |
| **04:15** | 10 | | 6 | | | | | | 16 | | **16:15** | 40 | | 62 | | | | | | 102 | |
| **04:30** | 19 | | 4 | | | | | | 23 | | **16:30** | 58 | | 81 | | | | | | 139 | |
| **04:45** | 5 | 46 | 11 | 25 | | | | | 16 | 71 | **16:45** | 59 | 214 | 94 | 340 | | | | | 153 | 554 |
| **05:00** | 9 | | 11 | | | | | | 20 | | **17:00** | 50 | | 93 | | | | | | 143 | |
| **05:15** | 10 | | 19 | | | | | | 29 | | **17:15** | 46 | | 100 | | | | | | 146 | |
| **05:30** | 12 | | 16 | | | | | | 28 | | **17:30** | 47 | | 78 | | | | | | 125 | |
| **05:45** | 14 | 45 | 13 | 59 | | | | | 27 | 104 | **17:45** | 46 | 189 | 62 | 333 | | | | | 108 | 522 |
| **06:00** | 16 | | 26 | | | | | | 42 | | **18:00** | 40 | | 51 | | | | | | 91 | |
| **06:15** | 19 | | 35 | | | | | | 54 | | **18:15** | 55 | | 30 | | | | | | 85 | |
| **06:30** | 21 | | 39 | | | | | | 60 | | **18:30** | 29 | | 37 | | | | | | 66 | |
| **06:45** | 34 | 90 | 67 | 167 | | | | | 101 | 257 | **18:45** | 27 | 151 | 35 | 153 | | | | | 62 | 304 |
| **07:00** | 40 | | 74 | | | | | | 114 | | **19:00** | 37 | | 36 | | | | | | 73 | |
| **07:15** | 49 | | 75 | | | | | | 124 | | **19:15** | 34 | | 45 | | | | | | 79 | |
| **07:30** | 80 | | 104 | | | | | | 184 | | **19:30** | 17 | | 24 | | | | | | 41 | |
| **07:45** | 95 | 264 | 94 | 347 | | | | | 189 | 611 | **19:45** | 45 | 133 | 21 | 126 | | | | | 66 | 259 |
| **08:00** | 63 | | 79 | | | | | | 142 | | **20:00** | 42 | | 30 | | | | | | 72 | |
| **08:15** | 46 | | 84 | | | | | | 130 | | **20:15** | 76 | | 33 | | | | | | 109 | |
| **08:30** | 49 | | 96 | | | | | | 145 | | **20:30** | 56 | | 26 | | | | | | 82 | |
| **08:45** | 41 | 199 | 62 | 321 | | | | | 103 | 520 | **20:45** | 44 | 218 | 22 | 111 | | | | | 66 | 329 |
| **09:00** | 35 | | 50 | | | | | | 85 | | **21:00** | 61 | | 30 | | | | | | 91 | |
| **09:15** | 41 | | 46 | | | | | | 87 | | **21:15** | 73 | | 31 | | | | | | 104 | |
| **09:30** | 42 | | 54 | | | | | | 96 | | **21:30** | 52 | | 18 | | | | | | 70 | |
| **09:45** | 45 | 163 | 76 | 226 | | | | | 121 | 389 | **21:45** | 31 | 217 | 13 | 92 | | | | | 44 | 309 |
| **10:00** | 38 | | 67 | | | | | | 105 | | **22:00** | 19 | | 15 | | | | | | 34 | |
| **10:15** | 40 | | 56 | | | | | | 96 | | **22:15** | 12 | | 9 | | | | | | 21 | |
| **10:30** | 32 | | 55 | | | | | | 87 | | **22:30** | 23 | | 15 | | | | | | 38 | |
| **10:45** | 35 | 145 | 55 | 233 | | | | | 90 | 378 | **22:45** | 11 | 65 | 12 | 51 | | | | | 23 | 116 |
| **11:00** | 42 | | 64 | | | | | | 106 | | **23:00** | 20 | | 8 | | | | | | 28 | |
| **11:15** | 31 | | 63 | | | | | | 94 | | **23:15** | 20 | | 5 | | | | | | 25 | |
| **11:30** | 43 | | 66 | | | | | | 109 | | **23:30** | 11 | | 4 | | | | | | 15 | |
| **11:45** | 43 | 159 | 62 | 255 | | | | | 105 | 414 | **23:45** | 12 | 63 | 6 | 23 | | | | | 18 | 86 |
| **TOTALS** | | 1206 | | 1732 | | | | | | **2938** | **TOTALS** | | 2137 | | 2364 | | | | | | **4501** |
| **SPLIT %** | | 41.0% | | 59.0% | | | | | | **39.5%** | **SPLIT %** | | 47.5% | | 52.5% | | | | | | **60.5%** |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 3,343 | 4,096 | 0 | 0 | 7,439 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM Peak Hour** | 07:15 | 07:30 | | | **07:30** | **PM Peak Hour** | 14:45 | 16:30 | | | **14:45** |
| **AM Pk Volume** | 287 | 361 | | | **645** | **PM Pk Volume** | 296 | 368 | | | **608** |
| **Pk Hr Factor** | 0.755 | 0.868 | | | **0.853** | **Pk Hr Factor** | 0.831 | 0.920 | | | **0.831** |
| **7 - 9 Volume** | 463 | 668 | 0 | 0 | **1131** | **4 - 6 Volume** | 403 | 673 | 0 | 0 | **1076** |
| **7 - 9 Peak Hour** | 07:15 | 07:30 | | | **07:30** | **4 - 6 Peak Hour** | 16:00 | 16:30 | | | **16:30** |
| **7 - 9 Pk Volume** | 287 | 361 | 0 | 0 | **645** | **4 - 6 Pk Volume** | 214 | 368 | 0 | 0 | **581** |
| **Pk Hr Factor** | 0.755 | 0.868 | 0.000 | 0.000 | **0.853** | **Pk Hr Factor** | 0.907 | 0.920 | 0.000 | 0.000 | **0.949** |

Prepared by NDS/ATD

# VOLUME

## Park Ave Bet. 9th St & 10th St

**Day:** Thursday
**Date:** 2/12/2015

**City:** Riverside
**Project #:** CA15_6022_010

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 1,315 | 1,569 | 0 | 0 | 2,884 |

| AM Period | NB | | SB | | EB | | WB | | TOTAL | | PM Period | NB | | SB | | EB | | WB | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 3 | | 3 | | | | | | 6 | | 12:00 | 26 | | 29 | | | | | | 55 | |
| 00:15 | 1 | | 2 | | | | | | 3 | | 12:15 | 21 | | 21 | | | | | | 42 | |
| 00:30 | 2 | | 1 | | | | | | 3 | | 12:30 | 27 | | 16 | | | | | | 43 | |
| 00:45 | 2 | 8 | 5 | 11 | | | | | 7 | 19 | 12:45 | 24 | 98 | 14 | 80 | | | | | 38 | 178 |
| 01:00 | 0 | | 2 | | | | | | 2 | | 13:00 | 16 | | 17 | | | | | | 33 | |
| 01:15 | 0 | | 0 | | | | | | 0 | | 13:15 | 14 | | 12 | | | | | | 26 | |
| 01:30 | 1 | | 0 | | | | | | 1 | | 13:30 | 16 | | 27 | | | | | | 43 | |
| 01:45 | 0 | 1 | 2 | 4 | | | | | 2 | 5 | 13:45 | 16 | 62 | 31 | 87 | | | | | 47 | 149 |
| 02:00 | 2 | | 2 | | | | | | 4 | | 14:00 | 31 | | 29 | | | | | | 60 | |
| 02:15 | 0 | | 1 | | | | | | 1 | | 14:15 | 27 | | 19 | | | | | | 46 | |
| 02:30 | 0 | | 0 | | | | | | 0 | | 14:30 | 31 | | 23 | | | | | | 54 | |
| 02:45 | 1 | 3 | 0 | 3 | | | | | 1 | 6 | 14:45 | 22 | 111 | 33 | 104 | | | | | 55 | 215 |
| 03:00 | 1 | | 0 | | | | | | 1 | | 15:00 | 23 | | 35 | | | | | | 58 | |
| 03:15 | 1 | | 0 | | | | | | 1 | | 15:15 | 27 | | 36 | | | | | | 63 | |
| 03:30 | 2 | | 0 | | | | | | 2 | | 15:30 | 21 | | 22 | | | | | | 43 | |
| 03:45 | 1 | 5 | 1 | 1 | | | | | 2 | 6 | 15:45 | 28 | 99 | 34 | 127 | | | | | 62 | 226 |
| 04:00 | 1 | | 3 | | | | | | 4 | | 16:00 | 16 | | 52 | | | | | | 68 | |
| 04:15 | 4 | | 2 | | | | | | 6 | | 16:15 | 31 | | 26 | | | | | | 57 | |
| 04:30 | 5 | | 3 | | | | | | 8 | | 16:30 | 23 | | 53 | | | | | | 76 | |
| 04:45 | 5 | 15 | 1 | 9 | | | | | 6 | 24 | 16:45 | 19 | 89 | 40 | 171 | | | | | 59 | 260 |
| 05:00 | 5 | | 2 | | | | | | 7 | | 17:00 | 22 | | 70 | | | | | | 92 | |
| 05:15 | 7 | | 5 | | | | | | 12 | | 17:15 | 17 | | 56 | | | | | | 73 | |
| 05:30 | 16 | | 7 | | | | | | 23 | | 17:30 | 12 | | 55 | | | | | | 67 | |
| 05:45 | 5 | 33 | 7 | 21 | | | | | 12 | 54 | 17:45 | 31 | 82 | 55 | 236 | | | | | 86 | 318 |
| 06:00 | 4 | | 5 | | | | | | 9 | | 18:00 | 26 | | 48 | | | | | | 74 | |
| 06:15 | 4 | | 7 | | | | | | 11 | | 18:15 | 16 | | 31 | | | | | | 47 | |
| 06:30 | 7 | | 11 | | | | | | 18 | | 18:30 | 16 | | 23 | | | | | | 39 | |
| 06:45 | 14 | 29 | 8 | 31 | | | | | 22 | 60 | 18:45 | 24 | 82 | 29 | 131 | | | | | 53 | 213 |
| 07:00 | 13 | | 14 | | | | | | 27 | | 19:00 | 17 | | 26 | | | | | | 43 | |
| 07:15 | 18 | | 18 | | | | | | 36 | | 19:15 | 12 | | 21 | | | | | | 33 | |
| 07:30 | 28 | | 20 | | | | | | 48 | | 19:30 | 17 | | 19 | | | | | | 36 | |
| 07:45 | 35 | 94 | 22 | 74 | | | | | 57 | 168 | 19:45 | 18 | 64 | 14 | 80 | | | | | 32 | 144 |
| 08:00 | 54 | | 20 | | | | | | 74 | | 20:00 | 13 | | 13 | | | | | | 26 | |
| 08:15 | 34 | | 21 | | | | | | 55 | | 20:15 | 10 | | 14 | | | | | | 24 | |
| 08:30 | 26 | | 14 | | | | | | 40 | | 20:30 | 19 | | 10 | | | | | | 29 | |
| 08:45 | 14 | 128 | 20 | 75 | | | | | 34 | 203 | 20:45 | 10 | 52 | 19 | 56 | | | | | 29 | 108 |
| 09:00 | 17 | | 18 | | | | | | 35 | | 21:00 | 17 | | 14 | | | | | | 31 | |
| 09:15 | 14 | | 18 | | | | | | 32 | | 21:15 | 9 | | 10 | | | | | | 19 | |
| 09:30 | 18 | | 16 | | | | | | 34 | | 21:30 | 9 | | 9 | | | | | | 18 | |
| 09:45 | 13 | 62 | 21 | 73 | | | | | 34 | 135 | 21:45 | 13 | 48 | 7 | 40 | | | | | 20 | 88 |
| 10:00 | 12 | | 15 | | | | | | 27 | | 22:00 | 8 | | 7 | | | | | | 15 | |
| 10:15 | 18 | | 14 | | | | | | 32 | | 22:15 | 6 | | 11 | | | | | | 17 | |
| 10:30 | 12 | | 9 | | | | | | 21 | | 22:30 | 4 | | 7 | | | | | | 11 | |
| 10:45 | 24 | 66 | 12 | 50 | | | | | 36 | 116 | 22:45 | 2 | 20 | 4 | 29 | | | | | 6 | 49 |
| 11:00 | 12 | | 10 | | | | | | 22 | | 23:00 | 1 | | 5 | | | | | | 6 | |
| 11:15 | 16 | | 22 | | | | | | 38 | | 23:15 | 1 | | 4 | | | | | | 5 | |
| 11:30 | 17 | | 13 | | | | | | 30 | | 23:30 | 0 | | 3 | | | | | | 3 | |
| 11:45 | 16 | 61 | 14 | 59 | | | | | 30 | 120 | 23:45 | 1 | 3 | 5 | 17 | | | | | 6 | 20 |
| TOTALS | | 505 | | 411 | | | | | | 916 | TOTALS | | 810 | | 1158 | | | | | | 1968 |
| SPLIT % | | 55.1% | | 44.9% | | | | | | 31.8% | SPLIT % | | 41.2% | | 58.8% | | | | | | 68.2% |

| DAILY TOTALS | NB | SB | EB | WB | Total |
|---|---|---|---|---|---|
| | 1,315 | 1,569 | 0 | 0 | 2,884 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Peak Hour | 07:30 | 07:30 | | | 07:30 | PM Peak Hour | 14:00 | 17:00 | | | 17:00 |
| AM Pk Volume | 151 | 83 | | | 234 | PM Pk Volume | 111 | 236 | | | 318 |
| Pk Hr Factor | 0.699 | 0.943 | | | 0.791 | Pk Hr Factor | 0.895 | 0.843 | | | 0.864 |
| 7 - 9 Volume | 222 | 149 | 0 | 0 | 371 | 4 - 6 Volume | 171 | 407 | 0 | 0 | 578 |
| 7 - 9 Peak Hour | 07:30 | 07:30 | | | 07:30 | 4 - 6 Peak Hour | 16:15 | 17:00 | | | 17:00 |
| 7 - 9 Pk Volume | 151 | 83 | 0 | 0 | 234 | 4 - 6 Pk Volume | 95 | 236 | 0 | 0 | 318 |
| Pk Hr Factor | 0.699 | 0.943 | 0.000 | 0.000 | 0.791 | Pk Hr Factor | 0.766 | 0.843 | 0.000 | 0.000 | 0.864 |

# ITM Peak Hour Summary

Prepared by:

NDS

## *Lime St and 9th St , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible]3[illegible] |

### Peak Hour Summary

### Southbound Approach

Lime St

| Lanes | 0 | 2 | 1 | | |
|---|---|---|---|---|---|
| AM | 48 | 635 | 29 | 237 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 24 | 857 | 1 | 306 | PM |

9th St

### Eastbound Approach

| | AM | NOON | PM |
|---|---|---|---|
| | 60 | 0 | 31 |
| 1 | 2 | 0 | 54 |
| 1 | 3 | 0 | 2 |
| 0 | 21 | 0 | 141 |
| Lanes | AM | NOON | PM |

### Westbound Approach

| AM | NOON | PM | Lanes |
|---|---|---|---|
| 1 | 0 | 21 | 0 |
| 0 | 0 | 5 | 1 |
| 3 | 0 | 15 | 1 |
| 41 | 0 | 3 | |
| AM | NOON | PM | |

**CONTROL**

Signalized

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

### Northbound Approach

| | | | | | |
|---|---|---|---|---|---|
| AM | 659 | 12 | 234 | 9 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 1013 | 2 | 231 | 0 | PM |
| | | 1 | 2 | 0 | Lanes |

## Total Ins & Outs

| | North Leg | | |
|---|---|---|---|
| AM | 712 | 237 | AM |
| NOON | 0 | 0 | NOON |
| PM | 882 | 306 | PM |

| West Leg | | | East Leg | | |
|---|---|---|---|---|---|
| AM | NOON | PM | AM | NOON | PM |
| 60 | 0 | 31 | 4 | 0 | 41 |
| 26 | 0 | 197 | 41 | 0 | 3 |

| | South Leg | |
|---|---|---|
| AM | 659 | 255 |
| NOON | 0 | 0 |
| PM | 1013 | 233 |

## Total Volume Per Leg

| | North Leg |
|---|---|
| AM | 949 |
| NOON | 0 |
| PM | 1188 |

| West Leg | | | East Leg | | |
|---|---|---|---|---|---|
| AM | NOON | PM | AM | NOON | PM |
| 86 | 0 | 228 | 45 | 0 | 44 |

| | South Leg |
|---|---|
| AM | 914 |
| NOON | 0 |
| PM | 1246 |

# ITM Peak Hour Summary

Prepared by:

NDS

## *Driveway and 9th St , Riverside*

| | |
|---|---|
| [illegible] | 2[illegible]2[illegible]2[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| [illegible] | [illegible]28[illegible] |
| [illegible] | [illegible] |

| | |
|---|---|
| AM Peak Hour | [illegible] |
| NOON Peak Hour | |
| PM Peak Hour | [illegible] |

### Peak Hour Summary

### Southbound Approach

Driveway

| | Lanes 0 | 0 | 0 | | |
|---|---|---|---|---|---|
| AM | 0 | 0 | 0 | 0 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 0 | 0 | 0 | 0 | PM |

### Eastbound Approach

9th St

| | AM | NOON | PM |
|---|---|---|---|
| | 13 | 0 | 38 |
| 0 | 0 | 0 | 0 |
| 1 | 3 | 0 | 17 |
| 0 | 4 | 0 | 0 |
| Lanes | AM | NOON | PM |

### Westbound Approach

| AM | NOON | PM | Lanes |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 13 | 0 | 9 | 1 |
| 0 | 0 | 3 | 0 |
| 3 | 0 | 30 | |
| AM | NOON | PM | |

### CONTROL

1-Way Stop (NB)

| | | | | | |
|---|---|---|---|---|---|
| AM | 4 | 0 | 0 | 0 | AM |
| NOON | 0 | 0 | 0 | 0 | NOON |
| PM | 3 | 29 | 0 | 13 | PM |
| | | 0 | 1 | 0 | Lanes |

### Northbound Approach

| Count Periods | Start | End |
|---|---|---|
| AM | [illegible] | [illegible] |
| NOON | | |
| PM | [illegible] | [illegible] |

## Total Ins & Outs

North Leg

| | | |
|---|---|---|
| 0 | 0 | AM |
| 0 | 0 | NOON |
| 0 | 0 | PM |

| AM | NOON | PM | East Leg | | |
|---|---|---|---|---|---|
| 13 | 0 | 38 | 13 | 0 | 12 |
| 7 | 0 | 17 | 3 | 0 | 30 |
| West Leg | | | AM | NOON | PM |

| | | |
|---|---|---|
| AM | 4 | 0 |
| NOON | 0 | 0 |
| PM | 3 | 42 |

South Leg

## Total Volume Per Leg

North Leg

| | |
|---|---|
| 0 | AM |
| 0 | NOON |
| 0 | PM |

| AM | NOON | PM | East Leg | | |
|---|---|---|---|---|---|
| 20 | 0 | 55 | 16 | 0 | 42 |
| West Leg | | | AM | NOON | PM |

| | |
|---|---|
| AM | 4 |
| NOON | 0 |
| PM | 45 |

South Leg

Prepared by National Data & Surveying Services

# PARKING STUDY

**Location:** 111 S. College Ave
**City:** Claremont

**Sunday, 2/22/2015**

| TIME | Courier Place Apartments | | | | TOTAL |
|---|---|---|---|---|---|
| | Numbered | Handicapped | Regular | Office Only | |
| **Spaces** | **78** | **5** | **28** | **2** | **113** |
| **11:00 PM** | 51 | 3 | 25 | 0 | **79** |

**Wednesday, 2/25/2015**

| TIME | Courier Place Apartments | | | | TOTAL |
|---|---|---|---|---|---|
| | Numbered | Handicapped | Regular | Office Only | |
| **Spaces** | **78** | **5** | **28** | **2** | **113** |
| **11:00 PM** | 54 | 2 | 21 | 1 | **78** |

# APPENDIX C: EXISTING (2015) LEVEL OF SERVICE AND SYNCHRO WORKSHEETS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 486 | 0 | 0 | 197 | 0 | 0 | 0 | 0 | 226 | 0 | 795 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 512 | 0 | 0 | 207 | 0 | 0 | 0 | 0 | 238 | 0 | 379 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| 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 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | 0 | 0 |
| Arrive On Green | 0.00 | 0.63 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 238 | |
| Grp Volume(v), veh/h | 0 | 512 | 0 | 0 | 207 | 0 | 0 | 0 | 0 | 238 | 32.6 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.1 | | |
| Cycle Q Clear(g_c), s | 0.0 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.1 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | | |
| V/C Ratio(X) | 0.00 | 0.23 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.47 | | |
| Avail Cap(c_a), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 140 | 0 | 506 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.5 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | | |
| 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 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.9 | | |
| LnGrp Delay(d),s/veh | 0.0 | 8.5 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 32.6 | | |
| LnGrp LOS | | A | | | A | | | | | C | | |
| Approach Vol, veh/h | | 512 | | | 207 | | | 0 | | | | |
| Approach Delay, s/veh | | 8.5 | | | 0.1 | | | 0.0 | | | | |
| Approach LOS | | A | | | A | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 67.0 | | | | 67.0 | 33.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 28.5 | 7.5 |
| Max Q Clear Time (g_c+I1), s | | 8.3 | | | | 2.0 | 13.1 | 0.0 |
| Green Ext Time (p_c), s | | 10.7 | | | | 11.0 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.7 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 184 | 226 | 0 | 0 | 73 | 68 | 123 | 191 | 59 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 204 | 251 | 0 | 0 | 81 | 0 | 137 | 212 | 54 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 437 | 111 | | | |
| Arrive On Green | 0.50 | 0.61 | 0.00 | 0.00 | 0.06 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1433 | 365 | | | |
| Grp Volume(v), veh/h | 204 | 251 | 0 | 0 | 81 | 0 | 137 | 0 | 266 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1798 | | | |
| Q Serve(g_s), s | 6.4 | 3.0 | 0.0 | 0.0 | 2.2 | 0.0 | 5.8 | 0.0 | 12.1 | | | |
| Cycle Q Clear(g_c), s | 6.4 | 3.0 | 0.0 | 0.0 | 2.2 | 0.0 | 5.8 | 0.0 | 12.1 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.20 | | | |
| Lane Grp Cap(c), veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 0 | 548 | | | |
| V/C Ratio(X) | 0.23 | 0.12 | 0.00 | 0.00 | 0.41 | 0.00 | 0.25 | 0.00 | 0.49 | | | |
| Avail Cap(c_a), veh/h | 895 | 2141 | 0 | 0 | 1256 | 562 | 541 | 0 | 548 | | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.80 | 0.80 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 13.9 | 8.4 | 0.0 | 0.0 | 45.6 | 0.0 | 26.2 | 0.0 | 28.3 | | | |
| Incr Delay (d2), s/veh | 0.5 | 0.1 | 0.0 | 0.0 | 6.3 | 0.0 | 1.1 | 0.0 | 3.1 | | | |
| 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(-26165%),veh/ln | 2.2 | 1.5 | 0.0 | 0.0 | 1.3 | 0.0 | 3.0 | 0.0 | 6.5 | | | |
| LnGrp Delay(d),s/veh | 14.3 | 8.5 | 0.0 | 0.0 | 51.9 | 0.0 | 27.3 | 0.0 | 31.4 | | | |
| LnGrp LOS | B | A | | | D | | C | | C | | | |
| Approach Vol, veh/h | | 455 | | | 81 | | | 403 | | | | |
| Approach Delay, s/veh | | 11.1 | | | 51.9 | | | 30.0 | | | | |
| Approach LOS | | B | | | D | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 65.0 | | | 54.9 | 10.1 | | 35.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 60.5 | | | 20.9 | * 36 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | | 5.0 | | | 8.4 | 4.2 | | 14.1 |
| Green Ext Time (p_c), s | | 2.7 | | | 2.0 | 0.3 | | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 22.7 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 6 | 316 | 89 | 330 | 600 | 49 | 13 | 119 | 122 | 49 | 626 | 44 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 7 | 343 | 30 | 359 | 652 | 49 | 14 | 129 | 21 | 53 | 680 | 44 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 425 | 1293 | 577 | 446 | 853 | 64 | 65 | 857 | 383 | 95 | 838 | 54 |
| Arrive On Green | 0.24 | 0.37 | 0.37 | 0.13 | 0.26 | 0.26 | 0.04 | 0.24 | 0.24 | 0.05 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3337 | 251 | 1774 | 3539 | 1579 | 1774 | 3375 | 218 |
| Grp Volume(v), veh/h | 7 | 343 | 30 | 359 | 345 | 356 | 14 | 129 | 21 | 53 | 356 | 368 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1818 | 1774 | 1770 | 1579 | 1774 | 1770 | 1824 |
| Q Serve(g_s), s | 0.3 | 5.7 | 0.8 | 8.5 | 15.1 | 15.1 | 0.6 | 2.4 | 0.9 | 2.4 | 15.8 | 15.9 |
| Cycle Q Clear(g_c), s | 0.3 | 5.7 | 0.8 | 8.5 | 15.1 | 15.1 | 0.6 | 2.4 | 0.9 | 2.4 | 15.8 | 15.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.14 | 1.00 | | 1.00 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 425 | 1293 | 577 | 446 | 452 | 465 | 65 | 857 | 383 | 95 | 439 | 453 |
| V/C Ratio(X) | 0.02 | 0.27 | 0.05 | 0.80 | 0.76 | 0.77 | 0.22 | 0.15 | 0.05 | 0.56 | 0.81 | 0.81 |
| Avail Cap(c_a), veh/h | 425 | 1293 | 577 | 824 | 635 | 653 | 425 | 2118 | 945 | 531 | 847 | 873 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 24.3 | 18.6 | 10.0 | 35.3 | 28.8 | 28.8 | 39.1 | 24.9 | 24.3 | 38.6 | 29.6 | 29.6 |
| Incr Delay (d2), s/veh | 0.1 | 0.5 | 0.2 | 1.3 | 2.0 | 2.0 | 0.6 | 0.0 | 0.0 | 1.9 | 1.4 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.1 | 2.9 | 0.5 | 4.1 | 7.6 | 7.9 | 0.3 | 1.2 | 0.4 | 1.2 | 7.9 | 8.1 |
| LnGrp Delay(d),s/veh | 24.3 | 19.1 | 10.2 | 36.6 | 30.8 | 30.8 | 39.7 | 24.9 | 24.3 | 40.5 | 31.0 | 30.9 |
| LnGrp LOS | C | B | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 380 | | | 1060 | | | 164 | | | 777 | |
| Approach Delay, s/veh | | 18.5 | | | 32.8 | | | 26.1 | | | 31.6 | |
| Approach LOS | | B | | | C | | | 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 | 8.5 | 25.1 | 14.8 | 35.1 | 8.0 | 25.6 | 24.0 | 26.0 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 4.4 | 4.4 | 10.5 | 7.7 | 2.6 | 17.9 | 2.3 | 17.1 |
| Green Ext Time (p_c), s | 0.0 | 0.6 | 0.4 | 5.0 | 0.4 | 2.8 | 0.0 | 3.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 29.7 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 123 | 334 | 0 | 0 | 600 | 92 | 371 | 169 | 173 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 134 | 363 | 0 | 0 | 652 | 0 | 294 | 337 | 60 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 242 | 1719 | 0 | 0 | 1125 | 503 | 567 | 596 | 505 | | | |
| Arrive On Green | 0.07 | 0.49 | 0.00 | 0.00 | 0.32 | 0.00 | 0.32 | 0.32 | 0.32 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1580 | | | |
| Grp Volume(v), veh/h | 134 | 363 | 0 | 0 | 652 | 0 | 294 | 337 | 60 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1580 | | | |
| Q Serve(g_s), s | 1.5 | 2.4 | 0.0 | 0.0 | 6.3 | 0.0 | 5.6 | 6.2 | 1.1 | | | |
| Cycle Q Clear(g_c), s | 1.5 | 2.4 | 0.0 | 0.0 | 6.3 | 0.0 | 5.6 | 6.2 | 1.1 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 242 | 1719 | 0 | 0 | 1125 | 503 | 567 | 596 | 505 | | | |
| V/C Ratio(X) | 0.55 | 0.21 | 0.00 | 0.00 | 0.58 | 0.00 | 0.52 | 0.57 | 0.12 | | | |
| Avail Cap(c_a), veh/h | 2511 | 2583 | 0 | 0 | 2583 | 1155 | 1295 | 1359 | 1153 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 18.5 | 6.1 | 0.0 | 0.0 | 11.7 | 0.0 | 11.4 | 11.6 | 9.9 | | | |
| Incr Delay (d2), s/veh | 0.7 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 1.0 | 1.2 | 0.1 | | | |
| 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(-26165%),veh/ln | 0.8 | 1.2 | 0.0 | 0.0 | 3.1 | 0.0 | 2.9 | 3.3 | 0.5 | | | |
| LnGrp Delay(d),s/veh | 19.2 | 6.1 | 0.0 | 0.0 | 11.9 | 0.0 | 12.4 | 12.8 | 10.0 | | | |
| LnGrp LOS | B | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 497 | | | 652 | | | 691 | | | | |
| Approach Delay, s/veh | | 9.6 | | | 11.9 | | | 12.4 | | | | |
| Approach LOS | | A | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 24.0 | | | 6.9 | 17.1 | | 17.1 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 4.4 | | | 3.5 | 8.3 | | 8.2 |
| Green Ext Time (p_c), s | | 4.8 | | | 0.1 | 4.6 | | 4.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.5 |
| 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) | 2 | 3 | 21 | 3 | 0 | 1 | 12 | 234 | 9 | 29 | 635 | 48 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 2 | 4 | 0 | 4 | 0 | 0 | 14 | 279 | 10 | 35 | 756 | 52 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 240 | 11 | 0 | 237 | 11 | 0 | 15 | 2043 | 73 | 39 | 2016 | 139 |
| Arrive On Green | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.59 | 0.59 | 0.02 | 0.60 | 0.60 |
| Sat Flow, veh/h | 1412 | 1863 | 0 | 1407 | 1863 | 0 | 1774 | 3486 | 125 | 1774 | 3361 | 231 |
| Grp Volume(v), veh/h | 2 | 4 | 0 | 4 | 0 | 0 | 14 | 141 | 148 | 35 | 398 | 410 |
| Grp Sat Flow(s),veh/h/ln | 1412 | 1863 | 0 | 1407 | 1863 | 0 | 1774 | 1770 | 1841 | 1774 | 1770 | 1822 |
| Q Serve(g_s), s | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.2 | 1.1 | 1.1 | 0.6 | 3.6 | 3.6 |
| Cycle Q Clear(g_c), s | 0.0 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 1.1 | 1.1 | 0.6 | 3.6 | 3.6 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.00 | 1.00 | | 0.07 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 240 | 11 | 0 | 237 | 11 | 0 | 15 | 1037 | 1079 | 39 | 1062 | 1093 |
| V/C Ratio(X) | 0.01 | 0.37 | 0.00 | 0.02 | 0.00 | 0.00 | 0.96 | 0.14 | 0.14 | 0.89 | 0.37 | 0.38 |
| Avail Cap(c_a), veh/h | 1140 | 1198 | 0 | 1586 | 1797 | 0 | 571 | 2277 | 2368 | 2282 | 2277 | 2344 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 15.4 | 15.4 | 0.0 | 15.5 | 0.0 | 0.0 | 15.4 | 2.9 | 2.9 | 15.2 | 3.2 | 3.2 |
| Incr Delay (d2), s/veh | 0.0 | 20.1 | 0.0 | 0.0 | 0.0 | 0.0 | 56.6 | 0.0 | 0.0 | 20.6 | 0.5 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.5 | 0.5 | 0.5 | 1.8 | 1.8 |
| LnGrp Delay(d),s/veh | 15.4 | 35.5 | 0.0 | 15.5 | 0.0 | 0.0 | 72.0 | 2.9 | 2.9 | 35.8 | 3.7 | 3.7 |
| LnGrp LOS | B | D | | B | | | E | A | A | D | A | A |
| Approach Vol, veh/h | | 6 | | | 4 | | | 303 | | | 843 | |
| Approach Delay, s/veh | | 28.8 | | | 15.5 | | | 6.1 | | | 5.0 | |
| Approach LOS | | C | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.7 | 22.2 | | 4.2 | 4.3 | 22.7 | | 4.2 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.6 | 3.1 | | 2.1 | 2.2 | 5.6 | | 2.2 |
| Green Ext Time (p_c), s | 0.0 | 13.4 | | 0.0 | 0.0 | 13.0 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.5 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 10 | 84 | 22 | 1 | 76 | 1 | 16 | 11 | 2 | 3 | 22 | 7 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 11 | 92 | 24 | 1 | 84 | 1 | 18 | 12 | 2 | 3 | 24 | 8 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 87 | 0 | 0 | 94 | 0 | 0 | 174 | 205 | 96 | 211 | 204 | 46 |
| Stage 1 | - | - | - | - | - | - | 116 | 116 | - | 88 | 88 | - |
| Stage 2 | - | - | - | - | - | - | 58 | 89 | - | 123 | 116 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1507 | - | - | 1500 | - | - | 781 | 691 | 960 | 737 | 692 | 1014 |
| Stage 1 | - | - | - | - | - | - | 888 | 799 | - | 910 | 822 | - |
| Stage 2 | - | - | - | - | - | - | 947 | 821 | - | 881 | 799 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1504 | - | - | 1498 | - | - | 747 | 683 | 957 | 718 | 684 | 1011 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 747 | 683 | - | 718 | 684 | - |
| Stage 1 | - | - | - | - | - | - | 879 | 791 | - | 901 | 820 | - |
| Stage 2 | - | - | - | - | - | - | 910 | 819 | - | 857 | 791 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.6 | 0.1 | 10.1 | 10.1 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 732 | 1504 | - | - | 1498 | - | - | 740 |
| HCM Lane V/C Ratio | 0.044 | 0.007 | - | - | 0.001 | - | - | 0.048 |
| HCM Control Delay (s) | 10.1 | 7.4 | 0 | - | 7.4 | - | - | 10.1 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 0.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 13 | 76 | 27 | 0 | 0 | 0 | 57 | 263 | 11 | 317 | 441 | 130 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 15 | 86 | 17 | | | | 65 | 299 | 9 | 360 | 501 | 124 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | | | | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 182 | 155 | 31 | | | | 116 | 1043 | 31 | 611 | 1153 | 284 |
| Arrive On Green | 0.10 | 0.10 | 0.10 | | | | 0.07 | 0.30 | 0.30 | 0.18 | 0.41 | 0.41 |
| Sat Flow, veh/h | 1774 | 1510 | 298 | | | | 1774 | 3508 | 105 | 3442 | 2815 | 693 |
| Grp Volume(v), veh/h | 15 | 0 | 103 | | | | 65 | 150 | 158 | 360 | 314 | 311 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1808 | | | | 1774 | 1770 | 1844 | 1721 | 1770 | 1738 |
| Q Serve(g_s), s | 0.3 | 0.0 | 2.1 | | | | 1.3 | 2.5 | 2.5 | 3.6 | 4.8 | 4.9 |
| Cycle Q Clear(g_c), s | 0.3 | 0.0 | 2.1 | | | | 1.3 | 2.5 | 2.5 | 3.6 | 4.8 | 4.9 |
| Prop In Lane | 1.00 | | 0.17 | | | | 1.00 | | 0.06 | 1.00 | | 0.40 |
| Lane Grp Cap(c), veh/h | 182 | 0 | 185 | | | | 116 | 526 | 548 | 611 | 724 | 712 |
| V/C Ratio(X) | 0.08 | 0.00 | 0.56 | | | | 0.56 | 0.29 | 0.29 | 0.59 | 0.43 | 0.44 |
| Avail Cap(c_a), veh/h | 1594 | 0 | 1624 | | | | 937 | 1870 | 1949 | 2728 | 1403 | 1378 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 15.4 | 0.0 | 16.2 | | | | 17.2 | 10.2 | 10.2 | 14.3 | 8.0 | 8.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 2.6 | | | | 1.6 | 0.3 | 0.3 | 0.9 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 0.0 | 1.1 | | | | 0.7 | 1.3 | 1.3 | 1.8 | 2.4 | 2.4 |
| LnGrp Delay(d),s/veh | 15.6 | 0.0 | 18.8 | | | | 18.7 | 10.5 | 10.5 | 15.2 | 8.4 | 8.5 |
| LnGrp LOS | B | | B | | | | B | B | B | B | A | A |
| Approach Vol, veh/h | | 118 | | | | | | 373 | | | 985 | |
| Approach Delay, s/veh | | 18.4 | | | | | | 11.9 | | | 10.9 | |
| Approach LOS | | B | | | | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 11.7 | 16.7 | | 9.4 | 7.5 | 21.0 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 5.6 | 4.5 | | 4.1 | 3.3 | 6.9 | | |
| Green Ext Time (p_c), s | 1.2 | 6.4 | | 0.6 | 0.1 | 5.8 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.8 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 26 | 457 | 19 | 13 | 624 | 52 | 32 | 41 | 30 | 30 | 39 | 32 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 28 | 497 | 20 | 14 | 678 | 53 | 35 | 45 | 4 | 33 | 42 | 2 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 31 | 1296 | 52 | 15 | 1213 | 95 | 40 | 196 | 17 | 37 | 202 | 10 |
| Arrive On Green | 0.02 | 0.37 | 0.37 | 0.01 | 0.36 | 0.36 | 0.02 | 0.12 | 0.12 | 0.02 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1774 | 3468 | 139 | 1774 | 3326 | 260 | 1774 | 1686 | 150 | 1774 | 1764 | 84 |
| Grp Volume(v), veh/h | 28 | 253 | 264 | 14 | 360 | 371 | 35 | 0 | 49 | 33 | 0 | 44 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1838 | 1774 | 1770 | 1816 | 1774 | 0 | 1836 | 1774 | 0 | 1848 |
| Q Serve(g_s), s | 0.6 | 3.7 | 3.7 | 0.3 | 5.7 | 5.8 | 0.7 | 0.0 | 0.9 | 0.7 | 0.0 | 0.8 |
| Cycle Q Clear(g_c), s | 0.6 | 3.7 | 3.7 | 0.3 | 5.7 | 5.8 | 0.7 | 0.0 | 0.9 | 0.7 | 0.0 | 0.8 |
| Prop In Lane | 1.00 | | 0.08 | 1.00 | | 0.14 | 1.00 | | 0.08 | 1.00 | | 0.05 |
| Lane Grp Cap(c), veh/h | 31 | 662 | 687 | 15 | 645 | 662 | 40 | 0 | 213 | 37 | 0 | 212 |
| V/C Ratio(X) | 0.90 | 0.38 | 0.38 | 0.95 | 0.56 | 0.56 | 0.88 | 0.00 | 0.23 | 0.89 | 0.00 | 0.21 |
| Avail Cap(c_a), veh/h | 1004 | 1502 | 1560 | 1004 | 1502 | 1541 | 1004 | 0 | 1506 | 1004 | 0 | 1516 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 17.3 | 8.1 | 8.1 | 17.5 | 9.0 | 9.0 | 17.2 | 0.0 | 14.2 | 17.3 | 0.0 | 14.2 |
| Incr Delay (d2), s/veh | 27.0 | 0.1 | 0.1 | 54.8 | 0.3 | 0.3 | 20.1 | 0.0 | 0.2 | 21.8 | 0.0 | 0.2 |
| 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(-26165%),veh/ln | 0.5 | 1.8 | 1.9 | 0.4 | 2.9 | 2.9 | 0.6 | 0.0 | 0.4 | 0.5 | 0.0 | 0.4 |
| LnGrp Delay(d),s/veh | 44.3 | 8.2 | 8.2 | 72.3 | 9.2 | 9.2 | 37.4 | 0.0 | 14.4 | 39.1 | 0.0 | 14.4 |
| LnGrp LOS | D | A | A | E | A | A | D | | B | D | | B |
| Approach Vol, veh/h | | 545 | | | 745 | | | 84 | | | 77 | |
| Approach Delay, s/veh | | 10.1 | | | 10.4 | | | 24.0 | | | 25.0 | |
| Approach LOS | | B | | | B | | | 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 | 4.3 | 18.2 | 4.8 | 8.1 | 4.6 | 17.9 | 4.7 | 8.1 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 2.3 | 5.7 | 2.7 | 2.8 | 2.6 | 7.8 | 2.7 | 2.9 |
| Green Ext Time (p_c), s | 0.0 | 5.1 | 0.0 | 0.3 | 0.0 | 5.0 | 0.0 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.8 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 3 | 4 | 0 | 13 | 0 | 0 |
| 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 | 63 | 63 | 63 | 63 | 63 | 63 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 5 | 6 | 0 | 21 | 0 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 11 | 0 | 29 | 8 |
| Stage 1 | - | - | - | - | 8 | - |
| Stage 2 | - | - | - | - | 21 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1608 | - | 986 | 1074 |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1002 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1608 | - | 986 | 1074 |
| Mov Cap-2 Maneuver | - | - | - | - | 986 | - |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1002 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 0 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | 1608 | - |
| HCM Lane V/C Ratio | - | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 | - |
| HCM Lane LOS | A | - | - | A | - |
| HCM 95th %tile Q(veh) | - | - | - | 0 | - |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 231 | 0 | 0 | 267 | 0 | 0 | 0 | 0 | 177 | 0 | 1054 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 241 | 0 | 0 | 278 | 0 | 0 | 0 | 0 | 184 | 0 | 645 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | 0 | 0 |
| Arrive On Green | 0.00 | 0.64 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 184 | |
| Grp Volume(v), veh/h | 0 | 241 | 0 | 0 | 278 | 0 | 0 | 0 | 0 | 184 | 32.6 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 2.6 | 0.0 | 0.0 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 8.5 | | |
| Cycle Q Clear(g_c), s | 0.0 | 2.6 | 0.0 | 0.0 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 8.5 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | | |
| V/C Ratio(X) | 0.00 | 0.11 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.39 | | |
| Avail Cap(c_a), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 177 | 0 | 470 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 6.8 | 0.0 | 0.0 | 16.5 | 0.0 | 0.0 | 0.0 | 0.0 | 30.1 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 1.3 | 0.0 | 0.0 | 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 4.5 | | |
| LnGrp Delay(d),s/veh | 0.0 | 6.9 | 0.0 | 0.0 | 16.6 | 0.0 | 0.0 | 0.0 | 0.0 | 32.6 | | |
| LnGrp LOS | | A | | | B | | | | | C | | |
| Approach Vol, veh/h | | 241 | | | 278 | | | 0 | | | | |
| Approach Delay, s/veh | | 6.9 | | | 16.6 | | | 0.0 | | | | |
| Approach LOS | | A | | | B | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 69.0 | | | | 69.0 | 31.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 26.5 | 9.5 |
| Max Q Clear Time (g_c+I1), s | | 4.6 | | | | 8.3 | 10.5 | 0.0 |
| Green Ext Time (p_c), s | | 7.3 | | | | 7.2 | 0.2 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 17.4 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 319 | 412 | 0 | 0 | 179 | 203 | 100 | 302 | 65 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 351 | 453 | 0 | 0 | 197 | 0 | 110 | 332 | 63 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 931 | 2318 | 0 | 0 | 302 | 135 | 452 | 388 | 74 | | | |
| Arrive On Green | 1.00 | 1.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.25 | 0.25 | 0.25 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1522 | 289 | | | |
| Grp Volume(v), veh/h | 351 | 453 | 0 | 0 | 197 | 0 | 110 | 0 | 395 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1811 | | | |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.4 | 0.0 | 4.9 | 0.0 | 20.8 | | | |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.4 | 0.0 | 4.9 | 0.0 | 20.8 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.16 | | | |
| Lane Grp Cap(c), veh/h | 931 | 2318 | 0 | 0 | 302 | 135 | 452 | 0 | 462 | | | |
| V/C Ratio(X) | 0.38 | 0.20 | 0.00 | 0.00 | 0.65 | 0.00 | 0.24 | 0.00 | 0.86 | | | |
| Avail Cap(c_a), veh/h | 931 | 2318 | 0 | 0 | 903 | 404 | 452 | 0 | 462 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.91 | 0.91 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 44.3 | 0.0 | 29.6 | 0.0 | 35.5 | | | |
| Incr Delay (d2), s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 10.4 | 0.0 | 1.3 | 0.0 | 18.0 | | | |
| 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(-26165%),veh/ln | 0.3 | 0.1 | 0.0 | 0.0 | 3.1 | 0.0 | 2.6 | 0.0 | 12.7 | | | |
| LnGrp Delay(d),s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 54.7 | 0.0 | 30.9 | 0.0 | 53.5 | | | |
| LnGrp LOS | A | A | | | D | | C | | D | | | |
| Approach Vol, veh/h | | 804 | | | 197 | | | 505 | | | | |
| Approach Delay, s/veh | | 0.6 | | | 54.7 | | | 48.6 | | | | |
| Approach LOS | | A | | | D | | | D | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 70.0 | | | 57.0 | 13.0 | | 30.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 65.5 | | | 35.9 | * 26 | | 25.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 2.0 | 7.4 | | 22.8 |
| Green Ext Time (p_c), s | | 5.2 | | | 5.1 | 0.7 | | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.8 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 14 | 709 | 124 | 260 | 477 | 49 | 26 | 203 | 371 | 168 | 680 | 55 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 15 | 779 | 51 | 286 | 524 | 49 | 29 | 223 | 63 | 185 | 747 | 56 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 414 | 1270 | 567 | 370 | 763 | 71 | 88 | 720 | 321 | 224 | 901 | 67 |
| Arrive On Green | 0.23 | 0.36 | 0.36 | 0.11 | 0.23 | 0.23 | 0.05 | 0.20 | 0.20 | 0.13 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3272 | 305 | 1774 | 3539 | 1579 | 1774 | 3337 | 250 |
| Grp Volume(v), veh/h | 15 | 779 | 51 | 286 | 283 | 290 | 29 | 223 | 63 | 185 | 396 | 407 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1808 | 1774 | 1770 | 1579 | 1774 | 1770 | 1818 |
| Q Serve(g_s), s | 0.6 | 15.5 | 1.4 | 6.9 | 12.5 | 12.6 | 1.4 | 4.6 | 2.8 | 8.7 | 18.1 | 18.1 |
| Cycle Q Clear(g_c), s | 0.6 | 15.5 | 1.4 | 6.9 | 12.5 | 12.6 | 1.4 | 4.6 | 2.8 | 8.7 | 18.1 | 18.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.17 | 1.00 | | 1.00 | 1.00 | | 0.14 |
| Lane Grp Cap(c), veh/h | 414 | 1270 | 567 | 370 | 412 | 421 | 88 | 720 | 321 | 224 | 478 | 491 |
| V/C Ratio(X) | 0.04 | 0.61 | 0.09 | 0.77 | 0.69 | 0.69 | 0.33 | 0.31 | 0.20 | 0.82 | 0.83 | 0.83 |
| Avail Cap(c_a), veh/h | 414 | 1270 | 567 | 802 | 619 | 632 | 414 | 2063 | 920 | 517 | 825 | 848 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 25.4 | 22.6 | 10.3 | 37.3 | 30.0 | 30.1 | 39.4 | 29.1 | 28.4 | 36.5 | 29.5 | 29.5 |
| Incr Delay (d2), s/veh | 0.2 | 2.2 | 0.3 | 1.3 | 0.8 | 0.8 | 0.8 | 0.1 | 0.1 | 2.9 | 1.4 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.3 | 8.0 | 0.8 | 3.4 | 6.2 | 6.4 | 0.7 | 2.2 | 1.2 | 4.4 | 9.0 | 9.2 |
| LnGrp Delay(d),s/veh | 25.6 | 24.8 | 10.6 | 38.6 | 30.8 | 30.8 | 40.2 | 29.1 | 28.5 | 39.5 | 30.9 | 30.9 |
| LnGrp LOS | C | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 845 | | | 859 | | | 315 | | | 988 | |
| Approach Delay, s/veh | | 24.0 | | | 33.4 | | | 30.0 | | | 32.5 | |
| Approach LOS | | C | | | C | | | 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 | 14.8 | 22.3 | 13.2 | 35.4 | 9.1 | 28.1 | 24.0 | 24.6 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 10.7 | 6.6 | 8.9 | 17.5 | 3.4 | 20.1 | 2.6 | 14.6 |
| Green Ext Time (p_c), s | 0.1 | 1.0 | 0.3 | 5.5 | 0.9 | 3.1 | 0.0 | 5.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 30.1 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 264 | 974 | 0 | 0 | 586 | 93 | 202 | 121 | 209 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 293 | 1082 | 0 | 0 | 651 | 0 | 179 | 197 | 145 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 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, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 444 | 2119 | 0 | 0 | 1351 | 604 | 400 | 420 | 356 | | | |
| Arrive On Green | 0.13 | 0.60 | 0.00 | 0.00 | 0.38 | 0.00 | 0.23 | 0.23 | 0.23 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1579 | | | |
| Grp Volume(v), veh/h | 293 | 1082 | 0 | 0 | 651 | 0 | 179 | 197 | 145 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1579 | | | |
| Q Serve(g_s), s | 3.7 | 8.0 | 0.0 | 0.0 | 6.3 | 0.0 | 4.0 | 4.2 | 3.6 | | | |
| Cycle Q Clear(g_c), s | 3.7 | 8.0 | 0.0 | 0.0 | 6.3 | 0.0 | 4.0 | 4.2 | 3.6 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 444 | 2119 | 0 | 0 | 1351 | 604 | 400 | 420 | 356 | | | |
| V/C Ratio(X) | 0.66 | 0.51 | 0.00 | 0.00 | 0.48 | 0.00 | 0.45 | 0.47 | 0.41 | | | |
| Avail Cap(c_a), veh/h | 2270 | 2334 | 0 | 0 | 2334 | 1044 | 1170 | 1228 | 1041 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 18.9 | 5.3 | 0.0 | 0.0 | 10.7 | 0.0 | 15.2 | 15.3 | 15.0 | | | |
| Incr Delay (d2), s/veh | 0.6 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 1.1 | 1.2 | 1.1 | | | |
| 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(-26165%),veh/ln | 1.8 | 3.8 | 0.0 | 0.0 | 3.1 | 0.0 | 2.1 | 2.3 | 1.6 | | | |
| LnGrp Delay(d),s/veh | 19.5 | 5.3 | 0.0 | 0.0 | 10.8 | 0.0 | 16.3 | 16.4 | 16.1 | | | |
| LnGrp LOS | B | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 1375 | | | 651 | | | 521 | | | | |
| Approach Delay, s/veh | | 8.4 | | | 10.8 | | | 16.3 | | | | |
| Approach LOS | | A | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 31.2 | | | 9.9 | 21.4 | | 14.3 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 10.0 | | | 5.7 | 8.3 | | 6.2 |
| Green Ext Time (p_c), s | | 8.6 | | | 0.3 | 8.9 | | 3.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 10.6 |
| HCM 2010 LOS | B |

Notes

User approved pedestrian interval to be less than phase max green.

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) | 54 | 2 | 141 | 15 | 5 | 21 | 2 | 231 | 0 | 1 | 857 | 24 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 61 | 2 | 13 | 17 | 6 | 2 | 2 | 262 | 0 | 1 | 974 | 25 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 277 | 15 | 97 | 270 | 93 | 31 | 5 | 2195 | 0 | 5 | 2184 | 56 |
| Arrive On Green | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.00 | 0.62 | 0.00 | 0.00 | 0.62 | 0.62 |
| Sat Flow, veh/h | 1402 | 215 | 1400 | 1393 | 1338 | 446 | 1774 | 3632 | 0 | 1774 | 3526 | 90 |
| Grp Volume(v), veh/h | 61 | 0 | 15 | 17 | 0 | 8 | 2 | 262 | 0 | 1 | 489 | 510 |
| Grp Sat Flow(s),veh/h/ln | 1402 | 0 | 1616 | 1393 | 0 | 1784 | 1774 | 1770 | 0 | 1774 | 1770 | 1847 |
| Q Serve(g_s), s | 1.6 | 0.0 | 0.3 | 0.4 | 0.0 | 0.2 | 0.0 | 1.2 | 0.0 | 0.0 | 5.6 | 5.6 |
| Cycle Q Clear(g_c), s | 1.8 | 0.0 | 0.3 | 0.8 | 0.0 | 0.2 | 0.0 | 1.2 | 0.0 | 0.0 | 5.6 | 5.6 |
| Prop In Lane | 1.00 | | 0.87 | 1.00 | | 0.25 | 1.00 | | 0.00 | 1.00 | | 0.05 |
| Lane Grp Cap(c), veh/h | 277 | 0 | 112 | 270 | 0 | 124 | 5 | 2195 | 0 | 5 | 1096 | 1144 |
| V/C Ratio(X) | 0.22 | 0.00 | 0.13 | 0.06 | 0.00 | 0.06 | 0.44 | 0.12 | 0.00 | 0.22 | 0.45 | 0.45 |
| Avail Cap(c_a), veh/h | 905 | 0 | 835 | 1254 | 0 | 1383 | 458 | 3659 | 0 | 1834 | 1829 | 1909 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 17.7 | 0.0 | 16.9 | 17.3 | 0.0 | 16.8 | 19.3 | 3.0 | 0.0 | 19.3 | 3.9 | 3.9 |
| Incr Delay (d2), s/veh | 0.4 | 0.0 | 0.5 | 0.1 | 0.0 | 0.2 | 22.3 | 0.0 | 0.0 | 8.6 | 0.6 | 0.6 |
| 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(-26165%),veh/ln | 0.7 | 0.0 | 0.2 | 0.2 | 0.0 | 0.1 | 0.0 | 0.5 | 0.0 | 0.0 | 2.9 | 3.0 |
| LnGrp Delay(d),s/veh | 18.1 | 0.0 | 17.5 | 17.4 | 0.0 | 17.1 | 41.6 | 3.0 | 0.0 | 27.9 | 4.5 | 4.5 |
| LnGrp LOS | B | | B | B | | B | D | A | | C | A | A |
| Approach Vol, veh/h | | 76 | | | 25 | | | 264 | | | 1000 | |
| Approach Delay, s/veh | | 18.0 | | | 17.3 | | | 3.3 | | | 4.5 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.0 | 28.0 | | 6.7 | 4.0 | 28.0 | | 6.7 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.0 | 3.2 | | 3.8 | 2.0 | 7.6 | | 2.8 |
| Green Ext Time (p_c), s | 0.0 | 17.4 | | 0.2 | 0.0 | 16.4 | | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.2 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 7 | 330 | 91 | 4 | 74 | 4 | 53 | 14 | 5 | 10 | 52 | 8 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 8 | 367 | 101 | 4 | 82 | 4 | 59 | 16 | 6 | 11 | 58 | 9 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 89 | 0 | 0 | 369 | 0 | 0 | 465 | 482 | 371 | 490 | 479 | 47 |
| Stage 1 | - | - | - | - | - | - | 384 | 384 | - | 95 | 95 | - |
| Stage 2 | - | - | - | - | - | - | 81 | 98 | - | 395 | 384 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1504 | - | - | 1190 | - | - | 494 | 483 | 674 | 475 | 485 | 1012 |
| Stage 1 | - | - | - | - | - | - | 638 | 611 | - | 902 | 816 | - |
| Stage 2 | - | - | - | - | - | - | 919 | 813 | - | 629 | 611 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1501 | - | - | 1188 | - | - | 439 | 476 | 672 | 454 | 478 | 1009 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 439 | 476 | - | 454 | 478 | - |
| Stage 1 | - | - | - | - | - | - | 632 | 606 | - | 894 | 812 | - |
| Stage 2 | - | - | - | - | - | - | 842 | 809 | - | 603 | 606 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.4 | 14.5 | 13.4 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 457 | 1501 | - | - | 1188 | - | - | 505 |
| HCM Lane V/C Ratio | 0.175 | 0.005 | - | - | 0.004 | - | - | 0.154 |
| HCM Control Delay (s) | 14.5 | 7.4 | 0 | - | 8 | - | - | 13.4 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.6 | 0 | - | - | 0 | - | - | 0.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 86 | 242 | 110 | 0 | 0 | 0 | 18 | 406 | 47 | 654 | 519 | 37 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 101 | 285 | 113 | | | | 21 | 478 | 46 | 769 | 611 | 39 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | | | | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 496 | 355 | 141 | | | | 42 | 723 | 69 | 940 | 1590 | 101 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | | | | 0.02 | 0.22 | 0.22 | 0.27 | 0.47 | 0.47 |
| Sat Flow, veh/h | 1774 | 1269 | 503 | | | | 1774 | 3263 | 313 | 3442 | 3378 | 215 |
| Grp Volume(v), veh/h | 101 | 0 | 398 | | | | 21 | 258 | 266 | 769 | 320 | 330 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1773 | | | | 1774 | 1770 | 1807 | 1721 | 1770 | 1824 |
| Q Serve(g_s), s | 3.1 | 0.0 | 14.8 | | | | 0.8 | 9.4 | 9.5 | 14.8 | 8.3 | 8.3 |
| Cycle Q Clear(g_c), s | 3.1 | 0.0 | 14.8 | | | | 0.8 | 9.4 | 9.5 | 14.8 | 8.3 | 8.3 |
| Prop In Lane | 1.00 | | 0.28 | | | | 1.00 | | 0.17 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 496 | 0 | 496 | | | | 42 | 392 | 400 | 940 | 833 | 859 |
| V/C Ratio(X) | 0.20 | 0.00 | 0.80 | | | | 0.50 | 0.66 | 0.66 | 0.82 | 0.38 | 0.38 |
| Avail Cap(c_a), veh/h | 851 | 0 | 850 | | | | 501 | 999 | 1020 | 1457 | 833 | 859 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 19.5 | 0.0 | 23.7 | | | | 34.2 | 25.2 | 25.2 | 24.1 | 12.1 | 12.1 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 3.1 | | | | 3.3 | 1.9 | 1.9 | 2.2 | 0.3 | 0.3 |
| 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(-26165%),veh/ln | 1.5 | 0.0 | 7.6 | | | | 0.4 | 4.8 | 4.9 | 7.3 | 4.1 | 4.2 |
| LnGrp Delay(d),s/veh | 19.7 | 0.0 | 26.8 | | | | 37.5 | 27.1 | 27.1 | 26.3 | 12.4 | 12.4 |
| LnGrp LOS | B | | C | | | | D | C | C | C | B | B |
| Approach Vol, veh/h | | 499 | | | | | | 545 | | | 1419 | |
| Approach Delay, s/veh | | 25.4 | | | | | | 27.5 | | | 19.9 | |
| Approach LOS | | C | | | | | | C | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 24.4 | 21.2 | | 25.3 | 6.7 | 38.9 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 16.8 | 11.5 | | 16.8 | 2.8 | 10.3 | | |
| Green Ext Time (p_c), s | 2.5 | 3.8 | | 2.7 | 0.0 | 7.0 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 22.7 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 35 | 1081 | 70 | 33 | 618 | 34 | 23 | 31 | 36 | 160 | 115 | 29 |
| 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 | | 0.99 | 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 39 | 1201 | 75 | 37 | 687 | 35 | 26 | 34 | 1 | 178 | 128 | 24 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 47 | 1523 | 95 | 44 | 1537 | 78 | 30 | 177 | 5 | 225 | 318 | 60 |
| Arrive On Green | 0.03 | 0.45 | 0.45 | 0.02 | 0.45 | 0.45 | 0.02 | 0.10 | 0.10 | 0.13 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1774 | 3383 | 211 | 1774 | 3427 | 174 | 1774 | 1800 | 53 | 1774 | 1525 | 286 |
| Grp Volume(v), veh/h | 39 | 628 | 648 | 37 | 355 | 367 | 26 | 0 | 35 | 178 | 0 | 152 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1825 | 1774 | 1770 | 1831 | 1774 | 0 | 1853 | 1774 | 0 | 1811 |
| Q Serve(g_s), s | 1.2 | 17.1 | 17.2 | 1.2 | 7.8 | 7.8 | 0.8 | 0.0 | 1.0 | 5.5 | 0.0 | 4.1 |
| Cycle Q Clear(g_c), s | 1.2 | 17.1 | 17.2 | 1.2 | 7.8 | 7.8 | 0.8 | 0.0 | 1.0 | 5.5 | 0.0 | 4.1 |
| Prop In Lane | 1.00 | | 0.12 | 1.00 | | 0.10 | 1.00 | | 0.03 | 1.00 | | 0.16 |
| Lane Grp Cap(c), veh/h | 47 | 797 | 821 | 44 | 794 | 822 | 30 | 0 | 183 | 225 | 0 | 378 |
| V/C Ratio(X) | 0.83 | 0.79 | 0.79 | 0.84 | 0.45 | 0.45 | 0.87 | 0.00 | 0.19 | 0.79 | 0.00 | 0.40 |
| Avail Cap(c_a), veh/h | 626 | 936 | 965 | 626 | 936 | 969 | 626 | 0 | 948 | 626 | 0 | 926 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 27.5 | 13.3 | 13.3 | 27.5 | 10.8 | 10.8 | 27.8 | 0.0 | 23.5 | 24.0 | 0.0 | 19.4 |
| Incr Delay (d2), s/veh | 13.2 | 3.2 | 3.1 | 14.2 | 0.1 | 0.1 | 23.3 | 0.0 | 0.2 | 2.4 | 0.0 | 0.3 |
| 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(-26165%),veh/ln | 0.8 | 8.9 | 9.2 | 0.7 | 3.8 | 3.9 | 0.6 | 0.0 | 0.5 | 2.9 | 0.0 | 2.1 |
| LnGrp Delay(d),s/veh | 40.6 | 16.5 | 16.4 | 41.7 | 10.9 | 10.9 | 51.1 | 0.0 | 23.7 | 26.4 | 0.0 | 19.7 |
| LnGrp LOS | D | B | B | D | B | B | D | | C | C | | B |
| Approach Vol, veh/h | | 1315 | | | 759 | | | 61 | | | 330 | |
| Approach Delay, s/veh | | 17.2 | | | 12.4 | | | 35.4 | | | 23.3 | |
| Approach LOS | | B | | | B | | | 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 | 5.4 | 30.5 | 5.0 | 15.8 | 5.5 | 30.4 | 11.2 | 9.6 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 3.2 | 19.2 | 2.8 | 6.1 | 3.2 | 9.8 | 7.5 | 3.0 |
| Green Ext Time (p_c), s | 0.0 | 6.3 | 0.0 | 0.7 | 0.0 | 9.1 | 0.1 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 17.0 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.6 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 17 | 0 | 3 | 9 | 29 | 13 |
| 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 | 66 | 66 | 66 | 66 | 66 | 66 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 26 | 0 | 5 | 14 | 44 | 20 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 26 | 0 | 49 | 26 |
| Stage 1 | - | - | - | - | 26 | - |
| Stage 2 | - | - | - | - | 23 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1588 | - | 960 | 1050 |
| Stage 1 | - | - | - | - | 997 | - |
| Stage 2 | - | - | - | - | 1000 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1588 | - | 957 | 1050 |
| Mov Cap-2 Maneuver | - | - | - | - | 957 | - |
| Stage 1 | - | - | - | - | 997 | - |
| Stage 2 | - | - | - | - | 997 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.8 | 8.9 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 984 | - | - | 1588 | - |
| HCM Lane V/C Ratio | 0.065 | - | - | 0.003 | - |
| HCM Control Delay (s) | 8.9 | - | - | 7.3 | 0 |
| HCM Lane LOS | A | - | - | A | A |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 0 | - |

# APPENDIX D: EXISTING PLUS PROJECT (2016) LEVEL OF SERVICE AND SYNCHRO WORKSHEETS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 496 | 0 | 0 | 201 | 0 | 0 | 0 | 0 | 238 | 0 | 811 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 522 | 0 | 0 | 212 | 0 | 0 | 0 | 0 | 251 | 0 | 399 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| 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 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | 0 | 0 |
| Arrive On Green | 0.00 | 0.63 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 251 | |
| Grp Volume(v), veh/h | 0 | 522 | 0 | 0 | 212 | 0 | 0 | 0 | 0 | 251 | 33.2 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.8 | | |
| Cycle Q Clear(g_c), s | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.8 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | | |
| V/C Ratio(X) | 0.00 | 0.24 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | | |
| Avail Cap(c_a), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 140 | 0 | 506 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.8 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.3 | | |
| LnGrp Delay(d),s/veh | 0.0 | 8.5 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 33.2 | | |
| LnGrp LOS | | A | | | A | | | | | C | | |
| Approach Vol, veh/h | | 522 | | | 212 | | | 0 | | | | |
| Approach Delay, s/veh | | 8.5 | | | 0.1 | | | 0.0 | | | | |
| Approach LOS | | A | | | A | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 67.0 | | | | 67.0 | 33.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 28.5 | 7.5 |
| Max Q Clear Time (g_c+I1), s | | 8.5 | | | | 2.0 | 13.8 | 0.0 |
| Green Ext Time (p_c), s | | 11.0 | | | | 11.3 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.0 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 188 | 238 | 0 | 0 | 75 | 96 | 126 | 195 | 61 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 209 | 264 | 0 | 0 | 83 | 0 | 140 | 217 | 56 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 436 | 112 | | | |
| Arrive On Green | 0.50 | 0.61 | 0.00 | 0.00 | 0.06 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1428 | 369 | | | |
| Grp Volume(v), veh/h | 209 | 264 | 0 | 0 | 83 | 0 | 140 | 0 | 273 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1797 | | | |
| Q Serve(g_s), s | 6.6 | 3.2 | 0.0 | 0.0 | 2.3 | 0.0 | 6.0 | 0.0 | 12.5 | | | |
| Cycle Q Clear(g_c), s | 6.6 | 3.2 | 0.0 | 0.0 | 2.3 | 0.0 | 6.0 | 0.0 | 12.5 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.21 | | | |
| Lane Grp Cap(c), veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 0 | 548 | | | |
| V/C Ratio(X) | 0.23 | 0.12 | 0.00 | 0.00 | 0.42 | 0.00 | 0.26 | 0.00 | 0.50 | | | |
| Avail Cap(c_a), veh/h | 895 | 2141 | 0 | 0 | 1256 | 562 | 541 | 0 | 548 | | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.79 | 0.79 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 13.9 | 8.4 | 0.0 | 0.0 | 45.7 | 0.0 | 26.2 | 0.0 | 28.5 | | | |
| Incr Delay (d2), s/veh | 0.5 | 0.1 | 0.0 | 0.0 | 6.5 | 0.0 | 1.2 | 0.0 | 3.2 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 3.4 | 1.6 | 0.0 | 0.0 | 1.3 | 0.0 | 3.1 | 0.0 | 6.6 | | | |
| LnGrp Delay(d),s/veh | 14.4 | 8.5 | 0.0 | 0.0 | 52.2 | 0.0 | 27.4 | 0.0 | 31.7 | | | |
| LnGrp LOS | B | A | | | D | | C | | C | | | |
| Approach Vol, veh/h | | 473 | | | 83 | | | 413 | | | | |
| Approach Delay, s/veh | | 11.1 | | | 52.2 | | | 30.2 | | | | |
| Approach LOS | | B | | | D | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 65.0 | | | 54.9 | 10.1 | | 35.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 60.5 | | | 20.9 | * 36 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | | 5.2 | | | 8.6 | 4.3 | | 14.5 |
| Green Ext Time (p_c), s | | 2.8 | | | 2.0 | 0.3 | | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 22.8 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 7 | 324 | 91 | 380 | 616 | 50 | 14 | 122 | 125 | 50 | 639 | 45 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 8 | 352 | 28 | 413 | 670 | 50 | 15 | 133 | 21 | 54 | 695 | 45 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 416 | 1243 | 555 | 498 | 874 | 65 | 65 | 869 | 388 | 95 | 849 | 55 |
| Arrive On Green | 0.23 | 0.35 | 0.35 | 0.14 | 0.26 | 0.26 | 0.04 | 0.25 | 0.25 | 0.05 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3339 | 249 | 1774 | 3539 | 1579 | 1774 | 3375 | 218 |
| Grp Volume(v), veh/h | 8 | 352 | 28 | 413 | 355 | 365 | 15 | 133 | 21 | 54 | 364 | 376 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1818 | 1774 | 1770 | 1579 | 1774 | 1770 | 1824 |
| Q Serve(g_s), s | 0.3 | 6.1 | 0.8 | 10.0 | 15.8 | 15.8 | 0.7 | 2.5 | 0.9 | 2.5 | 16.6 | 16.6 |
| Cycle Q Clear(g_c), s | 0.3 | 6.1 | 0.8 | 10.0 | 15.8 | 15.8 | 0.7 | 2.5 | 0.9 | 2.5 | 16.6 | 16.6 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.14 | 1.00 | | 1.00 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 416 | 1243 | 555 | 498 | 463 | 476 | 65 | 869 | 388 | 95 | 445 | 459 |
| V/C Ratio(X) | 0.02 | 0.28 | 0.05 | 0.83 | 0.77 | 0.77 | 0.23 | 0.15 | 0.05 | 0.57 | 0.82 | 0.82 |
| Avail Cap(c_a), veh/h | 416 | 1243 | 555 | 806 | 622 | 639 | 416 | 2072 | 925 | 519 | 829 | 854 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 25.2 | 20.0 | 10.9 | 35.5 | 29.1 | 29.1 | 40.0 | 25.3 | 24.6 | 39.5 | 30.1 | 30.1 |
| Incr Delay (d2), s/veh | 0.1 | 0.6 | 0.2 | 1.8 | 2.6 | 2.6 | 0.7 | 0.0 | 0.0 | 2.0 | 1.4 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 3.1 | 0.4 | 4.8 | 8.0 | 8.3 | 0.4 | 1.2 | 0.4 | 1.3 | 8.3 | 8.5 |
| LnGrp Delay(d),s/veh | 25.2 | 20.5 | 11.1 | 37.2 | 31.7 | 31.7 | 40.6 | 25.3 | 24.7 | 41.4 | 31.5 | 31.5 |
| LnGrp LOS | C | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 388 | | | 1133 | | | 169 | | | 794 | |
| Approach Delay, s/veh | | 19.9 | | | 33.7 | | | 26.6 | | | 32.2 | |
| Approach LOS | | B | | | C | | | 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 | 8.6 | 25.9 | 16.4 | 34.6 | 8.0 | 26.4 | 24.0 | 27.0 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 4.5 | 4.5 | 12.0 | 8.1 | 2.7 | 18.6 | 2.3 | 17.8 |
| Green Ext Time (p_c), s | 0.0 | 0.6 | 0.4 | 5.1 | 0.5 | 2.8 | 0.0 | 4.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 30.6 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 126 | 342 | 0 | 0 | 659 | 94 | 379 | 173 | 188 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 137 | 372 | 0 | 0 | 716 | 0 | 300 | 345 | 64 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 245 | 1757 | 0 | 0 | 1178 | 527 | 565 | 593 | 503 | | | |
| Arrive On Green | 0.07 | 0.50 | 0.00 | 0.00 | 0.33 | 0.00 | 0.32 | 0.32 | 0.32 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1580 | | | |
| Grp Volume(v), veh/h | 137 | 372 | 0 | 0 | 716 | 0 | 300 | 345 | 64 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1580 | | | |
| Q Serve(g_s), s | 1.7 | 2.6 | 0.0 | 0.0 | 7.3 | 0.0 | 6.0 | 6.7 | 1.2 | | | |
| Cycle Q Clear(g_c), s | 1.7 | 2.6 | 0.0 | 0.0 | 7.3 | 0.0 | 6.0 | 6.7 | 1.2 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 245 | 1757 | 0 | 0 | 1178 | 527 | 565 | 593 | 503 | | | |
| V/C Ratio(X) | 0.56 | 0.21 | 0.00 | 0.00 | 0.61 | 0.00 | 0.53 | 0.58 | 0.13 | | | |
| Avail Cap(c_a), veh/h | 2387 | 2455 | 0 | 0 | 2455 | 1098 | 1231 | 1292 | 1096 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 19.4 | 6.1 | 0.0 | 0.0 | 12.1 | 0.0 | 12.1 | 12.3 | 10.5 | | | |
| Incr Delay (d2), s/veh | 0.7 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 1.1 | 1.3 | 0.2 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 0.8 | 1.2 | 0.0 | 0.0 | 3.5 | 0.0 | 3.1 | 3.6 | 0.6 | | | |
| LnGrp Delay(d),s/veh | 20.2 | 6.1 | 0.0 | 0.0 | 12.3 | 0.0 | 13.2 | 13.6 | 10.6 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 509 | | | 716 | | | 709 | | | | |
| Approach Delay, s/veh | | 9.9 | | | 12.3 | | | 13.2 | | | | |
| Approach LOS | | A | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 25.5 | | | 7.1 | 18.4 | | 17.8 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 4.6 | | | 3.7 | 9.3 | | 8.7 |
| Green Ext Time (p_c), s | | 5.2 | | | 0.1 | 4.9 | | 4.9 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.0 |
| 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) | 3 | 4 | 22 | 4 | 0 | 2 | 13 | 239 | 10 | 30 | 691 | 49 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 15 | 285 | 11 | 36 | 823 | 54 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 230 | 15 | 0 | 226 | 15 | 0 | 16 | 2101 | 81 | 41 | 2087 | 137 |
| Arrive On Green | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.60 | 0.60 | 0.02 | 0.62 | 0.62 |
| Sat Flow, veh/h | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 3475 | 134 | 1774 | 3372 | 221 |
| Grp Volume(v), veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 15 | 145 | 151 | 36 | 432 | 445 |
| Grp Sat Flow(s),veh/h/ln | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 1770 | 1839 | 1774 | 1770 | 1824 |
| Q Serve(g_s), s | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 | 1.2 | 1.2 | 0.7 | 4.1 | 4.1 |
| Cycle Q Clear(g_c), s | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 | 1.2 | 1.2 | 0.7 | 4.1 | 4.1 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.00 | 1.00 | | 0.07 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 230 | 15 | 0 | 226 | 15 | 0 | 16 | 1070 | 1112 | 41 | 1095 | 1128 |
| V/C Ratio(X) | 0.02 | 0.33 | 0.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.14 | 0.14 | 0.88 | 0.39 | 0.39 |
| Avail Cap(c_a), veh/h | 1076 | 1131 | 0 | 1495 | 1696 | 0 | 538 | 2149 | 2233 | 2154 | 2149 | 2214 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.3 | 16.2 | 0.0 | 16.4 | 0.0 | 0.0 | 16.3 | 2.8 | 2.8 | 16.0 | 3.2 | 3.2 |
| Incr Delay (d2), s/veh | 0.0 | 12.2 | 0.0 | 0.0 | 0.0 | 0.0 | 52.8 | 0.0 | 0.0 | 19.2 | 0.5 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.6 | 0.6 | 0.5 | 2.1 | 2.1 |
| LnGrp Delay(d),s/veh | 16.3 | 28.5 | 0.0 | 16.4 | 0.0 | 0.0 | 69.1 | 2.8 | 2.8 | 35.3 | 3.7 | 3.6 |
| LnGrp LOS | B | C | | B | | | E | A | A | D | A | A |
| Approach Vol, veh/h | | 9 | | | 5 | | | 311 | | | 913 | |
| Approach Delay, s/veh | | 23.0 | | | 16.4 | | | 6.0 | | | 4.9 | |
| Approach LOS | | C | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.8 | 23.9 | | 4.3 | 4.3 | 24.4 | | 4.3 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.7 | 3.2 | | 2.1 | 2.3 | 6.1 | | 2.2 |
| Green Ext Time (p_c), s | 0.0 | 14.8 | | 0.0 | 0.0 | 14.3 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.4 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 11 | 89 | 27 | 2 | 90 | 2 | 31 | 12 | 3 | 4 | 23 | 8 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 98 | 30 | 2 | 99 | 2 | 34 | 13 | 3 | 4 | 25 | 9 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 103 | 0 | 0 | 100 | 0 | 0 | 192 | 231 | 102 | 238 | 230 | 55 |
| Stage 1 | - | - | - | - | - | - | 124 | 124 | - | 106 | 106 | - |
| Stage 2 | - | - | - | - | - | - | 68 | 107 | - | 132 | 124 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1487 | - | - | 1493 | - | - | 759 | 668 | 953 | 706 | 669 | 1001 |
| Stage 1 | - | - | - | - | - | - | 880 | 793 | - | 889 | 807 | - |
| Stage 2 | - | - | - | - | - | - | 935 | 806 | - | 871 | 793 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1485 | - | - | 1491 | - | - | 722 | 659 | 950 | 685 | 660 | 998 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 722 | 659 | - | 685 | 660 | - |
| Stage 1 | - | - | - | - | - | - | 871 | 785 | - | 880 | 805 | - |
| Stage 2 | - | - | - | - | - | - | 895 | 804 | - | 844 | 785 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.6 | 0.2 | 10.4 | 10.3 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 715 | 1485 | - | - | 1491 | - | - | 719 |
| HCM Lane V/C Ratio | 0.071 | 0.008 | - | - | 0.001 | - | - | 0.053 |
| HCM Control Delay (s) | 10.4 | 7.4 | 0 | - | 7.4 | - | - | 10.3 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 14 | 78 | 28 | 0 | 0 | 0 | 59 | 269 | 12 | 367 | 450 | 133 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 16 | 89 | 18 | | | | 67 | 306 | 11 | 417 | 511 | 127 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | | | | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 182 | 154 | 31 | | | | 117 | 1029 | 37 | 676 | 1198 | 296 |
| Arrive On Green | 0.10 | 0.10 | 0.10 | | | | 0.07 | 0.30 | 0.30 | 0.20 | 0.43 | 0.43 |
| Sat Flow, veh/h | 1774 | 1503 | 304 | | | | 1774 | 3485 | 125 | 3442 | 2812 | 695 |
| Grp Volume(v), veh/h | 16 | 0 | 107 | | | | 67 | 155 | 162 | 417 | 321 | 317 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1807 | | | | 1774 | 1770 | 1840 | 1721 | 1770 | 1738 |
| Q Serve(g_s), s | 0.3 | 0.0 | 2.2 | | | | 1.4 | 2.7 | 2.7 | 4.4 | 5.0 | 5.1 |
| Cycle Q Clear(g_c), s | 0.3 | 0.0 | 2.2 | | | | 1.4 | 2.7 | 2.7 | 4.4 | 5.0 | 5.1 |
| Prop In Lane | 1.00 | | 0.17 | | | | 1.00 | | 0.07 | 1.00 | | 0.40 |
| Lane Grp Cap(c), veh/h | 182 | 0 | 185 | | | | 117 | 523 | 544 | 676 | 754 | 740 |
| V/C Ratio(X) | 0.09 | 0.00 | 0.58 | | | | 0.57 | 0.30 | 0.30 | 0.62 | 0.43 | 0.43 |
| Avail Cap(c_a), veh/h | 1530 | 0 | 1559 | | | | 900 | 1795 | 1867 | 2619 | 1347 | 1323 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.0 | 0.0 | 16.9 | | | | 17.9 | 10.7 | 10.7 | 14.5 | 7.9 | 8.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 2.8 | | | | 1.6 | 0.3 | 0.3 | 0.9 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 0.0 | 1.2 | | | | 0.8 | 1.3 | 1.4 | 2.1 | 2.5 | 2.5 |
| LnGrp Delay(d),s/veh | 16.2 | 0.0 | 19.7 | | | | 19.5 | 11.0 | 11.0 | 15.4 | 8.3 | 8.3 |
| LnGrp LOS | B | | B | | | | B | B | B | B | A | A |
| Approach Vol, veh/h | | 123 | | | | | | 384 | | | 1055 | |
| Approach Delay, s/veh | | 19.3 | | | | | | 12.5 | | | 11.1 | |
| Approach LOS | | B | | | | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 12.7 | 17.1 | | 9.5 | 7.6 | 22.3 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 6.4 | 4.7 | | 4.2 | 3.4 | 7.1 | | |
| Green Ext Time (p_c), s | 1.5 | 6.5 | | 0.6 | 0.1 | 5.9 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.1 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 27 | 473 | 27 | 16 | 639 | 54 | 59 | 42 | 38 | 31 | 40 | 33 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 29 | 514 | 26 | 17 | 695 | 55 | 64 | 46 | 8 | 34 | 43 | 3 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 32 | 1279 | 65 | 18 | 1213 | 96 | 78 | 212 | 37 | 38 | 198 | 14 |
| Arrive On Green | 0.02 | 0.37 | 0.37 | 0.01 | 0.37 | 0.37 | 0.04 | 0.14 | 0.14 | 0.02 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1774 | 3428 | 173 | 1774 | 3322 | 263 | 1774 | 1545 | 269 | 1774 | 1721 | 120 |
| Grp Volume(v), veh/h | 29 | 265 | 275 | 17 | 370 | 380 | 64 | 0 | 54 | 34 | 0 | 46 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1832 | 1774 | 1770 | 1816 | 1774 | 0 | 1814 | 1774 | 0 | 1841 |
| Q Serve(g_s), s | 0.6 | 4.1 | 4.1 | 0.4 | 6.2 | 6.2 | 1.3 | 0.0 | 1.0 | 0.7 | 0.0 | 0.8 |
| Cycle Q Clear(g_c), s | 0.6 | 4.1 | 4.1 | 0.4 | 6.2 | 6.2 | 1.3 | 0.0 | 1.0 | 0.7 | 0.0 | 0.8 |
| Prop In Lane | 1.00 | | 0.09 | 1.00 | | 0.14 | 1.00 | | 0.15 | 1.00 | | 0.07 |
| Lane Grp Cap(c), veh/h | 32 | 660 | 683 | 18 | 646 | 663 | 78 | 0 | 249 | 38 | 0 | 212 |
| V/C Ratio(X) | 0.90 | 0.40 | 0.40 | 0.94 | 0.57 | 0.57 | 0.82 | 0.00 | 0.22 | 0.88 | 0.00 | 0.22 |
| Avail Cap(c_a), veh/h | 956 | 1430 | 1480 | 956 | 1430 | 1467 | 956 | 0 | 1417 | 956 | 0 | 1438 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.2 | 8.6 | 8.6 | 18.4 | 9.5 | 9.5 | 17.6 | 0.0 | 14.2 | 18.1 | 0.0 | 14.9 |
| Incr Delay (d2), s/veh | 25.2 | 0.1 | 0.1 | 45.5 | 0.3 | 0.3 | 7.9 | 0.0 | 0.2 | 20.4 | 0.0 | 0.2 |
| 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(-26165%),veh/ln | 0.5 | 2.0 | 2.1 | 0.4 | 3.0 | 3.1 | 0.8 | 0.0 | 0.5 | 0.6 | 0.0 | 0.4 |
| LnGrp Delay(d),s/veh | 43.4 | 8.7 | 8.7 | 63.9 | 9.8 | 9.8 | 25.5 | 0.0 | 14.4 | 38.5 | 0.0 | 15.1 |
| LnGrp LOS | D | A | A | E | A | A | C | | B | D | | B |
| Approach Vol, veh/h | | 569 | | | 767 | | | 118 | | | 80 | |
| Approach Delay, s/veh | | 10.5 | | | 11.0 | | | 20.4 | | | 25.0 | |
| Approach LOS | | B | | | B | | | 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 | 4.4 | 18.9 | 5.6 | 8.3 | 4.7 | 18.6 | 4.8 | 9.1 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 2.6 | 6.1 | 3.3 | 2.8 | 2.6 | 8.2 | 2.7 | 3.0 |
| Green Ext Time (p_c), s | 0.0 | 5.3 | 0.0 | 0.3 | 0.0 | 5.2 | 0.0 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.2 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.8 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 4 | 5 | 0 | 14 | 8 | 0 | 0 | 0 | 33 | 0 | 14 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 19 | 6 | 8 | 0 | 22 | 13 | 0 | 0 | 0 | 52 | 0 | 22 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 35 | 0 | 0 | 14 | 0 | 0 | 88 | 83 | 10 | 77 | 81 | 29 |
| Stage 1 | - | - | - | - | - | - | 48 | 48 | - | 29 | 29 | - |
| Stage 2 | - | - | - | - | - | - | 40 | 35 | - | 48 | 52 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1576 | - | - | 1604 | - | - | 897 | 807 | 1071 | 912 | 809 | 1046 |
| Stage 1 | - | - | - | - | - | - | 965 | 855 | - | 988 | 871 | - |
| Stage 2 | - | - | - | - | - | - | 975 | 866 | - | 965 | 852 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1576 | - | - | 1604 | - | - | 870 | 797 | 1071 | 904 | 799 | 1046 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 870 | 797 | - | 904 | 799 | - |
| Stage 1 | - | - | - | - | - | - | 953 | 845 | - | 976 | 871 | - |
| Stage 2 | - | - | - | - | - | - | 954 | 866 | - | 953 | 842 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 4.2 | 0 | 0 | 9.2 |
| HCM LOS | | | A | A |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | - | 1576 | - | - | 1604 | - | - | 942 |
| HCM Lane V/C Ratio | - | 0.012 | - | - | - | - | - | 0.079 |
| HCM Control Delay (s) | 0 | 7.3 | 0 | - | 0 | - | - | 9.2 |
| HCM Lane LOS | A | A | A | - | A | - | - | A |
| HCM 95th %tile Q(veh) | - | 0 | - | - | 0 | - | - | 0.3 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.6 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 91 | 3 | 0 | 80 | 12 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 50 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 99 | 3 | 0 | 87 | 13 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 102 | 0 | 188 | 101 |
| Stage 1 | - | - | - | - | 101 | - |
| Stage 2 | - | - | - | - | 87 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1490 | - | 801 | 954 |
| Stage 1 | - | - | - | - | 923 | - |
| Stage 2 | - | - | - | - | 936 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1490 | - | 801 | 954 |
| Mov Cap-2 Maneuver | - | - | - | - | 790 | - |
| Stage 1 | - | - | - | - | 923 | - |
| Stage 2 | - | - | - | - | 936 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 9.6 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 790 | - | - | 1490 | - |
| HCM Lane V/C Ratio | 0.017 | - | - | - | - |
| HCM Control Delay (s) | 9.6 | - | - | 0 | - |
| HCM Lane LOS | A | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.4 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 6 | 520 | 728 | 2 | 6 | 21 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 7 | 565 | 791 | 2 | 7 | 23 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 793 | 0 | - | 0 | 1088 | 397 |
| Stage 1 | - | - | - | - | 792 | - |
| Stage 2 | - | - | - | - | 296 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 824 | - | - | - | 210 | 602 |
| Stage 1 | - | - | - | - | 407 | - |
| Stage 2 | - | - | - | - | 729 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 824 | - | - | - | 207 | 602 |
| Mov Cap-2 Maneuver | - | - | - | - | 207 | - |
| Stage 1 | - | - | - | - | 407 | - |
| Stage 2 | - | - | - | - | 720 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0 | 14.1 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 824 | - | - | - | 423 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.069 |
| HCM Control Delay (s) | 9.4 | 0.1 | - | - | 14.1 |
| HCM Lane LOS | A | A | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 236 | 0 | 0 | 273 | 0 | 0 | 0 | 0 | 207 | 0 | 1076 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 246 | 0 | 0 | 284 | 0 | 0 | 0 | 0 | 216 | 0 | 671 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | 0 | 0 |
| Arrive On Green | 0.00 | 0.64 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 216 | |
| Grp Volume(v), veh/h | 0 | 246 | 0 | 0 | 284 | 0 | 0 | 0 | 0 | 216 | 34.0 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 2.7 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 10.2 | | |
| Cycle Q Clear(g_c), s | 0.0 | 2.7 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 10.2 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | | |
| V/C Ratio(X) | 0.00 | 0.11 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.46 | | |
| Avail Cap(c_a), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 177 | 0 | 470 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 6.8 | 0.0 | 0.0 | 16.5 | 0.0 | 0.0 | 0.0 | 0.0 | 30.8 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | | |
| 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 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 1.3 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 5.4 | | |
| LnGrp Delay(d),s/veh | 0.0 | 6.9 | 0.0 | 0.0 | 16.6 | 0.0 | 0.0 | 0.0 | 0.0 | 34.0 | | |
| LnGrp LOS | | A | | | B | | | | | C | | |
| Approach Vol, veh/h | | 246 | | | 284 | | | 0 | | | | |
| Approach Delay, s/veh | | 6.9 | | | 16.6 | | | 0.0 | | | | |
| Approach LOS | | A | | | B | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 69.0 | | | | 69.0 | 31.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 26.5 | 9.5 |
| Max Q Clear Time (g_c+I1), s | | 4.7 | | | | 8.5 | 12.2 | 0.0 |
| Green Ext Time (p_c), s | | 7.5 | | | | 7.4 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 18.4 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 326 | 447 | 0 | 0 | 183 | 222 | 102 | 309 | 67 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 358 | 491 | 0 | 0 | 201 | 0 | 112 | 340 | 65 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 929 | 2318 | 0 | 0 | 307 | 137 | 452 | 388 | 74 | | | |
| Arrive On Green | 1.00 | 1.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.25 | 0.25 | 0.25 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1520 | 291 | | | |
| Grp Volume(v), veh/h | 358 | 491 | 0 | 0 | 201 | 0 | 112 | 0 | 405 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1811 | | | |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 0.0 | 5.0 | 0.0 | 21.5 | | | |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 0.0 | 5.0 | 0.0 | 21.5 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.16 | | | |
| Lane Grp Cap(c), veh/h | 929 | 2318 | 0 | 0 | 307 | 137 | 452 | 0 | 462 | | | |
| V/C Ratio(X) | 0.39 | 0.21 | 0.00 | 0.00 | 0.66 | 0.00 | 0.25 | 0.00 | 0.88 | | | |
| Avail Cap(c_a), veh/h | 929 | 2318 | 0 | 0 | 903 | 404 | 452 | 0 | 462 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.89 | 0.89 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 44.2 | 0.0 | 29.6 | 0.0 | 35.7 | | | |
| Incr Delay (d2), s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 10.5 | 0.0 | 1.3 | 0.0 | 20.3 | | | |
| 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(-26165%),veh/ln | 0.3 | 0.1 | 0.0 | 0.0 | 3.1 | 0.0 | 2.6 | 0.0 | 13.3 | | | |
| LnGrp Delay(d),s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 54.7 | 0.0 | 30.9 | 0.0 | 56.1 | | | |
| LnGrp LOS | A | A | | | D | | C | | E | | | |
| Approach Vol, veh/h | | 849 | | | 201 | | | 517 | | | | |
| Approach Delay, s/veh | | 0.6 | | | 54.7 | | | 50.6 | | | | |
| Approach LOS | | A | | | D | | | D | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 70.0 | | | 56.8 | 13.2 | | 30.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 65.5 | | | 35.9 | * 26 | | 25.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 2.0 | 7.5 | | 23.5 |
| Green Ext Time (p_c), s | | 5.6 | | | 5.4 | 0.7 | | 0.4 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 24.0 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 15 | 728 | 127 | 289 | 489 | 50 | 27 | 208 | 379 | 172 | 694 | 57 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 16 | 800 | 54 | 318 | 537 | 50 | 30 | 229 | 75 | 189 | 763 | 59 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 405 | 1237 | 552 | 401 | 778 | 72 | 88 | 730 | 326 | 227 | 914 | 71 |
| Arrive On Green | 0.23 | 0.35 | 0.35 | 0.12 | 0.24 | 0.24 | 0.05 | 0.21 | 0.21 | 0.13 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3274 | 304 | 1774 | 3539 | 1579 | 1774 | 3329 | 257 |
| Grp Volume(v), veh/h | 16 | 800 | 54 | 318 | 290 | 297 | 30 | 229 | 75 | 189 | 405 | 417 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1808 | 1774 | 1770 | 1579 | 1774 | 1770 | 1817 |
| Q Serve(g_s), s | 0.6 | 16.7 | 1.5 | 7.9 | 13.1 | 13.2 | 1.4 | 4.8 | 3.5 | 9.1 | 18.9 | 18.9 |
| Cycle Q Clear(g_c), s | 0.6 | 16.7 | 1.5 | 7.9 | 13.1 | 13.2 | 1.4 | 4.8 | 3.5 | 9.1 | 18.9 | 18.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.17 | 1.00 | | 1.00 | 1.00 | | 0.14 |
| Lane Grp Cap(c), veh/h | 405 | 1237 | 552 | 401 | 420 | 430 | 88 | 730 | 326 | 227 | 486 | 499 |
| V/C Ratio(X) | 0.04 | 0.65 | 0.10 | 0.79 | 0.69 | 0.69 | 0.34 | 0.31 | 0.23 | 0.83 | 0.83 | 0.84 |
| Avail Cap(c_a), veh/h | 405 | 1237 | 552 | 785 | 606 | 619 | 405 | 2019 | 901 | 506 | 808 | 829 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 26.3 | 24.0 | 11.0 | 37.7 | 30.5 | 30.5 | 40.2 | 29.5 | 29.0 | 37.3 | 29.9 | 29.9 |
| Incr Delay (d2), s/veh | 0.2 | 2.6 | 0.4 | 1.4 | 0.8 | 0.8 | 0.8 | 0.1 | 0.1 | 3.0 | 1.5 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.3 | 8.6 | 0.9 | 3.8 | 6.4 | 6.6 | 0.7 | 2.4 | 1.5 | 4.7 | 9.4 | 9.7 |
| LnGrp Delay(d),s/veh | 26.5 | 26.6 | 11.4 | 39.1 | 31.2 | 31.2 | 41.1 | 29.6 | 29.1 | 40.3 | 31.5 | 31.4 |
| LnGrp LOS | C | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 870 | | | 905 | | | 334 | | | 1011 | |
| Approach Delay, s/veh | | 25.6 | | | 34.0 | | | 30.5 | | | 33.1 | |
| Approach LOS | | C | | | C | | | 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 | 15.2 | 23.0 | 14.2 | 35.2 | 9.3 | 29.0 | 24.0 | 25.4 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 11.1 | 6.8 | 9.9 | 18.7 | 3.4 | 20.9 | 2.6 | 15.2 |
| Green Ext Time (p_c), s | 0.1 | 1.1 | 0.3 | 5.3 | 0.9 | 3.1 | 0.0 | 5.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 31.0 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 270 | 998 | 0 | 0 | 623 | 95 | 207 | 124 | 257 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 300 | 1109 | 0 | 0 | 692 | 0 | 184 | 202 | 205 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 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, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 445 | 2110 | 0 | 0 | 1358 | 607 | 422 | 443 | 376 | | | |
| Arrive On Green | 0.13 | 0.60 | 0.00 | 0.00 | 0.38 | 0.00 | 0.24 | 0.24 | 0.24 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1579 | | | |
| Grp Volume(v), veh/h | 300 | 1109 | 0 | 0 | 692 | 0 | 184 | 202 | 205 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1579 | | | |
| Q Serve(g_s), s | 4.0 | 8.9 | 0.0 | 0.0 | 7.2 | 0.0 | 4.3 | 4.5 | 5.5 | | | |
| Cycle Q Clear(g_c), s | 4.0 | 8.9 | 0.0 | 0.0 | 7.2 | 0.0 | 4.3 | 4.5 | 5.5 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 445 | 2110 | 0 | 0 | 1358 | 607 | 422 | 443 | 376 | | | |
| V/C Ratio(X) | 0.67 | 0.53 | 0.00 | 0.00 | 0.51 | 0.00 | 0.44 | 0.46 | 0.55 | | | |
| Avail Cap(c_a), veh/h | 2142 | 2203 | 0 | 0 | 2203 | 986 | 1104 | 1160 | 983 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 20.0 | 5.7 | 0.0 | 0.0 | 11.4 | 0.0 | 15.6 | 15.7 | 16.1 | | | |
| Incr Delay (d2), s/veh | 0.7 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 1.0 | 1.0 | 1.8 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 1.9 | 4.2 | 0.0 | 0.0 | 3.5 | 0.0 | 2.2 | 2.4 | 2.6 | | | |
| LnGrp Delay(d),s/veh | 20.7 | 5.8 | 0.0 | 0.0 | 11.5 | 0.0 | 16.6 | 16.7 | 17.8 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 1409 | | | 692 | | | 591 | | | | |
| Approach Delay, s/veh | | 9.0 | | | 11.5 | | | 17.1 | | | | |
| Approach LOS | | A | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 32.7 | | | 10.2 | 22.5 | | 15.5 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 10.9 | | | 6.0 | 9.2 | | 7.5 |
| Green Ext Time (p_c), s | | 8.8 | | | 0.3 | 9.2 | | 3.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.4 |
| HCM 2010 LOS | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 56 | 3 | 144 | 16 | 6 | 22 | 3 | 236 | 0 | 2 | 898 | 25 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 64 | 3 | 13 | 18 | 7 | 2 | 3 | 268 | 0 | 2 | 1020 | 26 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 275 | 22 | 97 | 268 | 102 | 29 | 4 | 2220 | 0 | 4 | 2210 | 56 |
| Arrive On Green | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.00 | 0.63 | 0.00 | 0.00 | 0.63 | 0.63 |
| Sat Flow, veh/h | 1400 | 305 | 1324 | 1392 | 1394 | 398 | 1774 | 3632 | 0 | 1774 | 3527 | 90 |
| Grp Volume(v), veh/h | 64 | 0 | 16 | 18 | 0 | 9 | 3 | 268 | 0 | 2 | 512 | 534 |
| Grp Sat Flow(s),veh/h/ln | 1400 | 0 | 1629 | 1392 | 0 | 1792 | 1774 | 1770 | 0 | 1774 | 1770 | 1847 |
| Q Serve(g_s), s | 1.8 | 0.0 | 0.4 | 0.5 | 0.0 | 0.2 | 0.1 | 1.2 | 0.0 | 0.0 | 6.1 | 6.1 |
| Cycle Q Clear(g_c), s | 2.0 | 0.0 | 0.4 | 0.9 | 0.0 | 0.2 | 0.1 | 1.2 | 0.0 | 0.0 | 6.1 | 6.1 |
| Prop In Lane | 1.00 | | 0.81 | 1.00 | | 0.22 | 1.00 | | 0.00 | 1.00 | | 0.05 |
| Lane Grp Cap(c), veh/h | 275 | 0 | 120 | 268 | 0 | 132 | 4 | 2220 | 0 | 4 | 1109 | 1157 |
| V/C Ratio(X) | 0.23 | 0.00 | 0.13 | 0.07 | 0.00 | 0.07 | 0.68 | 0.12 | 0.00 | 0.45 | 0.46 | 0.46 |
| Avail Cap(c_a), veh/h | 868 | 0 | 810 | 1203 | 0 | 1336 | 441 | 3517 | 0 | 1763 | 1759 | 1835 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.3 | 0.0 | 17.4 | 17.9 | 0.0 | 17.4 | 20.1 | 3.0 | 0.0 | 20.1 | 3.9 | 3.9 |
| Incr Delay (d2), s/veh | 0.4 | 0.0 | 0.5 | 0.1 | 0.0 | 0.2 | 51.3 | 0.0 | 0.0 | 24.7 | 0.6 | 0.6 |
| 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(-26165%),veh/ln | 0.7 | 0.0 | 0.2 | 0.2 | 0.0 | 0.1 | 0.1 | 0.6 | 0.0 | 0.1 | 3.0 | 3.2 |
| LnGrp Delay(d),s/veh | 18.7 | 0.0 | 17.9 | 18.0 | 0.0 | 17.6 | 71.4 | 3.0 | 0.0 | 44.8 | 4.6 | 4.6 |
| LnGrp LOS | B | | B | B | | B | E | A | | D | A | A |
| Approach Vol, veh/h | | 80 | | | 27 | | | 271 | | | 1048 | |
| Approach Delay, s/veh | | 18.6 | | | 17.8 | | | 3.8 | | | 4.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.0 | 29.2 | | 7.0 | 4.1 | 29.2 | | 7.0 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.0 | 3.2 | | 4.0 | 2.1 | 8.1 | | 2.9 |
| Green Ext Time (p_c), s | 0.0 | 18.5 | | 0.3 | 0.0 | 17.1 | | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.5 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 8 | 348 | 107 | 5 | 82 | 5 | 63 | 15 | 6 | 11 | 54 | 9 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 9 | 387 | 119 | 6 | 91 | 6 | 70 | 17 | 7 | 12 | 60 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 99 | 0 | 0 | 389 | 0 | 0 | 495 | 516 | 391 | 525 | 513 | 52 |
| Stage 1 | - | - | - | - | - | - | 406 | 406 | - | 107 | 107 | - |
| Stage 2 | - | - | - | - | - | - | 89 | 110 | - | 418 | 406 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1492 | - | - | 1170 | - | - | 471 | 462 | 657 | 449 | 464 | 1005 |
| Stage 1 | - | - | - | - | - | - | 621 | 597 | - | 887 | 806 | - |
| Stage 2 | - | - | - | - | - | - | 909 | 804 | - | 612 | 597 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1490 | - | - | 1168 | - | - | 413 | 454 | 655 | 426 | 456 | 1002 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 413 | 454 | - | 426 | 456 | - |
| Stage 1 | - | - | - | - | - | - | 614 | 591 | - | 878 | 801 | - |
| Stage 2 | - | - | - | - | - | - | 827 | 799 | - | 582 | 591 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.4 | 15.6 | 14 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 431 | 1490 | - | - | 1168 | - | - | 483 |
| HCM Lane V/C Ratio | 0.217 | 0.006 | - | - | 0.005 | - | - | 0.17 |
| HCM Control Delay (s) | 15.6 | 7.4 | 0 | - | 8.1 | - | - | 14 |
| HCM Lane LOS | C | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.8 | 0 | - | - | 0 | - | - | 0.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 88 | 247 | 113 | 0 | 0 | 0 | 19 | 415 | 48 | 691 | 530 | 38 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 104 | 291 | 117 | | | | 22 | 488 | 47 | 813 | 624 | 40 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | | | | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 501 | 357 | 144 | | | | 44 | 714 | 69 | 975 | 1613 | 103 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | | | | 0.02 | 0.22 | 0.22 | 0.28 | 0.48 | 0.48 |
| Sat Flow, veh/h | 1774 | 1264 | 508 | | | | 1774 | 3263 | 313 | 3442 | 3377 | 216 |
| Grp Volume(v), veh/h | 104 | 0 | 408 | | | | 22 | 264 | 271 | 813 | 327 | 337 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1772 | | | | 1774 | 1770 | 1806 | 1721 | 1770 | 1824 |
| Q Serve(g_s), s | 3.3 | 0.0 | 15.9 | | | | 0.9 | 10.2 | 10.2 | 16.5 | 8.8 | 8.8 |
| Cycle Q Clear(g_c), s | 3.3 | 0.0 | 15.9 | | | | 0.9 | 10.2 | 10.2 | 16.5 | 8.8 | 8.8 |
| Prop In Lane | 1.00 | | 0.29 | | | | 1.00 | | 0.17 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 501 | 0 | 500 | | | | 44 | 387 | 395 | 975 | 845 | 871 |
| V/C Ratio(X) | 0.21 | 0.00 | 0.82 | | | | 0.50 | 0.68 | 0.69 | 0.83 | 0.39 | 0.39 |
| Avail Cap(c_a), veh/h | 812 | 0 | 811 | | | | 478 | 953 | 973 | 1391 | 845 | 871 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 20.3 | 0.0 | 24.8 | | | | 35.8 | 26.6 | 26.7 | 25.0 | 12.4 | 12.4 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 3.4 | | | | 3.3 | 2.1 | 2.1 | 3.1 | 0.3 | 0.3 |
| 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(-26165%),veh/ln | 1.6 | 0.0 | 8.2 | | | | 0.5 | 5.2 | 5.4 | 8.2 | 4.3 | 4.5 |
| LnGrp Delay(d),s/veh | 20.5 | 0.0 | 28.2 | | | | 39.1 | 28.7 | 28.8 | 28.1 | 12.7 | 12.7 |
| LnGrp LOS | C | | C | | | | D | C | C | C | B | B |
| Approach Vol, veh/h | | 512 | | | | | | 557 | | | 1477 | |
| Approach Delay, s/veh | | 26.6 | | | | | | 29.2 | | | 21.2 | |
| Approach LOS | | C | | | | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 26.0 | 21.7 | | 26.5 | 6.8 | 41.0 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 18.5 | 12.2 | | 17.9 | 2.9 | 10.8 | | |
| Green Ext Time (p_c), s | 2.6 | 3.6 | | 2.8 | 0.0 | 7.1 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 24.0 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 36 | 1106 | 98 | 41 | 637 | 35 | 38 | 32 | 41 | 164 | 118 | 30 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 40 | 1229 | 105 | 46 | 708 | 36 | 42 | 36 | 0 | 182 | 131 | 24 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 48 | 1502 | 128 | 56 | 1575 | 80 | 51 | 179 | 0 | 228 | 301 | 55 |
| Arrive On Green | 0.03 | 0.46 | 0.46 | 0.03 | 0.46 | 0.46 | 0.03 | 0.10 | 0.00 | 0.13 | 0.20 | 0.20 |
| Sat Flow, veh/h | 1774 | 3301 | 281 | 1774 | 3427 | 174 | 1774 | 1863 | 0 | 1774 | 1532 | 281 |
| Grp Volume(v), veh/h | 40 | 658 | 676 | 46 | 365 | 379 | 42 | 36 | 0 | 182 | 0 | 155 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1812 | 1774 | 1770 | 1832 | 1774 | 1863 | 0 | 1774 | 0 | 1812 |
| Q Serve(g_s), s | 1.3 | 19.0 | 19.1 | 1.5 | 8.3 | 8.3 | 1.4 | 1.1 | 0.0 | 5.9 | 0.0 | 4.4 |
| Cycle Q Clear(g_c), s | 1.3 | 19.0 | 19.1 | 1.5 | 8.3 | 8.3 | 1.4 | 1.1 | 0.0 | 5.9 | 0.0 | 4.4 |
| Prop In Lane | 1.00 | | 0.16 | 1.00 | | 0.10 | 1.00 | | 0.00 | 1.00 | | 0.15 |
| Lane Grp Cap(c), veh/h | 48 | 805 | 825 | 56 | 813 | 842 | 51 | 179 | 0 | 228 | 0 | 356 |
| V/C Ratio(X) | 0.83 | 0.82 | 0.82 | 0.82 | 0.45 | 0.45 | 0.82 | 0.20 | 0.00 | 0.80 | 0.00 | 0.44 |
| Avail Cap(c_a), veh/h | 601 | 900 | 921 | 601 | 900 | 931 | 601 | 915 | 0 | 601 | 0 | 890 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 28.6 | 13.9 | 14.0 | 28.4 | 10.9 | 10.9 | 28.5 | 24.6 | 0.0 | 25.0 | 0.0 | 20.8 |
| Incr Delay (d2), s/veh | 12.4 | 4.8 | 4.8 | 10.1 | 0.1 | 0.1 | 11.5 | 0.2 | 0.0 | 2.4 | 0.0 | 0.3 |
| 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(-26165%),veh/ln | 0.8 | 10.2 | 10.5 | 0.9 | 4.0 | 4.1 | 0.8 | 0.6 | 0.0 | 3.0 | 0.0 | 2.2 |
| LnGrp Delay(d),s/veh | 41.0 | 18.7 | 18.8 | 38.5 | 11.0 | 11.0 | 40.0 | 24.8 | 0.0 | 27.4 | 0.0 | 21.2 |
| LnGrp LOS | D | B | B | D | B | B | D | C | | C | | C |
| Approach Vol, veh/h | | 1374 | | | 790 | | | 78 | | | 337 | |
| Approach Delay, s/veh | | 19.4 | | | 12.6 | | | 33.0 | | | 24.5 | |
| Approach LOS | | B | | | B | | | 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 | 5.9 | 31.9 | 5.7 | 15.6 | 5.6 | 32.1 | 11.6 | 9.7 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 3.5 | 21.1 | 3.4 | 6.4 | 3.3 | 10.3 | 7.9 | 3.1 |
| Green Ext Time (p_c), s | 0.0 | 5.7 | 0.0 | 0.7 | 0.0 | 9.5 | 0.1 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 18.4 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 14 | 18 | 0 | 4 | 10 | 33 | 30 | 0 | 14 | 18 | 0 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 21 | 27 | 0 | 6 | 15 | 50 | 45 | 0 | 21 | 27 | 0 | 12 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 65 | 0 | 0 | 27 | 0 | 0 | 128 | 147 | 27 | 132 | 122 | 40 |
| Stage 1 | - | - | - | - | - | - | 70 | 70 | - | 52 | 52 | - |
| Stage 2 | - | - | - | - | - | - | 58 | 77 | - | 80 | 70 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1537 | - | - | 1587 | - | - | 845 | 744 | 1048 | 840 | 768 | 1031 |
| Stage 1 | - | - | - | - | - | - | 940 | 837 | - | 961 | 852 | - |
| Stage 2 | - | - | - | - | - | - | 954 | 831 | - | 929 | 837 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1537 | - | - | 1587 | - | - | 824 | 731 | 1048 | 812 | 754 | 1031 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 824 | 731 | - | 812 | 754 | - |
| Stage 1 | - | - | - | - | - | - | 927 | 825 | - | 948 | 849 | - |
| Stage 2 | - | - | - | - | - | - | 939 | 828 | - | 897 | 825 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 3.2 | 0.6 | 9.4 | 9.3 |
| HCM LOS | | | A | A |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 884 | 1537 | - | - | 1587 | - | - | 869 |
| HCM Lane V/C Ratio | 0.075 | 0.014 | - | - | 0.004 | - | - | 0.045 |
| HCM Control Delay (s) | 9.4 | 7.4 | 0 | - | 7.3 | 0 | - | 9.3 |
| HCM Lane LOS | A | A | A | - | A | A | - | A |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.1 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 352 | 11 | 0 | 84 | 6 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 50 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 383 | 12 | 0 | 91 | 7 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 395 | 0 | 480 | 389 |
| Stage 1 | - | - | - | - | 389 | - |
| Stage 2 | - | - | - | - | 91 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1164 | - | 545 | 659 |
| Stage 1 | - | - | - | - | 685 | - |
| Stage 2 | - | - | - | - | 933 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1164 | - | 545 | 659 |
| Mov Cap-2 Maneuver | - | - | - | - | 591 | - |
| Stage 1 | - | - | - | - | 685 | - |
| Stage 2 | - | - | - | - | 933 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 11.2 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 591 | - | - | 1164 | - |
| HCM Lane V/C Ratio | 0.011 | - | - | - | - |
| HCM Control Delay (s) | 11.2 | - | - | 0 | - |
| HCM Lane LOS | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.5 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 21 | 1236 | 698 | 6 | 3 | 12 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 23 | 1343 | 759 | 7 | 3 | 13 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 765 | 0 | - | 0 | 1479 | 383 |
| Stage 1 | - | - | - | - | 762 | - |
| Stage 2 | - | - | - | - | 717 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 844 | - | - | - | 116 | 615 |
| Stage 1 | - | - | - | - | 421 | - |
| Stage 2 | - | - | - | - | 445 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 844 | - | - | - | 104 | 615 |
| Mov Cap-2 Maneuver | - | - | - | - | 104 | - |
| Stage 1 | - | - | - | - | 421 | - |
| Stage 2 | - | - | - | - | 397 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.6 | 0 | 17.3 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 844 | - | - | - | 310 |
| HCM Lane V/C Ratio | 0.027 | - | - | - | 0.053 |
| HCM Control Delay (s) | 9.4 | 0.5 | - | - | 17.3 |
| HCM Lane LOS | A | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.2 |

# APPENDIX E: CUMULATIVE (2016) NO PROJECT LEVEL OF SERVICE AND SYNCHRO WORKSHEETS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 496 | 0 | 0 | 201 | 0 | 0 | 0 | 0 | 231 | 0 | 816 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 522 | 0 | 0 | 212 | 0 | 0 | 0 | 0 | 243 | 0 | 404 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| 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 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | 0 | 0 |
| Arrive On Green | 0.00 | 0.63 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 243 | |
| Grp Volume(v), veh/h | 0 | 522 | 0 | 0 | 212 | 0 | 0 | 0 | 0 | 243 | 32.9 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.3 | | |
| Cycle Q Clear(g_c), s | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.3 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | | |
| V/C Ratio(X) | 0.00 | 0.24 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | | |
| Avail Cap(c_a), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 140 | 0 | 506 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.6 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | | |
| 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 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | | |
| LnGrp Delay(d),s/veh | 0.0 | 8.5 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 32.9 | | |
| LnGrp LOS | | A | | | A | | | | | C | | |
| Approach Vol, veh/h | | 522 | | | 212 | | | 0 | | | | |
| Approach Delay, s/veh | | 8.5 | | | 0.1 | | | 0.0 | | | | |
| Approach LOS | | A | | | A | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 67.0 | | | | 67.0 | 33.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 28.5 | 7.5 |
| Max Q Clear Time (g_c+I1), s | | 8.5 | | | | 2.0 | 13.3 | 0.0 |
| Green Ext Time (p_c), s | | 11.0 | | | | 11.3 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.7 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 188 | 231 | 0 | 0 | 75 | 70 | 126 | 208 | 61 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 209 | 257 | 0 | 0 | 83 | 0 | 140 | 231 | 57 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 440 | 109 | | | |
| Arrive On Green | 0.50 | 0.61 | 0.00 | 0.00 | 0.06 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1443 | 356 | | | |
| Grp Volume(v), veh/h | 209 | 257 | 0 | 0 | 83 | 0 | 140 | 0 | 288 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1799 | | | |
| Q Serve(g_s), s | 6.6 | 3.1 | 0.0 | 0.0 | 2.3 | 0.0 | 6.0 | 0.0 | 13.2 | | | |
| Cycle Q Clear(g_c), s | 6.6 | 3.1 | 0.0 | 0.0 | 2.3 | 0.0 | 6.0 | 0.0 | 13.2 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.20 | | | |
| Lane Grp Cap(c), veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 0 | 549 | | | |
| V/C Ratio(X) | 0.23 | 0.12 | 0.00 | 0.00 | 0.42 | 0.00 | 0.26 | 0.00 | 0.52 | | | |
| Avail Cap(c_a), veh/h | 895 | 2141 | 0 | 0 | 1256 | 562 | 541 | 0 | 549 | | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.79 | 0.79 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 13.9 | 8.4 | 0.0 | 0.0 | 45.7 | 0.0 | 26.2 | 0.0 | 28.8 | | | |
| Incr Delay (d2), s/veh | 0.5 | 0.1 | 0.0 | 0.0 | 6.5 | 0.0 | 1.2 | 0.0 | 3.6 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 3.4 | 1.5 | 0.0 | 0.0 | 1.3 | 0.0 | 3.1 | 0.0 | 7.1 | | | |
| LnGrp Delay(d),s/veh | 14.4 | 8.5 | 0.0 | 0.0 | 52.2 | 0.0 | 27.4 | 0.0 | 32.3 | | | |
| LnGrp LOS | B | A | | | D | | C | | C | | | |
| Approach Vol, veh/h | | 466 | | | 83 | | | 428 | | | | |
| Approach Delay, s/veh | | 11.2 | | | 52.2 | | | 30.7 | | | | |
| Approach LOS | | B | | | D | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 65.0 | | | 54.9 | 10.1 | | 35.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 60.5 | | | 20.9 | * 36 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | | 5.1 | | | 8.6 | 4.3 | | 15.2 |
| Green Ext Time (p_c), s | | 2.8 | | | 2.0 | 0.3 | | 1.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.2 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 7 | 356 | 138 | 337 | 671 | 50 | 14 | 122 | 125 | 50 | 639 | 50 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 8 | 387 | 49 | 366 | 729 | 51 | 15 | 133 | 21 | 54 | 695 | 50 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 410 | 1301 | 581 | 450 | 896 | 63 | 65 | 872 | 389 | 94 | 846 | 61 |
| Arrive On Green | 0.23 | 0.37 | 0.37 | 0.13 | 0.27 | 0.27 | 0.04 | 0.25 | 0.25 | 0.05 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3356 | 235 | 1774 | 3539 | 1579 | 1774 | 3348 | 241 |
| Grp Volume(v), veh/h | 8 | 387 | 49 | 366 | 384 | 396 | 15 | 133 | 21 | 54 | 367 | 378 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1821 | 1774 | 1770 | 1579 | 1774 | 1770 | 1820 |
| Q Serve(g_s), s | 0.3 | 6.7 | 1.3 | 8.9 | 17.6 | 17.6 | 0.7 | 2.5 | 0.9 | 2.6 | 16.9 | 17.0 |
| Cycle Q Clear(g_c), s | 0.3 | 6.7 | 1.3 | 8.9 | 17.6 | 17.6 | 0.7 | 2.5 | 0.9 | 2.6 | 16.9 | 17.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 410 | 1301 | 581 | 450 | 473 | 486 | 65 | 872 | 389 | 94 | 447 | 460 |
| V/C Ratio(X) | 0.02 | 0.30 | 0.08 | 0.81 | 0.81 | 0.81 | 0.23 | 0.15 | 0.05 | 0.57 | 0.82 | 0.82 |
| Avail Cap(c_a), veh/h | 410 | 1301 | 581 | 796 | 614 | 631 | 410 | 2046 | 913 | 513 | 818 | 841 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 25.7 | 19.4 | 10.6 | 36.6 | 29.7 | 29.7 | 40.5 | 25.5 | 24.9 | 40.0 | 30.5 | 30.5 |
| Incr Delay (d2), s/veh | 0.1 | 0.6 | 0.3 | 1.4 | 4.9 | 4.8 | 0.7 | 0.0 | 0.0 | 2.0 | 1.5 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 3.4 | 0.8 | 4.4 | 9.2 | 9.4 | 0.4 | 1.2 | 0.4 | 1.3 | 8.4 | 8.7 |
| LnGrp Delay(d),s/veh | 25.8 | 20.0 | 10.8 | 37.9 | 34.6 | 34.5 | 41.2 | 25.6 | 24.9 | 42.0 | 31.9 | 31.9 |
| LnGrp LOS | C | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 444 | | | 1146 | | | 169 | | | 799 | |
| Approach Delay, s/veh | | 19.1 | | | 35.6 | | | 26.9 | | | 32.6 | |
| Approach LOS | | B | | | 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 | 8.6 | 26.2 | 15.3 | 36.4 | 8.1 | 26.8 | 24.0 | 27.7 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 4.6 | 4.5 | 10.9 | 8.7 | 2.7 | 19.0 | 2.3 | 19.6 |
| Green Ext Time (p_c), s | 0.0 | 0.6 | 0.4 | 5.7 | 0.5 | 2.8 | 0.0 | 3.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 31.2 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 139 | 361 | 0 | 0 | 656 | 94 | 394 | 173 | 177 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 151 | 392 | 0 | 0 | 713 | 0 | 308 | 356 | 57 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 265 | 1761 | 0 | 0 | 1169 | 523 | 571 | 600 | 509 | | | |
| Arrive On Green | 0.08 | 0.50 | 0.00 | 0.00 | 0.33 | 0.00 | 0.32 | 0.32 | 0.32 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1580 | | | |
| Grp Volume(v), veh/h | 151 | 392 | 0 | 0 | 713 | 0 | 308 | 356 | 57 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1580 | | | |
| Q Serve(g_s), s | 1.9 | 2.8 | 0.0 | 0.0 | 7.5 | 0.0 | 6.3 | 7.1 | 1.1 | | | |
| Cycle Q Clear(g_c), s | 1.9 | 2.8 | 0.0 | 0.0 | 7.5 | 0.0 | 6.3 | 7.1 | 1.1 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 265 | 1761 | 0 | 0 | 1169 | 523 | 571 | 600 | 509 | | | |
| V/C Ratio(X) | 0.57 | 0.22 | 0.00 | 0.00 | 0.61 | 0.00 | 0.54 | 0.59 | 0.11 | | | |
| Avail Cap(c_a), veh/h | 2330 | 2396 | 0 | 0 | 2396 | 1072 | 1201 | 1261 | 1070 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 19.7 | 6.3 | 0.0 | 0.0 | 12.4 | 0.0 | 12.3 | 12.6 | 10.6 | | | |
| Incr Delay (d2), s/veh | 0.7 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 1.1 | 1.3 | 0.1 | | | |
| 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(-26165%),veh/ln | 0.9 | 1.3 | 0.0 | 0.0 | 3.6 | 0.0 | 3.3 | 3.8 | 0.5 | | | |
| LnGrp Delay(d),s/veh | 20.5 | 6.3 | 0.0 | 0.0 | 12.6 | 0.0 | 13.5 | 13.9 | 10.7 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 543 | | | 713 | | | 721 | | | | |
| Approach Delay, s/veh | | 10.2 | | | 12.6 | | | 13.5 | | | | |
| Approach LOS | | B | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 26.0 | | | 7.4 | 18.6 | | 18.3 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 4.8 | | | 3.9 | 9.5 | | 9.1 |
| Green Ext Time (p_c), s | | 5.3 | | | 0.2 | 5.0 | | 5.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.3 |
| 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) | 3 | 4 | 22 | 4 | 0 | 2 | 13 | 239 | 10 | 30 | 695 | 49 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 15 | 285 | 11 | 36 | 827 | 54 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 229 | 15 | 0 | 226 | 15 | 0 | 16 | 2105 | 81 | 41 | 2091 | 137 |
| Arrive On Green | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.61 | 0.61 | 0.02 | 0.62 | 0.62 |
| Sat Flow, veh/h | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 3475 | 134 | 1774 | 3373 | 220 |
| Grp Volume(v), veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 15 | 145 | 151 | 36 | 434 | 447 |
| Grp Sat Flow(s),veh/h/ln | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 1770 | 1839 | 1774 | 1770 | 1824 |
| Q Serve(g_s), s | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 | 1.2 | 1.2 | 0.7 | 4.1 | 4.1 |
| Cycle Q Clear(g_c), s | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 | 1.2 | 1.2 | 0.7 | 4.1 | 4.1 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.00 | 1.00 | | 0.07 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 229 | 15 | 0 | 226 | 15 | 0 | 16 | 1072 | 1114 | 41 | 1097 | 1131 |
| V/C Ratio(X) | 0.02 | 0.33 | 0.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.13 | 0.14 | 0.88 | 0.40 | 0.40 |
| Avail Cap(c_a), veh/h | 1072 | 1127 | 0 | 1490 | 1691 | 0 | 537 | 2142 | 2226 | 2148 | 2142 | 2208 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.3 | 16.3 | 0.0 | 16.4 | 0.0 | 0.0 | 16.4 | 2.8 | 2.8 | 16.1 | 3.2 | 3.2 |
| Incr Delay (d2), s/veh | 0.0 | 12.2 | 0.0 | 0.0 | 0.0 | 0.0 | 52.8 | 0.0 | 0.0 | 19.2 | 0.5 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.6 | 0.6 | 0.5 | 2.1 | 2.1 |
| LnGrp Delay(d),s/veh | 16.3 | 28.5 | 0.0 | 16.4 | 0.0 | 0.0 | 69.1 | 2.8 | 2.8 | 35.3 | 3.7 | 3.6 |
| LnGrp LOS | B | C | | B | | | E | A | A | D | A | A |
| Approach Vol, veh/h | | 9 | | | 5 | | | 311 | | | 917 | |
| Approach Delay, s/veh | | 23.1 | | | 16.4 | | | 6.0 | | | 4.9 | |
| Approach LOS | | C | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.8 | 24.0 | | 4.3 | 4.3 | 24.5 | | 4.3 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.7 | 3.2 | | 2.1 | 2.3 | 6.1 | | 2.2 |
| Green Ext Time (p_c), s | 0.0 | 14.9 | | 0.0 | 0.0 | 14.4 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.4 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 11 | 86 | 23 | 2 | 78 | 2 | 17 | 12 | 3 | 4 | 23 | 8 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 95 | 25 | 2 | 86 | 2 | 19 | 13 | 3 | 4 | 25 | 9 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 90 | 0 | 0 | 97 | 0 | 0 | 183 | 215 | 99 | 222 | 214 | 48 |
| Stage 1 | - | - | - | - | - | - | 121 | 121 | - | 93 | 93 | - |
| Stage 2 | - | - | - | - | - | - | 62 | 94 | - | 129 | 121 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1503 | - | - | 1496 | - | - | 770 | 682 | 956 | 724 | 683 | 1011 |
| Stage 1 | - | - | - | - | - | - | 883 | 795 | - | 904 | 818 | - |
| Stage 2 | - | - | - | - | - | - | 942 | 817 | - | 874 | 795 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1500 | - | - | 1494 | - | - | 733 | 673 | 953 | 703 | 674 | 1008 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 733 | 673 | - | 703 | 674 | - |
| Stage 1 | - | - | - | - | - | - | 874 | 787 | - | 894 | 816 | - |
| Stage 2 | - | - | - | - | - | - | 902 | 815 | - | 847 | 787 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.7 | 0.2 | 10.2 | 10.2 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 724 | 1500 | - | - | 1494 | - | - | 733 |
| HCM Lane V/C Ratio | 0.049 | 0.008 | - | - | 0.001 | - | - | 0.052 |
| HCM Control Delay (s) | 10.2 | 7.4 | 0 | - | 7.4 | - | - | 10.2 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 14 | 78 | 28 | 0 | 0 | 0 | 59 | 269 | 12 | 371 | 450 | 133 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 16 | 89 | 18 | | | | 67 | 306 | 11 | 422 | 511 | 127 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | | | | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 181 | 154 | 31 | | | | 117 | 1027 | 37 | 682 | 1201 | 297 |
| Arrive On Green | 0.10 | 0.10 | 0.10 | | | | 0.07 | 0.29 | 0.29 | 0.20 | 0.43 | 0.43 |
| Sat Flow, veh/h | 1774 | 1503 | 304 | | | | 1774 | 3485 | 125 | 3442 | 2812 | 695 |
| Grp Volume(v), veh/h | 16 | 0 | 107 | | | | 67 | 155 | 162 | 422 | 321 | 317 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1807 | | | | 1774 | 1770 | 1840 | 1721 | 1770 | 1738 |
| Q Serve(g_s), s | 0.3 | 0.0 | 2.2 | | | | 1.4 | 2.7 | 2.7 | 4.4 | 5.0 | 5.1 |
| Cycle Q Clear(g_c), s | 0.3 | 0.0 | 2.2 | | | | 1.4 | 2.7 | 2.7 | 4.4 | 5.0 | 5.1 |
| Prop In Lane | 1.00 | | 0.17 | | | | 1.00 | | 0.07 | 1.00 | | 0.40 |
| Lane Grp Cap(c), veh/h | 181 | 0 | 185 | | | | 117 | 522 | 543 | 682 | 756 | 742 |
| V/C Ratio(X) | 0.09 | 0.00 | 0.58 | | | | 0.57 | 0.30 | 0.30 | 0.62 | 0.42 | 0.43 |
| Avail Cap(c_a), veh/h | 1526 | 0 | 1555 | | | | 898 | 1791 | 1863 | 2612 | 1343 | 1319 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.1 | 0.0 | 16.9 | | | | 17.9 | 10.8 | 10.8 | 14.5 | 7.9 | 7.9 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 2.9 | | | | 1.6 | 0.3 | 0.3 | 0.9 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 0.0 | 1.2 | | | | 0.8 | 1.3 | 1.4 | 2.1 | 2.5 | 2.5 |
| LnGrp Delay(d),s/veh | 16.3 | 0.0 | 19.8 | | | | 19.6 | 11.1 | 11.1 | 15.4 | 8.3 | 8.3 |
| LnGrp LOS | B | | B | | | | B | B | B | B | A | A |
| Approach Vol, veh/h | | 123 | | | | | | 384 | | | 1060 | |
| Approach Delay, s/veh | | 19.3 | | | | | | 12.6 | | | 11.1 | |
| Approach LOS | | B | | | | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 12.8 | 17.2 | | 9.5 | 7.6 | 22.4 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 6.4 | 4.7 | | 4.2 | 3.4 | 7.1 | | |
| Green Ext Time (p_c), s | 1.5 | 6.5 | | 0.6 | 0.1 | 5.9 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.1 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 27 | 487 | 20 | 14 | 681 | 54 | 33 | 42 | 31 | 31 | 40 | 33 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 29 | 529 | 21 | 15 | 740 | 56 | 36 | 46 | 4 | 34 | 43 | 2 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 32 | 1359 | 54 | 16 | 1275 | 96 | 41 | 195 | 17 | 38 | 201 | 9 |
| Arrive On Green | 0.02 | 0.39 | 0.39 | 0.01 | 0.38 | 0.38 | 0.02 | 0.12 | 0.12 | 0.02 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1774 | 3470 | 138 | 1774 | 3335 | 252 | 1774 | 1689 | 147 | 1774 | 1766 | 82 |
| Grp Volume(v), veh/h | 29 | 269 | 281 | 15 | 393 | 403 | 36 | 0 | 50 | 34 | 0 | 45 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1838 | 1774 | 1770 | 1817 | 1774 | 0 | 1836 | 1774 | 0 | 1848 |
| Q Serve(g_s), s | 0.6 | 4.0 | 4.0 | 0.3 | 6.5 | 6.5 | 0.7 | 0.0 | 0.9 | 0.7 | 0.0 | 0.8 |
| Cycle Q Clear(g_c), s | 0.6 | 4.0 | 4.0 | 0.3 | 6.5 | 6.5 | 0.7 | 0.0 | 0.9 | 0.7 | 0.0 | 0.8 |
| Prop In Lane | 1.00 | | 0.07 | 1.00 | | 0.14 | 1.00 | | 0.08 | 1.00 | | 0.04 |
| Lane Grp Cap(c), veh/h | 32 | 693 | 720 | 16 | 677 | 695 | 41 | 0 | 212 | 38 | 0 | 210 |
| V/C Ratio(X) | 0.90 | 0.39 | 0.39 | 0.95 | 0.58 | 0.58 | 0.88 | 0.00 | 0.24 | 0.88 | 0.00 | 0.21 |
| Avail Cap(c_a), veh/h | 965 | 1444 | 1500 | 965 | 1444 | 1483 | 965 | 0 | 1449 | 965 | 0 | 1458 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.0 | 8.0 | 8.0 | 18.2 | 9.0 | 9.0 | 17.9 | 0.0 | 14.8 | 17.9 | 0.0 | 14.8 |
| Incr Delay (d2), s/veh | 25.4 | 0.1 | 0.1 | 51.1 | 0.3 | 0.3 | 18.9 | 0.0 | 0.2 | 20.5 | 0.0 | 0.2 |
| 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(-26165%),veh/ln | 0.5 | 2.0 | 2.1 | 0.4 | 3.2 | 3.3 | 0.6 | 0.0 | 0.5 | 0.5 | 0.0 | 0.4 |
| LnGrp Delay(d),s/veh | 43.4 | 8.2 | 8.2 | 69.3 | 9.3 | 9.3 | 36.8 | 0.0 | 15.0 | 38.4 | 0.0 | 15.0 |
| LnGrp LOS | D | A | A | E | A | A | D | | B | D | | B |
| Approach Vol, veh/h | | 579 | | | 811 | | | 86 | | | 79 | |
| Approach Delay, s/veh | | 9.9 | | | 10.4 | | | 24.1 | | | 25.1 | |
| Approach LOS | | A | | | B | | | 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 | 4.3 | 19.4 | 4.8 | 8.2 | 4.7 | 19.1 | 4.8 | 8.2 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 2.3 | 6.0 | 2.7 | 2.8 | 2.6 | 8.5 | 2.7 | 2.9 |
| Green Ext Time (p_c), s | 0.0 | 5.6 | 0.0 | 0.3 | 0.0 | 5.5 | 0.0 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.7 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 5 | 0 | 14 | 0 | 0 |
| 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 | 63 | 63 | 63 | 63 | 63 | 63 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 6 | 8 | 0 | 22 | 0 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 14 | 0 | 32 | 10 |
| Stage 1 | - | - | - | - | 10 | - |
| Stage 2 | - | - | - | - | 22 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1604 | - | 982 | 1071 |
| Stage 1 | - | - | - | - | 1013 | - |
| Stage 2 | - | - | - | - | 1001 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1604 | - | 982 | 1071 |
| Mov Cap-2 Maneuver | - | - | - | - | 982 | - |
| Stage 1 | - | - | - | - | 1013 | - |
| Stage 2 | - | - | - | - | 1001 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 0 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | 1604 | - |
| HCM Lane V/C Ratio | - | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 | - |
| HCM Lane LOS | A | - | - | A | - |
| HCM 95th %tile Q(veh) | - | - | - | 0 | - |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 236 | 0 | 0 | 273 | 0 | 0 | 0 | 0 | 181 | 0 | 1093 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 246 | 0 | 0 | 284 | 0 | 0 | 0 | 0 | 189 | 0 | 306 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | 0 | 0 |
| Arrive On Green | 0.00 | 0.64 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 189 | |
| Grp Volume(v), veh/h | 0 | 246 | 0 | 0 | 284 | 0 | 0 | 0 | 0 | 189 | 32.8 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 2.7 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 8.8 | | |
| Cycle Q Clear(g_c), s | 0.0 | 2.7 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 8.8 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | | |
| V/C Ratio(X) | 0.00 | 0.11 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | | |
| Avail Cap(c_a), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 177 | 0 | 470 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 6.8 | 0.0 | 0.0 | 16.5 | 0.0 | 0.0 | 0.0 | 0.0 | 30.2 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 2.5 | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 1.3 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 4.6 | | |
| LnGrp Delay(d),s/veh | 0.0 | 6.9 | 0.0 | 0.0 | 16.6 | 0.0 | 0.0 | 0.0 | 0.0 | 32.8 | | |
| LnGrp LOS | | A | | | B | | | | | C | | |
| Approach Vol, veh/h | | 246 | | | 284 | | | 0 | | | | |
| Approach Delay, s/veh | | 6.9 | | | 16.6 | | | 0.0 | | | | |
| Approach LOS | | A | | | B | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 69.0 | | | | 69.0 | 31.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 26.5 | 9.5 |
| Max Q Clear Time (g_c+I1), s | | 4.7 | | | | 8.5 | 10.8 | 0.0 |
| Green Ext Time (p_c), s | | 7.5 | | | | 7.4 | 0.2 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 17.5 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 326 | 421 | 0 | 0 | 183 | 208 | 102 | 321 | 67 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 358 | 463 | 0 | 0 | 201 | 0 | 112 | 353 | 66 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 929 | 2318 | 0 | 0 | 307 | 137 | 452 | 389 | 73 | | | |
| Arrive On Green | 1.00 | 1.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.25 | 0.25 | 0.25 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1526 | 285 | | | |
| Grp Volume(v), veh/h | 358 | 463 | 0 | 0 | 201 | 0 | 112 | 0 | 419 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1812 | | | |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 0.0 | 5.0 | 0.0 | 22.4 | | | |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 0.0 | 5.0 | 0.0 | 22.4 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.16 | | | |
| Lane Grp Cap(c), veh/h | 929 | 2318 | 0 | 0 | 307 | 137 | 452 | 0 | 462 | | | |
| V/C Ratio(X) | 0.39 | 0.20 | 0.00 | 0.00 | 0.66 | 0.00 | 0.25 | 0.00 | 0.91 | | | |
| Avail Cap(c_a), veh/h | 929 | 2318 | 0 | 0 | 903 | 404 | 452 | 0 | 462 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.91 | 0.91 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 44.2 | 0.0 | 29.6 | 0.0 | 36.1 | | | |
| Incr Delay (d2), s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 10.5 | 0.0 | 1.3 | 0.0 | 24.1 | | | |
| 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(-26165%),veh/ln | 0.3 | 0.1 | 0.0 | 0.0 | 3.1 | 0.0 | 2.6 | 0.0 | 14.3 | | | |
| LnGrp Delay(d),s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 54.7 | 0.0 | 30.9 | 0.0 | 60.2 | | | |
| LnGrp LOS | A | A | | | D | | C | | E | | | |
| Approach Vol, veh/h | | 821 | | | 201 | | | 531 | | | | |
| Approach Delay, s/veh | | 0.6 | | | 54.7 | | | 54.0 | | | | |
| Approach LOS | | A | | | D | | | D | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 70.0 | | | 56.8 | 13.2 | | 30.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 65.5 | | | 35.9 | * 26 | | 25.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 2.0 | 7.5 | | 24.4 |
| Green Ext Time (p_c), s | | 5.4 | | | 5.2 | 0.7 | | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 25.9 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 15 | 782 | 161 | 266 | 571 | 50 | 27 | 208 | 379 | 172 | 694 | 74 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 16 | 859 | 78 | 292 | 627 | 51 | 30 | 229 | 76 | 189 | 763 | 74 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 397 | 1266 | 565 | 373 | 802 | 65 | 87 | 744 | 332 | 227 | 908 | 88 |
| Arrive On Green | 0.22 | 0.36 | 0.36 | 0.11 | 0.24 | 0.24 | 0.05 | 0.21 | 0.21 | 0.13 | 0.28 | 0.28 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3315 | 269 | 1774 | 3539 | 1579 | 1774 | 3260 | 316 |
| Grp Volume(v), veh/h | 16 | 859 | 78 | 292 | 334 | 344 | 30 | 229 | 76 | 189 | 414 | 423 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1814 | 1774 | 1770 | 1579 | 1774 | 1770 | 1806 |
| Q Serve(g_s), s | 0.6 | 18.4 | 2.3 | 7.4 | 15.8 | 15.8 | 1.5 | 4.9 | 3.6 | 9.3 | 19.7 | 19.7 |
| Cycle Q Clear(g_c), s | 0.6 | 18.4 | 2.3 | 7.4 | 15.8 | 15.8 | 1.5 | 4.9 | 3.6 | 9.3 | 19.7 | 19.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.15 | 1.00 | | 1.00 | 1.00 | | 0.17 |
| Lane Grp Cap(c), veh/h | 397 | 1266 | 565 | 373 | 428 | 439 | 87 | 744 | 332 | 227 | 493 | 503 |
| V/C Ratio(X) | 0.04 | 0.68 | 0.14 | 0.78 | 0.78 | 0.78 | 0.34 | 0.31 | 0.23 | 0.83 | 0.84 | 0.84 |
| Avail Cap(c_a), veh/h | 397 | 1266 | 565 | 771 | 595 | 610 | 397 | 1982 | 884 | 497 | 793 | 809 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 27.1 | 24.3 | 11.1 | 38.8 | 31.6 | 31.6 | 41.0 | 29.8 | 29.3 | 38.0 | 30.3 | 30.3 |
| Incr Delay (d2), s/veh | 0.2 | 2.9 | 0.5 | 1.4 | 2.8 | 2.8 | 0.9 | 0.1 | 0.1 | 3.1 | 2.2 | 2.2 |
| 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(-26165%),veh/ln | 0.3 | 9.5 | 1.3 | 3.6 | 8.0 | 8.3 | 0.7 | 2.4 | 1.6 | 4.8 | 9.9 | 10.1 |
| LnGrp Delay(d),s/veh | 27.3 | 27.3 | 11.6 | 40.2 | 34.5 | 34.5 | 41.9 | 29.9 | 29.4 | 41.1 | 32.6 | 32.5 |
| LnGrp LOS | C | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 953 | | | 970 | | | 335 | | | 1026 | |
| Approach Delay, s/veh | | 26.0 | | | 36.2 | | | 30.8 | | | 34.1 | |
| 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 | 15.4 | 23.7 | 13.7 | 36.5 | 9.3 | 29.8 | 24.0 | 26.2 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 11.3 | 6.9 | 9.4 | 20.4 | 3.5 | 21.7 | 2.6 | 17.8 |
| Green Ext Time (p_c), s | 0.1 | 1.1 | 0.3 | 5.3 | 0.9 | 3.2 | 0.0 | 3.5 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 32.0 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 282 | 1040 | 0 | 0 | 628 | 95 | 261 | 124 | 214 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 313 | 1156 | 0 | 0 | 698 | 0 | 214 | 244 | 165 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 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, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 456 | 2114 | 0 | 0 | 1360 | 608 | 428 | 449 | 381 | | | |
| Arrive On Green | 0.13 | 0.60 | 0.00 | 0.00 | 0.38 | 0.00 | 0.24 | 0.24 | 0.24 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1579 | | | |
| Grp Volume(v), veh/h | 313 | 1156 | 0 | 0 | 698 | 0 | 214 | 244 | 165 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1579 | | | |
| Q Serve(g_s), s | 4.3 | 9.7 | 0.0 | 0.0 | 7.5 | 0.0 | 5.2 | 5.7 | 4.4 | | | |
| Cycle Q Clear(g_c), s | 4.3 | 9.7 | 0.0 | 0.0 | 7.5 | 0.0 | 5.2 | 5.7 | 4.4 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 456 | 2114 | 0 | 0 | 1360 | 608 | 428 | 449 | 381 | | | |
| V/C Ratio(X) | 0.69 | 0.55 | 0.00 | 0.00 | 0.51 | 0.00 | 0.50 | 0.54 | 0.43 | | | |
| Avail Cap(c_a), veh/h | 2082 | 2141 | 0 | 0 | 2141 | 958 | 1073 | 1127 | 955 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 20.5 | 6.0 | 0.0 | 0.0 | 11.7 | 0.0 | 16.2 | 16.4 | 15.9 | | | |
| Incr Delay (d2), s/veh | 0.7 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 1.3 | 1.5 | 1.1 | | | |
| 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(-26165%),veh/ln | 2.1 | 4.7 | 0.0 | 0.0 | 3.6 | 0.0 | 2.6 | 3.1 | 2.0 | | | |
| LnGrp Delay(d),s/veh | 21.2 | 6.1 | 0.0 | 0.0 | 11.8 | 0.0 | 17.5 | 17.9 | 17.0 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 1469 | | | 698 | | | 623 | | | | |
| Approach Delay, s/veh | | 9.3 | | | 11.8 | | | 17.5 | | | | |
| Approach LOS | | A | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 33.6 | | | 10.6 | 23.1 | | 16.0 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 11.7 | | | 6.3 | 9.5 | | 7.7 |
| Green Ext Time (p_c), s | | 8.9 | | | 0.4 | 9.5 | | 4.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.8 |
| HCM 2010 LOS | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 56 | 3 | 144 | 16 | 6 | 22 | 3 | 236 | 0 | 2 | 909 | 25 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 64 | 3 | 13 | 18 | 7 | 2 | 3 | 268 | 0 | 2 | 1033 | 26 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 274 | 22 | 97 | 267 | 102 | 29 | 4 | 2229 | 0 | 4 | 2220 | 56 |
| Arrive On Green | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.00 | 0.63 | 0.00 | 0.00 | 0.63 | 0.63 |
| Sat Flow, veh/h | 1400 | 305 | 1324 | 1392 | 1394 | 398 | 1774 | 3632 | 0 | 1774 | 3528 | 89 |
| Grp Volume(v), veh/h | 64 | 0 | 16 | 18 | 0 | 9 | 3 | 268 | 0 | 2 | 518 | 541 |
| Grp Sat Flow(s),veh/h/ln | 1400 | 0 | 1629 | 1392 | 0 | 1792 | 1774 | 1770 | 0 | 1774 | 1770 | 1847 |
| Q Serve(g_s), s | 1.8 | 0.0 | 0.4 | 0.5 | 0.0 | 0.2 | 0.1 | 1.2 | 0.0 | 0.0 | 6.2 | 6.2 |
| Cycle Q Clear(g_c), s | 2.0 | 0.0 | 0.4 | 0.9 | 0.0 | 0.2 | 0.1 | 1.2 | 0.0 | 0.0 | 6.2 | 6.2 |
| Prop In Lane | 1.00 | | 0.81 | 1.00 | | 0.22 | 1.00 | | 0.00 | 1.00 | | 0.05 |
| Lane Grp Cap(c), veh/h | 274 | 0 | 120 | 267 | 0 | 132 | 4 | 2229 | 0 | 4 | 1113 | 1162 |
| V/C Ratio(X) | 0.23 | 0.00 | 0.13 | 0.07 | 0.00 | 0.07 | 0.69 | 0.12 | 0.00 | 0.46 | 0.47 | 0.47 |
| Avail Cap(c_a), veh/h | 861 | 0 | 803 | 1193 | 0 | 1325 | 437 | 3488 | 0 | 1748 | 1744 | 1820 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.4 | 0.0 | 17.6 | 18.0 | 0.0 | 17.5 | 20.2 | 3.0 | 0.0 | 20.2 | 3.9 | 3.9 |
| Incr Delay (d2), s/veh | 0.4 | 0.0 | 0.5 | 0.1 | 0.0 | 0.2 | 52.6 | 0.0 | 0.0 | 25.3 | 0.6 | 0.6 |
| 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(-26165%),veh/ln | 0.7 | 0.0 | 0.2 | 0.2 | 0.0 | 0.1 | 0.1 | 0.6 | 0.0 | 0.1 | 3.1 | 3.2 |
| LnGrp Delay(d),s/veh | 18.9 | 0.0 | 18.1 | 18.1 | 0.0 | 17.7 | 72.8 | 3.0 | 0.0 | 45.5 | 4.6 | 4.6 |
| LnGrp LOS | B | | B | B | | B | E | A | | D | A | A |
| Approach Vol, veh/h | | 80 | | | 27 | | | 271 | | | 1061 | |
| Approach Delay, s/veh | | 18.7 | | | 18.0 | | | 3.8 | | | 4.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.0 | 29.6 | | 7.0 | 4.1 | 29.5 | | 7.0 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.0 | 3.2 | | 4.0 | 2.1 | 8.2 | | 2.9 |
| Green Ext Time (p_c), s | 0.0 | 18.7 | | 0.3 | 0.0 | 17.3 | | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.5 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 8 | 337 | 93 | 5 | 76 | 5 | 55 | 15 | 6 | 11 | 54 | 9 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 9 | 374 | 103 | 6 | 84 | 6 | 61 | 17 | 7 | 12 | 60 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 92 | 0 | 0 | 376 | 0 | 0 | 479 | 497 | 378 | 506 | 494 | 49 |
| Stage 1 | - | - | - | - | - | - | 394 | 394 | - | 100 | 100 | - |
| Stage 2 | - | - | - | - | - | - | 85 | 103 | - | 406 | 394 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1501 | - | - | 1182 | - | - | 483 | 474 | 668 | 463 | 476 | 1009 |
| Stage 1 | - | - | - | - | - | - | 630 | 604 | - | 896 | 812 | - |
| Stage 2 | - | - | - | - | - | - | 914 | 809 | - | 621 | 604 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1498 | - | - | 1180 | - | - | 426 | 466 | 666 | 440 | 468 | 1006 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 426 | 466 | - | 440 | 468 | - |
| Stage 1 | - | - | - | - | - | - | 624 | 598 | - | 887 | 807 | - |
| Stage 2 | - | - | - | - | - | - | 832 | 804 | - | 592 | 598 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.5 | 14.9 | 13.7 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 446 | 1498 | - | - | 1180 | - | - | 496 |
| HCM Lane V/C Ratio | 0.189 | 0.006 | - | - | 0.005 | - | - | 0.166 |
| HCM Control Delay (s) | 14.9 | 7.4 | 0 | - | 8.1 | - | - | 13.7 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.7 | 0 | - | - | 0 | - | - | 0.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 88 | 247 | 113 | 0 | 0 | 0 | 19 | 415 | 48 | 702 | 530 | 38 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 104 | 291 | 117 | | | | 22 | 488 | 47 | 826 | 624 | 40 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | | | | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 500 | 356 | 143 | | | | 43 | 712 | 68 | 986 | 1621 | 104 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | | | | 0.02 | 0.22 | 0.22 | 0.29 | 0.48 | 0.48 |
| Sat Flow, veh/h | 1774 | 1264 | 508 | | | | 1774 | 3263 | 313 | 3442 | 3377 | 216 |
| Grp Volume(v), veh/h | 104 | 0 | 408 | | | | 22 | 264 | 271 | 826 | 327 | 337 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1772 | | | | 1774 | 1770 | 1806 | 1721 | 1770 | 1824 |
| Q Serve(g_s), s | 3.4 | 0.0 | 16.1 | | | | 0.9 | 10.3 | 10.3 | 16.9 | 8.8 | 8.8 |
| Cycle Q Clear(g_c), s | 3.4 | 0.0 | 16.1 | | | | 0.9 | 10.3 | 10.3 | 16.9 | 8.8 | 8.8 |
| Prop In Lane | 1.00 | | 0.29 | | | | 1.00 | | 0.17 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 500 | 0 | 499 | | | | 43 | 386 | 394 | 986 | 849 | 876 |
| V/C Ratio(X) | 0.21 | 0.00 | 0.82 | | | | 0.51 | 0.68 | 0.69 | 0.84 | 0.38 | 0.39 |
| Avail Cap(c_a), veh/h | 805 | 0 | 804 | | | | 474 | 945 | 964 | 1378 | 849 | 876 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 20.5 | 0.0 | 25.1 | | | | 36.1 | 26.9 | 26.9 | 25.1 | 12.4 | 12.4 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 3.5 | | | | 3.3 | 2.1 | 2.1 | 3.4 | 0.3 | 0.3 |
| 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(-26165%),veh/ln | 1.7 | 0.0 | 8.3 | | | | 0.5 | 5.2 | 5.4 | 8.5 | 4.3 | 4.5 |
| LnGrp Delay(d),s/veh | 20.7 | 0.0 | 28.6 | | | | 39.4 | 29.1 | 29.1 | 28.5 | 12.7 | 12.7 |
| LnGrp LOS | C | | C | | | | D | C | C | C | B | B |
| Approach Vol, veh/h | | 512 | | | | | | 557 | | | 1490 | |
| Approach Delay, s/veh | | 27.0 | | | | | | 29.5 | | | 21.4 | |
| Approach LOS | | C | | | | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 26.5 | 21.8 | | 26.6 | 6.8 | 41.5 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 18.9 | 12.3 | | 18.1 | 2.9 | 10.8 | | |
| Green Ext Time (p_c), s | 2.6 | 3.6 | | 2.7 | 0.0 | 7.1 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 24.3 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 36 | 1149 | 72 | 34 | 661 | 35 | 24 | 32 | 37 | 164 | 118 | 30 |
| 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 | | 0.99 | 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 40 | 1277 | 77 | 38 | 734 | 37 | 27 | 36 | 1 | 182 | 131 | 25 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 48 | 1559 | 94 | 46 | 1571 | 79 | 31 | 174 | 5 | 229 | 315 | 60 |
| Arrive On Green | 0.03 | 0.46 | 0.46 | 0.03 | 0.46 | 0.46 | 0.02 | 0.10 | 0.10 | 0.13 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1774 | 3392 | 204 | 1774 | 3429 | 173 | 1774 | 1803 | 50 | 1774 | 1520 | 290 |
| Grp Volume(v), veh/h | 40 | 665 | 689 | 38 | 379 | 392 | 27 | 0 | 37 | 182 | 0 | 156 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1826 | 1774 | 1770 | 1832 | 1774 | 0 | 1854 | 1774 | 0 | 1811 |
| Q Serve(g_s), s | 1.3 | 19.1 | 19.2 | 1.3 | 8.7 | 8.7 | 0.9 | 0.0 | 1.1 | 5.8 | 0.0 | 4.4 |
| Cycle Q Clear(g_c), s | 1.3 | 19.1 | 19.2 | 1.3 | 8.7 | 8.7 | 0.9 | 0.0 | 1.1 | 5.8 | 0.0 | 4.4 |
| Prop In Lane | 1.00 | | 0.11 | 1.00 | | 0.09 | 1.00 | | 0.03 | 1.00 | | 0.16 |
| Lane Grp Cap(c), veh/h | 48 | 814 | 840 | 46 | 811 | 839 | 31 | 0 | 178 | 229 | 0 | 376 |
| V/C Ratio(X) | 0.83 | 0.82 | 0.82 | 0.83 | 0.47 | 0.47 | 0.86 | 0.00 | 0.21 | 0.80 | 0.00 | 0.42 |
| Avail Cap(c_a), veh/h | 604 | 904 | 933 | 604 | 904 | 936 | 604 | 0 | 915 | 604 | 0 | 894 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 28.4 | 13.7 | 13.8 | 28.5 | 11.0 | 11.0 | 28.8 | 0.0 | 24.5 | 24.8 | 0.0 | 20.2 |
| Incr Delay (d2), s/veh | 12.4 | 4.8 | 4.8 | 13.4 | 0.2 | 0.2 | 21.7 | 0.0 | 0.2 | 2.4 | 0.0 | 0.3 |
| 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(-26165%),veh/ln | 0.8 | 10.3 | 10.7 | 0.8 | 4.2 | 4.4 | 0.6 | 0.0 | 0.6 | 3.0 | 0.0 | 2.2 |
| LnGrp Delay(d),s/veh | 40.9 | 18.6 | 18.5 | 41.9 | 11.1 | 11.1 | 50.5 | 0.0 | 24.7 | 27.2 | 0.0 | 20.5 |
| LnGrp LOS | D | B | B | D | B | B | D | | C | C | | C |
| Approach Vol, veh/h | | 1394 | | | 809 | | | 64 | | | 338 | |
| Approach Delay, s/veh | | 19.2 | | | 12.6 | | | 35.6 | | | 24.1 | |
| Approach LOS | | B | | | B | | | 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 | 5.5 | 32.0 | 5.0 | 16.2 | 5.6 | 31.9 | 11.6 | 9.7 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 21.2 | 2.9 | 6.4 | 3.3 | 10.7 | 7.8 | 3.1 |
| Green Ext Time (p_c), s | 0.0 | 5.8 | 0.0 | 0.7 | 0.0 | 9.6 | 0.1 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 18.2 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.5 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 18 | 0 | 4 | 10 | 30 | 14 |
| 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 | 66 | 66 | 66 | 66 | 66 | 66 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 27 | 0 | 6 | 15 | 45 | 21 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 27 | 0 | 54 | 27 |
| Stage 1 | - | - | - | - | 27 | - |
| Stage 2 | - | - | - | - | 27 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1587 | - | 954 | 1048 |
| Stage 1 | - | - | - | - | 996 | - |
| Stage 2 | - | - | - | - | 996 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1587 | - | 950 | 1048 |
| Mov Cap-2 Maneuver | - | - | - | - | 950 | - |
| Stage 1 | - | - | - | - | 996 | - |
| Stage 2 | - | - | - | - | 992 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 2.1 | 8.9 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 979 | - | - | 1587 | - |
| HCM Lane V/C Ratio | 0.068 | - | - | 0.004 | - |
| HCM Control Delay (s) | 8.9 | - | - | 7.3 | 0 |
| HCM Lane LOS | A | - | - | A | A |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 0 | - |

# APPENDIX F: CUMULATIVE (2016) PLUS PROJECT LEVEL OF SERVICE AND SYNCHRO WORKSHEETS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 496 | 0 | 0 | 201 | 0 | 0 | 0 | 0 | 238 | 0 | 816 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 522 | 0 | 0 | 212 | 0 | 0 | 0 | 0 | 251 | 0 | 213 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| 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 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | 0 | 0 |
| Arrive On Green | 0.00 | 0.63 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 251 | |
| Grp Volume(v), veh/h | 0 | 522 | 0 | 0 | 212 | 0 | 0 | 0 | 0 | 251 | 33.2 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.8 | | |
| Cycle Q Clear(g_c), s | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.8 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | | |
| V/C Ratio(X) | 0.00 | 0.24 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | | |
| Avail Cap(c_a), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 140 | 0 | 506 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.8 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.3 | | |
| LnGrp Delay(d),s/veh | 0.0 | 8.5 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 33.2 | | |
| LnGrp LOS | | A | | | A | | | | | C | | |
| Approach Vol, veh/h | | 522 | | | 212 | | | 0 | | | | |
| Approach Delay, s/veh | | 8.5 | | | 0.1 | | | 0.0 | | | | |
| Approach LOS | | A | | | A | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 67.0 | | | | 67.0 | 33.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 28.5 | 7.5 |
| Max Q Clear Time (g_c+I1), s | | 8.5 | | | | 2.0 | 13.8 | 0.0 |
| Green Ext Time (p_c), s | | 11.0 | | | | 11.3 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.0 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 188 | 238 | 0 | 0 | 75 | 96 | 126 | 208 | 61 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 209 | 264 | 0 | 0 | 83 | 0 | 140 | 231 | 57 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 440 | 109 | | | |
| Arrive On Green | 0.50 | 0.61 | 0.00 | 0.00 | 0.06 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1443 | 356 | | | |
| Grp Volume(v), veh/h | 209 | 264 | 0 | 0 | 83 | 0 | 140 | 0 | 288 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1799 | | | |
| Q Serve(g_s), s | 6.6 | 3.2 | 0.0 | 0.0 | 2.3 | 0.0 | 6.0 | 0.0 | 13.2 | | | |
| Cycle Q Clear(g_c), s | 6.6 | 3.2 | 0.0 | 0.0 | 2.3 | 0.0 | 6.0 | 0.0 | 13.2 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.20 | | | |
| Lane Grp Cap(c), veh/h | 895 | 2141 | 0 | 0 | 197 | 88 | 541 | 0 | 549 | | | |
| V/C Ratio(X) | 0.23 | 0.12 | 0.00 | 0.00 | 0.42 | 0.00 | 0.26 | 0.00 | 0.52 | | | |
| Avail Cap(c_a), veh/h | 895 | 2141 | 0 | 0 | 1256 | 562 | 541 | 0 | 549 | | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.79 | 0.79 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 13.9 | 8.4 | 0.0 | 0.0 | 45.7 | 0.0 | 26.2 | 0.0 | 28.8 | | | |
| Incr Delay (d2), s/veh | 0.5 | 0.1 | 0.0 | 0.0 | 6.5 | 0.0 | 1.2 | 0.0 | 3.6 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 3.4 | 1.6 | 0.0 | 0.0 | 1.3 | 0.0 | 3.1 | 0.0 | 7.1 | | | |
| LnGrp Delay(d),s/veh | 14.4 | 8.5 | 0.0 | 0.0 | 52.2 | 0.0 | 27.4 | 0.0 | 32.3 | | | |
| LnGrp LOS | B | A | | | D | | C | | C | | | |
| Approach Vol, veh/h | | 473 | | | 83 | | | 428 | | | | |
| Approach Delay, s/veh | | 11.1 | | | 52.2 | | | 30.7 | | | | |
| Approach LOS | | B | | | D | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 65.0 | | | 54.9 | 10.1 | | 35.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 60.5 | | | 20.9 | * 36 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | | 5.2 | | | 8.6 | 4.3 | | 15.2 |
| Green Ext Time (p_c), s | | 2.8 | | | 2.0 | 0.3 | | 1.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.1 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 7 | 357 | 138 | 380 | 675 | 50 | 14 | 122 | 125 | 50 | 639 | 50 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 8 | 388 | 47 | 413 | 734 | 51 | 15 | 133 | 21 | 54 | 695 | 50 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 407 | 1261 | 563 | 496 | 911 | 63 | 64 | 870 | 388 | 94 | 844 | 61 |
| Arrive On Green | 0.23 | 0.36 | 0.36 | 0.14 | 0.27 | 0.27 | 0.04 | 0.25 | 0.25 | 0.05 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3357 | 233 | 1774 | 3539 | 1579 | 1774 | 3348 | 241 |
| Grp Volume(v), veh/h | 8 | 388 | 47 | 413 | 387 | 398 | 15 | 133 | 21 | 54 | 367 | 378 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1821 | 1774 | 1770 | 1579 | 1774 | 1770 | 1820 |
| Q Serve(g_s), s | 0.3 | 6.9 | 1.3 | 10.2 | 17.8 | 17.8 | 0.7 | 2.6 | 0.9 | 2.6 | 17.1 | 17.1 |
| Cycle Q Clear(g_c), s | 0.3 | 6.9 | 1.3 | 10.2 | 17.8 | 17.8 | 0.7 | 2.6 | 0.9 | 2.6 | 17.1 | 17.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 407 | 1261 | 563 | 496 | 480 | 494 | 64 | 870 | 388 | 94 | 446 | 459 |
| V/C Ratio(X) | 0.02 | 0.31 | 0.08 | 0.83 | 0.81 | 0.81 | 0.23 | 0.15 | 0.05 | 0.57 | 0.82 | 0.82 |
| Avail Cap(c_a), veh/h | 407 | 1261 | 563 | 789 | 609 | 627 | 407 | 2030 | 906 | 509 | 812 | 835 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 26.0 | 20.3 | 11.2 | 36.3 | 29.6 | 29.6 | 40.8 | 25.8 | 25.1 | 40.3 | 30.8 | 30.8 |
| Incr Delay (d2), s/veh | 0.1 | 0.6 | 0.3 | 2.1 | 4.8 | 4.7 | 0.7 | 0.0 | 0.0 | 2.0 | 1.5 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 3.5 | 0.8 | 5.0 | 9.3 | 9.6 | 0.4 | 1.3 | 0.4 | 1.3 | 8.5 | 8.8 |
| LnGrp Delay(d),s/veh | 26.1 | 20.9 | 11.5 | 38.4 | 34.5 | 34.4 | 41.5 | 25.8 | 25.2 | 42.4 | 32.2 | 32.2 |
| LnGrp LOS | C | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 443 | | | 1198 | | | 169 | | | 799 | |
| Approach Delay, s/veh | | 20.0 | | | 35.8 | | | 27.1 | | | 32.9 | |
| 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 | 8.6 | 26.3 | 16.6 | 35.7 | 8.1 | 26.9 | 24.0 | 28.2 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 4.6 | 4.6 | 12.2 | 8.9 | 2.7 | 19.1 | 2.3 | 19.8 |
| Green Ext Time (p_c), s | 0.0 | 0.6 | 0.4 | 5.7 | 0.5 | 2.8 | 0.0 | 3.6 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 31.7 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 139 | 362 | 0 | 0 | 703 | 94 | 394 | 173 | 188 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 151 | 393 | 0 | 0 | 764 | 0 | 308 | 356 | 61 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 263 | 1793 | 0 | 0 | 1212 | 542 | 564 | 593 | 503 | | | |
| Arrive On Green | 0.08 | 0.51 | 0.00 | 0.00 | 0.34 | 0.00 | 0.32 | 0.32 | 0.32 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1580 | | | |
| Grp Volume(v), veh/h | 151 | 393 | 0 | 0 | 764 | 0 | 308 | 356 | 61 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1580 | | | |
| Q Serve(g_s), s | 1.9 | 2.8 | 0.0 | 0.0 | 8.3 | 0.0 | 6.5 | 7.4 | 1.3 | | | |
| Cycle Q Clear(g_c), s | 1.9 | 2.8 | 0.0 | 0.0 | 8.3 | 0.0 | 6.5 | 7.4 | 1.3 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 263 | 1793 | 0 | 0 | 1212 | 542 | 564 | 593 | 503 | | | |
| V/C Ratio(X) | 0.57 | 0.22 | 0.00 | 0.00 | 0.63 | 0.00 | 0.55 | 0.60 | 0.12 | | | |
| Avail Cap(c_a), veh/h | 2261 | 2325 | 0 | 0 | 2325 | 1040 | 1166 | 1224 | 1038 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 20.4 | 6.2 | 0.0 | 0.0 | 12.6 | 0.0 | 12.8 | 13.1 | 11.0 | | | |
| Incr Delay (d2), s/veh | 0.7 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 1.2 | 1.4 | 0.2 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 0.9 | 1.4 | 0.0 | 0.0 | 4.1 | 0.0 | 3.3 | 4.0 | 0.6 | | | |
| LnGrp Delay(d),s/veh | 21.1 | 6.3 | 0.0 | 0.0 | 12.8 | 0.0 | 14.0 | 14.5 | 11.2 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 544 | | | 764 | | | 725 | | | | |
| Approach Delay, s/veh | | 10.4 | | | 12.8 | | | 14.0 | | | | |
| Approach LOS | | B | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 27.1 | | | 7.5 | 19.6 | | 18.5 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 4.8 | | | 3.9 | 10.3 | | 9.4 |
| Green Ext Time (p_c), s | | 5.6 | | | 0.2 | 5.2 | | 5.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.6 |
| 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) | 3 | 4 | 22 | 4 | 0 | 2 | 13 | 239 | 10 | 30 | 738 | 49 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 15 | 285 | 11 | 36 | 879 | 54 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 221 | 15 | 0 | 217 | 15 | 0 | 16 | 2152 | 83 | 41 | 2146 | 132 |
| Arrive On Green | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.62 | 0.62 | 0.02 | 0.63 | 0.63 |
| Sat Flow, veh/h | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 3475 | 134 | 1774 | 3388 | 208 |
| Grp Volume(v), veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 15 | 145 | 151 | 36 | 459 | 474 |
| Grp Sat Flow(s),veh/h/ln | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 1770 | 1839 | 1774 | 1770 | 1826 |
| Q Serve(g_s), s | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 | 1.2 | 1.2 | 0.7 | 4.4 | 4.4 |
| Cycle Q Clear(g_c), s | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 | 1.2 | 1.2 | 0.7 | 4.4 | 4.4 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.00 | 1.00 | | 0.07 | 1.00 | | 0.11 |
| Lane Grp Cap(c), veh/h | 221 | 15 | 0 | 217 | 15 | 0 | 16 | 1096 | 1139 | 41 | 1121 | 1157 |
| V/C Ratio(X) | 0.02 | 0.33 | 0.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.13 | 0.13 | 0.88 | 0.41 | 0.41 |
| Avail Cap(c_a), veh/h | 1032 | 1085 | 0 | 1434 | 1628 | 0 | 517 | 2062 | 2143 | 2067 | 2062 | 2128 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.9 | 16.9 | 0.0 | 17.0 | 0.0 | 0.0 | 17.0 | 2.7 | 2.7 | 16.7 | 3.1 | 3.1 |
| Incr Delay (d2), s/veh | 0.0 | 12.2 | 0.0 | 0.0 | 0.0 | 0.0 | 52.3 | 0.0 | 0.0 | 18.8 | 0.5 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.6 | 0.6 | 0.5 | 2.2 | 2.3 |
| LnGrp Delay(d),s/veh | 17.0 | 29.1 | 0.0 | 17.1 | 0.0 | 0.0 | 69.3 | 2.7 | 2.7 | 35.5 | 3.6 | 3.6 |
| LnGrp LOS | B | C | | B | | | E | A | A | D | A | A |
| Approach Vol, veh/h | | 9 | | | 5 | | | 311 | | | 969 | |
| Approach Delay, s/veh | | 23.7 | | | 17.1 | | | 5.9 | | | 4.8 | |
| Approach LOS | | C | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.8 | 25.3 | | 4.3 | 4.3 | 25.7 | | 4.3 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.7 | 3.2 | | 2.1 | 2.3 | 6.4 | | 2.2 |
| Green Ext Time (p_c), s | 0.0 | 16.0 | | 0.0 | 0.0 | 15.3 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.3 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 11 | 89 | 27 | 2 | 90 | 2 | 31 | 12 | 3 | 4 | 23 | 8 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 98 | 30 | 2 | 99 | 2 | 34 | 13 | 3 | 4 | 25 | 9 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 103 | 0 | 0 | 100 | 0 | 0 | 192 | 231 | 102 | 238 | 230 | 55 |
| Stage 1 | - | - | - | - | - | - | 124 | 124 | - | 106 | 106 | - |
| Stage 2 | - | - | - | - | - | - | 68 | 107 | - | 132 | 124 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1487 | - | - | 1493 | - | - | 759 | 668 | 953 | 706 | 669 | 1001 |
| Stage 1 | - | - | - | - | - | - | 880 | 793 | - | 889 | 807 | - |
| Stage 2 | - | - | - | - | - | - | 935 | 806 | - | 871 | 793 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1485 | - | - | 1491 | - | - | 722 | 659 | 950 | 685 | 660 | 998 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 722 | 659 | - | 685 | 660 | - |
| Stage 1 | - | - | - | - | - | - | 871 | 785 | - | 880 | 805 | - |
| Stage 2 | - | - | - | - | - | - | 895 | 804 | - | 844 | 785 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.6 | 0.2 | 10.4 | 10.3 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 715 | 1485 | - | - | 1491 | - | - | 719 |
| HCM Lane V/C Ratio | 0.071 | 0.008 | - | - | 0.001 | - | - | 0.053 |
| HCM Control Delay (s) | 10.4 | 7.4 | 0 | - | 7.4 | - | - | 10.3 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 14 | 78 | 28 | 0 | 0 | 0 | 59 | 269 | 12 | 414 | 450 | 133 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 16 | 89 | 18 | | | | 67 | 306 | 11 | 470 | 511 | 128 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | | | | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 179 | 152 | 31 | | | | 116 | 1011 | 36 | 735 | 1231 | 307 |
| Arrive On Green | 0.10 | 0.10 | 0.10 | | | | 0.07 | 0.29 | 0.29 | 0.21 | 0.44 | 0.44 |
| Sat Flow, veh/h | 1774 | 1503 | 304 | | | | 1774 | 3485 | 125 | 3442 | 2807 | 700 |
| Grp Volume(v), veh/h | 16 | 0 | 107 | | | | 67 | 155 | 162 | 470 | 321 | 318 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1807 | | | | 1774 | 1770 | 1840 | 1721 | 1770 | 1737 |
| Q Serve(g_s), s | 0.3 | 0.0 | 2.3 | | | | 1.5 | 2.8 | 2.8 | 5.0 | 5.0 | 5.1 |
| Cycle Q Clear(g_c), s | 0.3 | 0.0 | 2.3 | | | | 1.5 | 2.8 | 2.8 | 5.0 | 5.0 | 5.1 |
| Prop In Lane | 1.00 | | 0.17 | | | | 1.00 | | 0.07 | 1.00 | | 0.40 |
| Lane Grp Cap(c), veh/h | 179 | 0 | 183 | | | | 116 | 514 | 534 | 735 | 776 | 762 |
| V/C Ratio(X) | 0.09 | 0.00 | 0.59 | | | | 0.58 | 0.30 | 0.30 | 0.64 | 0.41 | 0.42 |
| Avail Cap(c_a), veh/h | 1489 | 0 | 1517 | | | | 876 | 1748 | 1818 | 2549 | 1311 | 1287 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.5 | 0.0 | 17.4 | | | | 18.4 | 11.2 | 11.2 | 14.5 | 7.8 | 7.8 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 3.0 | | | | 1.7 | 0.3 | 0.3 | 0.9 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 0.0 | 1.3 | | | | 0.8 | 1.4 | 1.4 | 2.4 | 2.5 | 2.5 |
| LnGrp Delay(d),s/veh | 16.7 | 0.0 | 20.4 | | | | 20.1 | 11.5 | 11.5 | 15.4 | 8.2 | 8.2 |
| LnGrp LOS | B | | C | | | | C | B | B | B | A | A |
| Approach Vol, veh/h | | 123 | | | | | | 384 | | | 1109 | |
| Approach Delay, s/veh | | 19.9 | | | | | | 13.0 | | | 11.2 | |
| Approach LOS | | B | | | | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 13.7 | 17.3 | | 9.6 | 7.6 | 23.3 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 7.0 | 4.8 | | 4.3 | 3.5 | 7.1 | | |
| Green Ext Time (p_c), s | 1.7 | 6.6 | | 0.6 | 0.1 | 6.0 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.3 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 27 | 493 | 27 | 16 | 683 | 54 | 59 | 42 | 38 | 31 | 40 | 33 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 29 | 536 | 26 | 17 | 742 | 55 | 64 | 46 | 8 | 34 | 43 | 3 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 32 | 1326 | 64 | 18 | 1262 | 94 | 78 | 210 | 36 | 39 | 196 | 14 |
| Arrive On Green | 0.02 | 0.39 | 0.39 | 0.01 | 0.38 | 0.38 | 0.04 | 0.14 | 0.14 | 0.02 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1774 | 3436 | 166 | 1774 | 3340 | 248 | 1774 | 1545 | 269 | 1774 | 1721 | 120 |
| Grp Volume(v), veh/h | 29 | 276 | 286 | 17 | 393 | 404 | 64 | 0 | 54 | 34 | 0 | 46 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1833 | 1774 | 1770 | 1818 | 1774 | 0 | 1814 | 1774 | 0 | 1841 |
| Q Serve(g_s), s | 0.6 | 4.3 | 4.3 | 0.4 | 6.8 | 6.8 | 1.4 | 0.0 | 1.0 | 0.7 | 0.0 | 0.9 |
| Cycle Q Clear(g_c), s | 0.6 | 4.3 | 4.3 | 0.4 | 6.8 | 6.8 | 1.4 | 0.0 | 1.0 | 0.7 | 0.0 | 0.9 |
| Prop In Lane | 1.00 | | 0.09 | 1.00 | | 0.14 | 1.00 | | 0.15 | 1.00 | | 0.07 |
| Lane Grp Cap(c), veh/h | 32 | 683 | 707 | 18 | 669 | 687 | 78 | 0 | 246 | 39 | 0 | 209 |
| V/C Ratio(X) | 0.90 | 0.40 | 0.40 | 0.94 | 0.59 | 0.59 | 0.82 | 0.00 | 0.22 | 0.88 | 0.00 | 0.22 |
| Avail Cap(c_a), veh/h | 932 | 1394 | 1444 | 932 | 1394 | 1432 | 932 | 0 | 1381 | 932 | 0 | 1402 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.7 | 8.5 | 8.5 | 18.8 | 9.5 | 9.5 | 18.1 | 0.0 | 14.7 | 18.6 | 0.0 | 15.3 |
| Incr Delay (d2), s/veh | 24.9 | 0.1 | 0.1 | 45.1 | 0.3 | 0.3 | 7.8 | 0.0 | 0.2 | 20.1 | 0.0 | 0.2 |
| 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(-26165%),veh/ln | 0.5 | 2.1 | 2.2 | 0.4 | 3.3 | 3.4 | 0.8 | 0.0 | 0.5 | 0.6 | 0.0 | 0.4 |
| LnGrp Delay(d),s/veh | 43.6 | 8.6 | 8.6 | 64.0 | 9.8 | 9.8 | 25.8 | 0.0 | 14.8 | 38.7 | 0.0 | 15.5 |
| LnGrp LOS | D | A | A | E | A | A | C | | B | D | | B |
| Approach Vol, veh/h | | 591 | | | 814 | | | 118 | | | 80 | |
| Approach Delay, s/veh | | 10.4 | | | 10.9 | | | 20.8 | | | 25.4 | |
| Approach LOS | | B | | | B | | | 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 | 4.4 | 19.7 | 5.7 | 8.3 | 4.7 | 19.4 | 4.8 | 9.2 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 2.6 | 6.3 | 3.4 | 2.9 | 2.6 | 8.8 | 2.7 | 3.0 |
| Green Ext Time (p_c), s | 0.0 | 5.7 | 0.0 | 0.3 | 0.0 | 5.5 | 0.0 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.2 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 4 | 5 | 0 | 14 | 8 | 0 | 0 | 0 | 33 | 0 | 14 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 6 | 6 | 8 | 0 | 22 | 13 | 0 | 0 | 0 | 52 | 0 | 22 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 35 | 0 | 0 | 14 | 0 | 0 | 63 | 58 | 10 | 52 | 56 | 29 |
| Stage 1 | - | - | - | - | - | - | 23 | 23 | - | 29 | 29 | - |
| Stage 2 | - | - | - | - | - | - | 40 | 35 | - | 23 | 27 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1576 | - | - | 1604 | - | - | 932 | 833 | 1071 | 947 | 835 | 1046 |
| Stage 1 | - | - | - | - | - | - | 995 | 876 | - | 988 | 871 | - |
| Stage 2 | - | - | - | - | - | - | 975 | 866 | - | 995 | 873 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1576 | - | - | 1604 | - | - | 909 | 830 | 1071 | 944 | 832 | 1046 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 909 | 830 | - | 944 | 832 | - |
| Stage 1 | - | - | - | - | - | - | 991 | 872 | - | 984 | 871 | - |
| Stage 2 | - | - | - | - | - | - | 954 | 866 | - | 991 | 870 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 2.2 | 0 | 0 | 9 |
| HCM LOS | | | A | A |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | - | 1576 | - | - | 1604 | - | - | 972 |
| HCM Lane V/C Ratio | - | 0.004 | - | - | - | - | - | 0.077 |
| HCM Control Delay (s) | 0 | 7.3 | 0 | - | 0 | - | - | 9 |
| HCM Lane LOS | A | A | A | - | A | - | - | A |
| HCM 95th %tile Q(veh) | - | 0 | - | - | 0 | - | - | 0.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.6 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 91 | 3 | 0 | 80 | 12 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 50 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 99 | 3 | 0 | 87 | 13 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 102 | 0 | 188 | 101 |
| Stage 1 | - | - | - | - | 101 | - |
| Stage 2 | - | - | - | - | 87 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1490 | - | 801 | 954 |
| Stage 1 | - | - | - | - | 923 | - |
| Stage 2 | - | - | - | - | 936 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1490 | - | 801 | 954 |
| Mov Cap-2 Maneuver | - | - | - | - | 790 | - |
| Stage 1 | - | - | - | - | 923 | - |
| Stage 2 | - | - | - | - | 936 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 9.6 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 790 | - | - | 1490 | - |
| HCM Lane V/C Ratio | 0.017 | - | - | - | - |
| HCM Control Delay (s) | 9.6 | - | - | 0 | - |
| HCM Lane LOS | A | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.4 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 6 | 540 | 772 | 2 | 6 | 21 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 7 | 587 | 839 | 2 | 7 | 23 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 841 | 0 | - | 0 | 1147 | 421 |
| Stage 1 | - | - | - | - | 840 | - |
| Stage 2 | - | - | - | - | 307 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 790 | - | - | - | 192 | 581 |
| Stage 1 | - | - | - | - | 384 | - |
| Stage 2 | - | - | - | - | 719 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 790 | - | - | - | 190 | 581 |
| Mov Cap-2 Maneuver | - | - | - | - | 190 | - |
| Stage 1 | - | - | - | - | 384 | - |
| Stage 2 | - | - | - | - | 710 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0 | 14.7 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 790 | - | - | - | 399 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.074 |
| HCM Control Delay (s) | 9.6 | 0.1 | - | - | 14.7 |
| HCM Lane LOS | A | A | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 236 | 0 | 0 | 273 | 0 | 0 | 0 | 0 | 207 | 0 | 1093 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 246 | 0 | 0 | 284 | 0 | 0 | 0 | 0 | 216 | 0 | 306 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | 0 | 0 |
| Arrive On Green | 0.00 | 0.64 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 216 | |
| Grp Volume(v), veh/h | 0 | 246 | 0 | 0 | 284 | 0 | 0 | 0 | 0 | 216 | 34.0 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 2.7 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 10.2 | | |
| Cycle Q Clear(g_c), s | 0.0 | 2.7 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 10.2 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | | |
| V/C Ratio(X) | 0.00 | 0.11 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.46 | | |
| Avail Cap(c_a), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 177 | 0 | 470 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 6.8 | 0.0 | 0.0 | 16.5 | 0.0 | 0.0 | 0.0 | 0.0 | 30.8 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | | |
| 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 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 1.3 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 5.4 | | |
| LnGrp Delay(d),s/veh | 0.0 | 6.9 | 0.0 | 0.0 | 16.6 | 0.0 | 0.0 | 0.0 | 0.0 | 34.0 | | |
| LnGrp LOS | | A | | | B | | | | | C | | |
| Approach Vol, veh/h | | 246 | | | 284 | | | 0 | | | | |
| Approach Delay, s/veh | | 6.9 | | | 16.6 | | | 0.0 | | | | |
| Approach LOS | | A | | | B | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 69.0 | | | | 69.0 | 31.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 26.5 | 9.5 |
| Max Q Clear Time (g_c+I1), s | | 4.7 | | | | 8.5 | 12.2 | 0.0 |
| Green Ext Time (p_c), s | | 7.5 | | | | 7.4 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 18.4 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 326 | 447 | 0 | 0 | 183 | 222 | 102 | 321 | 67 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 358 | 491 | 0 | 0 | 201 | 0 | 112 | 353 | 66 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 929 | 2318 | 0 | 0 | 307 | 137 | 452 | 389 | 73 | | | |
| Arrive On Green | 1.00 | 1.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.25 | 0.25 | 0.25 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1526 | 285 | | | |
| Grp Volume(v), veh/h | 358 | 491 | 0 | 0 | 201 | 0 | 112 | 0 | 419 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1812 | | | |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 0.0 | 5.0 | 0.0 | 22.4 | | | |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 0.0 | 5.0 | 0.0 | 22.4 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.16 | | | |
| Lane Grp Cap(c), veh/h | 929 | 2318 | 0 | 0 | 307 | 137 | 452 | 0 | 462 | | | |
| V/C Ratio(X) | 0.39 | 0.21 | 0.00 | 0.00 | 0.66 | 0.00 | 0.25 | 0.00 | 0.91 | | | |
| Avail Cap(c_a), veh/h | 929 | 2318 | 0 | 0 | 903 | 404 | 452 | 0 | 462 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.89 | 0.89 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 44.2 | 0.0 | 29.6 | 0.0 | 36.1 | | | |
| Incr Delay (d2), s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 10.5 | 0.0 | 1.3 | 0.0 | 24.1 | | | |
| 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(-26165%),veh/ln | 0.3 | 0.1 | 0.0 | 0.0 | 3.1 | 0.0 | 2.6 | 0.0 | 14.3 | | | |
| LnGrp Delay(d),s/veh | 1.1 | 0.2 | 0.0 | 0.0 | 54.7 | 0.0 | 30.9 | 0.0 | 60.2 | | | |
| LnGrp LOS | A | A | | | D | | C | | E | | | |
| Approach Vol, veh/h | | 849 | | | 201 | | | 531 | | | | |
| Approach Delay, s/veh | | 0.6 | | | 54.7 | | | 54.0 | | | | |
| Approach LOS | | A | | | D | | | D | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 70.0 | | | 56.8 | 13.2 | | 30.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 65.5 | | | 35.9 | * 26 | | 25.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 2.0 | 7.5 | | 24.4 |
| Green Ext Time (p_c), s | | 5.6 | | | 5.4 | 0.7 | | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 25.4 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 15 | 786 | 161 | 289 | 573 | 50 | 27 | 208 | 379 | 172 | 694 | 74 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 16 | 864 | 78 | 318 | 630 | 51 | 30 | 229 | 76 | 189 | 763 | 74 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 395 | 1247 | 557 | 398 | 814 | 66 | 87 | 742 | 331 | 226 | 907 | 88 |
| Arrive On Green | 0.22 | 0.35 | 0.35 | 0.12 | 0.25 | 0.25 | 0.05 | 0.21 | 0.21 | 0.13 | 0.28 | 0.28 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3316 | 268 | 1774 | 3539 | 1579 | 1774 | 3260 | 316 |
| Grp Volume(v), veh/h | 16 | 864 | 78 | 318 | 336 | 345 | 30 | 229 | 76 | 189 | 414 | 423 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1815 | 1774 | 1770 | 1579 | 1774 | 1770 | 1806 |
| Q Serve(g_s), s | 0.6 | 18.8 | 2.3 | 8.1 | 15.9 | 15.9 | 1.5 | 4.9 | 3.6 | 9.4 | 19.8 | 19.8 |
| Cycle Q Clear(g_c), s | 0.6 | 18.8 | 2.3 | 8.1 | 15.9 | 15.9 | 1.5 | 4.9 | 3.6 | 9.4 | 19.8 | 19.8 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.15 | 1.00 | | 1.00 | 1.00 | | 0.17 |
| Lane Grp Cap(c), veh/h | 395 | 1247 | 557 | 398 | 435 | 446 | 87 | 742 | 331 | 226 | 492 | 503 |
| V/C Ratio(X) | 0.04 | 0.69 | 0.14 | 0.80 | 0.77 | 0.77 | 0.35 | 0.31 | 0.23 | 0.83 | 0.84 | 0.84 |
| Avail Cap(c_a), veh/h | 395 | 1247 | 557 | 766 | 591 | 606 | 395 | 1968 | 878 | 493 | 787 | 804 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 27.4 | 24.9 | 11.5 | 38.7 | 31.6 | 31.6 | 41.4 | 30.0 | 29.5 | 38.3 | 30.6 | 30.6 |
| Incr Delay (d2), s/veh | 0.2 | 3.2 | 0.5 | 1.4 | 2.8 | 2.8 | 0.9 | 0.1 | 0.1 | 3.1 | 2.4 | 2.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.3 | 9.7 | 1.3 | 3.9 | 8.1 | 8.3 | 0.7 | 2.4 | 1.6 | 4.8 | 10.0 | 10.2 |
| LnGrp Delay(d),s/veh | 27.6 | 28.1 | 12.0 | 40.1 | 34.4 | 34.4 | 42.2 | 30.1 | 29.6 | 41.4 | 33.0 | 32.9 |
| LnGrp LOS | C | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 958 | | | 999 | | | 335 | | | 1026 | |
| Approach Delay, s/veh | | 26.8 | | | 36.2 | | | 31.1 | | | 34.5 | |
| 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 | 15.5 | 23.7 | 14.4 | 36.3 | 9.3 | 29.9 | 24.0 | 26.7 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 25.0 | 50.0 | 20.0 | 30.0 | 20.0 | * 40 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 11.4 | 6.9 | 10.1 | 20.8 | 3.5 | 21.8 | 2.6 | 17.9 |
| Green Ext Time (p_c), s | 0.1 | 1.1 | 0.3 | 5.2 | 0.9 | 3.2 | 0.0 | 3.9 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 32.5 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 282 | 1044 | 0 | 0 | 653 | 95 | 261 | 124 | 257 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 313 | 1160 | 0 | 0 | 726 | 0 | 214 | 244 | 214 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 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, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 454 | 2104 | 0 | 0 | 1358 | 607 | 440 | 462 | 391 | | | |
| Arrive On Green | 0.13 | 0.59 | 0.00 | 0.00 | 0.38 | 0.00 | 0.25 | 0.25 | 0.25 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1580 | | | |
| Grp Volume(v), veh/h | 313 | 1160 | 0 | 0 | 726 | 0 | 214 | 244 | 214 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1580 | | | |
| Q Serve(g_s), s | 4.4 | 10.0 | 0.0 | 0.0 | 8.1 | 0.0 | 5.2 | 5.7 | 6.0 | | | |
| Cycle Q Clear(g_c), s | 4.4 | 10.0 | 0.0 | 0.0 | 8.1 | 0.0 | 5.2 | 5.7 | 6.0 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 454 | 2104 | 0 | 0 | 1358 | 607 | 440 | 462 | 391 | | | |
| V/C Ratio(X) | 0.69 | 0.55 | 0.00 | 0.00 | 0.53 | 0.00 | 0.49 | 0.53 | 0.55 | | | |
| Avail Cap(c_a), veh/h | 2037 | 2104 | 0 | 0 | 2094 | 937 | 1050 | 1102 | 935 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 21.0 | 6.2 | 0.0 | 0.0 | 12.1 | 0.0 | 16.3 | 16.5 | 16.6 | | | |
| Incr Delay (d2), s/veh | 0.7 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 1.2 | 1.3 | 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 | | | |
| %ile BackOfQ(-26165%),veh/ln | 2.1 | 4.9 | 0.0 | 0.0 | 4.0 | 0.0 | 2.7 | 3.1 | 2.8 | | | |
| LnGrp Delay(d),s/veh | 21.7 | 6.4 | 0.0 | 0.0 | 12.2 | 0.0 | 17.5 | 17.8 | 18.3 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 1473 | | | 726 | | | 672 | | | | |
| Approach Delay, s/veh | | 9.6 | | | 12.2 | | | 17.9 | | | | |
| Approach LOS | | A | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 34.1 | | | 10.7 | 23.4 | | 16.6 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 12.0 | | | 6.4 | 10.1 | | 8.0 |
| Green Ext Time (p_c), s | | 9.0 | | | 0.4 | 9.3 | | 4.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.2 |
| HCM 2010 LOS | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 56 | 3 | 144 | 16 | 6 | 22 | 3 | 236 | 0 | 2 | 932 | 25 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 64 | 3 | 13 | 18 | 7 | 2 | 3 | 268 | 0 | 2 | 1059 | 26 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 271 | 22 | 97 | 264 | 102 | 29 | 4 | 2246 | 0 | 4 | 2239 | 55 |
| Arrive On Green | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.00 | 0.63 | 0.00 | 0.00 | 0.63 | 0.63 |
| Sat Flow, veh/h | 1400 | 305 | 1324 | 1392 | 1394 | 398 | 1774 | 3632 | 0 | 1774 | 3530 | 87 |
| Grp Volume(v), veh/h | 64 | 0 | 16 | 18 | 0 | 9 | 3 | 268 | 0 | 2 | 531 | 554 |
| Grp Sat Flow(s),veh/h/ln | 1400 | 0 | 1629 | 1392 | 0 | 1792 | 1774 | 1770 | 0 | 1774 | 1770 | 1847 |
| Q Serve(g_s), s | 1.8 | 0.0 | 0.4 | 0.5 | 0.0 | 0.2 | 0.1 | 1.2 | 0.0 | 0.0 | 6.5 | 6.5 |
| Cycle Q Clear(g_c), s | 2.0 | 0.0 | 0.4 | 0.9 | 0.0 | 0.2 | 0.1 | 1.2 | 0.0 | 0.0 | 6.5 | 6.5 |
| Prop In Lane | 1.00 | | 0.81 | 1.00 | | 0.22 | 1.00 | | 0.00 | 1.00 | | 0.05 |
| Lane Grp Cap(c), veh/h | 271 | 0 | 120 | 264 | 0 | 132 | 4 | 2246 | 0 | 4 | 1122 | 1171 |
| V/C Ratio(X) | 0.24 | 0.00 | 0.13 | 0.07 | 0.00 | 0.07 | 0.70 | 0.12 | 0.00 | 0.47 | 0.47 | 0.47 |
| Avail Cap(c_a), veh/h | 847 | 0 | 790 | 1173 | 0 | 1303 | 430 | 3430 | 0 | 1719 | 1715 | 1791 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.8 | 0.0 | 17.9 | 18.3 | 0.0 | 17.8 | 20.6 | 3.0 | 0.0 | 20.6 | 3.9 | 3.9 |
| Incr Delay (d2), s/veh | 0.4 | 0.0 | 0.5 | 0.1 | 0.0 | 0.2 | 55.1 | 0.0 | 0.0 | 26.3 | 0.7 | 0.6 |
| 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(-26165%),veh/ln | 0.7 | 0.0 | 0.2 | 0.2 | 0.0 | 0.1 | 0.1 | 0.6 | 0.0 | 0.1 | 3.3 | 3.4 |
| LnGrp Delay(d),s/veh | 19.2 | 0.0 | 18.4 | 18.4 | 0.0 | 18.0 | 75.7 | 3.0 | 0.0 | 46.9 | 4.6 | 4.6 |
| LnGrp LOS | B | | B | B | | B | E | A | | D | A | A |
| Approach Vol, veh/h | | 80 | | | 27 | | | 271 | | | 1087 | |
| Approach Delay, s/veh | | 19.0 | | | 18.3 | | | 3.8 | | | 4.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.0 | 30.2 | | 7.0 | 4.1 | 30.2 | | 7.0 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.0 | 3.2 | | 4.0 | 2.1 | 8.5 | | 2.9 |
| Green Ext Time (p_c), s | 0.0 | 19.3 | | 0.3 | 0.0 | 17.7 | | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 5.5 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 8 | 348 | 107 | 5 | 82 | 5 | 63 | 15 | 6 | 11 | 54 | 9 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 9 | 387 | 119 | 6 | 91 | 6 | 70 | 17 | 7 | 12 | 60 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 99 | 0 | 0 | 389 | 0 | 0 | 495 | 516 | 391 | 525 | 513 | 52 |
| Stage 1 | - | - | - | - | - | - | 406 | 406 | - | 107 | 107 | - |
| Stage 2 | - | - | - | - | - | - | 89 | 110 | - | 418 | 406 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1492 | - | - | 1170 | - | - | 471 | 462 | 657 | 449 | 464 | 1005 |
| Stage 1 | - | - | - | - | - | - | 621 | 597 | - | 887 | 806 | - |
| Stage 2 | - | - | - | - | - | - | 909 | 804 | - | 612 | 597 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1490 | - | - | 1168 | - | - | 413 | 454 | 655 | 426 | 456 | 1002 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 413 | 454 | - | 426 | 456 | - |
| Stage 1 | - | - | - | - | - | - | 614 | 591 | - | 878 | 801 | - |
| Stage 2 | - | - | - | - | - | - | 827 | 799 | - | 582 | 591 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.4 | 15.6 | 14 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 431 | 1490 | - | - | 1168 | - | - | 483 |
| HCM Lane V/C Ratio | 0.217 | 0.006 | - | - | 0.005 | - | - | 0.17 |
| HCM Control Delay (s) | 15.6 | 7.4 | 0 | - | 8.1 | - | - | 14 |
| HCM Lane LOS | C | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.8 | 0 | - | - | 0 | - | - | 0.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 88 | 247 | 113 | 0 | 0 | 0 | 19 | 415 | 48 | 725 | 530 | 38 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 104 | 291 | 117 | | | | 22 | 488 | 47 | 853 | 624 | 40 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | | | | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 498 | 355 | 143 | | | | 43 | 707 | 68 | 1008 | 1639 | 105 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | | | | 0.02 | 0.22 | 0.22 | 0.29 | 0.49 | 0.49 |
| Sat Flow, veh/h | 1774 | 1264 | 508 | | | | 1774 | 3263 | 313 | 3442 | 3377 | 216 |
| Grp Volume(v), veh/h | 104 | 0 | 408 | | | | 22 | 264 | 271 | 853 | 327 | 337 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1772 | | | | 1774 | 1770 | 1806 | 1721 | 1770 | 1824 |
| Q Serve(g_s), s | 3.4 | 0.0 | 16.4 | | | | 0.9 | 10.5 | 10.6 | 17.8 | 8.9 | 8.9 |
| Cycle Q Clear(g_c), s | 3.4 | 0.0 | 16.4 | | | | 0.9 | 10.5 | 10.6 | 17.8 | 8.9 | 8.9 |
| Prop In Lane | 1.00 | | 0.29 | | | | 1.00 | | 0.17 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 498 | 0 | 497 | | | | 43 | 384 | 392 | 1008 | 859 | 885 |
| V/C Ratio(X) | 0.21 | 0.00 | 0.82 | | | | 0.51 | 0.69 | 0.69 | 0.85 | 0.38 | 0.38 |
| Avail Cap(c_a), veh/h | 790 | 0 | 789 | | | | 465 | 928 | 947 | 1353 | 859 | 885 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.0 | 0.0 | 25.7 | | | | 36.8 | 27.5 | 27.5 | 25.4 | 12.4 | 12.4 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 3.8 | | | | 3.4 | 2.2 | 2.2 | 3.9 | 0.3 | 0.3 |
| 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(-26165%),veh/ln | 1.7 | 0.0 | 8.6 | | | | 0.5 | 5.4 | 5.5 | 9.0 | 4.3 | 4.5 |
| LnGrp Delay(d),s/veh | 21.2 | 0.0 | 29.5 | | | | 40.2 | 29.7 | 29.7 | 29.3 | 12.7 | 12.7 |
| LnGrp LOS | C | | C | | | | D | C | C | C | B | B |
| Approach Vol, veh/h | | 512 | | | | | | 557 | | | 1517 | |
| Approach Delay, s/veh | | 27.8 | | | | | | 30.1 | | | 22.0 | |
| Approach LOS | | C | | | | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 27.3 | 22.0 | | 26.9 | 6.9 | 42.5 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 19.8 | 12.6 | | 18.4 | 2.9 | 10.9 | | |
| Green Ext Time (p_c), s | 2.6 | 3.6 | | 2.7 | 0.0 | 7.1 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 24.9 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 36 | 1152 | 98 | 41 | 667 | 35 | 38 | 32 | 41 | 164 | 118 | 30 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 40 | 1280 | 105 | 46 | 741 | 37 | 42 | 36 | 0 | 182 | 131 | 24 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 48 | 1528 | 125 | 56 | 1598 | 80 | 51 | 177 | 0 | 228 | 298 | 55 |
| Arrive On Green | 0.03 | 0.46 | 0.46 | 0.03 | 0.47 | 0.47 | 0.03 | 0.10 | 0.00 | 0.13 | 0.19 | 0.19 |
| Sat Flow, veh/h | 1774 | 3313 | 271 | 1774 | 3430 | 171 | 1774 | 1863 | 0 | 1774 | 1532 | 281 |
| Grp Volume(v), veh/h | 40 | 682 | 703 | 46 | 382 | 396 | 42 | 36 | 0 | 182 | 0 | 155 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1814 | 1774 | 1770 | 1832 | 1774 | 1863 | 0 | 1774 | 0 | 1812 |
| Q Serve(g_s), s | 1.3 | 20.3 | 20.4 | 1.5 | 8.8 | 8.8 | 1.4 | 1.1 | 0.0 | 6.0 | 0.0 | 4.5 |
| Cycle Q Clear(g_c), s | 1.3 | 20.3 | 20.4 | 1.5 | 8.8 | 8.8 | 1.4 | 1.1 | 0.0 | 6.0 | 0.0 | 4.5 |
| Prop In Lane | 1.00 | | 0.15 | 1.00 | | 0.09 | 1.00 | | 0.00 | 1.00 | | 0.15 |
| Lane Grp Cap(c), veh/h | 48 | 816 | 837 | 56 | 824 | 853 | 51 | 177 | 0 | 228 | 0 | 353 |
| V/C Ratio(X) | 0.83 | 0.84 | 0.84 | 0.81 | 0.46 | 0.46 | 0.82 | 0.20 | 0.00 | 0.80 | 0.00 | 0.44 |
| Avail Cap(c_a), veh/h | 591 | 885 | 907 | 591 | 885 | 916 | 591 | 900 | 0 | 591 | 0 | 876 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 29.0 | 14.2 | 14.2 | 28.9 | 10.9 | 10.9 | 29.0 | 25.1 | 0.0 | 25.4 | 0.0 | 21.3 |
| Incr Delay (d2), s/veh | 12.3 | 6.0 | 6.1 | 10.0 | 0.2 | 0.1 | 11.4 | 0.2 | 0.0 | 2.4 | 0.0 | 0.3 |
| 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(-26165%),veh/ln | 0.8 | 11.2 | 11.6 | 0.9 | 4.3 | 4.4 | 0.9 | 0.6 | 0.0 | 3.1 | 0.0 | 2.3 |
| LnGrp Delay(d),s/veh | 41.3 | 20.2 | 20.3 | 38.9 | 11.1 | 11.1 | 40.4 | 25.3 | 0.0 | 27.8 | 0.0 | 21.6 |
| LnGrp LOS | D | C | C | D | B | B | D | C | | C | | C |
| Approach Vol, veh/h | | 1425 | | | 824 | | | 78 | | | 337 | |
| Approach Delay, s/veh | | 20.8 | | | 12.6 | | | 33.4 | | | 25.0 | |
| Approach LOS | | C | | | B | | | 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 | 5.9 | 32.7 | 5.7 | 15.7 | 5.6 | 33.0 | 11.7 | 9.7 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 3.5 | 22.4 | 3.4 | 6.5 | 3.3 | 10.8 | 8.0 | 3.1 |
| Green Ext Time (p_c), s | 0.0 | 5.2 | 0.0 | 0.7 | 0.0 | 9.8 | 0.1 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 19.2 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 14 | 18 | 0 | 4 | 10 | 33 | 30 | 0 | 14 | 18 | 0 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 21 | 27 | 0 | 6 | 15 | 50 | 45 | 0 | 21 | 27 | 0 | 12 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 65 | 0 | 0 | 27 | 0 | 0 | 128 | 147 | 27 | 132 | 122 | 40 |
| Stage 1 | - | - | - | - | - | - | 70 | 70 | - | 52 | 52 | - |
| Stage 2 | - | - | - | - | - | - | 58 | 77 | - | 80 | 70 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1537 | - | - | 1587 | - | - | 845 | 744 | 1048 | 840 | 768 | 1031 |
| Stage 1 | - | - | - | - | - | - | 940 | 837 | - | 961 | 852 | - |
| Stage 2 | - | - | - | - | - | - | 954 | 831 | - | 929 | 837 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1537 | - | - | 1587 | - | - | 824 | 731 | 1048 | 812 | 754 | 1031 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 824 | 731 | - | 812 | 754 | - |
| Stage 1 | - | - | - | - | - | - | 927 | 825 | - | 948 | 849 | - |
| Stage 2 | - | - | - | - | - | - | 939 | 828 | - | 897 | 825 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 3.2 | 0.6 | 9.4 | 9.3 |
| HCM LOS | | | A | A |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 884 | 1537 | - | - | 1587 | - | - | 869 |
| HCM Lane V/C Ratio | 0.075 | 0.014 | - | - | 0.004 | - | - | 0.045 |
| HCM Control Delay (s) | 9.4 | 7.4 | 0 | - | 7.3 | 0 | - | 9.3 |
| HCM Lane LOS | A | A | A | - | A | A | - | A |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.1 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 352 | 11 | 0 | 84 | 6 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 50 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 383 | 12 | 0 | 91 | 7 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 395 | 0 | 480 | 389 |
| Stage 1 | - | - | - | - | 389 | - |
| Stage 2 | - | - | - | - | 91 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1164 | - | 545 | 659 |
| Stage 1 | - | - | - | - | 685 | - |
| Stage 2 | - | - | - | - | 933 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1164 | - | 545 | 659 |
| Mov Cap-2 Maneuver | - | - | - | - | 591 | - |
| Stage 1 | - | - | - | - | 685 | - |
| Stage 2 | - | - | - | - | 933 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 11.2 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 591 | - | - | 1164 | - |
| HCM Lane V/C Ratio | 0.011 | - | - | - | - |
| HCM Control Delay (s) | 11.2 | - | - | 0 | - |
| HCM Lane LOS | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.6 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 21 | 1282 | 728 | 6 | 3 | 12 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 23 | 1393 | 791 | 7 | 3 | 13 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 798 | 0 | - | 0 | 1537 | 399 |
| Stage 1 | - | - | - | - | 795 | - |
| Stage 2 | - | - | - | - | 742 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 820 | - | - | - | 107 | 601 |
| Stage 1 | - | - | - | - | 405 | - |
| Stage 2 | - | - | - | - | 432 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 820 | - | - | - | 94 | 601 |
| Mov Cap-2 Maneuver | - | - | - | - | 94 | - |
| Stage 1 | - | - | - | - | 405 | - |
| Stage 2 | - | - | - | - | 378 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.7 | 0 | 18.2 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 820 | - | - | - | 289 |
| HCM Lane V/C Ratio | 0.028 | - | - | - | 0.056 |
| HCM Control Delay (s) | 9.5 | 0.6 | - | - | 18.2 |
| HCM Lane LOS | A | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.2 |

# APPENDIX G: BUILD-OUT (2025) NO PROJECT LEVEL OF SERVICE AND SYNCHRO WORKSHEETS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 603 | 0 | 0 | 245 | 0 | 0 | 0 | 0 | 281 | 0 | 992 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 635 | 0 | 0 | 258 | 0 | 0 | 0 | 0 | 296 | 0 | 620 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| 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 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | 0 | 0 |
| Arrive On Green | 0.00 | 0.63 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 296 | |
| Grp Volume(v), veh/h | 0 | 635 | 0 | 0 | 258 | 0 | 0 | 0 | 0 | 296 | 35.6 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | D | |
| Q Serve(g_s), s | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.3 | | |
| Cycle Q Clear(g_c), s | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.3 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | | |
| V/C Ratio(X) | 0.00 | 0.29 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.59 | | |
| Avail Cap(c_a), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 140 | 0 | 506 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 8.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.7 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | | |
| 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 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.7 | | |
| LnGrp Delay(d),s/veh | 0.0 | 8.9 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 35.6 | | |
| LnGrp LOS | | A | | | A | | | | | D | | |
| Approach Vol, veh/h | | 635 | | | 258 | | | 0 | | | | |
| Approach Delay, s/veh | | 8.9 | | | 0.1 | | | 0.0 | | | | |
| Approach LOS | | A | | | A | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 67.0 | | | | 67.0 | 33.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 28.5 | 7.5 |
| Max Q Clear Time (g_c+I1), s | | 10.2 | | | | 2.0 | 16.3 | 0.0 |
| Green Ext Time (p_c), s | | 13.9 | | | | 14.6 | 0.4 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.6 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 229 | 281 | 0 | 0 | 91 | 85 | 153 | 250 | 74 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 254 | 312 | 0 | 0 | 101 | 0 | 170 | 278 | 71 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 893 | 2141 | 0 | 0 | 201 | 90 | 541 | 437 | 112 | | | |
| Arrive On Green | 1.00 | 1.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1432 | 366 | | | |
| Grp Volume(v), veh/h | 254 | 312 | 0 | 0 | 101 | 0 | 170 | 0 | 349 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1797 | | | |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 0.0 | 7.4 | 0.0 | 16.7 | | | |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 0.0 | 7.4 | 0.0 | 16.7 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.20 | | | |
| Lane Grp Cap(c), veh/h | 893 | 2141 | 0 | 0 | 201 | 90 | 541 | 0 | 548 | | | |
| V/C Ratio(X) | 0.28 | 0.15 | 0.00 | 0.00 | 0.50 | 0.00 | 0.31 | 0.00 | 0.64 | | | |
| Avail Cap(c_a), veh/h | 893 | 2141 | 0 | 0 | 1256 | 562 | 541 | 0 | 548 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.75 | 0.75 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 45.8 | 0.0 | 26.7 | 0.0 | 30.0 | | | |
| Incr Delay (d2), s/veh | 0.6 | 0.1 | 0.0 | 0.0 | 8.7 | 0.0 | 1.5 | 0.0 | 5.6 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 0.1 | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 3.8 | 0.0 | 9.2 | | | |
| LnGrp Delay(d),s/veh | 0.6 | 0.1 | 0.0 | 0.0 | 54.4 | 0.0 | 28.2 | 0.0 | 35.5 | | | |
| LnGrp LOS | A | A | | | D | | C | | D | | | |
| Approach Vol, veh/h | | 566 | | | 101 | | | 519 | | | | |
| Approach Delay, s/veh | | 0.3 | | | 54.4 | | | 33.1 | | | | |
| Approach LOS | | A | | | D | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 65.0 | | | 54.8 | 10.2 | | 35.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 60.5 | | | 20.9 | * 36 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 2.0 | 4.8 | | 18.7 |
| Green Ext Time (p_c), s | | 3.5 | | | 3.0 | 0.4 | | 1.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 19.3 |
| HCM 2010 LOS | B |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 8 | 437 | 158 | 410 | 835 | 61 | 17 | 148 | 152 | 61 | 777 | 60 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 9 | 475 | 67 | 446 | 908 | 63 | 18 | 161 | 33 | 66 | 845 | 60 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 54 | 1172 | 523 | 524 | 1520 | 105 | 56 | 993 | 443 | 101 | 995 | 71 |
| Arrive On Green | 0.03 | 0.33 | 0.33 | 0.15 | 0.45 | 0.45 | 0.03 | 0.28 | 0.28 | 0.06 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 3539 | 1580 | 3442 | 3358 | 233 | 1774 | 3539 | 1580 | 1774 | 3352 | 238 |
| Grp Volume(v), veh/h | 9 | 475 | 67 | 446 | 479 | 492 | 18 | 161 | 33 | 66 | 446 | 459 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1580 | 1721 | 1770 | 1821 | 1774 | 1770 | 1580 | 1774 | 1770 | 1820 |
| Q Serve(g_s), s | 0.5 | 10.1 | 2.3 | 12.3 | 19.8 | 19.8 | 1.0 | 3.4 | 1.5 | 3.6 | 23.2 | 23.2 |
| Cycle Q Clear(g_c), s | 0.5 | 10.1 | 2.3 | 12.3 | 19.8 | 19.8 | 1.0 | 3.4 | 1.5 | 3.6 | 23.2 | 23.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 54 | 1172 | 523 | 524 | 801 | 825 | 56 | 993 | 443 | 101 | 525 | 540 |
| V/C Ratio(X) | 0.17 | 0.41 | 0.13 | 0.85 | 0.60 | 0.60 | 0.32 | 0.16 | 0.07 | 0.65 | 0.85 | 0.85 |
| Avail Cap(c_a), veh/h | 54 | 1172 | 523 | 1055 | 1074 | 1106 | 91 | 1758 | 785 | 254 | 1042 | 1072 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 46.2 | 25.3 | 14.9 | 40.4 | 20.1 | 20.1 | 46.3 | 26.5 | 25.9 | 45.2 | 32.3 | 32.3 |
| Incr Delay (d2), s/veh | 6.4 | 1.0 | 0.5 | 1.5 | 0.3 | 0.3 | 1.2 | 0.0 | 0.0 | 2.6 | 1.5 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.3 | 5.1 | 1.3 | 6.0 | 9.8 | 10.0 | 0.5 | 1.6 | 0.7 | 1.8 | 11.5 | 11.8 |
| LnGrp Delay(d),s/veh | 52.6 | 26.3 | 15.4 | 41.9 | 20.3 | 20.3 | 47.5 | 26.6 | 25.9 | 47.8 | 33.9 | 33.8 |
| LnGrp LOS | D | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 551 | | | 1417 | | | 212 | | | 971 | |
| Approach Delay, s/veh | | 25.4 | | | 27.1 | | | 28.2 | | | 34.8 | |
| Approach LOS | | C | | | C | | | 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 | 9.6 | 32.4 | 18.9 | 37.0 | 8.0 | 33.9 | 7.0 | 48.9 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 14.0 | 48.6 | 30.0 | 32.4 | 5.0 | * 58 | 3.0 | 59.4 |
| Max Q Clear Time (g_c+I1), s | 5.6 | 5.4 | 14.3 | 12.1 | 3.0 | 25.2 | 2.5 | 21.8 |
| Green Ext Time (p_c), s | 0.0 | 0.7 | 0.5 | 7.3 | 0.1 | 3.8 | 0.0 | 8.6 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 29.3 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 166 | 446 | 0 | 0 | 821 | 115 | 476 | 210 | 215 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 180 | 485 | 0 | 0 | 892 | 0 | 372 | 430 | 72 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 291 | 1828 | 0 | 0 | 1274 | 570 | 603 | 633 | 537 | | | |
| Arrive On Green | 0.08 | 0.52 | 0.00 | 0.00 | 0.36 | 0.00 | 0.34 | 0.34 | 0.34 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1581 | | | |
| Grp Volume(v), veh/h | 180 | 485 | 0 | 0 | 892 | 0 | 372 | 430 | 72 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1581 | | | |
| Q Serve(g_s), s | 2.8 | 4.3 | 0.0 | 0.0 | 12.0 | 0.0 | 9.7 | 11.0 | 1.8 | | | |
| Cycle Q Clear(g_c), s | 2.8 | 4.3 | 0.0 | 0.0 | 12.0 | 0.0 | 9.7 | 11.0 | 1.8 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 291 | 1828 | 0 | 0 | 1274 | 570 | 603 | 633 | 537 | | | |
| V/C Ratio(X) | 0.62 | 0.27 | 0.00 | 0.00 | 0.70 | 0.00 | 0.62 | 0.68 | 0.13 | | | |
| Avail Cap(c_a), veh/h | 1856 | 1909 | 0 | 0 | 1909 | 854 | 957 | 1005 | 853 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 24.6 | 7.5 | 0.0 | 0.0 | 15.2 | 0.0 | 15.3 | 15.8 | 12.7 | | | |
| Incr Delay (d2), s/veh | 0.8 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 1.5 | 1.8 | 0.2 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 1.4 | 2.1 | 0.0 | 0.0 | 5.9 | 0.0 | 5.0 | 5.9 | 0.8 | | | |
| LnGrp Delay(d),s/veh | 25.4 | 7.6 | 0.0 | 0.0 | 15.5 | 0.0 | 16.8 | 17.6 | 12.9 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 665 | | | 892 | | | 874 | | | | |
| Approach Delay, s/veh | | 12.4 | | | 15.5 | | | 16.9 | | | | |
| Approach LOS | | B | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 32.7 | | | 8.7 | 24.0 | | 22.9 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 6.3 | | | 4.8 | 14.0 | | 13.0 |
| Green Ext Time (p_c), s | | 6.9 | | | 0.2 | 5.9 | | 5.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 15.1 |
| 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) | 3 | 4 | 27 | 4 | 0 | 2 | 15 | 291 | 12 | 36 | 835 | 60 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 18 | 346 | 12 | 43 | 994 | 67 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 175 | 15 | 0 | 171 | 15 | 0 | 19 | 2414 | 84 | 51 | 2387 | 161 |
| Arrive On Green | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.69 | 0.69 | 0.03 | 0.71 | 0.71 |
| Sat Flow, veh/h | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 3490 | 121 | 1774 | 3365 | 227 |
| Grp Volume(v), veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 18 | 175 | 183 | 43 | 523 | 538 |
| Grp Sat Flow(s),veh/h/ln | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 1770 | 1841 | 1774 | 1770 | 1823 |
| Q Serve(g_s), s | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.4 | 1.5 | 1.5 | 1.1 | 5.4 | 5.4 |
| Cycle Q Clear(g_c), s | 0.1 | 0.1 | 0.0 | 0.3 | 0.0 | 0.0 | 0.4 | 1.5 | 1.5 | 1.1 | 5.4 | 5.4 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.00 | 1.00 | | 0.07 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 175 | 15 | 0 | 171 | 15 | 0 | 19 | 1224 | 1274 | 51 | 1255 | 1293 |
| V/C Ratio(X) | 0.02 | 0.33 | 0.00 | 0.03 | 0.00 | 0.00 | 0.92 | 0.14 | 0.14 | 0.85 | 0.42 | 0.42 |
| Avail Cap(c_a), veh/h | 1121 | 1265 | 0 | 1113 | 1265 | 0 | 361 | 2763 | 2876 | 442 | 2844 | 2929 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.8 | 21.8 | 0.0 | 21.9 | 0.0 | 0.0 | 21.8 | 2.3 | 2.3 | 21.4 | 2.7 | 2.7 |
| Incr Delay (d2), s/veh | 0.1 | 11.9 | 0.0 | 0.1 | 0.0 | 0.0 | 40.7 | 0.0 | 0.0 | 13.2 | 0.5 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.4 | 0.7 | 0.8 | 0.7 | 2.6 | 2.7 |
| LnGrp Delay(d),s/veh | 21.8 | 33.7 | 0.0 | 22.0 | 0.0 | 0.0 | 62.6 | 2.4 | 2.4 | 34.6 | 3.1 | 3.1 |
| LnGrp LOS | C | C | | C | | | E | A | A | C | A | A |
| Approach Vol, veh/h | | 9 | | | 5 | | | 376 | | | 1104 | |
| Approach Delay, s/veh | | 28.4 | | | 22.0 | | | 5.2 | | | 4.3 | |
| Approach LOS | | C | | | C | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 5.3 | 34.6 | | 4.4 | 4.5 | 35.3 | | 4.4 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 1.3 | 69.0 | | 30.0 | 9.0 | 71.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 3.1 | 3.5 | | 2.1 | 2.4 | 7.4 | | 2.3 |
| Green Ext Time (p_c), s | 0.0 | 24.2 | | 0.0 | 0.0 | 24.0 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 4.8 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 13 | 105 | 28 | 2 | 95 | 2 | 20 | 14 | 3 | 4 | 28 | 9 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 14 | 115 | 31 | 2 | 104 | 2 | 22 | 15 | 3 | 4 | 31 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 109 | 0 | 0 | 117 | 0 | 0 | 220 | 259 | 119 | 267 | 258 | 57 |
| Stage 1 | - | - | - | - | - | - | 146 | 146 | - | 112 | 112 | - |
| Stage 2 | - | - | - | - | - | - | 74 | 113 | - | 155 | 146 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1479 | - | - | 1471 | - | - | 726 | 645 | 932 | 675 | 646 | 998 |
| Stage 1 | - | - | - | - | - | - | 856 | 776 | - | 881 | 802 | - |
| Stage 2 | - | - | - | - | - | - | 927 | 802 | - | 847 | 776 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1477 | - | - | 1469 | - | - | 684 | 636 | 929 | 652 | 637 | 995 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 684 | 636 | - | 652 | 637 | - |
| Stage 1 | - | - | - | - | - | - | 846 | 767 | - | 871 | 800 | - |
| Stage 2 | - | - | - | - | - | - | 880 | 800 | - | 817 | 767 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.7 | 0.2 | 10.6 | 10.6 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 679 | 1477 | - | - | 1469 | - | - | 693 |
| HCM Lane V/C Ratio | 0.06 | 0.01 | - | - | 0.001 | - | - | 0.065 |
| HCM Control Delay (s) | 10.6 | 7.5 | 0 | - | 7.5 | - | - | 10.6 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 17 | 95 | 34 | 0 | 0 | 0 | 71 | 327 | 14 | 441 | 548 | 162 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 19 | 108 | 25 | | | | 81 | 372 | 13 | 501 | 623 | 158 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | | | | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 214 | 177 | 41 | | | | 124 | 1108 | 39 | 740 | 1294 | 328 |
| Arrive On Green | 0.12 | 0.12 | 0.12 | | | | 0.07 | 0.32 | 0.32 | 0.22 | 0.46 | 0.46 |
| Sat Flow, veh/h | 1774 | 1462 | 339 | | | | 1774 | 3489 | 122 | 3442 | 2797 | 708 |
| Grp Volume(v), veh/h | 19 | 0 | 133 | | | | 81 | 188 | 197 | 501 | 394 | 387 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1801 | | | | 1774 | 1770 | 1841 | 1721 | 1770 | 1736 |
| Q Serve(g_s), s | 0.4 | 0.0 | 3.2 | | | | 2.1 | 3.8 | 3.8 | 6.2 | 7.1 | 7.1 |
| Cycle Q Clear(g_c), s | 0.4 | 0.0 | 3.2 | | | | 2.1 | 3.8 | 3.8 | 6.2 | 7.1 | 7.1 |
| Prop In Lane | 1.00 | | 0.19 | | | | 1.00 | | 0.07 | 1.00 | | 0.41 |
| Lane Grp Cap(c), veh/h | 214 | 0 | 218 | | | | 124 | 562 | 585 | 740 | 819 | 803 |
| V/C Ratio(X) | 0.09 | 0.00 | 0.61 | | | | 0.65 | 0.34 | 0.34 | 0.68 | 0.48 | 0.48 |
| Avail Cap(c_a), veh/h | 1306 | 0 | 1326 | | | | 769 | 1533 | 1595 | 2236 | 1150 | 1128 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.0 | 0.0 | 19.3 | | | | 20.9 | 12.0 | 12.0 | 16.6 | 8.6 | 8.6 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 2.8 | | | | 2.2 | 0.3 | 0.3 | 1.1 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 0.0 | 1.8 | | | | 1.1 | 1.9 | 2.0 | 3.0 | 3.5 | 3.4 |
| LnGrp Delay(d),s/veh | 18.2 | 0.0 | 22.0 | | | | 23.1 | 12.4 | 12.4 | 17.7 | 9.0 | 9.0 |
| LnGrp LOS | B | | C | | | | C | B | B | B | A | A |
| Approach Vol, veh/h | | 152 | | | | | | 466 | | | 1282 | |
| Approach Delay, s/veh | | 21.6 | | | | | | 14.2 | | | 12.4 | |
| Approach LOS | | C | | | | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 14.9 | 20.2 | | 11.1 | 8.2 | 26.9 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 8.2 | 5.8 | | 5.2 | 4.1 | 9.1 | | |
| Green Ext Time (p_c), s | 1.8 | 8.5 | | 0.8 | 0.1 | 7.3 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.6 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 33 | 598 | 24 | 17 | 851 | 65 | 40 | 51 | 38 | 38 | 49 | 40 |
| 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 | | 0.99 | 1.00 | | 0.99 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 36 | 650 | 25 | 18 | 925 | 68 | 43 | 55 | 12 | 41 | 53 | 10 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 42 | 1535 | 59 | 19 | 1435 | 106 | 51 | 174 | 38 | 48 | 177 | 33 |
| Arrive On Green | 0.02 | 0.44 | 0.44 | 0.01 | 0.43 | 0.43 | 0.03 | 0.12 | 0.12 | 0.03 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1774 | 3475 | 134 | 1774 | 3343 | 246 | 1774 | 1481 | 323 | 1774 | 1523 | 287 |
| Grp Volume(v), veh/h | 36 | 331 | 344 | 18 | 490 | 503 | 43 | 0 | 67 | 41 | 0 | 63 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1839 | 1774 | 1770 | 1819 | 1774 | 0 | 1804 | 1774 | 0 | 1810 |
| Q Serve(g_s), s | 0.9 | 5.4 | 5.4 | 0.4 | 9.2 | 9.2 | 1.0 | 0.0 | 1.4 | 1.0 | 0.0 | 1.3 |
| Cycle Q Clear(g_c), s | 0.9 | 5.4 | 5.4 | 0.4 | 9.2 | 9.2 | 1.0 | 0.0 | 1.4 | 1.0 | 0.0 | 1.3 |
| Prop In Lane | 1.00 | | 0.07 | 1.00 | | 0.14 | 1.00 | | 0.18 | 1.00 | | 0.16 |
| Lane Grp Cap(c), veh/h | 42 | 782 | 812 | 19 | 760 | 781 | 51 | 0 | 212 | 48 | 0 | 210 |
| V/C Ratio(X) | 0.87 | 0.42 | 0.42 | 0.93 | 0.64 | 0.64 | 0.85 | 0.00 | 0.32 | 0.85 | 0.00 | 0.30 |
| Avail Cap(c_a), veh/h | 840 | 1257 | 1306 | 840 | 1257 | 1292 | 840 | 0 | 1238 | 840 | 0 | 1243 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 20.6 | 8.1 | 8.1 | 20.9 | 9.5 | 9.5 | 20.4 | 0.0 | 17.1 | 20.5 | 0.0 | 17.1 |
| Incr Delay (d2), s/veh | 17.5 | 0.1 | 0.1 | 41.2 | 0.3 | 0.3 | 13.5 | 0.0 | 0.3 | 14.5 | 0.0 | 0.3 |
| 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(-26165%),veh/ln | 0.6 | 2.6 | 2.7 | 0.4 | 4.6 | 4.7 | 0.7 | 0.0 | 0.7 | 0.7 | 0.0 | 0.7 |
| LnGrp Delay(d),s/veh | 38.1 | 8.2 | 8.2 | 62.1 | 9.9 | 9.8 | 33.9 | 0.0 | 17.4 | 34.9 | 0.0 | 17.4 |
| LnGrp LOS | D | A | A | E | A | A | C | | B | C | | B |
| Approach Vol, veh/h | | 711 | | | 1011 | | | 110 | | | 104 | |
| Approach Delay, s/veh | | 9.7 | | | 10.8 | | | 23.8 | | | 24.3 | |
| Approach LOS | | A | | | B | | | 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 | 4.5 | 23.7 | 5.2 | 8.9 | 5.0 | 23.1 | 5.1 | 9.0 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 2.9 | 7.4 | 3.0 | 3.3 | 2.9 | 11.2 | 3.0 | 3.4 |
| Green Ext Time (p_c), s | 0.0 | 7.4 | 0.0 | 0.5 | 0.0 | 6.9 | 0.0 | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.9 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 5 | 0 | 17 | 0 | 0 |
| 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 | 63 | 63 | 63 | 63 | 63 | 63 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 6 | 8 | 0 | 27 | 0 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 14 | 0 | 37 | 10 |
| Stage 1 | - | - | - | - | 10 | - |
| Stage 2 | - | - | - | - | 27 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1604 | - | 975 | 1071 |
| Stage 1 | - | - | - | - | 1013 | - |
| Stage 2 | - | - | - | - | 996 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1604 | - | 975 | 1071 |
| Mov Cap-2 Maneuver | - | - | - | - | 975 | - |
| Stage 1 | - | - | - | - | 1013 | - |
| Stage 2 | - | - | - | - | 996 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 0 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | 1604 | - |
| HCM Lane V/C Ratio | - | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 | - |
| HCM Lane LOS | A | - | - | A | - |
| HCM 95th %tile Q(veh) | - | - | - | 0 | - |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 287 | 0 | 0 | 332 | 0 | 0 | 0 | 0 | 220 | 0 | 1325 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 299 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 229 | 0 | 963 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | 0 | 0 |
| Arrive On Green | 0.00 | 0.64 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 229 | |
| Grp Volume(v), veh/h | 0 | 299 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 229 | 34.6 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | C | |
| Q Serve(g_s), s | 0.0 | 3.3 | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.9 | | |
| Cycle Q Clear(g_c), s | 0.0 | 3.3 | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.9 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | | |
| V/C Ratio(X) | 0.00 | 0.13 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | | |
| Avail Cap(c_a), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 177 | 0 | 470 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 6.9 | 0.0 | 0.0 | 17.1 | 0.0 | 0.0 | 0.0 | 0.0 | 31.0 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.6 | | |
| 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 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 1.6 | 0.0 | 0.0 | 3.9 | 0.0 | 0.0 | 0.0 | 0.0 | 5.8 | | |
| LnGrp Delay(d),s/veh | 0.0 | 7.0 | 0.0 | 0.0 | 17.2 | 0.0 | 0.0 | 0.0 | 0.0 | 34.6 | | |
| LnGrp LOS | | A | | | B | | | | | C | | |
| Approach Vol, veh/h | | 299 | | | 346 | | | 0 | | | | |
| Approach Delay, s/veh | | 7.0 | | | 17.2 | | | 0.0 | | | | |
| Approach LOS | | A | | | B | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 69.0 | | | | 69.0 | 31.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 26.5 | 9.5 |
| Max Q Clear Time (g_c+I1), s | | 5.3 | | | | 10.0 | 12.9 | 0.0 |
| Green Ext Time (p_c), s | | 9.4 | | | | 9.2 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 18.3 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 396 | 512 | 0 | 0 | 223 | 252 | 125 | 387 | 81 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 435 | 563 | 0 | 0 | 245 | 0 | 137 | 425 | 80 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 798 | 2106 | 0 | 0 | 354 | 158 | 559 | 480 | 90 | | | |
| Arrive On Green | 0.90 | 1.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1524 | 287 | | | |
| Grp Volume(v), veh/h | 435 | 563 | 0 | 0 | 245 | 0 | 137 | 0 | 505 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1811 | | | |
| Q Serve(g_s), s | 4.8 | 0.0 | 0.0 | 0.0 | 6.7 | 0.0 | 5.7 | 0.0 | 26.5 | | | |
| Cycle Q Clear(g_c), s | 4.8 | 0.0 | 0.0 | 0.0 | 6.7 | 0.0 | 5.7 | 0.0 | 26.5 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.16 | | | |
| Lane Grp Cap(c), veh/h | 798 | 2106 | 0 | 0 | 354 | 158 | 559 | 0 | 571 | | | |
| V/C Ratio(X) | 0.54 | 0.27 | 0.00 | 0.00 | 0.69 | 0.00 | 0.25 | 0.00 | 0.89 | | | |
| Avail Cap(c_a), veh/h | 798 | 2106 | 0 | 0 | 938 | 420 | 559 | 0 | 571 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.87 | 0.87 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 3.0 | 0.0 | 0.0 | 0.0 | 43.5 | 0.0 | 25.4 | 0.0 | 32.5 | | | |
| Incr Delay (d2), s/veh | 2.3 | 0.3 | 0.0 | 0.0 | 10.6 | 0.0 | 1.0 | 0.0 | 18.0 | | | |
| 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(-26165%),veh/ln | 2.4 | 0.1 | 0.0 | 0.0 | 3.8 | 0.0 | 3.0 | 0.0 | 16.0 | | | |
| LnGrp Delay(d),s/veh | 5.3 | 0.3 | 0.0 | 0.0 | 54.1 | 0.0 | 26.5 | 0.0 | 50.5 | | | |
| LnGrp LOS | A | A | | | D | | C | | D | | | |
| Approach Vol, veh/h | | 998 | | | 245 | | | 642 | | | | |
| Approach Delay, s/veh | | 2.5 | | | 54.1 | | | 45.4 | | | | |
| Approach LOS | | A | | | D | | | D | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 64.0 | | | 49.5 | 14.5 | | 36.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 59.5 | | | 28.9 | * 27 | | 31.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 6.8 | 8.7 | | 28.5 |
| Green Ext Time (p_c), s | | 7.0 | | | 6.0 | 0.9 | | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.8 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 18 | 979 | 188 | 323 | 693 | 61 | 33 | 252 | 461 | 209 | 844 | 86 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 20 | 1076 | 105 | 355 | 762 | 62 | 36 | 277 | 337 | 230 | 927 | 88 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 70 | 1294 | 578 | 406 | 1472 | 120 | 93 | 831 | 371 | 255 | 1042 | 99 |
| Arrive On Green | 0.04 | 0.37 | 0.37 | 0.12 | 0.44 | 0.44 | 0.05 | 0.23 | 0.23 | 0.14 | 0.32 | 0.32 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3315 | 270 | 1774 | 3539 | 1579 | 1774 | 3267 | 310 |
| Grp Volume(v), veh/h | 20 | 1076 | 105 | 355 | 407 | 417 | 36 | 277 | 337 | 230 | 502 | 513 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1815 | 1774 | 1770 | 1579 | 1774 | 1770 | 1807 |
| Q Serve(g_s), s | 1.4 | 35.2 | 4.6 | 12.9 | 21.0 | 21.1 | 2.5 | 8.2 | 26.3 | 16.2 | 34.2 | 34.2 |
| Cycle Q Clear(g_c), s | 1.4 | 35.2 | 4.6 | 12.9 | 21.0 | 21.1 | 2.5 | 8.2 | 26.3 | 16.2 | 34.2 | 34.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.15 | 1.00 | | 1.00 | 1.00 | | 0.17 |
| Lane Grp Cap(c), veh/h | 70 | 1294 | 578 | 406 | 786 | 806 | 93 | 831 | 371 | 255 | 564 | 576 |
| V/C Ratio(X) | 0.29 | 0.83 | 0.18 | 0.88 | 0.52 | 0.52 | 0.39 | 0.33 | 0.91 | 0.90 | 0.89 | 0.89 |
| Avail Cap(c_a), veh/h | 70 | 1294 | 578 | 434 | 801 | 821 | 93 | 1160 | 518 | 294 | 803 | 820 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 59.2 | 36.7 | 17.5 | 55.0 | 25.5 | 25.5 | 58.1 | 40.3 | 47.2 | 53.4 | 41.1 | 41.1 |
| Incr Delay (d2), s/veh | 10.0 | 6.3 | 0.7 | 16.1 | 0.2 | 0.2 | 1.0 | 0.1 | 13.1 | 24.9 | 7.0 | 6.9 |
| 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(-26165%),veh/ln | 0.9 | 18.3 | 2.4 | 7.0 | 10.3 | 10.6 | 1.2 | 4.0 | 12.9 | 9.7 | 17.8 | 18.2 |
| LnGrp Delay(d),s/veh | 69.2 | 43.0 | 18.2 | 71.2 | 25.7 | 25.7 | 59.1 | 40.4 | 60.4 | 78.3 | 48.1 | 48.0 |
| LnGrp LOS | E | D | B | E | C | C | E | D | E | E | D | D |
| Approach Vol, veh/h | | 1201 | | | 1179 | | | 650 | | | 1245 | |
| Approach Delay, s/veh | | 41.3 | | | 39.4 | | | 51.8 | | | 53.6 | |
| Approach LOS | | D | | | 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 | 22.2 | 34.7 | 18.9 | 51.0 | 11.6 | 45.4 | 9.0 | 60.9 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 21.3 | 41.6 | 16.0 | 46.4 | 5.0 | * 58 | 5.0 | 57.4 |
| Max Q Clear Time (g_c+I1), s | 18.2 | 28.3 | 14.9 | 37.2 | 4.5 | 36.2 | 3.4 | 23.1 |
| Green Ext Time (p_c), s | 0.1 | 1.4 | 0.1 | 6.2 | 0.1 | 4.2 | 0.0 | 13.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 45.9 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 340 | 1296 | 0 | 0 | 775 | 116 | 305 | 151 | 260 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 378 | 1440 | 0 | 0 | 861 | 0 | 254 | 288 | 289 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 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, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 484 | 2159 | 0 | 0 | 1454 | 650 | 484 | 509 | 431 | | | |
| Arrive On Green | 0.14 | 0.61 | 0.00 | 0.00 | 0.41 | 0.00 | 0.27 | 0.27 | 0.27 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1580 | | | |
| Grp Volume(v), veh/h | 378 | 1440 | 0 | 0 | 861 | 0 | 254 | 288 | 289 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1580 | | | |
| Q Serve(g_s), s | 7.2 | 18.3 | 0.0 | 0.0 | 12.9 | 0.0 | 8.3 | 9.1 | 11.1 | | | |
| Cycle Q Clear(g_c), s | 7.2 | 18.3 | 0.0 | 0.0 | 12.9 | 0.0 | 8.3 | 9.1 | 11.1 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 484 | 2159 | 0 | 0 | 1454 | 650 | 484 | 509 | 431 | | | |
| V/C Ratio(X) | 0.78 | 0.67 | 0.00 | 0.00 | 0.59 | 0.00 | 0.52 | 0.57 | 0.67 | | | |
| Avail Cap(c_a), veh/h | 957 | 3159 | 0 | 0 | 1968 | 880 | 857 | 899 | 763 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 28.4 | 8.8 | 0.0 | 0.0 | 15.7 | 0.0 | 21.1 | 21.4 | 22.1 | | | |
| Incr Delay (d2), s/veh | 1.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 1.3 | 1.4 | 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 | | | |
| %ile BackOfQ(-26165%),veh/ln | 3.5 | 8.8 | 0.0 | 0.0 | 6.2 | 0.0 | 4.2 | 4.8 | 5.1 | | | |
| LnGrp Delay(d),s/veh | 29.4 | 8.9 | 0.0 | 0.0 | 15.8 | 0.0 | 22.3 | 22.8 | 24.7 | | | |
| LnGrp LOS | C | A | | | B | | C | C | C | | | |
| Approach Vol, veh/h | | 1818 | | | 861 | | | 831 | | | | |
| Approach Delay, s/veh | | 13.2 | | | 15.8 | | | 23.3 | | | | |
| Approach LOS | | B | | | B | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 45.7 | | | 13.6 | 32.1 | | 22.7 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 61.0 | | | 19.0 | 38.0 | | 33.0 |
| Max Q Clear Time (g_c+I1), s | | 20.3 | | | 9.2 | 14.9 | | 13.1 |
| Green Ext Time (p_c), s | | 17.2 | | | 0.4 | 13.1 | | 5.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 16.2 |
| HCM 2010 LOS | B |

Notes

User approved pedestrian interval to be less than phase max green.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 67 | 3 | 175 | 19 | 7 | 27 | 3 | 287 | 0 | 2 | 1098 | 30 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 76 | 3 | 199 | 22 | 8 | 31 | 3 | 326 | 0 | 2 | 1248 | 34 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 373 | 5 | 312 | 225 | 67 | 259 | 3 | 2074 | 0 | 3 | 2061 | 56 |
| Arrive On Green | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.00 | 0.59 | 0.00 | 0.00 | 0.59 | 0.59 |
| Sat Flow, veh/h | 1363 | 24 | 1563 | 1175 | 335 | 1299 | 1774 | 3632 | 0 | 1774 | 3520 | 96 |
| Grp Volume(v), veh/h | 76 | 0 | 202 | 22 | 0 | 39 | 3 | 326 | 0 | 2 | 627 | 655 |
| Grp Sat Flow(s),veh/h/ln | 1363 | 0 | 1587 | 1175 | 0 | 1634 | 1774 | 1770 | 0 | 1774 | 1770 | 1846 |
| Q Serve(g_s), s | 2.7 | 0.0 | 6.6 | 1.0 | 0.0 | 1.1 | 0.1 | 2.4 | 0.0 | 0.1 | 12.8 | 12.8 |
| Cycle Q Clear(g_c), s | 3.8 | 0.0 | 6.6 | 7.6 | 0.0 | 1.1 | 0.1 | 2.4 | 0.0 | 0.1 | 12.8 | 12.8 |
| Prop In Lane | 1.00 | | 0.99 | 1.00 | | 0.79 | 1.00 | | 0.00 | 1.00 | | 0.05 |
| Lane Grp Cap(c), veh/h | 373 | 0 | 317 | 225 | 0 | 326 | 3 | 2074 | 0 | 3 | 1036 | 1081 |
| V/C Ratio(X) | 0.20 | 0.00 | 0.64 | 0.10 | 0.00 | 0.12 | 0.95 | 0.16 | 0.00 | 0.64 | 0.61 | 0.61 |
| Avail Cap(c_a), veh/h | 585 | 0 | 563 | 616 | 0 | 870 | 315 | 2513 | 0 | 1259 | 1256 | 1310 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 20.1 | 0.0 | 20.7 | 24.1 | 0.0 | 18.5 | 28.1 | 5.3 | 0.0 | 28.1 | 7.5 | 7.5 |
| Incr Delay (d2), s/veh | 0.3 | 0.0 | 2.1 | 0.2 | 0.0 | 0.2 | 129.8 | 0.0 | 0.0 | 58.8 | 1.2 | 1.2 |
| 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(-26165%),veh/ln | 1.0 | 0.0 | 3.0 | 0.3 | 0.0 | 0.5 | 0.2 | 1.1 | 0.0 | 0.1 | 6.4 | 6.7 |
| LnGrp Delay(d),s/veh | 20.3 | 0.0 | 22.8 | 24.3 | 0.0 | 18.6 | 157.9 | 5.3 | 0.0 | 86.9 | 8.7 | 8.7 |
| LnGrp LOS | C | | C | C | | B | F | A | | F | A | A |
| Approach Vol, veh/h | | 278 | | | 61 | | | 329 | | | 1284 | |
| Approach Delay, s/veh | | 22.1 | | | 20.7 | | | 6.7 | | | 8.8 | |
| Approach LOS | | C | | | C | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.1 | 37.0 | | 15.3 | 4.1 | 37.0 | | 15.3 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.1 | 4.4 | | 8.6 | 2.1 | 14.8 | | 9.6 |
| Green Ext Time (p_c), s | 0.0 | 23.3 | | 1.4 | 0.0 | 18.2 | | 1.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 10.7 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 9 | 410 | 113 | 5 | 92 | 5 | 66 | 18 | 7 | 13 | 65 | 10 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 10 | 456 | 126 | 6 | 102 | 6 | 73 | 20 | 8 | 14 | 72 | 11 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 110 | 0 | 0 | 458 | 0 | 0 | 578 | 599 | 460 | 609 | 596 | 58 |
| Stage 1 | - | - | - | - | - | - | 478 | 478 | - | 118 | 118 | - |
| Stage 2 | - | - | - | - | - | - | 100 | 121 | - | 491 | 478 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1478 | - | - | 1103 | - | - | 413 | 414 | 600 | 393 | 416 | 996 |
| Stage 1 | - | - | - | - | - | - | 567 | 555 | - | 874 | 798 | - |
| Stage 2 | - | - | - | - | - | - | 896 | 795 | - | 558 | 555 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1476 | - | - | 1101 | - | - | 348 | 406 | 598 | 368 | 408 | 993 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 348 | 406 | - | 368 | 408 | - |
| Stage 1 | - | - | - | - | - | - | 560 | 549 | - | 864 | 792 | - |
| Stage 2 | - | - | - | - | - | - | 799 | 789 | - | 524 | 549 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.4 | 18.3 | 15.8 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 370 | 1476 | - | - | 1101 | - | - | 430 |
| HCM Lane V/C Ratio | 0.273 | 0.007 | - | - | 0.005 | - | - | 0.227 |
| HCM Control Delay (s) | 18.3 | 7.5 | 0 | - | 8.3 | - | - | 15.8 |
| HCM Lane LOS | C | A | A | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 1.1 | 0 | - | - | 0 | - | - | 0.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 107 | 301 | 137 | 0 | 0 | 0 | 23 | 504 | 59 | 846 | 644 | 46 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 126 | 354 | 161 | | | | 27 | 593 | 15 | 995 | 758 | 10 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | | | | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 563 | 385 | 175 | | | | 47 | 773 | 20 | 1040 | 1770 | 23 |
| Arrive On Green | 0.32 | 0.32 | 0.32 | | | | 0.03 | 0.22 | 0.22 | 0.30 | 0.49 | 0.49 |
| Sat Flow, veh/h | 1774 | 1213 | 552 | | | | 1774 | 3527 | 89 | 3442 | 3577 | 47 |
| Grp Volume(v), veh/h | 126 | 0 | 515 | | | | 27 | 297 | 311 | 995 | 375 | 393 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1764 | | | | 1774 | 1770 | 1847 | 1721 | 1770 | 1854 |
| Q Serve(g_s), s | 5.2 | 0.0 | 27.9 | | | | 1.5 | 15.7 | 15.7 | 28.2 | 13.5 | 13.5 |
| Cycle Q Clear(g_c), s | 5.2 | 0.0 | 27.9 | | | | 1.5 | 15.7 | 15.7 | 28.2 | 13.5 | 13.5 |
| Prop In Lane | 1.00 | | 0.31 | | | | 1.00 | | 0.05 | 1.00 | | 0.03 |
| Lane Grp Cap(c), veh/h | 563 | 0 | 560 | | | | 47 | 388 | 405 | 1040 | 876 | 918 |
| V/C Ratio(X) | 0.22 | 0.00 | 0.92 | | | | 0.58 | 0.77 | 0.77 | 0.96 | 0.43 | 0.43 |
| Avail Cap(c_a), veh/h | 608 | 0 | 604 | | | | 357 | 713 | 744 | 1040 | 876 | 918 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 24.9 | 0.0 | 32.7 | | | | 47.8 | 36.4 | 36.4 | 34.0 | 16.1 | 16.1 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 18.7 | | | | 4.1 | 3.2 | 3.1 | 18.3 | 0.3 | 0.3 |
| 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(-26165%),veh/ln | 2.6 | 0.0 | 16.5 | | | | 0.8 | 8.0 | 8.4 | 16.1 | 6.6 | 7.0 |
| LnGrp Delay(d),s/veh | 25.1 | 0.0 | 51.3 | | | | 51.8 | 39.6 | 39.5 | 52.3 | 16.4 | 16.4 |
| LnGrp LOS | C | | D | | | | D | D | D | D | B | B |
| Approach Vol, veh/h | | 641 | | | | | | 635 | | | 1763 | |
| Approach Delay, s/veh | | 46.2 | | | | | | 40.0 | | | 36.7 | |
| Approach LOS | | D | | | | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 35.0 | 27.3 | | 37.0 | 7.6 | 54.6 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 30.2 | 17.7 | | 29.9 | 3.5 | 15.5 | | |
| Green Ext Time (p_c), s | 0.0 | 3.9 | | 1.5 | 0.0 | 7.1 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 39.4 |
| HCM 2010 LOS | D |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 44 | 1429 | 87 | 41 | 814 | 43 | 29 | 39 | 45 | 199 | 143 | 36 |
| 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 | | 0.99 | 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 49 | 1588 | 0 | 46 | 904 | 20 | 32 | 43 | 50 | 221 | 159 | 38 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 62 | 1885 | 0 | 58 | 1877 | 42 | 39 | 78 | 91 | 255 | 322 | 77 |
| Arrive On Green | 0.04 | 0.53 | 0.00 | 0.03 | 0.53 | 0.53 | 0.02 | 0.10 | 0.10 | 0.14 | 0.22 | 0.22 |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 1774 | 3540 | 78 | 1774 | 784 | 911 | 1774 | 1453 | 347 |
| Grp Volume(v), veh/h | 49 | 1588 | 0 | 46 | 452 | 472 | 32 | 0 | 93 | 221 | 0 | 197 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 1774 | 1770 | 1849 | 1774 | 0 | 1695 | 1774 | 0 | 1800 |
| Q Serve(g_s), s | 2.4 | 33.8 | 0.0 | 2.3 | 14.3 | 14.3 | 1.6 | 0.0 | 4.6 | 10.8 | 0.0 | 8.5 |
| Cycle Q Clear(g_c), s | 2.4 | 33.8 | 0.0 | 2.3 | 14.3 | 14.3 | 1.6 | 0.0 | 4.6 | 10.8 | 0.0 | 8.5 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.04 | 1.00 | | 0.54 | 1.00 | | 0.19 |
| Lane Grp Cap(c), veh/h | 62 | 1885 | 0 | 58 | 938 | 980 | 39 | 0 | 169 | 255 | 0 | 399 |
| V/C Ratio(X) | 0.79 | 0.84 | 0.00 | 0.79 | 0.48 | 0.48 | 0.82 | 0.00 | 0.55 | 0.87 | 0.00 | 0.49 |
| Avail Cap(c_a), veh/h | 160 | 2110 | 0 | 60 | 955 | 998 | 120 | 0 | 553 | 279 | 0 | 749 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 42.6 | 17.6 | 0.0 | 42.7 | 13.2 | 13.2 | 43.3 | 0.0 | 38.1 | 37.2 | 0.0 | 30.3 |
| Incr Delay (d2), s/veh | 7.9 | 2.7 | 0.0 | 45.5 | 0.1 | 0.1 | 13.9 | 0.0 | 1.0 | 20.7 | 0.0 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 1.3 | 17.0 | 0.0 | 1.9 | 6.9 | 7.3 | 0.9 | 0.0 | 2.2 | 6.8 | 0.0 | 4.3 |
| LnGrp Delay(d),s/veh | 50.5 | 20.3 | 0.0 | 88.2 | 13.3 | 13.3 | 57.2 | 0.0 | 39.2 | 57.9 | 0.0 | 30.6 |
| LnGrp LOS | D | C | | F | B | B | E | | D | E | | C |
| Approach Vol, veh/h | | 1637 | | | 970 | | | 125 | | | 418 | |
| Approach Delay, s/veh | | 21.2 | | | 16.9 | | | 43.8 | | | 45.1 | |
| Approach LOS | | C | | | B | | | 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 | 6.9 | 52.4 | 6.0 | 23.7 | 7.1 | 52.1 | 16.8 | 12.8 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 3.0 | 53.0 | 6.0 | 37.0 | 8.0 | 48.0 | 14.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 4.3 | 35.8 | 3.6 | 10.5 | 4.4 | 16.3 | 12.8 | 6.6 |
| Green Ext Time (p_c), s | 0.0 | 11.5 | 0.0 | 1.2 | 0.0 | 16.8 | 0.0 | 1.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.9 |
| HCM 2010 LOS | C |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.6 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 22 | 0 | 4 | 12 | 36 | 17 |
| 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 | 66 | 66 | 66 | 66 | 66 | 66 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 33 | 0 | 6 | 18 | 55 | 26 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 33 | 0 | 63 | 33 |
| Stage 1 | - | - | - | - | 33 | - |
| Stage 2 | - | - | - | - | 30 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1579 | - | 943 | 1041 |
| Stage 1 | - | - | - | - | 989 | - |
| Stage 2 | - | - | - | - | 993 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1579 | - | 939 | 1041 |
| Mov Cap-2 Maneuver | - | - | - | - | 939 | - |
| Stage 1 | - | - | - | - | 989 | - |
| Stage 2 | - | - | - | - | 989 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.8 | 9.1 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 969 | - | - | 1579 | - |
| HCM Lane V/C Ratio | 0.083 | - | - | 0.004 | - |
| HCM Control Delay (s) | 9.1 | - | - | 7.3 | 0 |
| HCM Lane LOS | A | - | - | A | A |
| HCM 95th %tile Q(veh) | 0.3 | - | - | 0 | - |

# APPENDIX H: BUILD-OUT (2025) PLUS PROJECT LEVEL OF SERVICE AND SYNCHRO WORKSHEETS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 603 | 0 | 0 | 245 | 0 | 0 | 0 | 0 | 288 | 0 | 992 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 635 | 0 | 0 | 258 | 0 | 0 | 0 | 0 | 303 | 0 | 620 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| 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 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | 0 | 0 |
| Arrive On Green | 0.00 | 0.63 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 303 | |
| Grp Volume(v), veh/h | 0 | 635 | 0 | 0 | 258 | 0 | 0 | 0 | 0 | 303 | 36.0 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | D | |
| Q Serve(g_s), s | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.7 | | |
| Cycle Q Clear(g_c), s | 0.0 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.7 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 2 | 0 | 506 | | |
| V/C Ratio(X) | 0.00 | 0.29 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | | |
| Avail Cap(c_a), veh/h | 0 | 2212 | 0 | 0 | 2212 | 0 | 0 | 140 | 0 | 506 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 8.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.8 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 5.2 | | |
| 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 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.0 | | |
| LnGrp Delay(d),s/veh | 0.0 | 8.9 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 36.0 | | |
| LnGrp LOS | | A | | | A | | | | | D | | |
| Approach Vol, veh/h | | 635 | | | 258 | | | 0 | | | | |
| Approach Delay, s/veh | | 8.9 | | | 0.1 | | | 0.0 | | | | |
| Approach LOS | | A | | | A | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 67.0 | | | | 67.0 | 33.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 28.5 | 7.5 |
| Max Q Clear Time (g_c+I1), s | | 10.2 | | | | 2.0 | 16.7 | 0.0 |
| Green Ext Time (p_c), s | | 13.9 | | | | 14.6 | 0.4 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.9 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 229 | 288 | 0 | 0 | 91 | 111 | 153 | 250 | 74 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 254 | 320 | 0 | 0 | 101 | 0 | 170 | 278 | 71 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 893 | 2141 | 0 | 0 | 201 | 90 | 541 | 437 | 112 | | | |
| Arrive On Green | 1.00 | 1.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1432 | 366 | | | |
| Grp Volume(v), veh/h | 254 | 320 | 0 | 0 | 101 | 0 | 170 | 0 | 349 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1797 | | | |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 0.0 | 7.4 | 0.0 | 16.7 | | | |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 0.0 | 7.4 | 0.0 | 16.7 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.20 | | | |
| Lane Grp Cap(c), veh/h | 893 | 2141 | 0 | 0 | 201 | 90 | 541 | 0 | 548 | | | |
| V/C Ratio(X) | 0.28 | 0.15 | 0.00 | 0.00 | 0.50 | 0.00 | 0.31 | 0.00 | 0.64 | | | |
| Avail Cap(c_a), veh/h | 893 | 2141 | 0 | 0 | 1256 | 562 | 541 | 0 | 548 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.74 | 0.74 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 45.8 | 0.0 | 26.7 | 0.0 | 30.0 | | | |
| Incr Delay (d2), s/veh | 0.6 | 0.1 | 0.0 | 0.0 | 8.7 | 0.0 | 1.5 | 0.0 | 5.6 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 0.1 | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 3.8 | 0.0 | 9.2 | | | |
| LnGrp Delay(d),s/veh | 0.6 | 0.1 | 0.0 | 0.0 | 54.4 | 0.0 | 28.2 | 0.0 | 35.5 | | | |
| LnGrp LOS | A | A | | | D | | C | | D | | | |
| Approach Vol, veh/h | | 574 | | | 101 | | | 519 | | | | |
| Approach Delay, s/veh | | 0.3 | | | 54.4 | | | 33.1 | | | | |
| Approach LOS | | A | | | D | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 65.0 | | | 54.8 | 10.2 | | 35.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 60.5 | | | 20.9 | * 36 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 2.0 | 4.8 | | 18.7 |
| Green Ext Time (p_c), s | | 3.5 | | | 3.0 | 0.4 | | 1.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 19.2 |
| HCM 2010 LOS | B |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 8 | 438 | 158 | 453 | 839 | 61 | 17 | 148 | 152 | 61 | 777 | 60 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 9 | 476 | 65 | 492 | 912 | 63 | 18 | 161 | 33 | 66 | 845 | 60 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 53 | 1146 | 512 | 569 | 1542 | 107 | 55 | 989 | 441 | 101 | 991 | 70 |
| Arrive On Green | 0.03 | 0.32 | 0.32 | 0.17 | 0.46 | 0.46 | 0.03 | 0.28 | 0.28 | 0.06 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 3539 | 1580 | 3442 | 3359 | 232 | 1774 | 3539 | 1580 | 1774 | 3352 | 238 |
| Grp Volume(v), veh/h | 9 | 476 | 65 | 492 | 480 | 495 | 18 | 161 | 33 | 66 | 446 | 459 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1580 | 1721 | 1770 | 1821 | 1774 | 1770 | 1580 | 1774 | 1770 | 1820 |
| Q Serve(g_s), s | 0.5 | 10.5 | 2.4 | 13.9 | 20.2 | 20.2 | 1.0 | 3.4 | 1.5 | 3.6 | 23.7 | 23.8 |
| Cycle Q Clear(g_c), s | 0.5 | 10.5 | 2.4 | 13.9 | 20.2 | 20.2 | 1.0 | 3.4 | 1.5 | 3.6 | 23.7 | 23.8 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 53 | 1146 | 512 | 569 | 812 | 836 | 55 | 989 | 441 | 101 | 523 | 538 |
| V/C Ratio(X) | 0.17 | 0.42 | 0.13 | 0.87 | 0.59 | 0.59 | 0.33 | 0.16 | 0.07 | 0.66 | 0.85 | 0.85 |
| Avail Cap(c_a), veh/h | 53 | 1146 | 512 | 1032 | 1051 | 1081 | 89 | 1719 | 768 | 248 | 1019 | 1048 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 47.3 | 26.4 | 15.8 | 40.7 | 20.1 | 20.1 | 47.4 | 27.2 | 26.5 | 46.2 | 33.2 | 33.2 |
| Incr Delay (d2), s/veh | 6.8 | 1.1 | 0.5 | 1.6 | 0.3 | 0.2 | 1.2 | 0.0 | 0.0 | 2.7 | 1.6 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.3 | 5.3 | 1.1 | 6.8 | 9.9 | 10.2 | 0.5 | 1.7 | 0.7 | 1.9 | 11.8 | 12.1 |
| LnGrp Delay(d),s/veh | 54.1 | 27.5 | 16.3 | 42.3 | 20.3 | 20.3 | 48.7 | 27.2 | 26.6 | 48.9 | 34.7 | 34.7 |
| LnGrp LOS | D | C | B | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 550 | | | 1467 | | | 212 | | | 971 | |
| Approach Delay, s/veh | | 26.6 | | | 27.7 | | | 29.0 | | | 35.7 | |
| Approach LOS | | C | | | C | | | C | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 9.7 | 32.8 | 20.5 | 37.0 | 8.0 | 34.5 | 7.0 | 50.5 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 14.0 | 48.6 | 30.0 | 32.4 | 5.0 | * 58 | 3.0 | 59.4 |
| Max Q Clear Time (g_c+I1), s | 5.6 | 5.4 | 15.9 | 12.5 | 3.0 | 25.8 | 2.5 | 22.2 |
| Green Ext Time (p_c), s | 0.0 | 0.7 | 0.6 | 7.3 | 0.1 | 3.8 | 0.0 | 8.6 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 30.0 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 166 | 447 | 0 | 0 | 868 | 115 | 476 | 210 | 226 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 180 | 486 | 0 | 0 | 943 | 0 | 372 | 430 | 73 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 289 | 1855 | 0 | 0 | 1310 | 586 | 596 | 626 | 531 | | | |
| Arrive On Green | 0.08 | 0.52 | 0.00 | 0.00 | 0.37 | 0.00 | 0.34 | 0.34 | 0.34 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1581 | | | |
| Grp Volume(v), veh/h | 180 | 486 | 0 | 0 | 943 | 0 | 372 | 430 | 73 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1581 | | | |
| Q Serve(g_s), s | 2.9 | 4.3 | 0.0 | 0.0 | 13.1 | 0.0 | 10.1 | 11.4 | 1.8 | | | |
| Cycle Q Clear(g_c), s | 2.9 | 4.3 | 0.0 | 0.0 | 13.1 | 0.0 | 10.1 | 11.4 | 1.8 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 289 | 1855 | 0 | 0 | 1310 | 586 | 596 | 626 | 531 | | | |
| V/C Ratio(X) | 0.62 | 0.26 | 0.00 | 0.00 | 0.72 | 0.00 | 0.62 | 0.69 | 0.14 | | | |
| Avail Cap(c_a), veh/h | 1806 | 1857 | 0 | 0 | 1857 | 831 | 931 | 978 | 829 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 25.3 | 7.5 | 0.0 | 0.0 | 15.5 | 0.0 | 15.9 | 16.4 | 13.2 | | | |
| Incr Delay (d2), s/veh | 0.8 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 1.5 | 1.9 | 0.2 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 1.4 | 2.1 | 0.0 | 0.0 | 6.3 | 0.0 | 5.1 | 6.2 | 0.8 | | | |
| LnGrp Delay(d),s/veh | 26.1 | 7.5 | 0.0 | 0.0 | 15.8 | 0.0 | 17.5 | 18.3 | 13.4 | | | |
| LnGrp LOS | C | A | | | B | | B | B | B | | | |
| Approach Vol, veh/h | | 666 | | | 943 | | | 875 | | | | |
| Approach Delay, s/veh | | 12.6 | | | 15.8 | | | 17.5 | | | | |
| Approach LOS | | B | | | B | | | B | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 34.0 | | | 8.8 | 25.2 | | 23.2 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 30.0 | | | 30.0 | 30.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | | 6.3 | | | 4.9 | 15.1 | | 13.4 |
| Green Ext Time (p_c), s | | 7.2 | | | 0.2 | 6.0 | | 5.6 |

| 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) | 3 | 4 | 27 | 4 | 0 | 2 | 15 | 291 | 12 | 36 | 878 | 60 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 18 | 346 | 12 | 43 | 1045 | 67 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 167 | 15 | 0 | 163 | 15 | 0 | 20 | 2459 | 85 | 51 | 2439 | 156 |
| Arrive On Green | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.70 | 0.70 | 0.03 | 0.72 | 0.72 |
| Sat Flow, veh/h | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 3490 | 121 | 1774 | 3378 | 217 |
| Grp Volume(v), veh/h | 4 | 5 | 0 | 5 | 0 | 0 | 18 | 175 | 183 | 43 | 547 | 565 |
| Grp Sat Flow(s),veh/h/ln | 1412 | 1863 | 0 | 1405 | 1863 | 0 | 1774 | 1770 | 1841 | 1774 | 1770 | 1825 |
| Q Serve(g_s), s | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.5 | 1.5 | 1.5 | 1.1 | 5.8 | 5.8 |
| Cycle Q Clear(g_c), s | 0.1 | 0.1 | 0.0 | 0.3 | 0.0 | 0.0 | 0.5 | 1.5 | 1.5 | 1.1 | 5.8 | 5.8 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.00 | 1.00 | | 0.07 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 167 | 15 | 0 | 163 | 15 | 0 | 20 | 1247 | 1297 | 51 | 1278 | 1318 |
| V/C Ratio(X) | 0.02 | 0.33 | 0.00 | 0.03 | 0.00 | 0.00 | 0.92 | 0.14 | 0.14 | 0.84 | 0.43 | 0.43 |
| Avail Cap(c_a), veh/h | 1068 | 1204 | 0 | 1060 | 1204 | 0 | 344 | 2631 | 2738 | 420 | 2707 | 2791 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 22.9 | 22.9 | 0.0 | 23.0 | 0.0 | 0.0 | 22.9 | 2.2 | 2.3 | 22.4 | 2.6 | 2.6 |
| Incr Delay (d2), s/veh | 0.1 | 11.9 | 0.0 | 0.1 | 0.0 | 0.0 | 40.0 | 0.0 | 0.0 | 12.8 | 0.5 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.4 | 0.7 | 0.8 | 0.7 | 2.9 | 3.0 |
| LnGrp Delay(d),s/veh | 22.9 | 34.8 | 0.0 | 23.1 | 0.0 | 0.0 | 62.9 | 2.3 | 2.3 | 35.3 | 3.1 | 3.1 |
| LnGrp LOS | C | C | | C | | | E | A | A | D | A | A |
| Approach Vol, veh/h | | 9 | | | 5 | | | 376 | | | 1155 | |
| Approach Delay, s/veh | | 29.5 | | | 23.1 | | | 5.2 | | | 4.3 | |
| Approach LOS | | C | | | C | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 5.3 | 36.7 | | 4.4 | 4.5 | 37.5 | | 4.4 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 1.3 | 69.0 | | 30.0 | 9.0 | 71.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 3.1 | 3.5 | | 2.1 | 2.5 | 7.8 | | 2.3 |
| Green Ext Time (p_c), s | 0.0 | 26.0 | | 0.0 | 0.0 | 25.7 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 4.7 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 13 | 108 | 32 | 2 | 107 | 2 | 34 | 14 | 3 | 4 | 28 | 9 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 14 | 119 | 35 | 2 | 118 | 2 | 37 | 15 | 3 | 4 | 31 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 122 | 0 | 0 | 121 | 0 | 0 | 230 | 275 | 123 | 284 | 274 | 64 |
| Stage 1 | - | - | - | - | - | - | 149 | 149 | - | 125 | 125 | - |
| Stage 2 | - | - | - | - | - | - | 81 | 126 | - | 159 | 149 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1463 | - | - | 1467 | - | - | 715 | 632 | 927 | 657 | 633 | 988 |
| Stage 1 | - | - | - | - | - | - | 853 | 773 | - | 866 | 792 | - |
| Stage 2 | - | - | - | - | - | - | 919 | 791 | - | 843 | 773 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1461 | - | - | 1465 | - | - | 673 | 622 | 924 | 634 | 623 | 985 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 673 | 622 | - | 634 | 623 | - |
| Stage 1 | - | - | - | - | - | - | 842 | 763 | - | 855 | 790 | - |
| Stage 2 | - | - | - | - | - | - | 872 | 789 | - | 813 | 763 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.6 | 0.1 | 10.9 | 10.7 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 669 | 1461 | - | - | 1465 | - | - | 679 |
| HCM Lane V/C Ratio | 0.084 | 0.01 | - | - | 0.002 | - | - | 0.066 |
| HCM Control Delay (s) | 10.9 | 7.5 | 0 | - | 7.5 | - | - | 10.7 |
| HCM Lane LOS | B | A | A | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.3 | 0 | - | - | 0 | - | - | 0.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 17 | 95 | 34 | 0 | 0 | 0 | 71 | 327 | 14 | 484 | 548 | 162 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 19 | 108 | 25 | | | | 81 | 372 | 13 | 550 | 623 | 158 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | | | | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 213 | 176 | 41 | | | | 123 | 1089 | 38 | 791 | 1323 | 335 |
| Arrive On Green | 0.12 | 0.12 | 0.12 | | | | 0.07 | 0.31 | 0.31 | 0.23 | 0.47 | 0.47 |
| Sat Flow, veh/h | 1774 | 1462 | 339 | | | | 1774 | 3489 | 122 | 3442 | 2797 | 708 |
| Grp Volume(v), veh/h | 19 | 0 | 133 | | | | 81 | 188 | 197 | 550 | 394 | 387 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1801 | | | | 1774 | 1770 | 1841 | 1721 | 1770 | 1736 |
| Q Serve(g_s), s | 0.5 | 0.0 | 3.3 | | | | 2.1 | 3.9 | 3.9 | 6.9 | 7.1 | 7.2 |
| Cycle Q Clear(g_c), s | 0.5 | 0.0 | 3.3 | | | | 2.1 | 3.9 | 3.9 | 6.9 | 7.1 | 7.2 |
| Prop In Lane | 1.00 | | 0.19 | | | | 1.00 | | 0.07 | 1.00 | | 0.41 |
| Lane Grp Cap(c), veh/h | 213 | 0 | 217 | | | | 123 | 552 | 575 | 791 | 837 | 821 |
| V/C Ratio(X) | 0.09 | 0.00 | 0.61 | | | | 0.66 | 0.34 | 0.34 | 0.70 | 0.47 | 0.47 |
| Avail Cap(c_a), veh/h | 1273 | 0 | 1292 | | | | 749 | 1494 | 1554 | 2179 | 1120 | 1099 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.5 | 0.0 | 19.8 | | | | 21.5 | 12.5 | 12.6 | 16.7 | 8.5 | 8.5 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 2.8 | | | | 2.3 | 0.4 | 0.4 | 1.1 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(-26165%),veh/ln | 0.2 | 0.0 | 1.8 | | | | 1.1 | 1.9 | 2.0 | 3.4 | 3.5 | 3.4 |
| LnGrp Delay(d),s/veh | 18.7 | 0.0 | 22.6 | | | | 23.8 | 12.9 | 12.9 | 17.8 | 8.9 | 8.9 |
| LnGrp LOS | B | | C | | | | C | B | B | B | A | A |
| Approach Vol, veh/h | | 152 | | | | | | 466 | | | 1331 | |
| Approach Delay, s/veh | | 22.1 | | | | | | 14.8 | | | 12.6 | |
| Approach LOS | | C | | | | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 15.9 | 20.3 | | 11.2 | 8.3 | 27.9 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 8.9 | 5.9 | | 5.3 | 4.1 | 9.2 | | |
| Green Ext Time (p_c), s | 2.0 | 8.5 | | 0.8 | 0.1 | 7.3 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.9 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 33 | 604 | 31 | 19 | 853 | 65 | 66 | 51 | 45 | 38 | 49 | 40 |
| 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 | | 0.99 |
| 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 36 | 657 | 32 | 21 | 927 | 68 | 72 | 55 | 14 | 41 | 53 | 10 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 42 | 1494 | 73 | 23 | 1419 | 104 | 90 | 197 | 50 | 48 | 173 | 33 |
| Arrive On Green | 0.02 | 0.43 | 0.43 | 0.01 | 0.42 | 0.42 | 0.05 | 0.14 | 0.14 | 0.03 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1774 | 3435 | 167 | 1774 | 3343 | 245 | 1774 | 1432 | 365 | 1774 | 1523 | 287 |
| Grp Volume(v), veh/h | 36 | 338 | 351 | 21 | 491 | 504 | 72 | 0 | 69 | 41 | 0 | 63 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1833 | 1774 | 1770 | 1819 | 1774 | 0 | 1797 | 1774 | 0 | 1810 |
| Q Serve(g_s), s | 0.9 | 5.9 | 5.9 | 0.5 | 9.7 | 9.7 | 1.8 | 0.0 | 1.5 | 1.0 | 0.0 | 1.4 |
| Cycle Q Clear(g_c), s | 0.9 | 5.9 | 5.9 | 0.5 | 9.7 | 9.7 | 1.8 | 0.0 | 1.5 | 1.0 | 0.0 | 1.4 |
| Prop In Lane | 1.00 | | 0.09 | 1.00 | | 0.13 | 1.00 | | 0.20 | 1.00 | | 0.16 |
| Lane Grp Cap(c), veh/h | 42 | 769 | 797 | 23 | 751 | 772 | 90 | 0 | 247 | 48 | 0 | 206 |
| V/C Ratio(X) | 0.86 | 0.44 | 0.44 | 0.91 | 0.65 | 0.65 | 0.80 | 0.00 | 0.28 | 0.85 | 0.00 | 0.31 |
| Avail Cap(c_a), veh/h | 809 | 1211 | 1254 | 809 | 1211 | 1244 | 809 | 0 | 1188 | 809 | 0 | 1197 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.3 | 8.7 | 8.7 | 21.6 | 10.1 | 10.1 | 20.6 | 0.0 | 17.0 | 21.2 | 0.0 | 17.8 |
| Incr Delay (d2), s/veh | 17.2 | 0.1 | 0.1 | 34.4 | 0.4 | 0.4 | 6.1 | 0.0 | 0.2 | 14.1 | 0.0 | 0.3 |
| 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(-26165%),veh/ln | 0.6 | 2.8 | 3.0 | 0.5 | 4.7 | 4.8 | 1.0 | 0.0 | 0.8 | 0.7 | 0.0 | 0.7 |
| LnGrp Delay(d),s/veh | 38.5 | 8.8 | 8.8 | 56.0 | 10.4 | 10.4 | 26.7 | 0.0 | 17.2 | 35.4 | 0.0 | 18.1 |
| LnGrp LOS | D | A | A | E | B | B | C | | B | D | | B |
| Approach Vol, veh/h | | 725 | | | 1016 | | | 141 | | | 104 | |
| Approach Delay, s/veh | | 10.3 | | | 11.4 | | | 22.0 | | | 24.9 | |
| Approach LOS | | B | | | B | | | 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 | 4.6 | 24.1 | 6.2 | 9.0 | 5.0 | 23.6 | 5.2 | 10.0 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 20.0 | 30.0 | 20.0 | 29.0 | 20.0 | 30.0 | 20.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 2.5 | 7.9 | 3.8 | 3.4 | 2.9 | 11.7 | 3.0 | 3.5 |
| Green Ext Time (p_c), s | 0.0 | 7.4 | 0.0 | 0.5 | 0.0 | 6.9 | 0.0 | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.4 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 4 | 5 | 0 | 17 | 8 | 0 | 0 | 0 | 33 | 0 | 14 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 6 | 6 | 8 | 0 | 27 | 13 | 0 | 0 | 0 | 52 | 0 | 22 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 40 | 0 | 0 | 14 | 0 | 0 | 67 | 63 | 10 | 56 | 60 | 33 |
| Stage 1 | - | - | - | - | - | - | 23 | 23 | - | 33 | 33 | - |
| Stage 2 | - | - | - | - | - | - | 44 | 40 | - | 23 | 27 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1570 | - | - | 1604 | - | - | 926 | 828 | 1071 | 941 | 831 | 1041 |
| Stage 1 | - | - | - | - | - | - | 995 | 876 | - | 983 | 868 | - |
| Stage 2 | - | - | - | - | - | - | 970 | 862 | - | 995 | 873 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1570 | - | - | 1604 | - | - | 903 | 825 | 1071 | 938 | 828 | 1041 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 903 | 825 | - | 938 | 828 | - |
| Stage 1 | - | - | - | - | - | - | 991 | 872 | - | 979 | 868 | - |
| Stage 2 | - | - | - | - | - | - | 949 | 862 | - | 991 | 870 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 2.2 | 0 | 0 | 9 |
| HCM LOS | | | A | A |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | - | 1570 | - | - | 1604 | - | - | 966 |
| HCM Lane V/C Ratio | - | 0.004 | - | - | - | - | - | 0.077 |
| HCM Control Delay (s) | 0 | 7.3 | 0 | - | 0 | - | - | 9 |
| HCM Lane LOS | A | A | A | - | A | - | - | A |
| HCM 95th %tile Q(veh) | - | 0 | - | - | 0 | - | - | 0.3 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.5 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 111 | 3 | 0 | 97 | 12 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 50 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 121 | 3 | 0 | 105 | 13 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 124 | 0 | 227 | 122 |
| Stage 1 | - | - | - | - | 122 | - |
| Stage 2 | - | - | - | - | 105 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1463 | - | 761 | 929 |
| Stage 1 | - | - | - | - | 903 | - |
| Stage 2 | - | - | - | - | 919 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1463 | - | 761 | 929 |
| Mov Cap-2 Maneuver | - | - | - | - | 763 | - |
| Stage 1 | - | - | - | - | 903 | - |
| Stage 2 | - | - | - | - | 919 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 9.8 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 763 | - | - | 1463 | - |
| HCM Lane V/C Ratio | 0.017 | - | - | - | - |
| HCM Control Delay (s) | 9.8 | - | - | 0 | - |
| HCM Lane LOS | A | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.4 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 6 | 661 | 956 | 2 | 6 | 21 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 7 | 718 | 1039 | 2 | 7 | 23 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 1041 | 0 | - | 0 | 1412 | 521 |
| Stage 1 | - | - | - | - | 1040 | - |
| Stage 2 | - | - | - | - | 372 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 664 | - | - | - | 129 | 500 |
| Stage 1 | - | - | - | - | 302 | - |
| Stage 2 | - | - | - | - | 667 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 664 | - | - | - | 127 | 500 |
| Mov Cap-2 Maneuver | - | - | - | - | 127 | - |
| Stage 1 | - | - | - | - | 302 | - |
| Stage 2 | - | - | - | - | 655 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0 | 18.2 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 664 | - | - | - | 303 |
| HCM Lane V/C Ratio | 0.01 | - | - | - | 0.097 |
| HCM Control Delay (s) | 10.5 | 0.1 | - | - | 18.2 |
| HCM Lane LOS | B | A | - | - | C |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 287 | 0 | 0 | 332 | 0 | 0 | 0 | 0 | 246 | 0 | 1325 |
| 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 | 0 | 1863 | 0 | 0 | 1863 | 0 | 1900 | 1863 | 1900 | 1863 | 0 | 1863 |
| Adj Flow Rate, veh/h | 0 | 299 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 256 | 0 | 629 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 2 |
| Cap, veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | 0 | 0 |
| Arrive On Green | 0.00 | 0.64 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 |
| Sat Flow, veh/h | 0 | 3725 | 0 | 0 | 3725 | 0 | 0 | -65196 | 0 | 1774 | 256 | |
| Grp Volume(v), veh/h | 0 | 299 | 0 | 0 | 346 | 0 | 0 | 0 | 0 | 256 | 36.0 | |
| Grp Sat Flow(s),veh/h/ln | 0 | 1770 | 0 | 0 | 1770 | 0 | 0 | 1863 | 0 | 1774 | D | |
| Q Serve(g_s), s | 0.0 | 3.3 | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.4 | | |
| Cycle Q Clear(g_c), s | 0.0 | 3.3 | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.4 | | |
| Prop In Lane | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 2 | 0 | 470 | | |
| V/C Ratio(X) | 0.00 | 0.13 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.54 | | |
| Avail Cap(c_a), veh/h | 0 | 2283 | 0 | 0 | 2283 | 0 | 0 | 177 | 0 | 470 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(I) | 0.00 | 1.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 0.0 | 6.9 | 0.0 | 0.0 | 17.1 | 0.0 | 0.0 | 0.0 | 0.0 | 31.6 | | |
| Incr Delay (d2), s/veh | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 4.5 | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| %ile BackOfQ(-26165%),veh/ln | 0.0 | 1.6 | 0.0 | 0.0 | 3.9 | 0.0 | 0.0 | 0.0 | 0.0 | 6.6 | | |
| LnGrp Delay(d),s/veh | 0.0 | 7.0 | 0.0 | 0.0 | 17.2 | 0.0 | 0.0 | 0.0 | 0.0 | 36.0 | | |
| LnGrp LOS | | A | | | B | | | | | D | | |
| Approach Vol, veh/h | | 299 | | | 346 | | | 0 | | | | |
| Approach Delay, s/veh | | 7.0 | | | 17.2 | | | 0.0 | | | | |
| Approach LOS | | A | | | B | | | | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | | 69.0 | | | | 69.0 | 31.0 | 0.0 |
| Change Period (Y+Rc), s | | 4.5 | | | | 4.5 | 4.5 | 3.5 |
| Max Green Setting (Gmax), s | | 51.5 | | | | 51.5 | 26.5 | 9.5 |
| Max Q Clear Time (g_c+I1), s | | 5.3 | | | | 10.0 | 14.4 | 0.0 |
| Green Ext Time (p_c), s | | 9.4 | | | | 9.2 | 0.3 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 19.2 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 396 | 538 | 0 | 0 | 223 | 266 | 125 | 387 | 81 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1900 | | | |
| Adj Flow Rate, veh/h | 435 | 591 | 0 | 0 | 245 | 0 | 137 | 425 | 80 | | | |
| Adj No. of Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | | | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | | | |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 798 | 2106 | 0 | 0 | 354 | 158 | 559 | 480 | 90 | | | |
| Arrive On Green | 0.90 | 1.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.31 | 0.31 | 0.31 | | | |
| Sat Flow, veh/h | 1774 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1524 | 287 | | | |
| Grp Volume(v), veh/h | 435 | 591 | 0 | 0 | 245 | 0 | 137 | 0 | 505 | | | |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 0 | 1811 | | | |
| Q Serve(g_s), s | 4.8 | 0.0 | 0.0 | 0.0 | 6.7 | 0.0 | 5.7 | 0.0 | 26.5 | | | |
| Cycle Q Clear(g_c), s | 4.8 | 0.0 | 0.0 | 0.0 | 6.7 | 0.0 | 5.7 | 0.0 | 26.5 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 0.16 | | | |
| Lane Grp Cap(c), veh/h | 798 | 2106 | 0 | 0 | 354 | 158 | 559 | 0 | 571 | | | |
| V/C Ratio(X) | 0.54 | 0.28 | 0.00 | 0.00 | 0.69 | 0.00 | 0.25 | 0.00 | 0.89 | | | |
| Avail Cap(c_a), veh/h | 798 | 2106 | 0 | 0 | 938 | 420 | 559 | 0 | 571 | | | |
| HCM Platoon Ratio | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| Upstream Filter(I) | 0.85 | 0.85 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 3.0 | 0.0 | 0.0 | 0.0 | 43.5 | 0.0 | 25.4 | 0.0 | 32.5 | | | |
| Incr Delay (d2), s/veh | 2.3 | 0.3 | 0.0 | 0.0 | 10.6 | 0.0 | 1.0 | 0.0 | 18.0 | | | |
| 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(-26165%),veh/ln | 2.4 | 0.1 | 0.0 | 0.0 | 3.8 | 0.0 | 3.0 | 0.0 | 16.0 | | | |
| LnGrp Delay(d),s/veh | 5.3 | 0.3 | 0.0 | 0.0 | 54.1 | 0.0 | 26.5 | 0.0 | 50.5 | | | |
| LnGrp LOS | A | A | | | D | | C | | D | | | |
| Approach Vol, veh/h | | 1026 | | | 245 | | | 642 | | | | |
| Approach Delay, s/veh | | 2.4 | | | 54.1 | | | 45.4 | | | | |
| Approach LOS | | A | | | D | | | D | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 64.0 | | | 49.5 | 14.5 | | 36.0 |
| Change Period (Y+Rc), s | | 4.5 | | | 4.5 | * 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 59.5 | | | 28.9 | * 27 | | 31.5 |
| Max Q Clear Time (g_c+I1), s | | 2.0 | | | 6.8 | 8.7 | | 28.5 |
| Green Ext Time (p_c), s | | 7.2 | | | 6.2 | 0.9 | | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.5 |
| HCM 2010 LOS | C |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 18 | 983 | 188 | 346 | 695 | 61 | 33 | 252 | 461 | 209 | 844 | 86 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 20 | 1080 | 104 | 380 | 764 | 62 | 36 | 277 | 337 | 230 | 927 | 88 |
| Adj No. of Lanes | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 69 | 1279 | 571 | 428 | 1481 | 120 | 93 | 830 | 370 | 255 | 1040 | 99 |
| Arrive On Green | 0.04 | 0.36 | 0.36 | 0.12 | 0.45 | 0.45 | 0.05 | 0.23 | 0.23 | 0.14 | 0.32 | 0.32 |
| Sat Flow, veh/h | 1774 | 3539 | 1581 | 3442 | 3315 | 269 | 1774 | 3539 | 1579 | 1774 | 3267 | 310 |
| Grp Volume(v), veh/h | 20 | 1080 | 104 | 380 | 408 | 418 | 36 | 277 | 337 | 230 | 502 | 513 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1581 | 1721 | 1770 | 1815 | 1774 | 1770 | 1579 | 1774 | 1770 | 1807 |
| Q Serve(g_s), s | 1.4 | 36.0 | 4.6 | 14.0 | 21.3 | 21.3 | 2.5 | 8.3 | 26.7 | 16.4 | 34.7 | 34.7 |
| Cycle Q Clear(g_c), s | 1.4 | 36.0 | 4.6 | 14.0 | 21.3 | 21.3 | 2.5 | 8.3 | 26.7 | 16.4 | 34.7 | 34.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.15 | 1.00 | | 1.00 | 1.00 | | 0.17 |
| Lane Grp Cap(c), veh/h | 69 | 1279 | 571 | 428 | 791 | 811 | 93 | 830 | 370 | 255 | 563 | 575 |
| V/C Ratio(X) | 0.29 | 0.84 | 0.18 | 0.89 | 0.52 | 0.52 | 0.39 | 0.33 | 0.91 | 0.90 | 0.89 | 0.89 |
| Avail Cap(c_a), veh/h | 69 | 1279 | 571 | 429 | 791 | 811 | 93 | 1147 | 512 | 290 | 794 | 811 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 60.0 | 37.7 | 18.0 | 55.3 | 25.5 | 25.5 | 58.8 | 40.8 | 47.8 | 54.1 | 41.6 | 41.6 |
| Incr Delay (d2), s/veh | 10.3 | 6.9 | 0.7 | 19.2 | 0.3 | 0.3 | 1.0 | 0.1 | 13.7 | 25.6 | 7.4 | 7.2 |
| 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(-26165%),veh/ln | 0.9 | 18.8 | 2.4 | 7.8 | 10.5 | 10.7 | 1.3 | 4.1 | 13.0 | 9.9 | 18.0 | 18.4 |
| LnGrp Delay(d),s/veh | 70.3 | 44.6 | 18.7 | 74.5 | 25.8 | 25.8 | 59.8 | 40.9 | 61.5 | 79.7 | 49.0 | 48.9 |
| LnGrp LOS | E | D | B | E | C | C | E | D | E | E | D | D |
| Approach Vol, veh/h | | 1204 | | | 1206 | | | 650 | | | 1245 | |
| Approach Delay, s/veh | | 42.8 | | | 41.1 | | | 52.6 | | | 54.6 | |
| Approach LOS | | D | | | 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 | 22.4 | 35.0 | 20.0 | 51.0 | 11.7 | 45.8 | 9.0 | 62.0 |
| Change Period (Y+Rc), s | 4.0 | 4.9 | 4.0 | 4.6 | 4.9 | * 4.9 | 4.0 | 4.6 |
| Max Green Setting (Gmax), s | 21.6 | 41.6 | 16.0 | 46.4 | 5.0 | * 58 | 5.0 | 57.4 |
| Max Q Clear Time (g_c+I1), s | 3.4 | 28.7 | 16.0 | 38.0 | 4.5 | 36.7 | 3.4 | 23.3 |
| Green Ext Time (p_c), s | 0.1 | 1.4 | 0.0 | 5.8 | 0.1 | 4.2 | 0.0 | 13.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 47.2 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 340 | 1300 | 0 | 0 | 800 | 116 | 305 | 151 | 303 | 0 | 0 | 0 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | | | |
| 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 | 1863 | 1863 | 0 | 0 | 1863 | 1863 | 1863 | 1863 | 1863 | | | |
| Adj Flow Rate, veh/h | 378 | 1444 | 0 | 0 | 889 | 0 | 254 | 288 | 297 | | | |
| Adj No. of Lanes | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 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, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | | | |
| Cap, veh/h | 481 | 2159 | 0 | 0 | 1461 | 653 | 489 | 513 | 435 | | | |
| Arrive On Green | 0.14 | 0.61 | 0.00 | 0.00 | 0.41 | 0.00 | 0.28 | 0.28 | 0.28 | | | |
| Sat Flow, veh/h | 3442 | 3632 | 0 | 0 | 3632 | 1583 | 1774 | 1863 | 1580 | | | |
| Grp Volume(v), veh/h | 378 | 1444 | 0 | 0 | 889 | 0 | 254 | 288 | 297 | | | |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1770 | 0 | 0 | 1770 | 1583 | 1774 | 1863 | 1580 | | | |
| Q Serve(g_s), s | 7.4 | 18.8 | 0.0 | 0.0 | 13.8 | 0.0 | 8.5 | 9.3 | 11.7 | | | |
| Cycle Q Clear(g_c), s | 7.4 | 18.8 | 0.0 | 0.0 | 13.8 | 0.0 | 8.5 | 9.3 | 11.7 | | | |
| Prop In Lane | 1.00 | | 0.00 | 0.00 | | 1.00 | 1.00 | | 1.00 | | | |
| Lane Grp Cap(c), veh/h | 481 | 2159 | 0 | 0 | 1461 | 653 | 489 | 513 | 435 | | | |
| V/C Ratio(X) | 0.79 | 0.67 | 0.00 | 0.00 | 0.61 | 0.00 | 0.52 | 0.56 | 0.68 | | | |
| Avail Cap(c_a), veh/h | 937 | 3092 | 0 | 0 | 1926 | 862 | 839 | 880 | 747 | | | |
| 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 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | | | |
| Uniform Delay (d), s/veh | 29.0 | 9.0 | 0.0 | 0.0 | 16.1 | 0.0 | 21.4 | 21.7 | 22.6 | | | |
| Incr Delay (d2), s/veh | 1.1 | 0.1 | 0.0 | 0.0 | 0.2 | 0.0 | 1.2 | 1.4 | 2.7 | | | |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| %ile BackOfQ(-26165%),veh/ln | 2.6 | 9.1 | 0.0 | 0.0 | 6.7 | 0.0 | 4.3 | 4.9 | 5.4 | | | |
| LnGrp Delay(d),s/veh | 30.1 | 9.1 | 0.0 | 0.0 | 16.2 | 0.0 | 22.6 | 23.0 | 25.2 | | | |
| LnGrp LOS | C | A | | | B | | C | C | C | | | |
| Approach Vol, veh/h | | 1822 | | | 889 | | | 839 | | | | |
| Approach Delay, s/veh | | 13.5 | | | 16.2 | | | 23.7 | | | | |
| Approach LOS | | B | | | B | | | C | | | | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 46.6 | | | 13.8 | 32.8 | | 23.2 |
| Change Period (Y+Rc), s | | 4.0 | | | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 61.0 | | | 19.0 | 38.0 | | 33.0 |
| Max Q Clear Time (g_c+I1), s | | 20.8 | | | 9.4 | 15.8 | | 13.7 |
| Green Ext Time (p_c), s | | 17.5 | | | 0.4 | 13.1 | | 5.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 16.6 |
| HCM 2010 LOS | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 67 | 3 | 175 | 19 | 7 | 27 | 3 | 287 | 0 | 2 | 1121 | 30 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 76 | 3 | 19 | 22 | 8 | 3 | 3 | 326 | 0 | 2 | 1274 | 32 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 266 | 19 | 123 | 255 | 114 | 43 | 4 | 2336 | 0 | 4 | 2327 | 58 |
| Arrive On Green | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.00 | 0.66 | 0.00 | 0.00 | 0.66 | 0.66 |
| Sat Flow, veh/h | 1398 | 220 | 1396 | 1384 | 1293 | 485 | 1774 | 3632 | 0 | 1774 | 3528 | 89 |
| Grp Volume(v), veh/h | 76 | 0 | 22 | 22 | 0 | 11 | 3 | 326 | 0 | 2 | 639 | 667 |
| Grp Sat Flow(s),veh/h/ln | 1398 | 0 | 1616 | 1384 | 0 | 1777 | 1774 | 1770 | 0 | 1774 | 1770 | 1847 |
| Q Serve(g_s), s | 2.5 | 0.0 | 0.6 | 0.7 | 0.0 | 0.3 | 0.1 | 1.7 | 0.0 | 0.1 | 9.2 | 9.2 |
| Cycle Q Clear(g_c), s | 2.8 | 0.0 | 0.6 | 1.3 | 0.0 | 0.3 | 0.1 | 1.7 | 0.0 | 0.1 | 9.2 | 9.2 |
| Prop In Lane | 1.00 | | 0.86 | 1.00 | | 0.27 | 1.00 | | 0.00 | 1.00 | | 0.05 |
| Lane Grp Cap(c), veh/h | 266 | 0 | 143 | 255 | 0 | 157 | 4 | 2336 | 0 | 4 | 1167 | 1218 |
| V/C Ratio(X) | 0.29 | 0.00 | 0.15 | 0.09 | 0.00 | 0.07 | 0.81 | 0.14 | 0.00 | 0.54 | 0.55 | 0.55 |
| Avail Cap(c_a), veh/h | 726 | 0 | 675 | 999 | 0 | 1112 | 370 | 2954 | 0 | 1481 | 1477 | 1542 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.3 | 0.0 | 20.2 | 20.8 | 0.0 | 20.0 | 23.9 | 3.0 | 0.0 | 23.9 | 4.3 | 4.3 |
| Incr Delay (d2), s/veh | 0.6 | 0.0 | 0.5 | 0.1 | 0.0 | 0.2 | 83.9 | 0.0 | 0.0 | 38.6 | 0.9 | 0.8 |
| 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(-26165%),veh/ln | 1.0 | 0.0 | 0.3 | 0.3 | 0.0 | 0.1 | 0.1 | 0.8 | 0.0 | 0.1 | 4.7 | 4.9 |
| LnGrp Delay(d),s/veh | 21.9 | 0.0 | 20.7 | 20.9 | 0.0 | 20.2 | 107.8 | 3.1 | 0.0 | 62.6 | 5.2 | 5.2 |
| LnGrp LOS | C | | C | C | | C | F | A | | E | A | A |
| Approach Vol, veh/h | | 98 | | | 33 | | | 329 | | | 1308 | |
| Approach Delay, s/veh | | 21.6 | | | 20.7 | | | 4.0 | | | 5.3 | |
| Approach LOS | | C | | | C | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.1 | 35.6 | | 8.2 | 4.1 | 35.6 | | 8.2 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | 10.0 | 40.0 | | 20.0 | 10.0 | 40.0 | | 30.0 |
| Max Q Clear Time (g_c+I1), s | 2.1 | 3.7 | | 4.8 | 2.1 | 11.2 | | 3.3 |
| Green Ext Time (p_c), s | 0.0 | 24.0 | | 0.3 | 0.0 | 20.4 | | 0.4 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 6.2 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 9 | 421 | 127 | 5 | 98 | 5 | 74 | 18 | 7 | 13 | 65 | 10 |
| Conflicting Peds, #/hr | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | 0 | 100 | - | 175 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 10 | 468 | 141 | 6 | 109 | 6 | 82 | 20 | 8 | 14 | 72 | 11 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 116 | 0 | 0 | 470 | 0 | 0 | 594 | 618 | 472 | 629 | 615 | 61 |
| Stage 1 | - | - | - | - | - | - | 490 | 490 | - | 125 | 125 | - |
| Stage 2 | - | - | - | - | - | - | 104 | 128 | - | 504 | 490 | - |
| Critical Hdwy | 4.14 | - | - | 4.12 | - | - | 7.33 | 6.53 | 6.23 | 7.33 | 6.53 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.13 | 5.53 | - | 6.53 | 5.53 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.53 | 5.53 | - | 6.13 | 5.53 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.218 | - | - | 3.519 | 4.019 | 3.319 | 3.519 | 4.019 | 3.319 |
| Pot Cap-1 Maneuver | 1470 | - | - | 1092 | - | - | 402 | 404 | 591 | 381 | 406 | 992 |
| Stage 1 | - | - | - | - | - | - | 559 | 548 | - | 866 | 792 | - |
| Stage 2 | - | - | - | - | - | - | 891 | 790 | - | 549 | 548 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1468 | - | - | 1090 | - | - | 337 | 396 | 589 | 356 | 398 | 989 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 337 | 396 | - | 356 | 398 | - |
| Stage 1 | - | - | - | - | - | - | 552 | 541 | - | 855 | 786 | - |
| Stage 2 | - | - | - | - | - | - | 794 | 784 | - | 515 | 541 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.4 | 19.5 | 16.2 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 357 | 1468 | - | - | 1090 | - | - | 419 |
| HCM Lane V/C Ratio | 0.308 | 0.007 | - | - | 0.005 | - | - | 0.233 |
| HCM Control Delay (s) | 19.5 | 7.5 | 0 | - | 8.3 | - | - | 16.2 |
| HCM Lane LOS | C | A | A | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 1.3 | 0 | - | - | 0 | - | - | 0.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 107 | 301 | 137 | 0 | 0 | 0 | 23 | 504 | 59 | 869 | 644 | 46 |
| Number | 7 | 4 | 14 | | | | 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 | 1863 | 1863 | 1900 | | | | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 126 | 354 | 146 | | | | 27 | 593 | 60 | 1022 | 758 | 49 |
| Adj No. of Lanes | 1 | 1 | 0 | | | | 1 | 2 | 0 | 2 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | | | | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 548 | 387 | 160 | | | | 47 | 757 | 77 | 1027 | 1706 | 110 |
| Arrive On Green | 0.31 | 0.31 | 0.31 | | | | 0.03 | 0.23 | 0.23 | 0.30 | 0.51 | 0.51 |
| Sat Flow, veh/h | 1774 | 1253 | 517 | | | | 1774 | 3246 | 328 | 3442 | 3375 | 218 |
| Grp Volume(v), veh/h | 126 | 0 | 500 | | | | 27 | 323 | 330 | 1022 | 397 | 410 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1770 | | | | 1774 | 1770 | 1804 | 1721 | 1770 | 1824 |
| Q Serve(g_s), s | 5.3 | 0.0 | 27.3 | | | | 1.5 | 17.2 | 17.3 | 29.8 | 14.4 | 14.4 |
| Cycle Q Clear(g_c), s | 5.3 | 0.0 | 27.3 | | | | 1.5 | 17.2 | 17.3 | 29.8 | 14.4 | 14.4 |
| Prop In Lane | 1.00 | | 0.29 | | | | 1.00 | | 0.18 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 548 | 0 | 547 | | | | 47 | 413 | 421 | 1027 | 895 | 922 |
| V/C Ratio(X) | 0.23 | 0.00 | 0.91 | | | | 0.58 | 0.78 | 0.78 | 0.99 | 0.44 | 0.44 |
| Avail Cap(c_a), veh/h | 600 | 0 | 599 | | | | 353 | 704 | 718 | 1027 | 895 | 922 |
| 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 | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 25.8 | 0.0 | 33.4 | | | | 48.4 | 36.1 | 36.1 | 35.2 | 15.8 | 15.8 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 17.8 | | | | 4.1 | 3.3 | 3.3 | 26.7 | 0.3 | 0.3 |
| 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(-26165%),veh/ln | 2.6 | 0.0 | 16.0 | | | | 0.8 | 8.8 | 9.0 | 17.9 | 7.0 | 7.3 |
| LnGrp Delay(d),s/veh | 26.0 | 0.0 | 51.3 | | | | 52.5 | 39.4 | 39.4 | 61.9 | 16.2 | 16.2 |
| LnGrp LOS | C | | D | | | | D | D | D | E | B | B |
| Approach Vol, veh/h | | 626 | | | | | | 680 | | | 1829 | |
| Approach Delay, s/veh | | 46.2 | | | | | | 39.9 | | | 41.7 | |
| Approach LOS | | D | | | | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | 35.0 | 29.0 | | 36.5 | 7.6 | 56.3 | | |
| Change Period (Y+Rc), s | 5.0 | 5.5 | | 5.5 | 5.0 | 5.5 | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | | 34.0 | 20.0 | 30.0 | | |
| Max Q Clear Time (g_c+I1), s | 31.8 | 19.3 | | 29.3 | 3.5 | 16.4 | | |
| Green Ext Time (p_c), s | 0.0 | 4.1 | | 1.6 | 0.0 | 7.3 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 42.2 |
| HCM 2010 LOS | D |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 44 | 1432 | 113 | 48 | 820 | 43 | 43 | 39 | 49 | 199 | 143 | 36 |
| 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 | | 0.99 | 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 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 49 | 1591 | 122 | 53 | 911 | 46 | 48 | 43 | 3 | 221 | 159 | 31 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 62 | 1852 | 141 | 61 | 1903 | 96 | 61 | 121 | 8 | 256 | 274 | 53 |
| Arrive On Green | 0.04 | 0.56 | 0.56 | 0.03 | 0.55 | 0.55 | 0.03 | 0.07 | 0.07 | 0.14 | 0.18 | 0.18 |
| Sat Flow, veh/h | 1774 | 3333 | 254 | 1774 | 3428 | 173 | 1774 | 1720 | 120 | 1774 | 1514 | 295 |
| Grp Volume(v), veh/h | 49 | 839 | 874 | 53 | 470 | 487 | 48 | 0 | 46 | 221 | 0 | 190 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1817 | 1774 | 1770 | 1832 | 1774 | 0 | 1840 | 1774 | 0 | 1809 |
| Q Serve(g_s), s | 2.4 | 34.9 | 35.9 | 2.6 | 14.0 | 14.0 | 2.3 | 0.0 | 2.1 | 10.6 | 0.0 | 8.4 |
| Cycle Q Clear(g_c), s | 2.4 | 34.9 | 35.9 | 2.6 | 14.0 | 14.0 | 2.3 | 0.0 | 2.1 | 10.6 | 0.0 | 8.4 |
| Prop In Lane | 1.00 | | 0.14 | 1.00 | | 0.09 | 1.00 | | 0.07 | 1.00 | | 0.16 |
| Lane Grp Cap(c), veh/h | 62 | 983 | 1010 | 61 | 982 | 1017 | 61 | 0 | 130 | 256 | 0 | 327 |
| V/C Ratio(X) | 0.79 | 0.85 | 0.87 | 0.87 | 0.48 | 0.48 | 0.79 | 0.00 | 0.35 | 0.86 | 0.00 | 0.58 |
| Avail Cap(c_a), veh/h | 163 | 1076 | 1105 | 61 | 982 | 1017 | 122 | 0 | 612 | 285 | 0 | 768 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 41.7 | 16.4 | 16.6 | 41.9 | 11.8 | 11.8 | 41.8 | 0.0 | 38.6 | 36.4 | 0.0 | 32.7 |
| Incr Delay (d2), s/veh | 8.0 | 5.8 | 6.4 | 68.3 | 0.1 | 0.1 | 8.2 | 0.0 | 0.6 | 19.7 | 0.0 | 0.6 |
| 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(-26165%),veh/ln | 1.3 | 18.4 | 19.5 | 2.4 | 6.8 | 7.1 | 1.3 | 0.0 | 1.1 | 6.6 | 0.0 | 4.2 |
| LnGrp Delay(d),s/veh | 49.7 | 22.2 | 23.0 | 110.2 | 11.9 | 11.9 | 50.0 | 0.0 | 39.2 | 56.1 | 0.0 | 33.3 |
| LnGrp LOS | D | C | C | F | B | B | D | | D | E | | C |
| Approach Vol, veh/h | | 1762 | | | 1010 | | | 94 | | | 411 | |
| Approach Delay, s/veh | | 23.3 | | | 17.0 | | | 44.7 | | | 45.6 | |
| Approach LOS | | C | | | B | | | 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 | 7.0 | 53.4 | 7.0 | 19.8 | 7.1 | 53.4 | 16.6 | 10.2 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 3.0 | 53.0 | 6.0 | 37.0 | 8.0 | 48.0 | 14.0 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 4.6 | 37.9 | 4.3 | 10.4 | 4.4 | 16.0 | 12.6 | 4.1 |
| Green Ext Time (p_c), s | 0.0 | 10.5 | 0.0 | 0.9 | 0.0 | 17.4 | 0.0 | 0.9 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 24.8 |
| HCM 2010 LOS | C |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 14 | 22 | 0 | 4 | 12 | 33 | 36 | 0 | 17 | 18 | 0 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 21 | 33 | 0 | 6 | 18 | 50 | 55 | 0 | 26 | 27 | 0 | 12 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 68 | 0 | 0 | 33 | 0 | 0 | 137 | 156 | 33 | 144 | 131 | 43 |
| Stage 1 | - | - | - | - | - | - | 76 | 76 | - | 55 | 55 | - |
| Stage 2 | - | - | - | - | - | - | 61 | 80 | - | 89 | 76 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1533 | - | - | 1579 | - | - | 834 | 736 | 1041 | 825 | 760 | 1027 |
| Stage 1 | - | - | - | - | - | - | 933 | 832 | - | 957 | 849 | - |
| Stage 2 | - | - | - | - | - | - | 950 | 828 | - | 918 | 832 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1533 | - | - | 1579 | - | - | 813 | 723 | 1041 | 794 | 746 | 1027 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 813 | 723 | - | 794 | 746 | - |
| Stage 1 | - | - | - | - | - | - | 920 | 820 | - | 944 | 846 | - |
| Stage 2 | - | - | - | - | - | - | 935 | 825 | - | 883 | 820 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 2.9 | 0.6 | 9.5 | 9.4 |
| HCM LOS | | | A | A |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 874 | 1533 | - | - | 1579 | - | - | 854 |
| HCM Lane V/C Ratio | 0.092 | 0.014 | - | - | 0.004 | - | - | 0.046 |
| HCM Control Delay (s) | 9.5 | 7.4 | 0 | - | 7.3 | 0 | - | 9.4 |
| HCM Lane LOS | A | A | A | - | A | A | - | A |
| HCM 95th %tile Q(veh) | 0.3 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.1 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 429 | 11 | 0 | 102 | 6 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 50 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 466 | 12 | 0 | 111 | 7 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 478 | 0 | 583 | 472 |
| Stage 1 | - | - | - | - | 472 | - |
| Stage 2 | - | - | - | - | 111 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1084 | - | 475 | 592 |
| Stage 1 | - | - | - | - | 628 | - |
| Stage 2 | - | - | - | - | 914 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1084 | - | 475 | 592 |
| Mov Cap-2 Maneuver | - | - | - | - | 537 | - |
| Stage 1 | - | - | - | - | 628 | - |
| Stage 2 | - | - | - | - | 914 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 11.8 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 537 | - | - | 1084 | - |
| HCM Lane V/C Ratio | 0.012 | - | - | - | - |
| HCM Control Delay (s) | 11.8 | - | - | 0 | - |
| HCM Lane LOS | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.9 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 21 | 1585 | 893 | 6 | 3 | 12 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 23 | 1723 | 971 | 7 | 3 | 13 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 977 | 0 | - | 0 | 1881 | 489 |
| Stage 1 | - | - | - | - | 974 | - |
| Stage 2 | - | - | - | - | 907 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 702 | - | - | - | 63 | 525 |
| Stage 1 | - | - | - | - | 327 | - |
| Stage 2 | - | - | - | - | 354 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 702 | - | - | - | 15 | 525 |
| Mov Cap-2 Maneuver | - | - | - | - | 15 | - |
| Stage 1 | - | - | - | - | 327 | - |
| Stage 2 | - | - | - | - | 84 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 3.9 | 0 | 75.2 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 702 | - | - | - | 67 |
| HCM Lane V/C Ratio | 0.033 | - | - | - | 0.243 |
| HCM Control Delay (s) | 10.3 | 3.8 | - | - | 75.2 |
| HCM Lane LOS | B | A | - | - | F |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.9 |

# APPENDIX I: TRAFFIC SIGNAL WARRANTS

FEHR PEERS

| | | | |
|---|---|---|---|
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| [illegible] | 2[illegible] | [illegible] | [illegible]28 | [illegible]8 |

[illegible]

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| [illegible] | | [illegible] |
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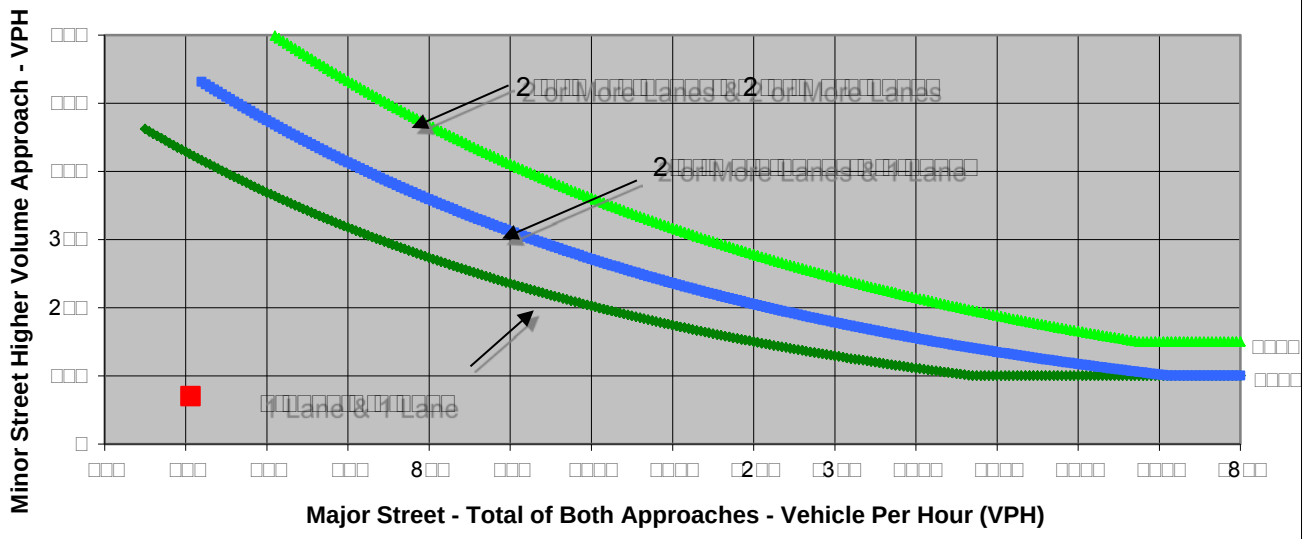
**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **506** | **70** | |

[illegible]

FEHR PEERS

| | | | |
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
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[illegible]

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| [illegible] | 3 | [illegible] | [illegible] | 3 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 3 |

[illegible]

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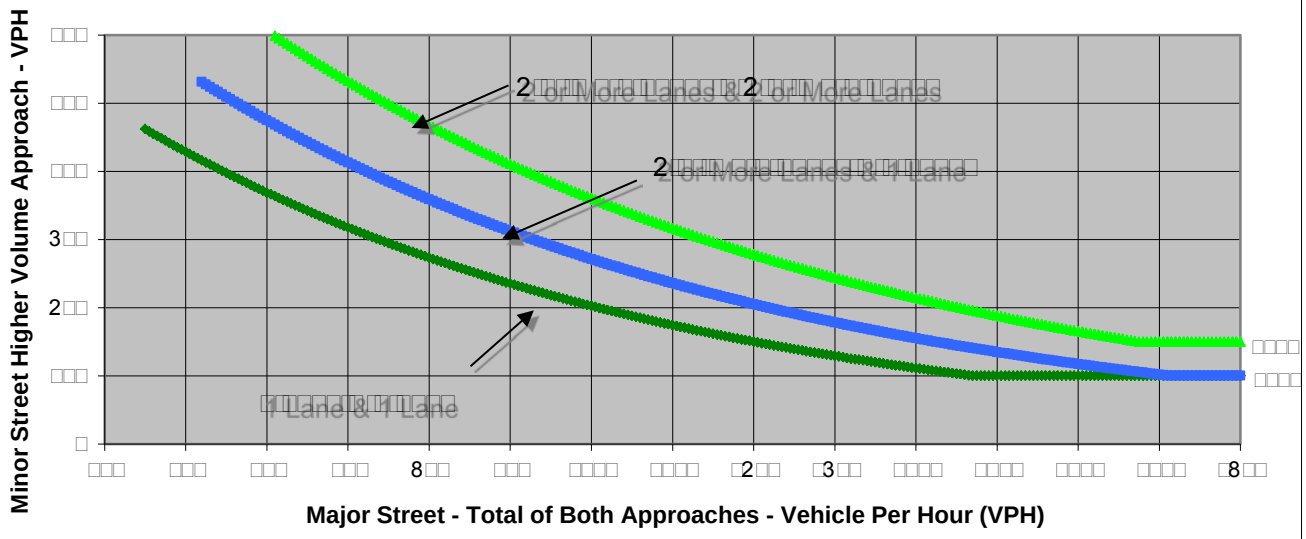
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2 [illegible] 2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **13** | **7** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 22 | 8[illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | 22 | [illegible] |
| [illegible] | [illegible]2 | 32 | [illegible] | 82 |

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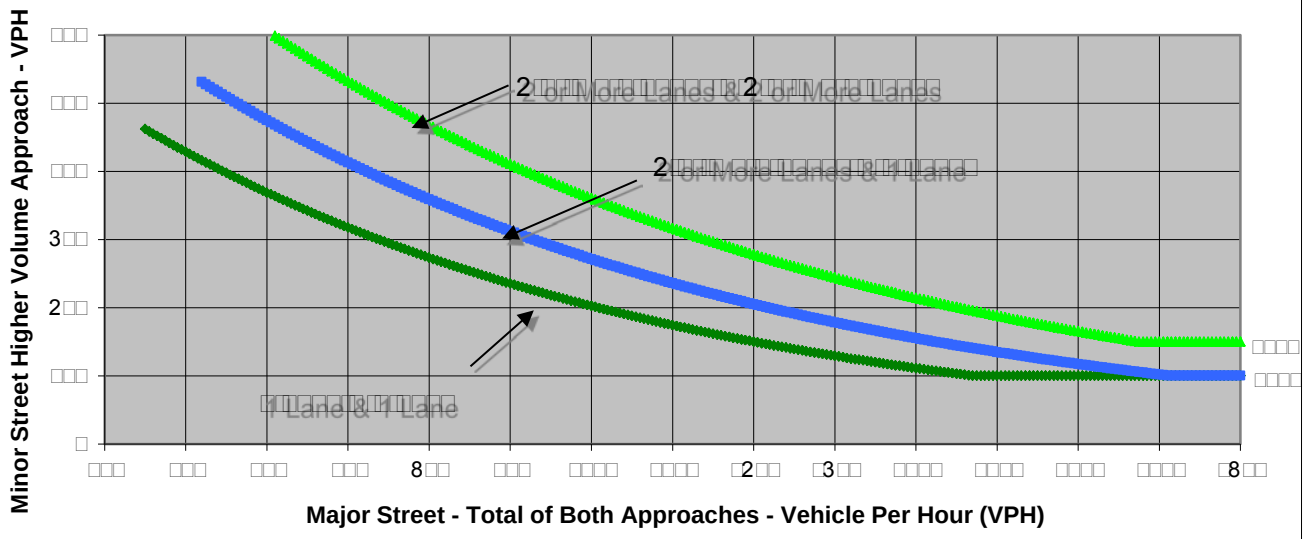
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **198** | **72** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

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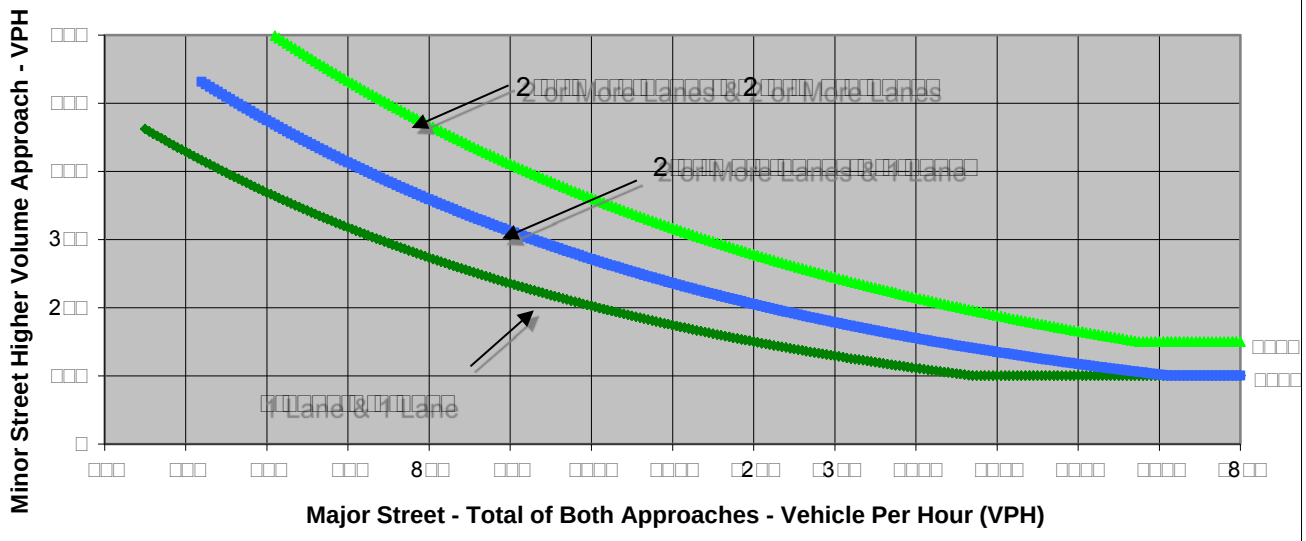
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **29** | **42** | |

[illegible]

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|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible]2[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 3[illegible] | [illegible] | 8 | 2 |
| [illegible] | [illegible]2 | [illegible] | 3[illegible] | [illegible] |
| [illegible] | 3 | [illegible] | [illegible] | 2 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

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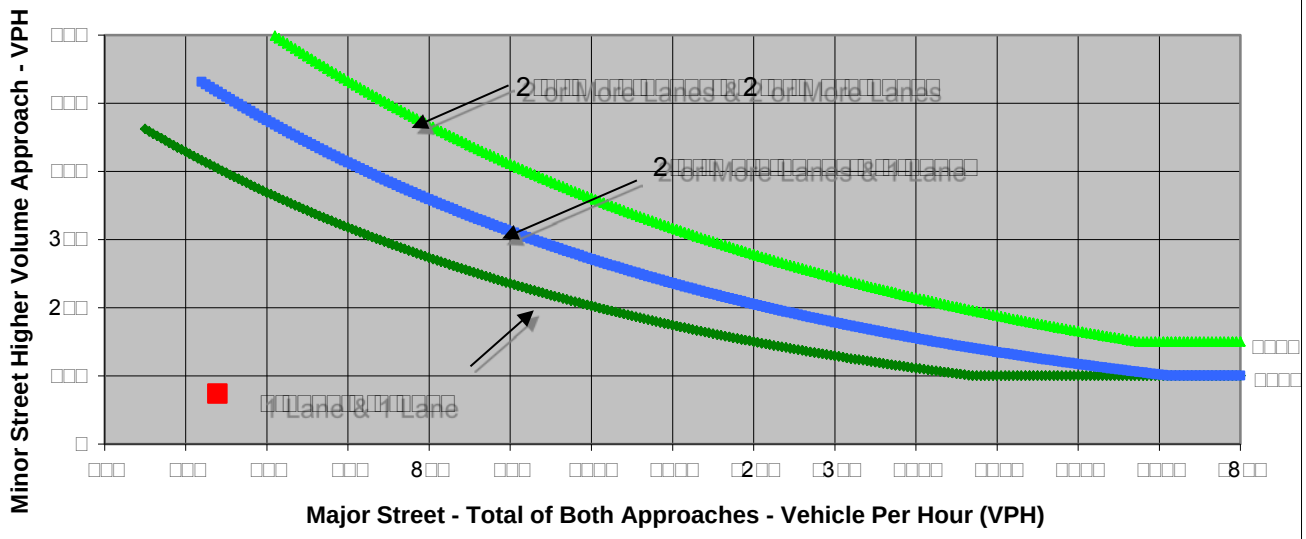
| | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **539** | **74** | |

[illegible]

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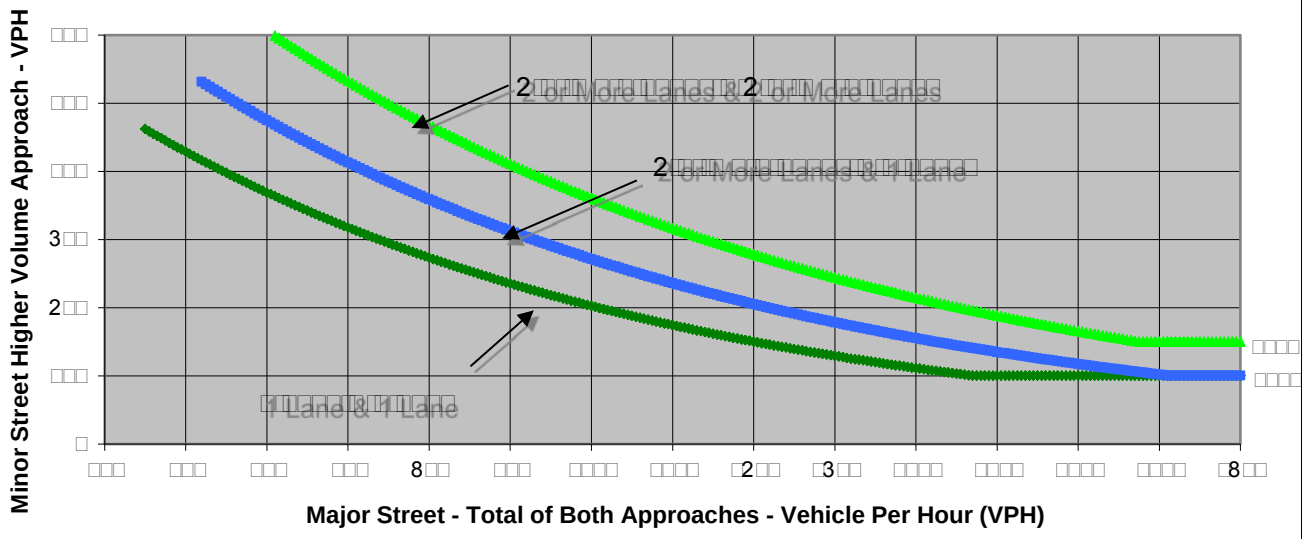
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | |
|---|---|---|---|---|
| [illegible] | [illegible] | 33 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 8 |
| [illegible] | [illegible] | [illegible] | [illegible] | 22 |

| | |
|---|---|
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **26** | **47** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

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|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

| | |
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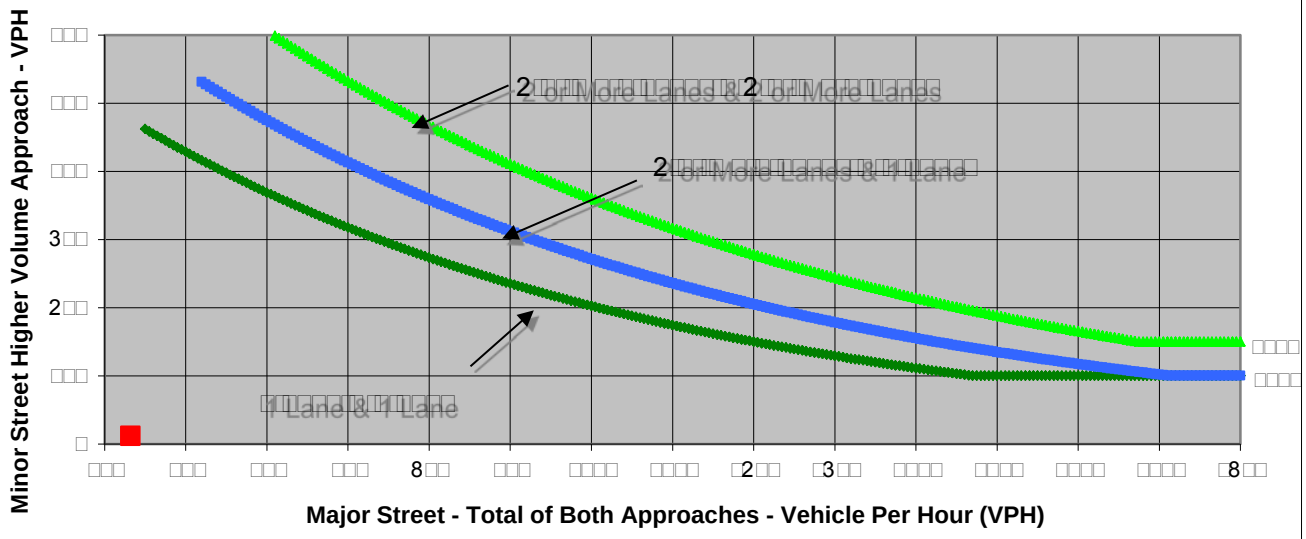
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **432** | **12** | |

[illegible]

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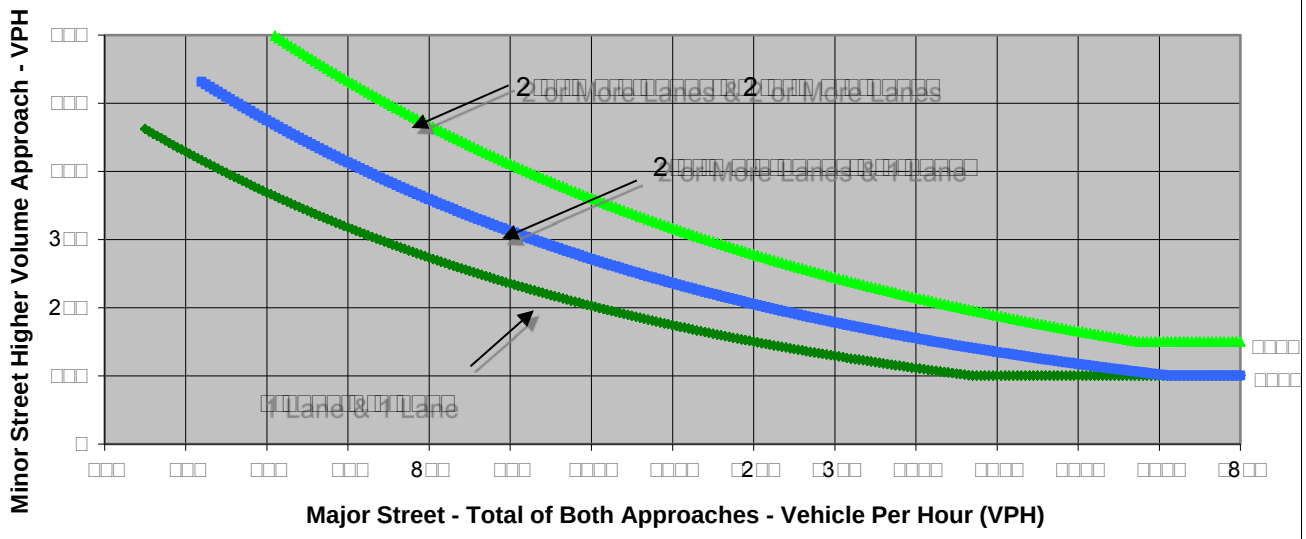
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

| | | |
|---|---|---|
| [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,950** | **27** | |

[illegible]

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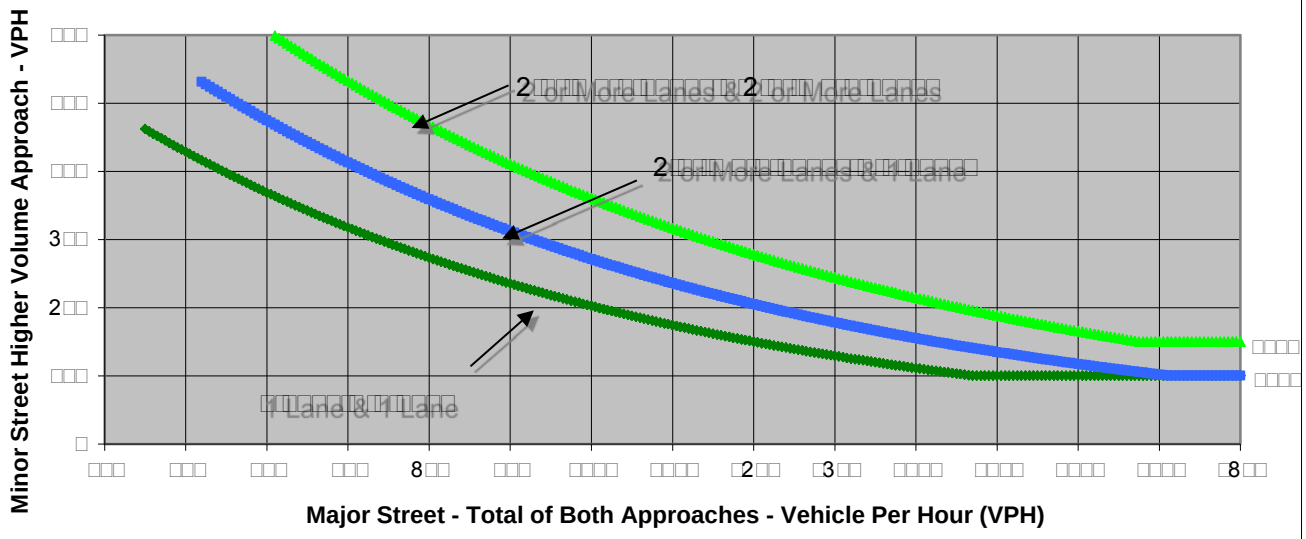
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | | |

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 23 | [illegible] | 82 |
| [illegible] | [illegible] | 8 | 3[illegible] | [illegible] |
| [illegible] | 8[illegible] | 3[illegible] | [illegible] | [illegible] |

[illegible]

[illegible]

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **237** | **84** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 3[illegible] | [illegible]8 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible]8 | [illegible] |
| [illegible] | [illegible] | 8 | [illegible] | 33 |
| [illegible] | [illegible] | 2[illegible] | 32 | [illegible] |

[illegible]

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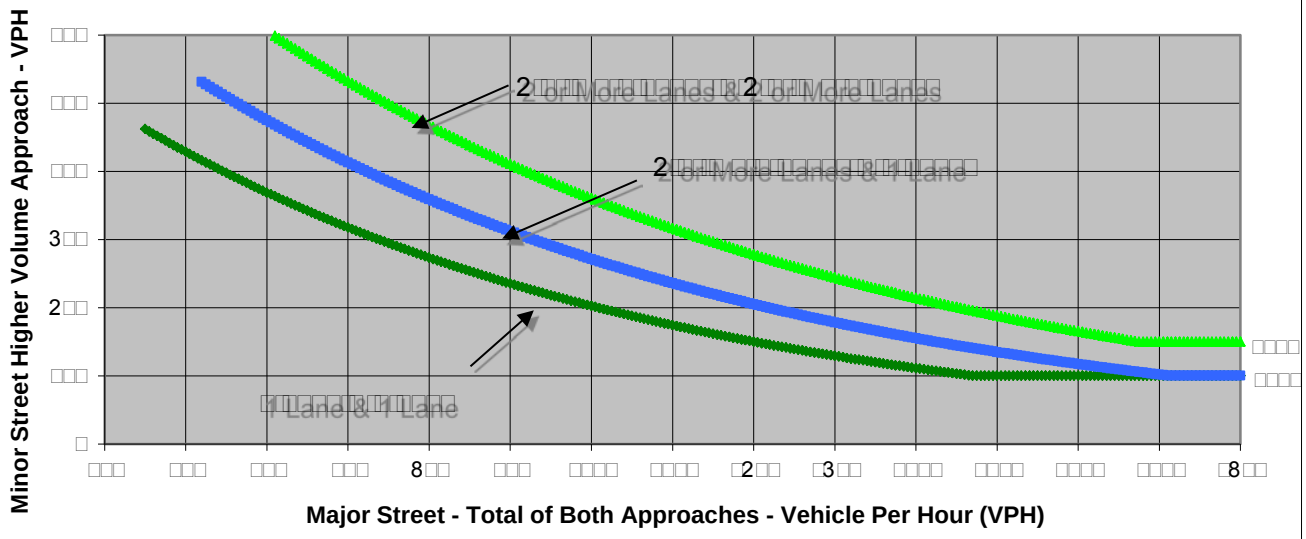
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **79** | **44** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible]2[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 8[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 8[illegible] |

[illegible]

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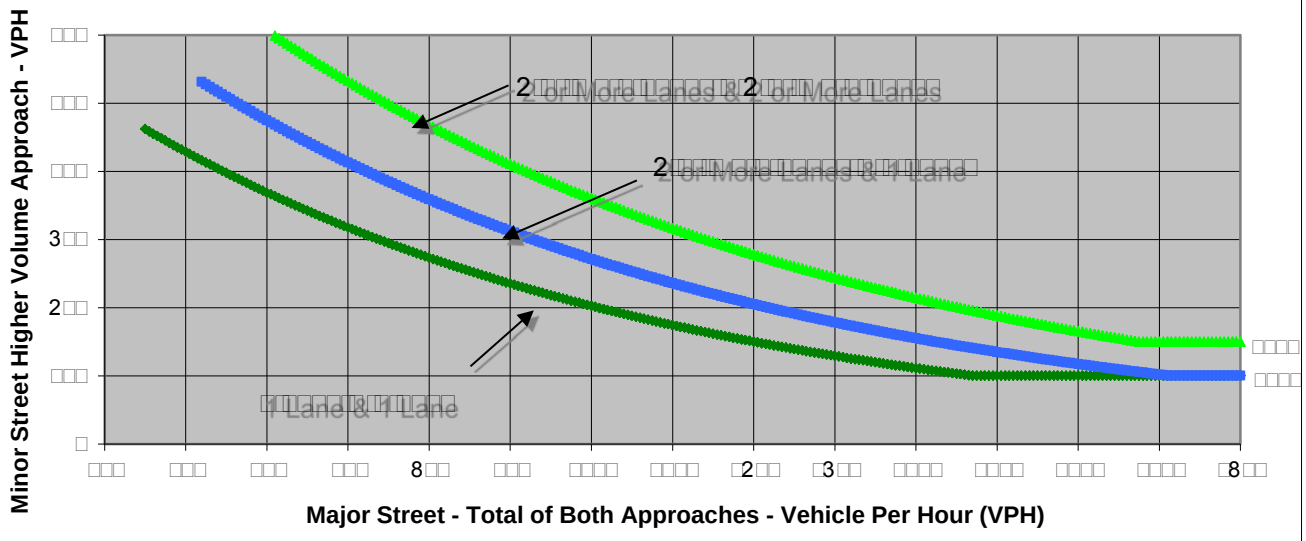
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **189** | **6** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 3 | 2[illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible]3[illegible] | [illegible] |
| [illegible] | [illegible] | [illegible]2 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

| | |
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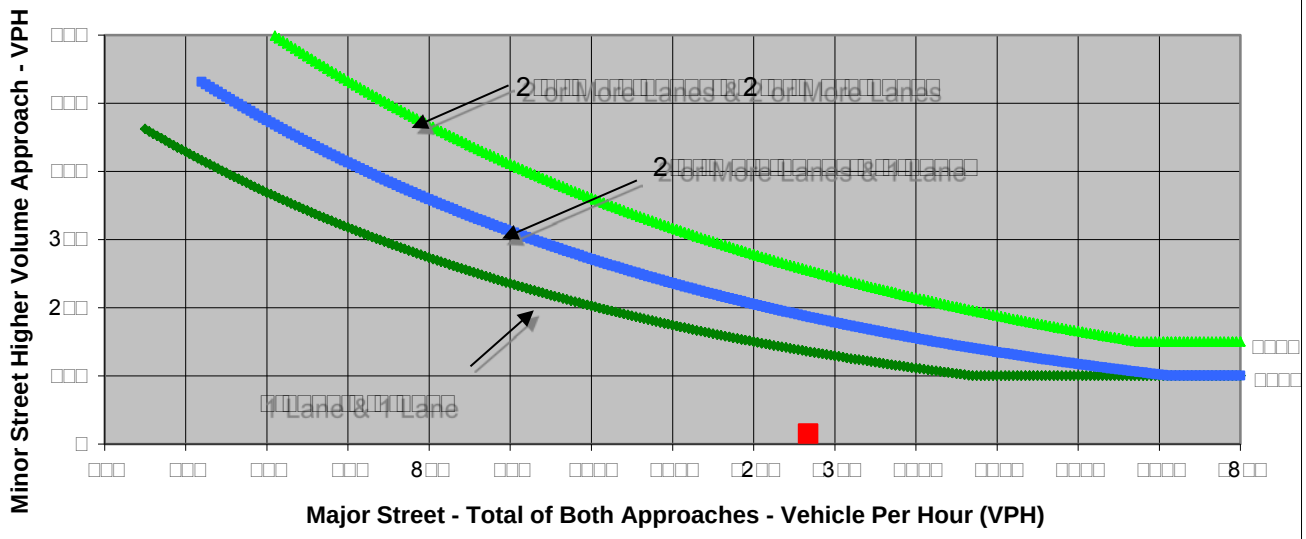
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible]2 | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,267** | **15** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

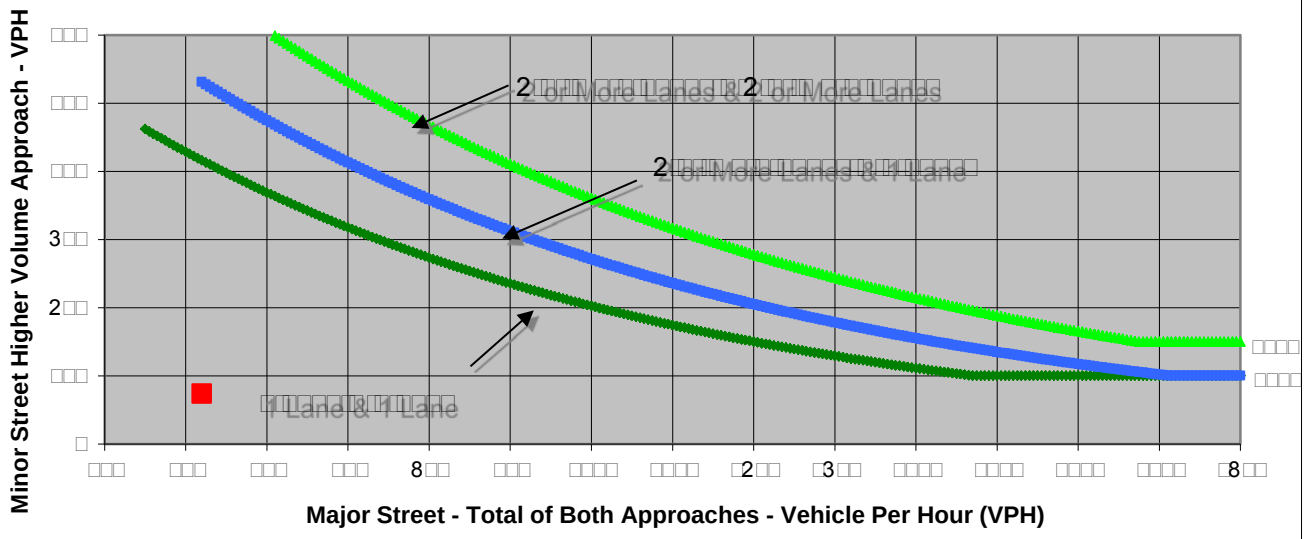
[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | 8 | 2 |
| [illegible] | [illegible] | [illegible] | 33[illegible] | [illegible]8 |
| [illegible] | 3 | [illegible] | [illegible]3 | 2 |
| [illegible] | 32 | [illegible] | [illegible]38 | 82 |

[illegible]

| | |
|---|---|
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **520** | **74** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] 2 [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

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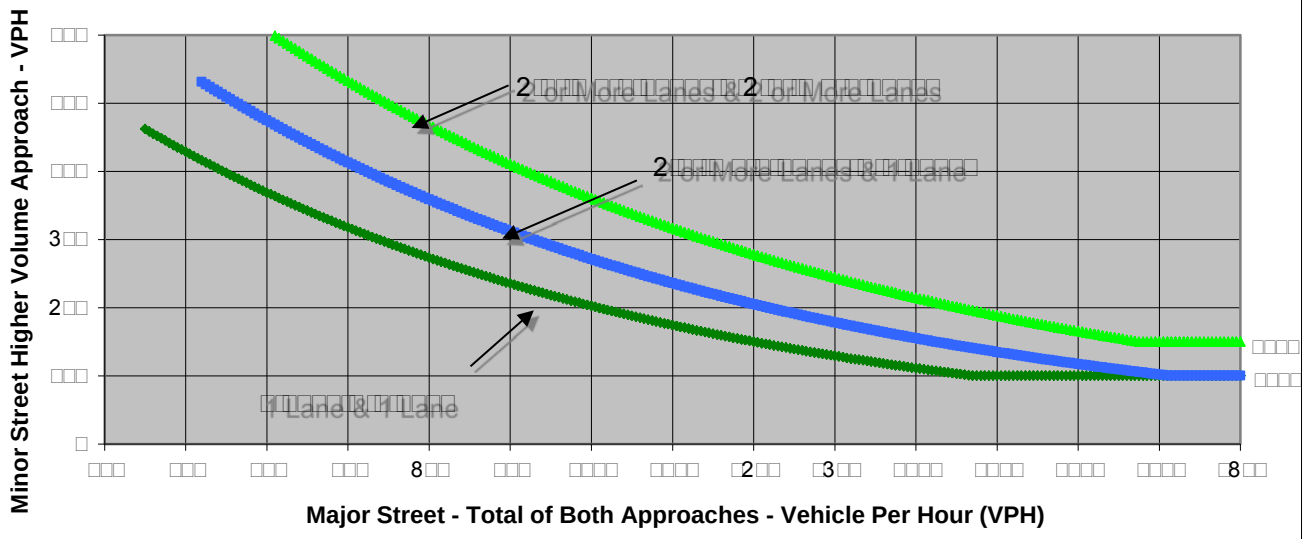
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2 [illegible] 2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **14** | **9** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible]2[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 23 | 8[illegible] | [illegible] |
| [illegible] | [illegible] | 8 | 23 | [illegible] |
| [illegible] | [illegible] | 3[illegible] | [illegible]2[illegible] | 8[illegible] |

[illegible]

| | |
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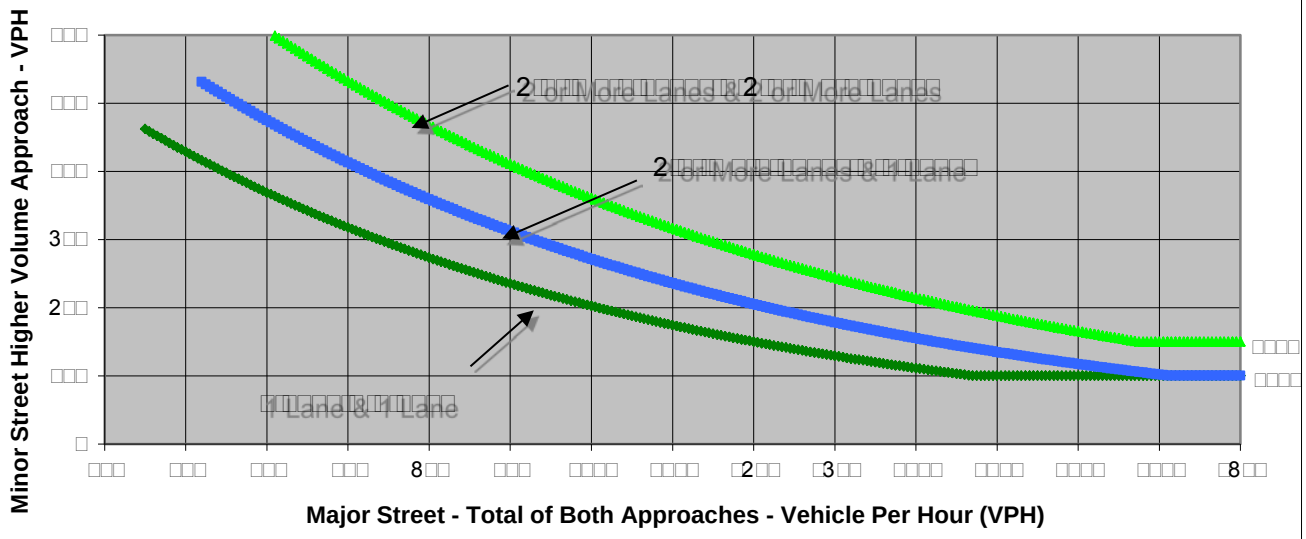
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **206** | **76** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

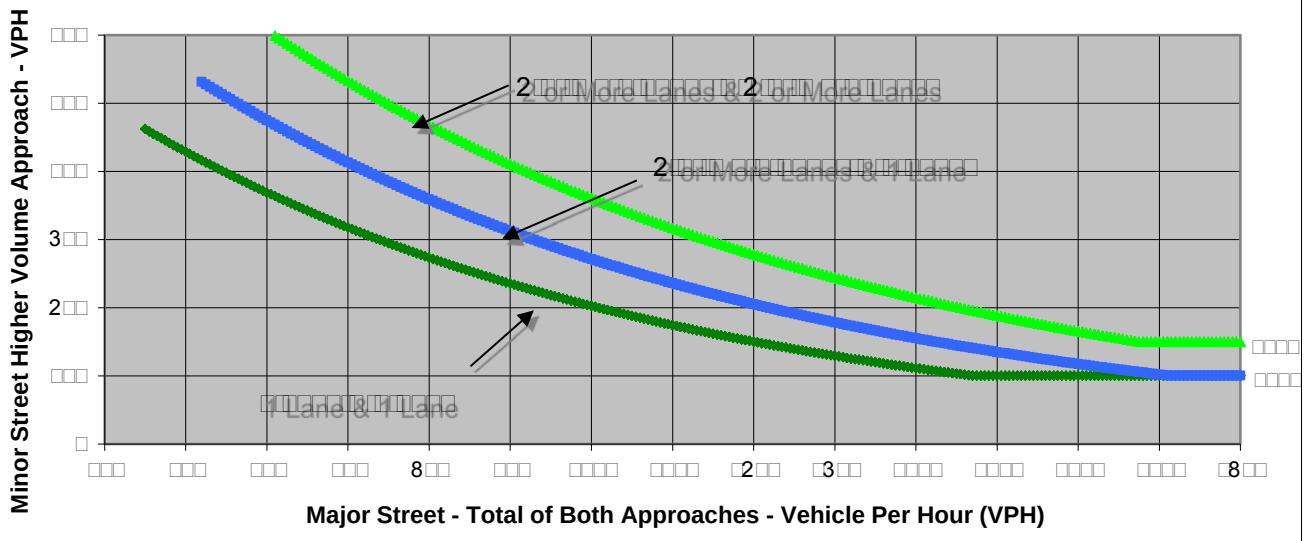
[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 3[illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | |
|---|---|
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **32** | **44** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 3[illegible] | [illegible] | 8 | 2 |
| [illegible] | [illegible]2 | [illegible] | 3[illegible] | [illegible] |
| [illegible] | 3 | [illegible] | [illegible] | 2 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

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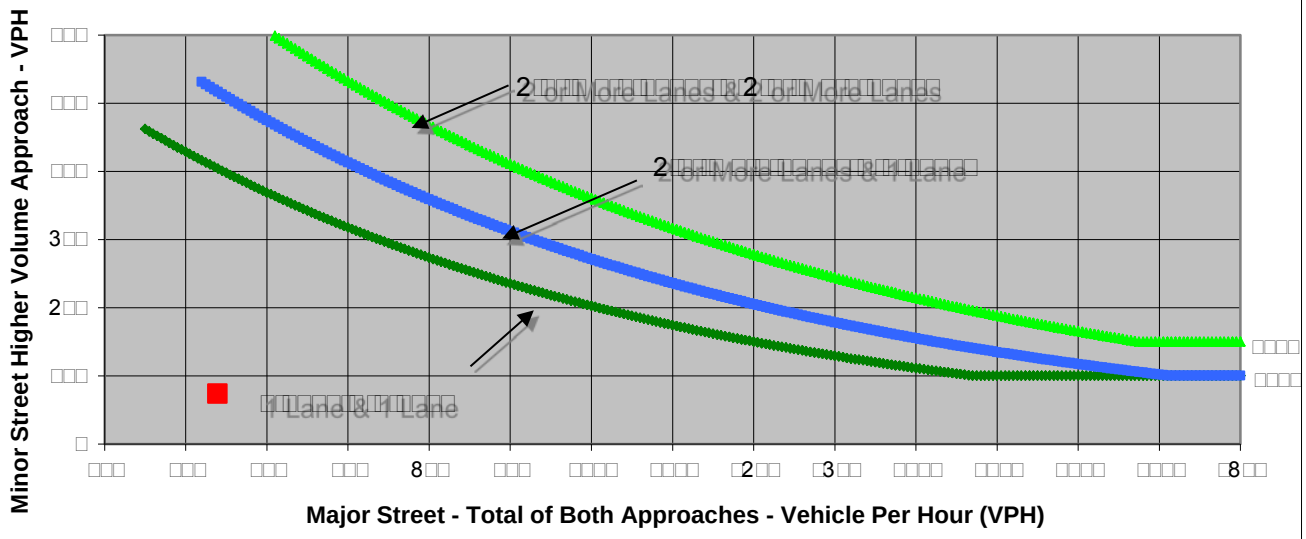
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **539** | **74** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

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|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 33 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 8 |
| [illegible] | [illegible] | [illegible] | [illegible] | 22 |

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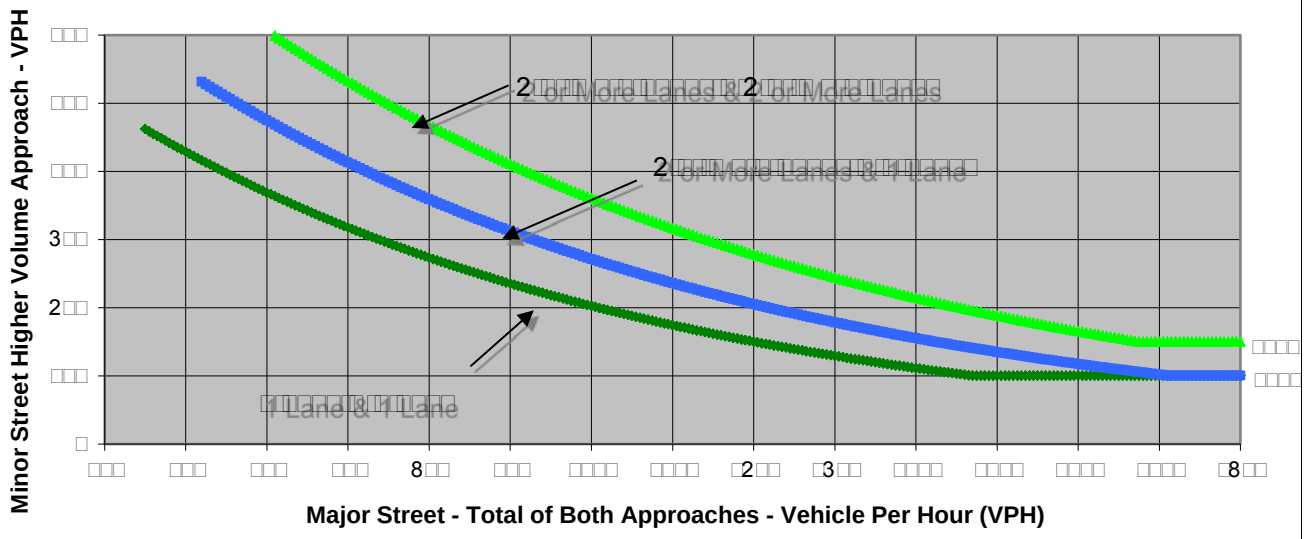
|---|---|
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **26** | **47** | |

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

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| | [illegible] | [illegible] | [illegible] | [illegible] |
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| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

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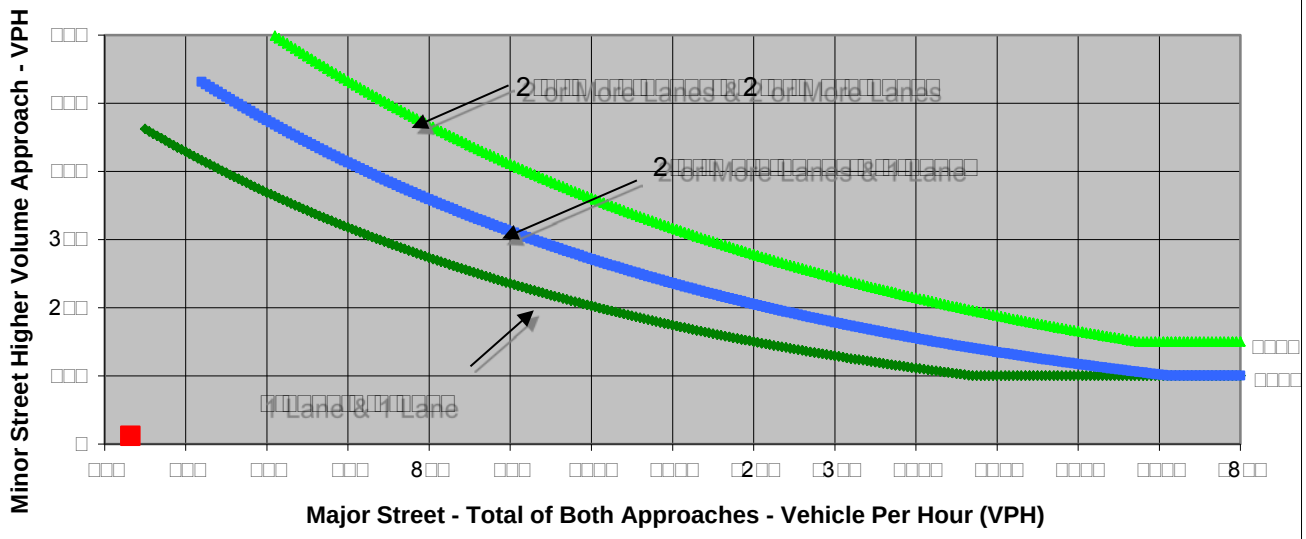
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **432** | **12** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

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| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

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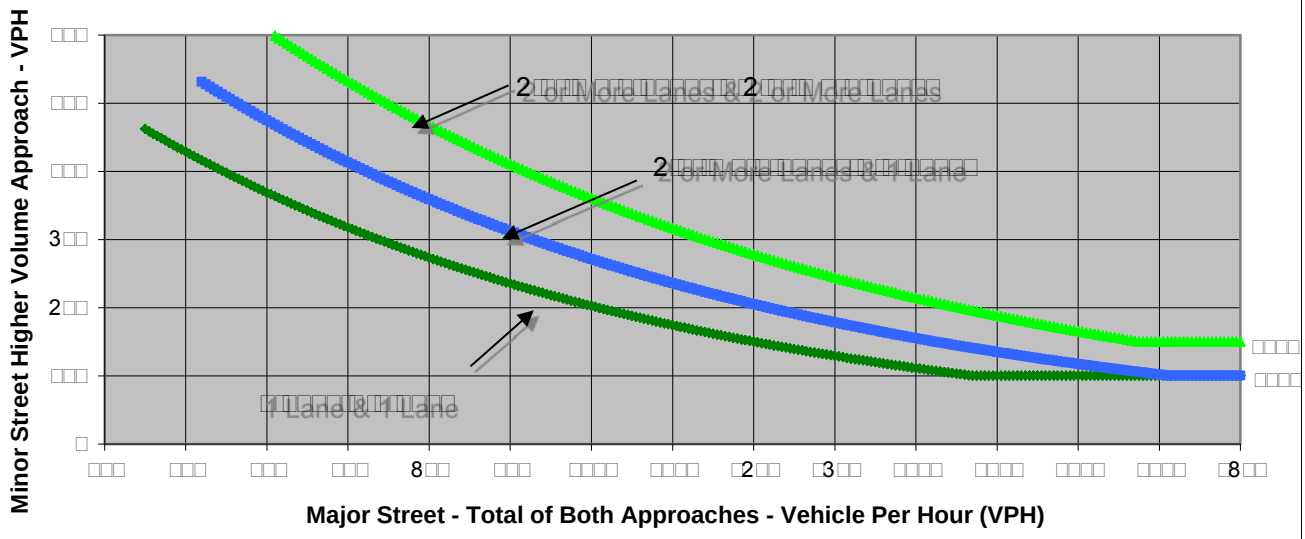
| [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,014** | **27** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 23 | [illegible] | 82 |
| [illegible] | [illegible] | 8 | 3[illegible] | [illegible] |
| [illegible] | 8[illegible] | 3[illegible] | [illegible] | [illegible] |

[illegible]

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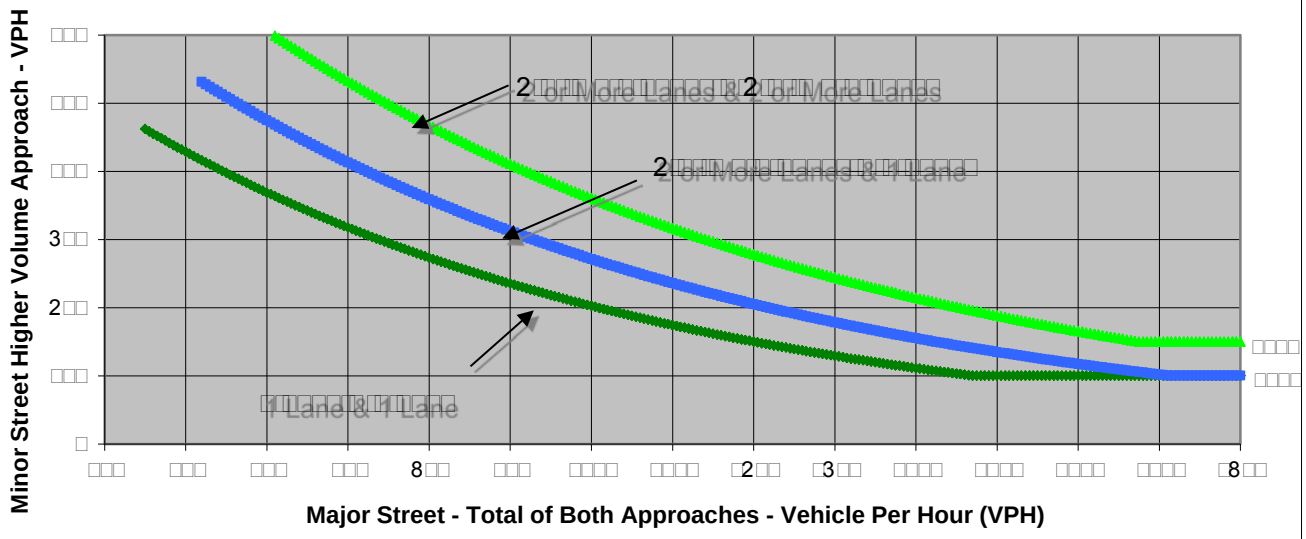
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **237** | **84** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 3[illegible] | [illegible]8 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible]8 | [illegible] |
| [illegible] | [illegible] | 8 | [illegible] | 33 |
| [illegible] | [illegible] | 2[illegible] | 32 | [illegible] |

[illegible]

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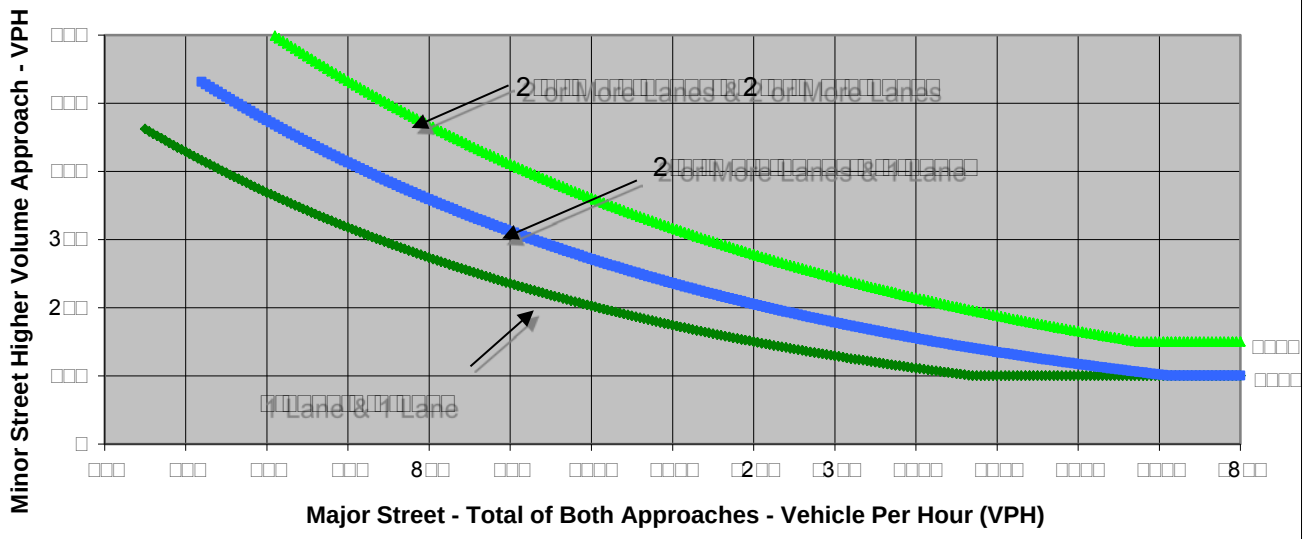
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **79** | **44** | |

[illegible]

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| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| | [illegible] | [illegible] | [illegible] | [illegible] |
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| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

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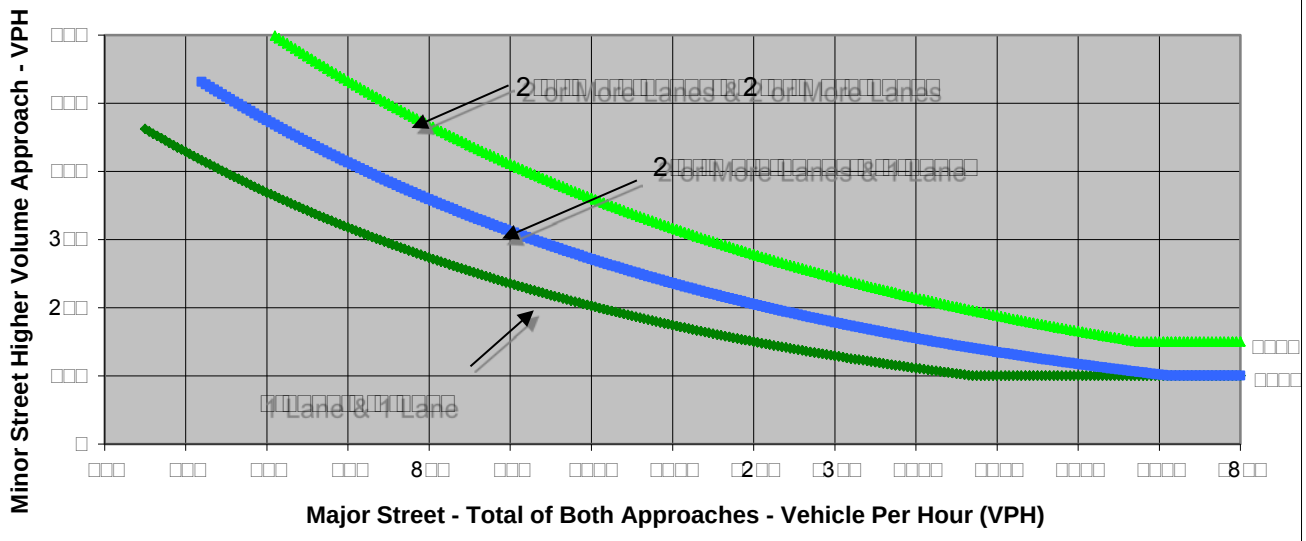
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **189** | **6** | |

[illegible]

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|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|
| [illegible] | 3 | 2[illegible] | [illegible] |
| [illegible] | [illegible] | [illegible]8[illegible] | [illegible]3[illegible] |
| [illegible] | [illegible] | [illegible]2 | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible]3[illegible] |

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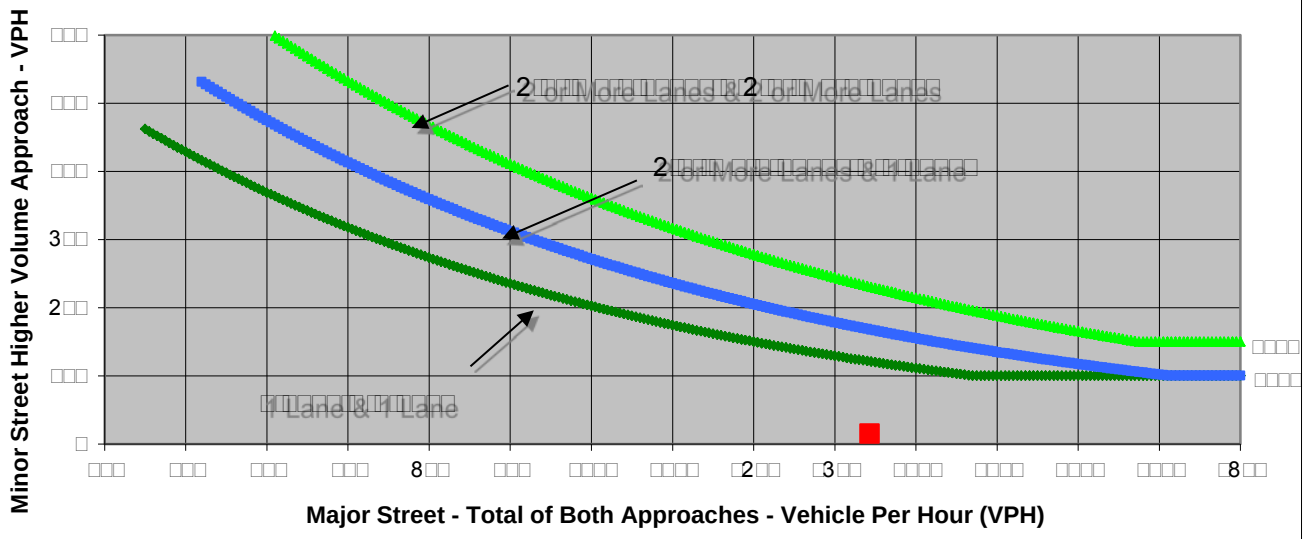
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible]2 | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,343** | **15** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible] 2 2 [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 2[illegible] | [illegible]3 | [illegible] | 2 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | 3 | [illegible] | [illegible]3 | 2 |
| [illegible] | 3[illegible] | 88 | [illegible]32 | [illegible] |

[illegible]

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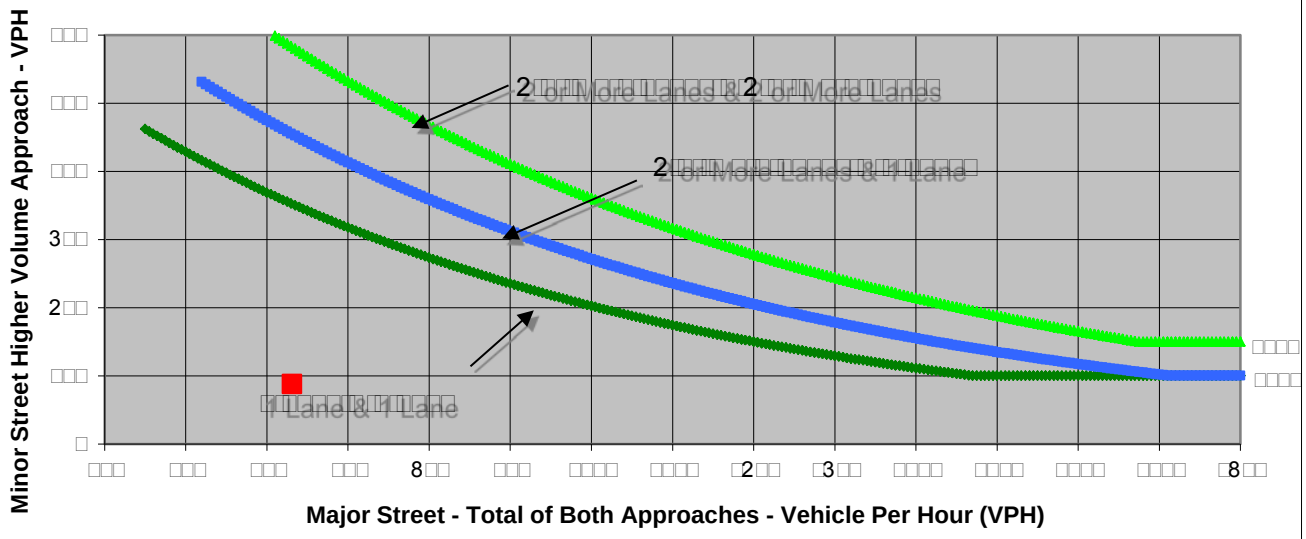
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2 [illegible] 2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **631** | **88** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

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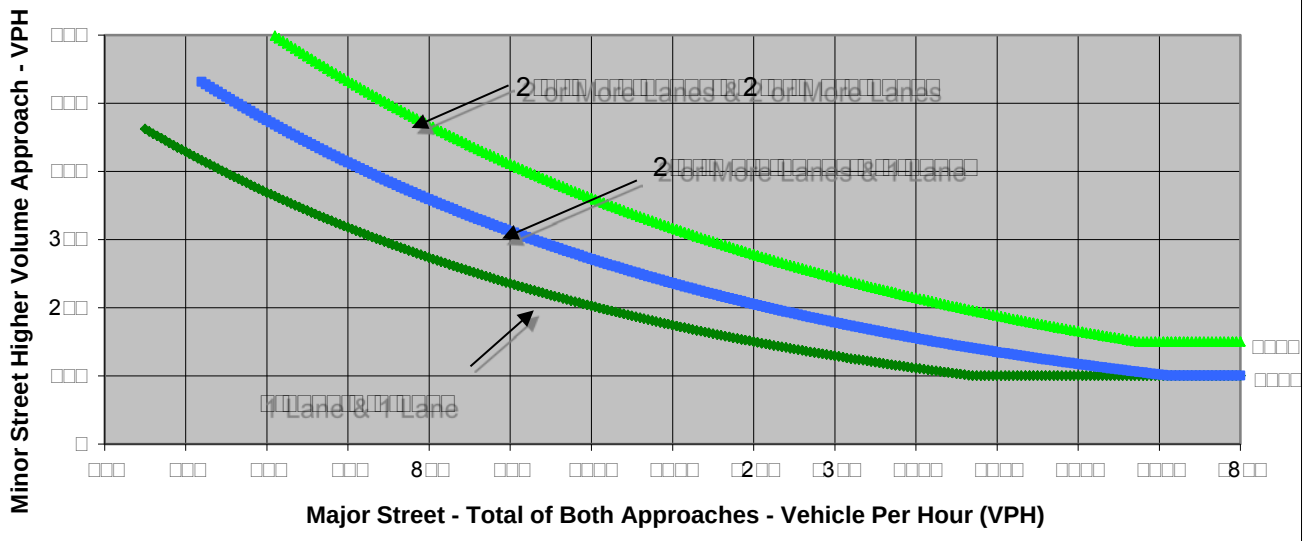
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **17** | **9** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible] 2 2 [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | 3 | [illegible] |
| [illegible] | 8 | 28 | [illegible] | 2 |
| [illegible] | [illegible] | [illegible] | 28 | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 2 |

[illegible]

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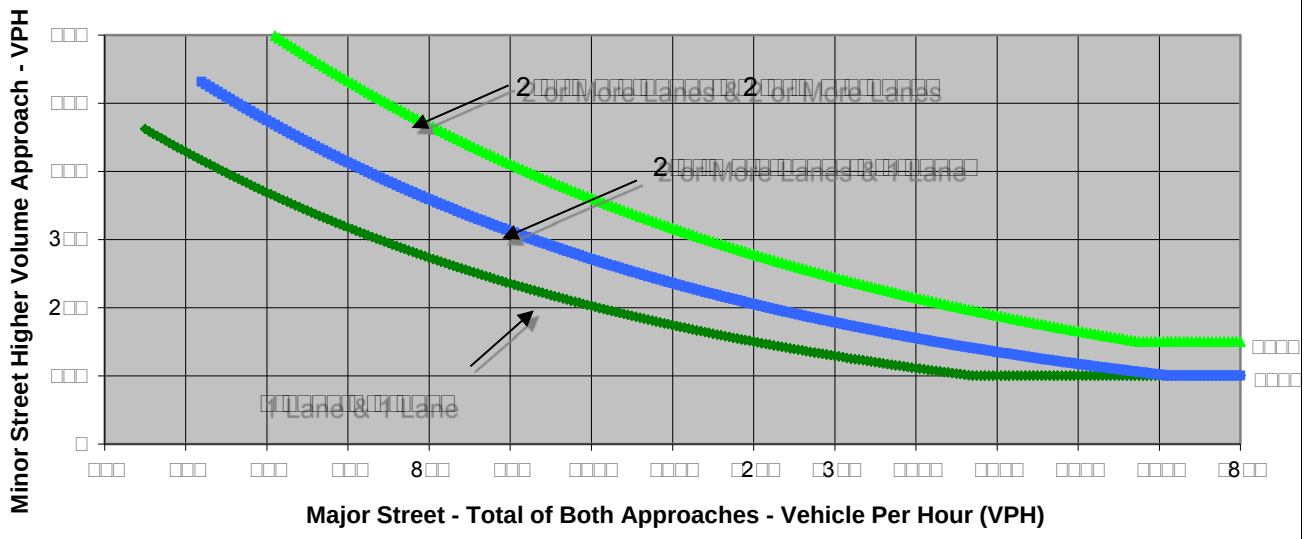
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2 [illegible] 2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **248** | **91** | |

[illegible]

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| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible] 2 2 [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 3[illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | 22 | [illegible]2 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible]3 | [illegible] | 22 | [illegible] |

[illegible]

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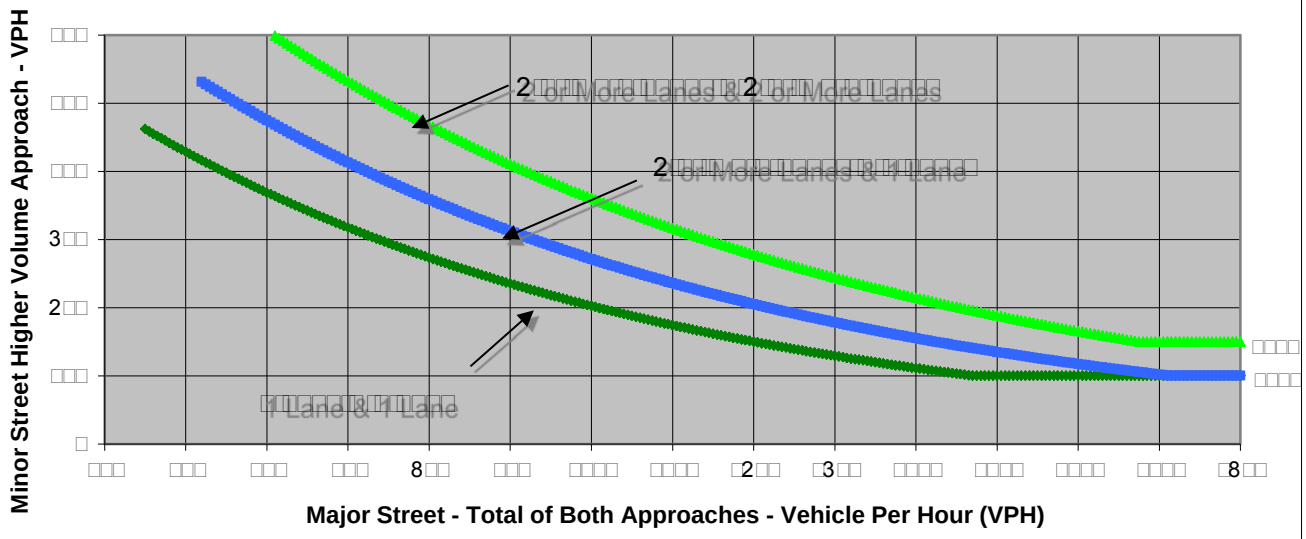
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2 [illegible] 2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **38** | **53** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | 3[illegible] | [illegible]3 | [illegible] | 2 |
| [illegible] | [illegible] | [illegible] | [illegible]3 | [illegible] |
| [illegible] | 3 | [illegible] | [illegible] | 2 |
| [illegible] | [illegible] | 88 | [illegible]3[illegible] | [illegible] |

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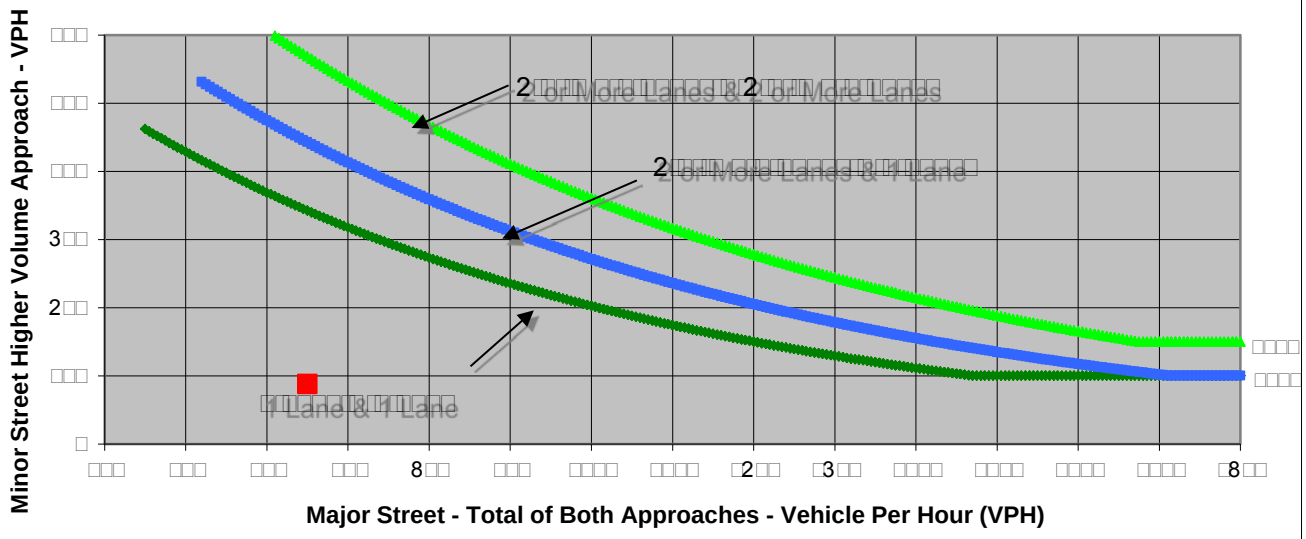
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **650** | **88** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

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|---|---|---|---|---|
| | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 33 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 8 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

| | |
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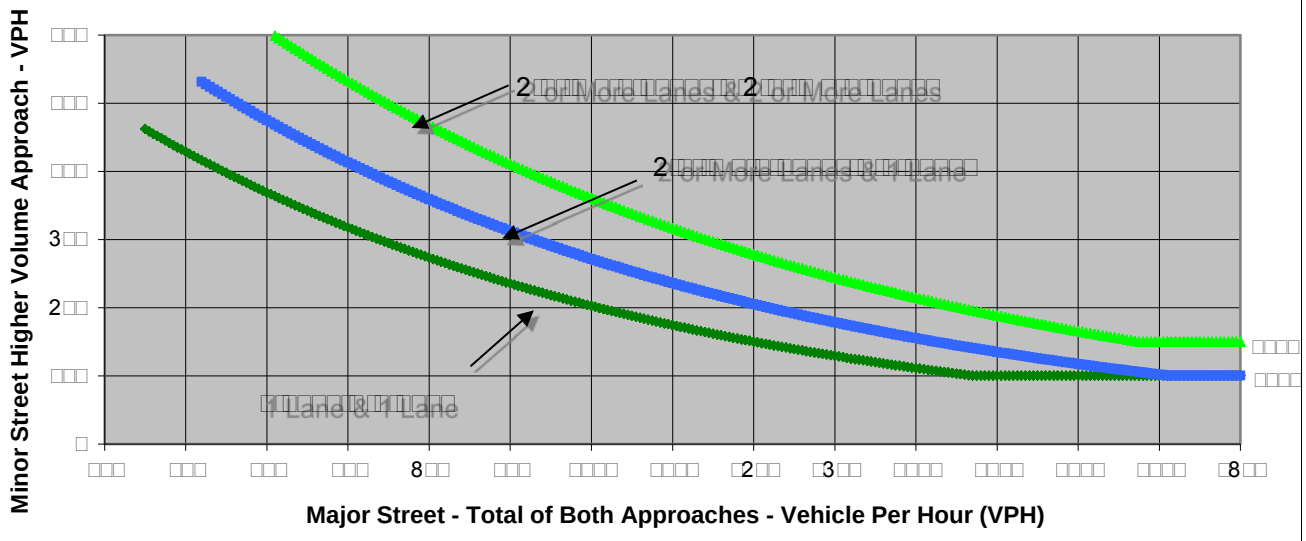
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **29** | **47** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
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| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | 3 | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

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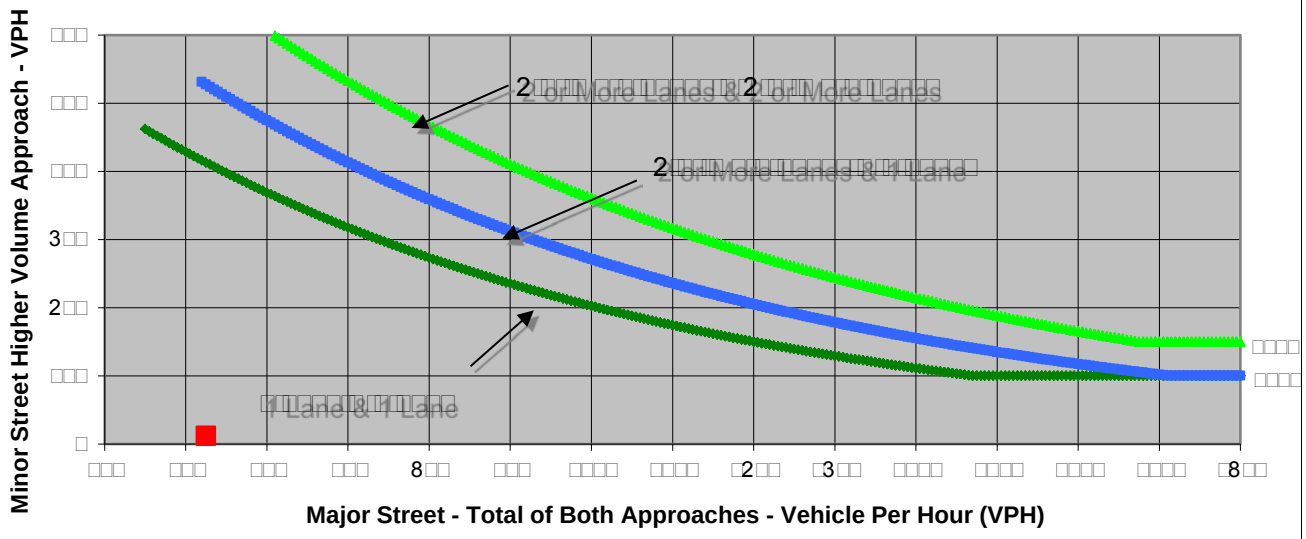
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **525** | **12** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

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|---|---|
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

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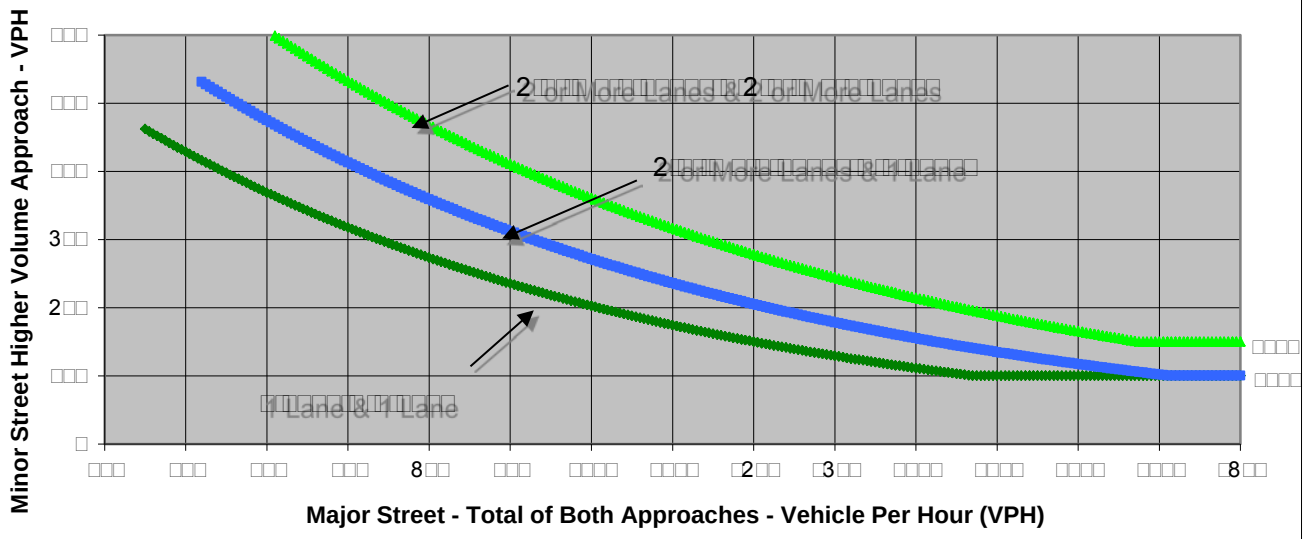
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**



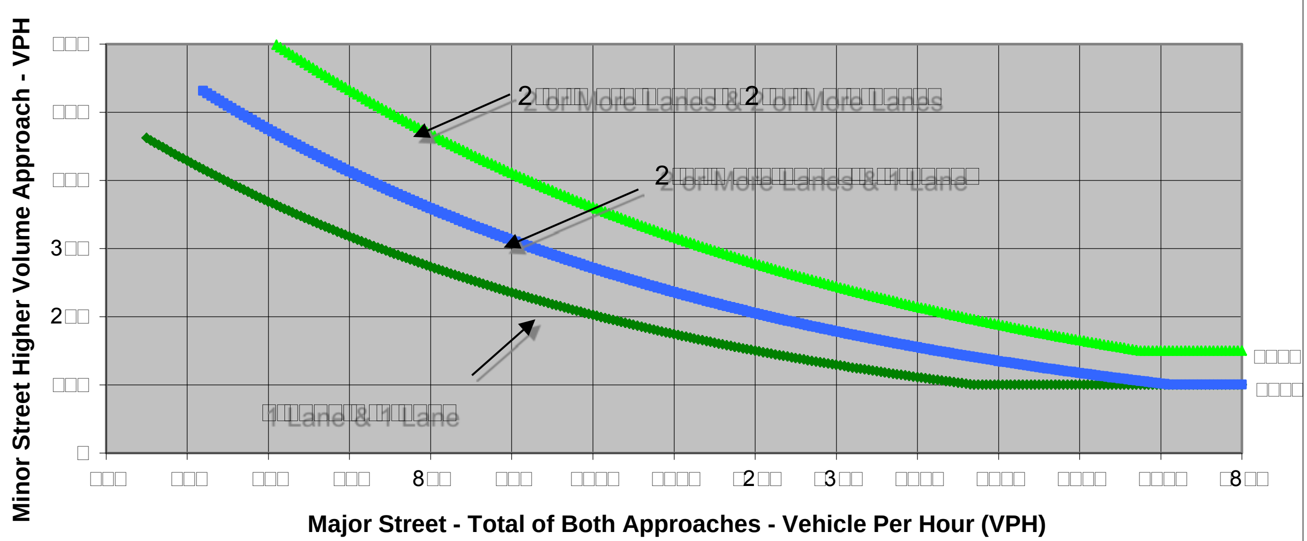

[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,470** | **27** | |

[illegible]

**Figure 4C-3. Warrant 3, Peak Hour**

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| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| Number of Approach Lanes | 2 | 1 | **NO** |
| Traffic Volume (VPH) * | 279 | 99 | |

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|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible] 2 2 [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| [illegible] | 3[illegible] | [illegible]8 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | 22 | [illegible]2 |
| [illegible] | [illegible] | 8 | [illegible] | 33 |
| [illegible] | [illegible]3 | 2[illegible] | 3[illegible] | [illegible] |

[illegible]

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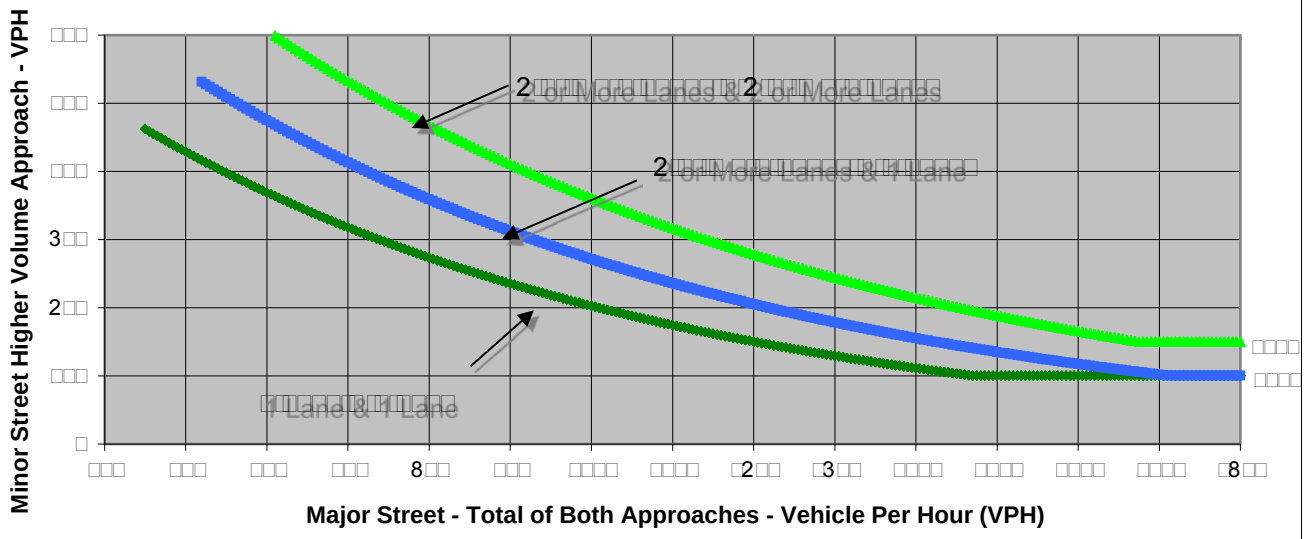
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible] 2 [illegible] 2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **85** | **53** | |

[illegible]

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| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

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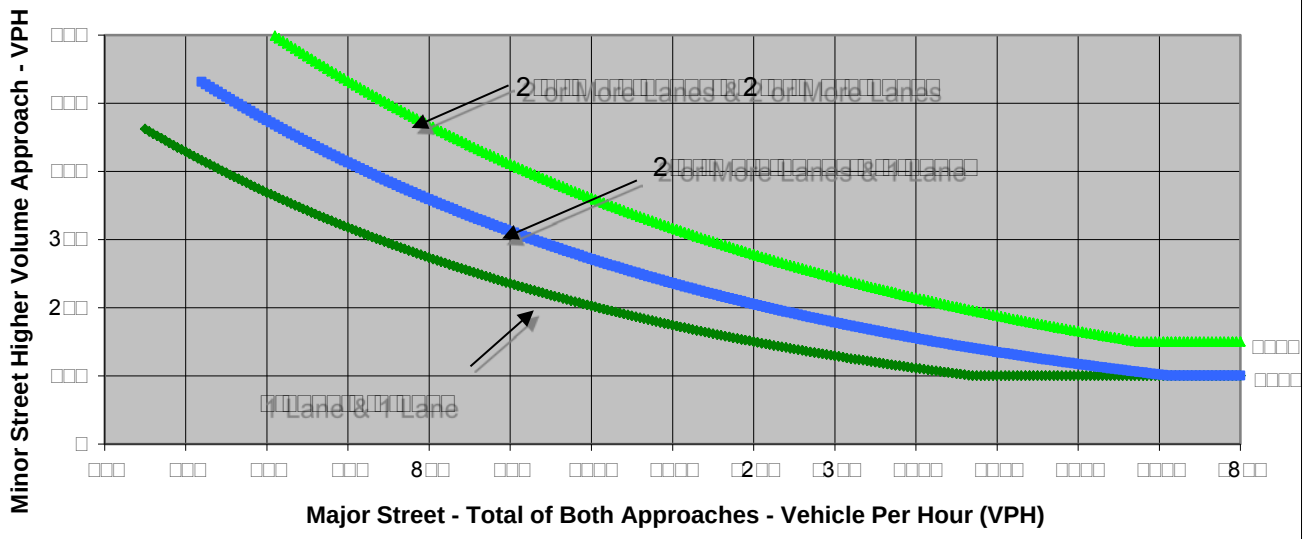
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible] | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **228** | **6** | |

[illegible]

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|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

| [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|
| [illegible] | 3 | 2[illegible] | [illegible] |
| [illegible] | [illegible] | [illegible]3[illegible] | 8[illegible] |
| [illegible] | [illegible] | [illegible]2 | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible]2 |

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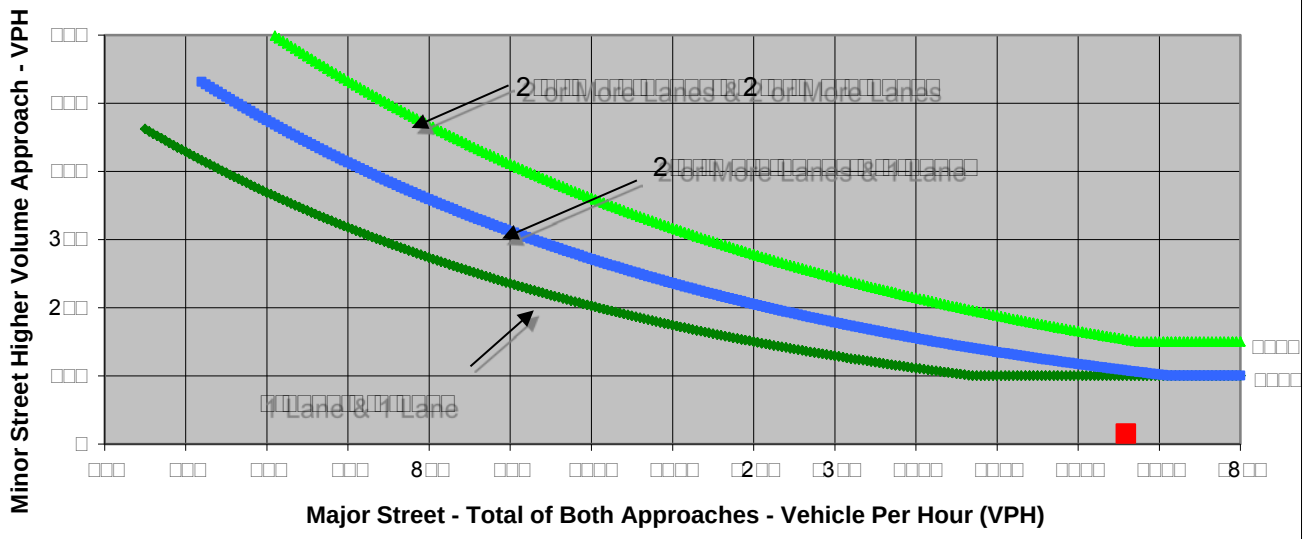
|---|---|
| [illegible] | [illegible] |
| [illegible] | [illegible] |

**Figure 4C-3. Warrant 3, Peak Hour**




[illegible]

[illegible] *California Manual on Uniform Traffic Control Devices* [illegible]2[illegible]2

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | [illegible] | [illegible]2 | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,659** | **15** | |

[illegible]