City of Indio
Public Works Department

Initial Study/Mitigated Negative Declaration

Jackson Street Improvement Project from Avenue 50 to Avenue 52

July 2021

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City of Indio
Public Works Department
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INTRODUCTION

In accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Sections 21000–21177), this Initial Study has been prepared to determine potentially significant impacts upon the environment resulting from the proposed Jackson Street Improvement Project from Avenue 50 to Avenue 52 (Project). In accordance with Section 15063 of the State *CEQA Guidelines*, this Initial Study is a preliminary analysis by the City of Indio (City) as Lead Agency, in consultation with the County of Riverside as Responsible Agency, to inform the Lead Agency decision makers, Responsible Agencies, other affected agencies, and the public of potential environmental impacts associated with the implementation of the proposed Project.

Organization of the Initial Study

The Initial Study is organized as follows:

- **Introduction**, which provides the context for the review along with applicable citation pursuant to CEQA and the State *CEQA Guidelines.*
- **City of Indio Environmental Initial Study**, the City of Indio form that provides the Project Description, a brief discussion of the existing environmental setting, and an environmental impact assessment consisting of an environmental checklist and accompanying analysis for responding to checklist questions.
- **References,** which includes a list of reference sources.
- **List of Initial Study Preparers,** which identifies those responsible for preparation of this Initial Study and other parties contacted during the preparation of the Initial Study.

Environmental Process

The environmental process being undertaken as part of the proposed Project began with the initial project and environmental research. The Initial Study and Draft Mitigated Negative Declaration (IS/MND) will be subject to a 30-day public review period. During this review period, public and agency comments on the document relative to environmental issues should be addressed to:

Timothy Wassil, Director of Public Works
City of Indio Public Works Department
100 Civic Center Mall
Indio, CA 92201

Comments received during that time will be considered as part of the Project's environmental review and will be included with the Initial Study document for consideration by the Indio City Council. If the City Council determines that the Project will have no significant long-term, unmitigatable environmental effects, a Mitigated Negative Declaration will be adopted for the Project.

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Environmental Initial Study

1. Project Title:	Jackson Street Improvement Project from Avenue 50 to Avenue 52
2. Lead Agency Name & Address:	City of Indio Public Works Department 100 Civic Center Mall Indio, CA 92201
3. Contact Person & Phone Number:	Timothy Wassil, Director of Public Works (760) 391-4042
4. Project Location:	Jackson Street, from approximately 0.5 miles north of the intersection of Jackson Street and Avenue 50 to approximately 0.25 miles south of the intersection of Jackson Street and Avenue 52. Improvements to Avenue 50 extend from approximately 0.1 mile west to approximately 0.3 east of the intersection of Jackson Street and improvements to Avenue 52 extend from approximately 0.1 miles west to 0.4 miles east of the intersection of Jackson Street. Jackson Street between Avenue 50 and Avenue 52 acts as a border between the City of Indio to the west of Jackson Street and County of Riverside to the east. (**Figure 1 – Regional Location Map** and **Figure 2 – Aerial Map**)
5. Project Sponsor: Name & Address:	City of Indio Public Works Department 100 Civic Center Mall Indio, CA 92201 County of Riverside, Transportation Department 4080 Lemon Street Riverside, CA 92501

6. General Plan Designation:

City of Indio

The City's General Plan (GP) Circulation Element designates the Project's roadway segments that are within the City limits – Jackson Street, Avenue 50, and Avenue 52 – as "4-Lane Boulevard with Median or Center Left-Turn Lane" (GP, Figure 4-3). Boulevards are identified as a specific street typology in the City's GP, which have the following attributes (GP, Table 4-2):

- Boulevards should have two to four travel lanes and a median.
- Bicycle lanes should be provided.
- Off-street bicycle parking should be provided in retail areas.

- Bike racks may be provided within the public right-of-way and encouraged on private property.
- Traffic calming devices, such as curb extensions (bulbouts) or enhanced pedestrian crossing may be implemented.
- Street furniture shall be oriented toward the businesses.
- Mid-block pedestrian crossings could be provided at appropriate locations (e.g. where sight distance is adequate and speeds are appropriate).
- On-street vehicle parking should be provided. In areas with high parking demand, innovative parking management techniques should be implemented / considered.
- Pedestrians should be “buffered” from vehicle traffic using landscaping or parked vehicles.

Jackson Street and Avenue 52 are also classified as Class II Bike Lanes, while Avenue 50 is a Class IV Separated Bikeway or Cycle Track. There are also trails designated along Jackson Street, Avenue 50, and Avenue 52 (GP, Figure 4-1). Class II Bike Lanes provide a striped land for one-way bike travel on a street or highway (GP, p. 4-8). Class IV Separated Bikeway or Cycle Track providers a protected lane for one-way bike travel on a street or highway. Implementation of the Project will be consistent with the City’s GP circulation element.

The City’s GP designates the land directly adjacent to Jackson Street and the intersections of Avenue 50 and 52 as Neighborhood Center (NC) and Suburban Neighborhood (SN). See **Figure 3 – General Plan Land Use Map**. Implementation of the Project will not require a change to existing GP designations.

Unincorporated Riverside County

The area generally south of Avenue 50 and east of Jackson Street is within the County of Riverside (**Figure 3**). The County GP has designated the properties adjacent to Jackson Street as estate density residential and agriculture with a small area of commercial retail near Avenue 52.

7. Zoning:

City of Indio

As shown on **Figure 4 – Zoning Map,** the City of Indio designates areas adjacent to the Project as: Neighborhood Commercial (NC), Country Estate and Visitor Serving (CE), Project Master plan (PMP), Residential Low (RL), and Residential Medium (RM). Implementation of the Project will not require a change to existing zoning.

City of Coachella
An area south of Avenue 50, near the eastern Project boundary is within the City of Coachella. This land is zoned Residential Multi-Family Planned Unit Development (R-M PUD). Implementation of the Project would not require improvements within the City of Coachella, or changes to existing zoning. (**Figure 4**)

Unincorporated Riverside County
The Riverside County zoning designations directly adjacent to the east of Jackson Street and south of Avenue 50 are Light Agriculture (A-1), Scenic Highway Commercial (C-P-S), Controlled Development Areas (W-2), and Light Agriculture 20,000 square-foot minimum lot size (A-1-20) (**Figure 4**). Implementation of the Project will not require a change to existing zoning.

8. Description of Project:

The City of Indio continues to experience significant growth in population, jobs, and multiple festivals that bring people to the City each year. Improvements to the City's transportation infrastructure are required to meet the City's mobility needs, which include a desire to have better options to safely walk, bicycle, and ride transit, in addition to traveling by automobile.

Recognizing this need, the City of Indio proposes to improve a portion of Jackson Street, Avenue 50, and Avenue 52 to its ultimate General Plan configuration as well as construct drainage improvements consistent with the City's Master Drainage Plan.

The Jackson Street Improvement Project from Avenue 50 to Avenue 52 (hereinafter the Project) entails the improvement of Jackson Street from Odlum Drive, approximately 0.5 miles north of the intersection of Jackson Street and Avenue 50 to approximately 0.25 miles south of the intersection of Jackson Street and Avenue 52. Improvements are also proposed along Avenue 50 and Avenue 52, east and west of Jackson Street.

Improvements generally include widening Jackson Street from three travel lanes to four travel lanes and adding sidewalk, bike lane, curb and gutter, and drainage improvements per the City of Indio's Master Drainage Plan (MDP). The improvements along Jackson Street south of Avenue 50 are primarily within the County of Riverside. All improvements are consistent with the City's and Riverside County's GP Road Classifications. Details are provided below.

Jackson Street North of Avenue 50
The proposed improvements include widening the easterly side of Jackson Street approximately 14 feet and constructing an 8-foot wide, curb-adjacent sidewalk. All private driveways will be reconstructed with standard residential driveway curb cuts. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate storm water, 48-inch or 60-inch diameter perforated high-density polyethylene (HDPE) underground storage pipes are proposed underneath portions of the sidewalk.

Jackson Street at Avenue 50

The proposed improvements include signalizing the existing 4-way stop. Americans with Disabilities Act (ADA)-compliant curb ramps are proposed at both northeast and southeast curb returns. A section of Coachella Valley Water District (CVWD) irrigation line facilities will be removed and replaced where surface improvements are proposed.

There is an existing local market store (L&G Desert Store) located at the northeast corner of the intersection. An adjacent 1-acre unpaved lot provides parking for the market customers. The proposed improvements will include paving and striping of the existing lot, along with driveway cuts for lot access.

Along the south side of Avenue 50, west of Jackson Street, there is a 300 foot “gap” of unimproved frontage. The proposed improvements will construct this gap to ultimate width by widening the existing pavement approximately 22 feet, constructing curb and gutter, and sidewalk. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

The south side of Avenue 50, east of Jackson Street will be widened approximately 14 feet and includes construction of curb, gutter, and sidewalk. The proposed ultimate improvements will terminate at the City limit line and include a short pavement transition into the City of Coachella.

The north side of Avenue 50, east of Jackson Street will be widened approximately 16 feet and includes construction of curb, gutter, and sidewalk. The proposed ultimate improvements will terminate approximately 320 feet short of the City limit line, where ultimate improvements have been constructed. Approximately 1,000 linear feet of Imperial Irrigation District (IID) power lines are proposed to be undergrounded.

Jackson Street from Avenue 50 to Avenue 51

The proposed improvements include widening the easterly side of Jackson Street approximately 12 feet and constructing an 8-foot wide, curb-adjacent sidewalk. All private driveways will be reconstructed with standard residential driveway curb cuts. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate storm water, 48-inch or 60-inch diameter HDPE underground storage pipes are proposed underneath portions of the sidewalk.

Approximately 800 feet south of Avenue 50, there are four single family residences located on the east side of Jackson. Removal and reconstruction of said driveways is proposed to accommodate the roadway widening and construction of 8-foot wide sidewalk.

Jackson Street at Avenue 51

The proposed improvements include signalizing the existing 2-way stop. ADA ramps are proposed at both northeast and southeast curb returns. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

Jackson Street from Avenue 51 to Avenue 52
The proposed improvements include widening the easterly side of Jackson Street approximately 12 feet and construct an 8-foot wide, curb-adjacent sidewalk. Existing IID power poles along this section will be protected in place. All private driveways will be reconstructed with standard residential driveway curb cuts. Approaching the Avenue 51 intersection, the existing right turn pocket to head eastbound on Avenue 51 will be removed and replaced to meet turn pocket design standards. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate storm water, 48-inch or 60-inch diameter HDPE underground storage pipes are proposed underneath portions of the sidewalk.

Jackson Street at Avenue 52
The proposed improvements include signalizing the existing 4-way stop. The existing Jackson Street south of Avenue 52 is a two-lane road with one lane of travel in each direction. The Project proposes to construct curb and gutter west side and provide a lane taper to accommodate through traffic. The east side will be widened approximately 24 feet with curb and gutter to accommodate a northbound right turn lane. Avenue 52, west of the intersection will be widened approximately 12 feet and taper westerly back to existing pavement to also accommodate a right turn lane onto southbound Jackson Street. There are no improvements proposed along the north side of Avenue 52, west of Jackson Street. Avenue 52, east of Jackson Street will be widened approximately 13 feet on the south side with curb and gutter to accommodate a lane taper. The north side of Avenue 52, east of Jackson will be widened approximately 12 feet without curb and gutter to accommodate a right turn pocket onto northbound Jackson street. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

Acquisitions and Construction
Some areas proposed for improvements require right-of-way (ROW) acquisition of approximately 0.91 acres; these areas are on Jackson Street north of Avenue 50, and on Avenue 50 east of Jackson Street (See **Figure 5 – Potential Right-of-Way Acquisition** and **Figure 6 – City of Indio Street Improvement Plans**). Project construction will also require temporary construction easements extending up to 25 feet outside of street ROW for properties adjacent to the Project site.

9. Surrounding Land Uses and Setting:

Terrain in the immediate vicinity of the Project site is generally flat. Many surrounding properties are converting from farms and open space to residential land uses, with palm orchards, small commercial buildings, and vacant lots interspersed (**Figure 2)**.

10. Other Public Agencies Whose Approval is Required:

- County of Riverside
- Coachella Valley Water District
- Imperial Irrigation District

11. Have California Native American tribes traditionally and culturally affiliated with the Project area requested consultation pursuant to Public Resource Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

The City provided “Notification of Tribal Consultation Opportunity” letters October 3, 2019 pursuant to Assembly Bill 52 (AB 52) to Tribes that have previously requested such a notice. Refer to the discussion in Section XVIII, Tribal Cultural Resources for additional information.

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ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

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

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

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DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☒	I find 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.
☐	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	I find 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.
☐	I find 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

Timothy Wassil, Director of Public Works
Printed Name

JUL 26 2021
Date

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

I. AESTHETICS – Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒

Source(s): *GP; Project Description; RCGP WCVAP*

Western Coachella Valley, as defined in the RCGP WCVAP, is characterized by a vast network of natural open space with tremendous habitat, rural and scenic value for both local residents and the region at large. It is this natural open space that provides the area's scenic vistas, the nearest of which is Lake Cahuilla (RCGP WCVAP, pp. 6-8), approximately 4 miles southwest of the Project site. The nearest scenic corridor is State Route 111 (herein referred to as Highway 111), approximately 2 miles north of the Project site. No portion of the Project site is located in an open space area. Land surrounding the Project site has been, for the most part, previously disturbed and developed for existing or future land uses that do not include natural open space. As such, implementation of this Project will not have the potential to negatively impact a scenic vista. Moreover, the Project does not include any sizeable above-grade features that would have the potential to obscure views of the Santa Rosa Mountains to the southwest of the Project site or of the Indio Hills north of Interstate 10, which are visible from the Project site. Construction equipment and related construction activity along the Project site may result in limited, short term, and undesirable visuals; however, this will be a temporary condition and given that there are no scenic vistas within the Project area, **no impact** will occur.

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

Source(s): *Project Description; Caltrans*

No scenic resources are within the Project site or in the immediate vicinity. See also the response to I.a), above. Jackson Street is not designated a state scenic highway nor is there a scenic highway in the immediate vicinity. The nearest officially-designated highway is State Route 74 (Caltrans), approximately 10.7 miles to the southwest, any views of which are blocked by the foothills of the Santa Rosa Mountains. In addition, the Project’s proposed roadway widening and improvements along a portion of an existing roadway does not have the potential to impact scenic resources. Therefore, **no impact** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	☒

Source(s): *Project Description*

The Project is located in a developed area and does not include any above-grade features of significant mass that could substantially degrade the existing visual character or quality of public views of the site or its surroundings. See also the response to I.a), above. In addition. the existing condition of the Project site is that of an existing roadway (Jackson Street, between Avenue 50 and Avenue 52). Therefore, **no impact** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Create a new source of substantial light or glare which would adversely affect day or night time views in the area?	☐	☐	☒	☐

Source(s): *Project Description*

Implementation of the Project may introduce new sources of light, such as from traffic signal installation or associated street lights along the Project roadway Any and all street lights will be designed to direct downward onto the roadway and will not substantially alter the nighttime views along the Project site. Therefore, **impacts will be less than significant**.

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Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

II. AGRICULTURE AND FORESTRY 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 compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

Source(s): *DOC FMMP; Project Description*

The existing Project site is not designated Farmland. There are two locations along the Project alignment where designated Prime Farmland is located east of the proposed street improvements. The first location is between Avenue 50 and Avenue 51 and is a nursery. The second location is between Avenue 51 and Avenue 52 and is also a nursery. Because the Project consists of roadway improvements that will only disturb the street edges and no ROW acquisition is proposed adjacent to these two properties, construction of the proposed roadway improvements will not result in the conversion of Farmland to a non-agricultural use. Therefore, **no impact** will occur.

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

Source(s): *Indio Zoning; DOC WA; RCIT*

There is no property within the Project site zoned for or utilized for agriculture. The east side of Jackson Street, south of Avenue 50, is zoned for agricultural use by the County of Riverside (**Figure 4**). Some of this area also contains existing agricultural uses. However, due to the limited disturbance during construction within the Project footprint and nominal ROW acquisition at the intersections with Avenue 51 and Avenue 52 (**Figure 5**), the proposed Project improvements would not conflict with existing zoning or agricultural use. There is no property within the Project site under an active Williamson Act contract. There is one area north of Avenue 52 and east of Jackson Street that is within an active Williamson Act contract; however, there is no ROW acquisition in this area and no construction extend beyond any existing fences. Therefore, construction and operation of the Project, including the acquisition of additional ROW, will not result in a conflict with existing agricultural zoning, agricultural uses, or Williamson Act contracts. Therefore, **no impact** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	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 by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒

Source(s): *Indio Zoning; RCGP EIR; ORD 348; PRC*

Forest land, as defined in Public Resources Code (PRC) section 12220(g), is land that can support 10 percent of native tree cover of any species under natural conditions and that allows for the management of one or more forest resources. Timberland, as defined in PRC section 4526, means land other than land owned by the federal government and land designated as experimental forest land, which is capable of growing a crop of trees for any commercial species, including Christmas trees. The Project site does not contain property zoned for forestland, timberland, Timberland Production, or utilized as such. Neither Indio or the County of Riverside has a zoning designation specific for such uses or any forestland, timberland, or Timberland Production within their boundaries. Moreover, the majority of the land within the City and County of Riverside in proximity to the Project site are located along the desert floor, which does not provide the climate for naturally-occurring forestland or timberland. Therefore, **no impact** will occur.

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

Source(s): *Indio Zoning; RCGP EIR; ORD 348*

As discussed in response II.c), above, the Project site does not contain forest land or timberland nor is it zoned for forest land or timberland. The proposed Project consists of road improvements and will not influence any land use changes. For these reasons, implementation of the Project will not result in the loss of forest land or the conversion of forest land to non-forest uses, and there will be **no impacts** in this regard.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☐	☒

Source(s): *Indio Zoning; ORD 348*

The proposed Project consists of road and drainage improvements to Jackson Street within the Project site. As discussed in response II.a), above, implementation of the Project will not result in the conversion of Farmland. The proposed Project will not result in any other changes in the existing environment of the Project site or surrounding area that would precipitate conversion of Farmland to non-agricultural uses or the conversion of forest land to non-forest uses. Therefore, **no impacts** relative to the conversion of Farmland will occur.

III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management district 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?	☐	☐	☐	☒

Source(s): *AQMP*

The Project site is located within Coachella Valley area of the Salton Sea Air Basin (Basin). The South Coast Air Quality Management District (SCAQMD) prepares the Air Quality Management Plan (AQMP) for the Basin. The AQMP for the Basin 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, conformance with the AQMP for development projects is determined by demonstrating compliance with local land use plans and/or population projections.

Since the proposed Project consists of roadway improvements that, in and of itself, will not result in any changes to the existing land use patterns in the Project area, the Project does not conflict with or obstruct implementation of the AQMP. Therefore, **no impacts** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) 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?	☐	☐	☒	☐

Source(s): *Webb (a); CARB; SCAQMD 2003; GP FEIR*

The portion of the Basin within which the Project site is located, is designated as a non-attainment area for ozone and Particulate Matter of 10 microns or less (PM-10) under both state and federal standards (CARB).

The SCAQMD considers the thresholds for project-specific impacts and cumulative impacts to be the same (SCAQMD 2003). Therefore, projects that exceed project-specific significance thresholds are considered by SCAQMD to be cumulatively considerable. Based on SCAQMD's regulatory jurisdiction over regional air quality, it is reasonable to rely on its thresholds to determine whether there is a cumulative air quality 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.

Short-term emissions were evaluated using the CalEEMod version 2016.3.2 computer program (see Appendix A – AQ/GHG Analysis, cited as Webb(a)). 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 SCAQMD's daily regional thresholds:

Table II-B – Estimated Maximum Daily Construction Emissions

Activity/Year	Peak Daily Emissions (lb/day)					
	VOC	NO_X	CO	SO_2	PM-10	PM-2.5
SCAQMD Daily Thresholds	**75**	**100**	**550**	**150**	**150**	**55**
Maximum	4.22	44.05	31.83	0.06	5.04	3.28
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

Note: Maximum emissions are from Table 2 of Appendix A

Evaluation of the above table indicates that the maximum daily criteria pollutant emissions from construction of this Project's improvements are below the SCAQMD daily regional thresholds. Additionally, the short-term emissions do not exceed SCAQMD's localized significance thresholds (LST), as contained in Appendix A.

Long-term emissions are evaluated at build-out of a project. The proposed Project would not result in a change in land use or introduce new vehicle trips and would be consistent with the roadway classifications in the City of Indio General Plan (a Boulevard) and Riverside County General Plan (as a secondary roadway north of Avenue 50 and an Arterial south of Avenue 50).

As discussed in response XVII.b), below, the proposed Project would add roadway capacity and slightly increase automobile traffic due to added capacity. However, because it also improves the bicycle and pedestrian network in the area, it also reduces automobile travel and results in a net reduction of vehicle miles traveled (VMT) in the City of Indio. Therefore, the Project would not result in long-term increases in emissions. Operational emissions would also include infrequent visits by vehicles driven by existing maintenance personnel and are considered negligible.

Therefore, the Project's short-term impacts will be less than significant. Long-term air quality impacts would also be less than significant because the Project would not result in a net increase in long-term emissions and would result in negligible emissions from infrequent maintenance activities. Thus, 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**.

c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐

Source(s): *Webb (a)*

The proposed Project is located adjacent to existing residences. As detailed in Appendix A, the closest sensitive receptors are the residences adjacent to the Project site.

Short-term emissions will only be generated in the Project area during construction of the Project and have been found to be less than significant (see Response III.b) and Appendix A of this Initial Study). In addition, the Project would not result in a carbon monoxide (CO) "hot spot"; hence, the Project will not expose sensitive receptors to substantial pollutant concentrations and impacts are considered **less than significant**.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Source(s): *Webb (a)*

The Project presents the potential for generation of other emissions such as 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. After completion of the proposed improvements, a net reduction in VMT is expected and only emissions from infrequent maintenance will be required. Recognizing the short-term duration and quantity of emissions in the Project area, the Project will not adversely affect a substantial number of people and the resulting impacts are **less than significant**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

IV. 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?	☐	☒	☐	☐

Source(s): *Site visit, IPaC, CNDDB, CVMSHCP, MBTA*

Albert A. Webb Associates (Webb) conducted a site visit of the Project area on January 23, 2020 for the purpose of assessing the extent of impacts to biological resources. No special status animal or plant species were observed in the footprint of the proposed Project. A review of information available from the U.S. Fish & Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW) and Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) were also conducted, as described below.

The Information for Planning and Consultation (IPaC) resource list (Appendix B.1), which is an automatically generated list of species and other resources provided by the USFWS, states that the proposed Project is within the known or expected range of the following federally endangered or federally threatened species: least Bell's vireo (*vireo belii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), Yuma clapper rail (*Rallus longirostris yumanensis*), Coachella Valley fringe-toed lizard (*Uma inornata*), desert tortoise (*Gopherus agassizii*), and the Coachella Valley milk-vetch (*Atragalus lentiginosus var. coachellae*). Further, the following USFWS Birds of Conservation Concern may be present in the Project area: burrowing owl (*Athene cunicularia*) and Costa's hummingbird (*Calypte costae*).

The California Natural Diversity Database (CNDDB) is an inventory provided by the CDFW to document the status and locations of rare plants and animals. The database produced two records of Coachella Valley fringe-toed lizard; the first in the area north of the intersection of Avenue 50 and Jackson Street (i.e. Indian Palms Country Club) and the area south of Avenue 52 and west of Jackson Street (i.e. Coachella Valley Cemetery). The observations were both made in 1975 and the locations of the observations are both nonspecific. No other observations were recorded in the CNDDB that are within the Project area.

The Project is located within the plan boundaries of the CVMSHCP; however, it is in an urban area that is not located within a designated Conservation Area. Because the Project is not within a Conservation Area, protocol surveys for burrowing owl, riparian birds, and desert tortoise, are not required. Further, the land use adjacency guidelines in Section 4.5 of the CVMSHCP are not required for the Project. However, because burrowing owl is a ground nester and has been known to occupy burrows adjacent to roadways, there is potential for burrowing owl to exist in unpaved road shoulders. The burrowing owl breeding season is March to July (CVMSHCP, p. 9-141). Further, pursuant to Department of Fish and Game Codes and the federal Migratory Bird Treaty Act (MBTA), take of burrowing owls shall be avoided. This will be accomplished by take avoidance (pre-construction) surveys as described in mitigation measure **MM BIO 1**, which will require two pre-construction surveys to locate burrows that could be used by burrowing owl, and whether an owl is present in the burrow(s).

> **MM BIO 1. Burrowing Owl Surveys:** A qualified biologist shall conduct two take-avoidance pre-construction burrowing owl surveys onsite. The survey area shall include the construction area and adjacent areas within 500 feet of the construction limits, or to the edge of the property if less than 500 feet. The first shall occur between 14 and 30 days prior to ground disturbance, and the second survey shall occur within 24 hours of ground disturbance. The survey should locate suitable burrows and determine whether the burrows are occupied by burrowing owl. If burrowing owls are detected, the City shall consult with the California Department of Fish and Wildlife to determine what course of action is needed, such as the use of exclusion devices (if applicable) to discourage owls from using burrows that are believed to be in jeopardy of being impacted by implementation of the Project.

Potential roosting and/or foraging habitat for common and special-status bats is present in the palm trees within and adjacent to the Project footprint. If bats are present, the potential impacts will depend on the level of construction activities; however, adverse impacts are not expected because there are no historical records in the area and the limited habitat present. Nonetheless, to reduce potential, albeit unlikely, impacts to bat species to less than significant, the Project will incorporate mitigation measure **MM BIO 2**.

> **MM BIO 2. Roosting Bat Survey:** Construction activities including palm tree removals shall be avoided during the bat breeding season of February 1 to August 31 to limit potential impacts to roosting/foraging habitat for common and special-status bat species. If construction work including palm tree removals cannot avoid the period from February 1 to August 31, then pre-construction surveys for common and special-status bat species shall be conducted by a qualified biologist no less than 7 days and no more than 14 days prior to any palm tree removal or construction activities. Survey shall be done during the appropriate time of day (e.g., dawn or dusk) to maximize detectability to determine if bat species are roosting near the work area. Survey methodology may include visual surveys of bats (e.g., observation of bats during foraging period), inspection for suitable habitat, bat sign (e.g., guano), or use of ultrasonic detectors (e.g., Anabat, etc.). The type of survey will depend on the condition of the potential roosting habitat. If no bat roosts are found, then no further study is required. If bat species are found to be roosting within 100 feet of the project impact area, a 100-foot buffer zone will be established around the active roost. Construction activities shall not occur within the 100-foot buffer zone. Construction-related lighting shall not be used within the 100-foot

buffer zone. Combustion equipment, such as generators, pumps, and vehicles are not to be parking nor operated within the 100-foot buffer zone. Construction personnel shall not enter the 100-foot buffer zone. If the active roost is in a tree identified for removal, the tree removal shall be delayed until a qualified biologist determines the roost to no longer be active. Tree removal shall follow a two-day process, as outlined herein or as otherwise modified by the Project biologist.

Day 1: Contractor must only trim the outermost fronds (no more than 50 percent of the palm fronds) using chainsaws only (no dozers, backhoes, cranes, or other heavy equipment, other than to provide access for tree cutters using chainsaws).

Day 2: The palm tree must be felled. Day 2 activities must occur the day immediately following the Day 1 activities. To accomplish this, work may need to be phased and Day 1/Day 2 steps can be repeated. Should bats emerge during the tree trimming, trimming activities must temporarily cease at the individual tree until bats are no longer actively emerging from the tree.

Native and ornamental vegetation is present within and adjacent to the Project footprint, which is potentially suitable habitat for nesting birds. Therefore, the potential exists for nesting birds to be present during the nesting season, which is generally February 1 through August 31. Nesting birds are protected under the MBTA. To comply with the MBTA, any construction activities, vegetation removal, and/or grading occurring during the nesting season will require a nesting bird survey to be conducted by a qualified biologist immediately prior to the initiation of construction activities. If no nests are found, construction may proceed. If nests are found, impact avoidance measures (e.g., buffers) will be required until the young have fledged and nests are inactive. Compliance with MBTA will be incorporated by the Project as mitigation measure **MM BIO 3**.

MM BIO 3. Nesting Bird Survey: Vegetation removals shall not occur between February 1 to August 31 to avoid impacts to potentially nesting migratory birds. Vegetation includes native and ornamental trees and brush. If vegetation removals cannot be limited to the non-breeding season of September 1 to January 31, a qualified biologist shall survey potential nesting sites within the Project footprint and immediately adjacent to the Project limits no more than three (3) days prior to the start of work or as otherwise deemed necessary at the discretion of the qualified biologist. If active nests birds are identified, the area shall be avoided until a qualified biologist has determined the young have fledged and the nest is no longer active. Avoidance will involve a 500-foot buffer zone for birds of prey and a 100- to 300-foot buffer zone for songbirds. Avoidance buffers may be reduced with the use of noise attenuation barriers at the discretion of the qualified biologist. Vegetation removals may occur between September 1 to January 31 without a pre-construction nesting bird survey (barring requirements of the other biological mitigation measures). A qualified biologist will conduct a training program for Project and construction personnel prior to grading. The training will include a description of the species of concern and their habitats, the general provisions of the

Endangered Species Acts (FESA and CESA) and the CVMSHCP, the need to adhere to the provisions of the acts and the CVMSHCP, the penalties associated with violating the provisions of the acts, the general measures that are being implemented to conserve the species of concern as they relate to the proposed Project, and the access routes to and Project site boundaries within which the Project activities must be accomplished.

Through compliance with existing regulations for the protection of listed plant and animal species, and incorporation of mitigation measures **MM BIO 1, MM BIO 2**, and **MM BIO 3** potential Project impacts to special status species including burrowing owl, roosting bats and nesting migratory birds will be **less than significant with mitigation**.

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 US Fish and Wildlife Service?	☐	☐	☐	☒

Source(s): *Site visit, NWI, NHD, Google Earth.*

conducted a site visit of the Project area on January 23, 2020 for the purpose of assessing the extent of impacts to biological resources, including riparian and other sensitive natural habitats. A review was conducted for recorded drainage features in the National Wetland Inventory (NWI) published by USFWS and the National Hydrography Dataset (NHD) published by the U.S. Geological Service (USGS). Historic aerials from 1996 to present were also reviewed from Google Earth to determine presence of drainage features that may have or had riparian or other sensitive habitats.

No riparian or other sensitive habitats were observed in the Project footprint or adjacent to the Project site. The nearest recorded features are man-made freshwater ponds located in the Indian Palms County Club community west of Jackson Street and north of Avenue 50, which will not be affected by the Project. Project impacts will occur within the disturbed road shoulders of segments of Avenues 50, 51, and 52, and Jackson Street. These road shoulders are developed or disturbed, with no riparian habitat or other sensitive natural community. Properties that abut the road shoulder are mostly developed or disturbed with exceptions. Some undeveloped parcels with vacant fields and/or native vegetation are present along Jackson Street, Avenue 50 and Avenue 52; however, Project impacts are limited to the road shoulders, which does not extend past existing walls or fences. Therefore, because no riparian habitat or other sensitive natural communities are present, impacts to said habitat will not occur and there will be **no impact** in this regard.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒

Source(s): *Site visit, NWI, NHD, Google Earth.*

As mentioned in response IV.b), above, a site visit was conducted by Webb in addition to a review of available databases to determine the presence of wetlands or other state or federally protected waters. All areas adjacent to and within the Project limits are developed or disturbed; and no native habitat occurs within the Project site. Further, no wetlands or potentially jurisdictional drainage features including "waters of the United States" or "waters of the State" were found during the site visit or in available literature. Therefore, impacts to regulated wetlands or other waterways will not occur and there will be **no impact** in this regard.

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?	☐	☒	☐	☐

Source(s): *CVMSHCP, NHD, NWI, Google Earth, site visit*

The Project site is not located within a CVMSHCP Conservation Area. No riparian habitat or other sensitive natural community exists in the Project boundary or within its proximity. Moreover, no wetlands occur within or in proximity to the Project boundary. The Project impacts will be located adjacent to palm orchards located along the east side of Jackson Street and the south side of Avenue 50 (east of Jackson Street). It is possible that migratory birds, bats, and burrowing owls utilize the orchards in the area. Therefore, mitigation measures **MM BIO 1, MM BIO 2, and MM BIO 3** will ensure that impacts to burrowing owl, roosting bats and nesting migratory birds will be **less than significant with mitigation** should they be found within or immediately adjacent to the Project footprint.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

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

Source(s): *IMC; RCMC, Project Description, Site visit*

Trees may be removed as part of the Project, but they are expected to be located on privately owned properties and not city-owned or county-owned property. Neither the City of Indio nor the County of Riverside have tree preservation policies or ordinances protecting biological resources. Consequently, these trees are not protected by local ordinance or policy.

Therefore, the Project will not conflict with any biological resource policies or ordinances, including a tree preservation ordinance. The Project is consistent with the provisions of the CVMSHCP as discussed in responses to IV.a) and IV.b) above and IV.f), below. Therefore, **no impact** will occur.

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?	☐	☐	☐	☒

Source(s): *CVMSHCP*

The Project site is located within the boundaries of the CVMSHCP; however, it is not located within a Conservation Area. The CVMSHCP provides Take Authorization (Permits) of Covered Species to the Permittees, which include City of Indio, and the County of Riverside. Covered Species include both listed and non-listed species that are adequately conserved by the CVMSHCP. The Permits provide for the Take of these species or loss of their habitat, so long as compliance with the Plan requirements is achieved. The Permits provide Take Authorization for the following types of Covered Activities outside Conservation Areas:

- **Development permitted or approved by Local Permittees:** This includes, but is not limited to, new projects approved pursuant to county and city general plans, including the circulation element of said general plans, transportation improvement plans for roads, master drainage plans, capital improvement plans, water and waste management plans, the county's adopted Trails Master Plan, and other plans adopted by the Permittees.

Further, the Permits provide Take Authorization for specific regional road projects, including this Project (listed in Table 7-3 in the CVMSHCP). Thus, the Project will not conflict with the provisions of the CVMSHCP and there will be, **no impact** in this regard.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

V. CULTURAL RESOURCES -- Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☒	☐

Source(s): *(AE (a))*

A *Phase I Cultural Resources Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project* (the Phase I CRA) Study was prepared by Applied EarthWorks, Inc. (Æ) and is included as Appendix C to this IS/MND. The Phase 1 CRA conducted a historical/archaeological resources records search, historical background research, communication with Native American representatives, and an intensive-level field survey of the Project site. A summary of this research as it relates to historical resources is provided in the following discussion.

Two previously recorded cultural resources (historic-period refuse scatter [33-002082/CARIV-2082] and [33-013131/CA-RIV-7130]) within the Project area were not found. Æ's fieldwork confirmed the recorded location of both resources is currently within a housing development. No other prehistoric, historical sites, features, or isolated artifacts were encountered within the Project area during the survey. However, Æ's survey did identify and document seven built-environment resources that are at least 50 years old within the Project area: a segment of Jackson Street, a segment of Avenue 50, a segment of Avenue 52, the L&G Desert Store building, and three residential homes south of Avenue 50 on the east side of Jackson Street (Assessor Parcel Numbers (APNs) 767-120-006, -007, and -027).

None of the seven built-environment resources were formally evaluated for the California Register of Historical Resources (CRHR) as a part of this study. The three roads were constructed in the early 1940s and appear on USGS maps dated to 1941. Although these roads are more than 50 years old, the survey indicates the structures have been substantially altered and appear to be modern construction that is regularly maintained. In addition, the Project is proposing standard improvement to the roads and the original alignments will not be altered. The Project proposes to modify the existing parking area for the L&G Desert Store. Therefore, the Project as presently planned has no potential to directly impact the L&G Desert Store structures. Finally, the Project proposes reconstruction at residences south of Avenue 50. Reconstruction of fence, wall, and driveways at these residential locations may be necessary. However, the houses at APNs 767-120-006, -007, and -027 will not be altered as a part of the Project. Therefore, no impact to these built-environment resources will occur.

For the reasons explained above, implementation of the Project will not cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5. Therefore, potential impacts to historical resources will be **less than significant**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐

Source(s): *(AE (a))*

The state Native American Heritage Commission (NAHC) was contacted by Æ for a review of the sacred lands file (SLF) to determine if any know Native American cultural properties are present within or adjacent to the Project site. The NAHC responded on August 15, 2019 stating that SLF search was complete with negative results and recommended contacting local Native American tribes. Subsequently, a total of seven Native American representatives in the region were contacted via electronic mail on February 3, 2020, to elicit information regarding Native American resources in the Project area, if any. Of the 7 tribes contacted, only the Cabazon Band of Indians responded. The Cabazon Band indicated the Project area is located outside of the Tribe's current reservation boundaries and the Tribe has no specific information about the Project area.

The survey conducted as part of the Phase I CRA involved walking near the shoulders of the asphalt paved roads within the Project area. The Project area is heavily developed with a combination of hard- and softscape (i.e., living landscape) in which no assessment of sediments could be made. Ground surface visibility within open areas (i.e., not covered with hardscape) was excellent (100 percent). Æ's archaeologist inspected the few subareas where the ground surface appeared to be lightly developed or undeveloped, along the east side of Jackson Street and along Avenues 50 and 52. However, no native, undisturbed soils were observed on the ground surface during the intensive survey. No prehistoric or historic-period archaeological resources were encountered within the Project area during the field survey.

Additionally, the Project area lacks well-developed soils. The depth for roadway improvements and private property reconstruction is 3 feet below ground surface, and the maximum depth of proposed disturbances for traffic signals, drainage improvements, and utility relocation/replacement (8–14 feet) will penetrate far deeper. These construction-related activities are unlikely to affect intact and significant buried archaeological resources, because of the lack of well-developed soils within the Project area. Nonetheless, to reduce potential impacts to unknown archaeological resources, the Project will incorporate mitigation measure **MM CR 1**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

MM CR 1: Should any cultural and/or archaeological resources be inadvertently discovered during construction, construction activities within a 60-foot radius 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). The qualified archaeologist shall have the discretion to modify the avoidance area while the resource(s) are being evaluated. If the find is determined to be an historical or unique archaeological resource, as defined in California Code of Regulations Section 15064.5 (State CEQA Guidelines), avoidance or other appropriate measures shall be implemented.

Therefore, for the reasons stated in the discussion above, Project impacts to archaeological resources will be **less than significant with mitigation**.

c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

Source(s): *(AE (a))*

The Project site is not located on a known formal or informal cemetery. The Project site is adjacent to the Coachella Valley Cemetery located on the southwest corner of Jackson Street and Avenue 52. However, the Project does not encroach into the cemetery boundaries, which are enclosed by a block wall. No impacts to human remains, including those interred outside of formal cemeteries are anticipated. In the unlikely event that unknown human remains are uncovered during Project construction, pursuant to law, the proper authorities will be notified and standard procedures for the respectful handling of human remains will be adhered to in compliance with California Health and Safety Code Section 7050.5, and Public Resources Code Section 5097.98. Compliance with these regulations will be incorporated by the Project as mitigation measure **MM CR 2**.

MM CR 2: If human remains are uncovered at any time, all activities in the immediate area of the find shall be halted by the City or its contractor and the County Coroner shall be notified immediately pursuant to Health & Safety Code Section 7050.5 and Public Resources Code Section 5097.98. If the Coroner determines that the remains are of Native American origin, the Coroner shall proceed as directed in Section 15064.5(e) of the CEQA Guidelines.

Therefore, through compliance with existing regulations (as implemented by **MM CR 2**), the Project's impacts will be **less than significant with mitigation**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

VI. ENERGY -- Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐

Source(s): *Webb(a), Webb(b), Project Description*

As an infrastructure project, the majority of impacts will be short-term. As described in the AQ/GHG Analysis (Appendix A), the Project's short-term construction would last approximately 10 months. Project construction would require the use of construction equipment for grading, paving, as well as construction workers and vendors traveling to and from the Project site. Construction equipment requires diesel as the fuel source and construction worker and vendor trips use both gasoline and diesel fuel. Project-related fuel consumption was estimated and is included in Appendix D – Energy Tables.

Fuel consumption from on-site heavy-duty construction equipment and construction would be temporary in nature and uses a limited number of equipment, which would represent a negligible demand on energy resources. Additionally, the Project would not conflict with or obstruct implementation of any state or local plans for renewable energy or energy efficiency because there are no applicable plans for a Project that consists of roadway and drainage improvements. Furthermore, there are no unusual Project site characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in other parts of the State.

As discussed in response XVII.b), below, the proposed Project would add roadway capacity and slightly increases automobile traffic due to added capacity. However, because it also improves the bicycle and pedestrian network in the area, it also reduces automobile travel and results in a net reduction of vehicle miles traveled (VMT) in the City of Indio. Therefore, the Project would result in a net reduction in vehicle fuel consumption post-construction.

For these reasons, the Project would not result in a potentially significant impact due to wasteful, inefficient, or unnecessary consumption of energy during Project construction or operation. Impacts are **less than significant**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

Source(s): *Project Description*

As discussed in response VI.a), above, as an infrastructure improvement project, there are no applicable plans. Thus, the Project would not conflict with or obstruct implementation of a state or local plan for renewable energy or energy efficiency. **No impact** will occur.

VII. GEOLOGY AND SOILS -- Would the project:				
a) Directly or indirectly cause 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.	☐	☐	☐	☒

Source(s): *GP; RCIT*

There are three major, known faults located in Riverside County: the San Andreas, San Jacinto, and Elsinore faults (GP, p. 10-4). However, there are no known active fault lines near the Project site, nor is the Project site or the immediate vicinity within an Alquist-Priolo Special Studies Zone (GP, Figure 10-1 and RCIT). Additionally, due to the nature of the Project it does not pose a substantial risk to people or other structures in the event of strong seismic ground shaking since it does not propose any structures, habitable or otherwise and because the improvements would be limited to expansion of existing roadway infrastructure consistent with the American Association of State Highway and Transportation Officials (AASHTO) standards. For these reasons, **no impacts** associated with rupture of a known earthquake fault are anticipated.

ii) Strong seismic ground shaking?	☐	☐	☐	☒

Source(s): *GP*

Per the City's GP, the Project site is in an area of high ground shaking risk (GP, Figure 10-1). However, the Project will not pose a substantial risk to people or structures in the event of strong seismic ground shaking since it does not propose any structures, habitable or otherwise and because the improvements would be limited to expansion of existing roadway infrastructure consistent with AASHTO standards. Therefore, there will be **no impact**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

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

Source(s): *GP; RCIT*

Liquefaction, most often caused by earthquakes, describes a phenomenon where a soil's strength and stiffness is substantially reduced. Liquefaction causes the soil's composition to liquefy, which destabilizes buildings that are supported by the ground (GP, p. 10-5). The Project site is in an area of high risk of ground shaking and liquefaction (GP, Figure 10-1 and RCIT). However, the nature of the Project will not result in exposing people or structures to substantial risk from seismic-related ground failure including liquefaction, since there are no structures proposed and because the improvements would be limited to expansion of existing roadway infrastructure consistent with AASHTO standards. Further, the Project will incorporate and implement other standard engineering and construction protocols, which address ground failure/liquefaction. Therefore, there will be **no impact**.

iv) Landslides?	☐	☐	☐	☒

Source(s): *GP*

Landslides occur when masses of rock, earth, or other material move rapidly down a slope. Landslides and surficial slope failure are most likely to occur in areas with a slope greater than 25 percent (hillside areas) and along steep bluffs. Since the City is relatively flat with undeveloped hillsides along the northern boundary, the City is at low risk for landslides (GP, p. 10-5). No topographical features that could potentially create landslides are located within the immediate vicinity of the Project Boundary. Therefore, **no impact** will occur.

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

Source(s): *Project Description*

Construction of the road and drainage improvements will entail grading and construction in unpaved areas, which may result in a marginal loss of topsoil. A Storm Water Pollution Prevention Plan (SWPPP) will be prepared and implemented during Project construction that includes erosion control, sediment control, tracking control, and wind erosion control Best Management Practices (BMPs). For these reasons there will be **no impact** regarding soil erosion or the loss of topsoil.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in, on or offsite landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒

Source(s): *GP; RCIT; USGS*

Lateral spreading consists of lateral movement of level or near-level ground associated with liquefaction during an earthquake (USGS). As discussed in response VII.a)iii), above, the Project site is located in an area of high risk of ground shaking and liquefaction (GP, Figure 10-1 and RCIT); thus, during an earthquake, lateral spreading could occur. Land subsidence is a gradual settling or sudden sinking of the Earth's surface. The principal causes of land subsidence include groundwater extraction, oil extraction, and peat loss. Indio is in an area of historic subsidence (GP, p. 10-9). However, the potential for subsidence will be reduced by the installation of a roadbed, where road widening is proposed. Because the Project entails widening and improvement of existing roadway and will incorporate engineering and construction protocols, including installation of a road bed, there will be **no impacts** in regards to potential for on- or off-site impacts related to the Project being located on a geologic unit or soil that would become unstable.

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

Source(s): *USDA*

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). Soils in the Project site include: Coachella Fine Sand, 0 to 2 percent slopes, Gilman loamy fine sand, 0 to 5 percent slopes, Gilman fine sandy loam, wet, 0 to 2 percent slopes, and Myoma Fine Sand 0 to 5 percent slopes. All three of three soil types have a low potential for shrinking and swelling and are not considered expansive soils. Further, the installation of a road base for the roadway improvements consistent with AASHTO standards will eliminate the potential for expansive soils to adversely impact the streets. Therefore, **no impact** will occur with regards to the Project being located on expansive soils that would create substantial risks to life or property.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

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?	☐	☐	☐	☒

Source(s): *Project Description*

The Project involves the improvement of an existing roadway and will not require septic tanks or alternative wastewater disposal systems. Therefore, **no impact** will occur.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

Source(s): *AE (b)*

The County has assigned various paleontological sensitivity to the various geologic units exposed within its boundaries—Low, Undetermined, High A (Ha), and High B (Hb) Potential. In contrast to the County, the City includes only three categories for ranking the sensitivity of a geologic unit—High, Undetermined, and Low Potential.

A *Paleontological Technical Memorandum for the Avenue 50 and Jackson Street Intersection Improvements Project* was prepared by Applied EarthWorks, Inc. (Æ) and is included as Appendix E to this IS/MND. The paleontological resource assessment (AE(b)) indicates when placed over the County of Riverside paleontological sensitivity map, the entire Project area is mapped as High A. Similarly, the City of Indio sensitive paleontological resources map indicates the entire Project area is High Potential. Æ's desktop studies support these assessments, although the field survey did not verify the High A and High sensitivity rankings because the ground surface is obscured throughout most of the Project area by vegetation and/or hardscape and exposed stratigraphy is absent (e.g., riverbanks that could confirm geologic units and paleontology below the ground surface).

Because of the high paleontological sensitivity assigned to the Project site, a Paleontological Resource Impact Mitigation Program (PRIMP) shall be prepared and approved by the City, as set forth in mitigation measure **MM GEO 1**. Thus, with implementation of **MM GEO 1**, impacts with regard to directly or indirectly destroying a unique paleontological resource or site or unique geologic feature would be reduced to **less than significant with mitigation**.

> **MM GEO 1**: Prior to construction, a paleontological resource mitigation program (PRIMP) shall be prepared by a qualified professional paleontologist to indicate where and how often construction monitoring will be required for the Project. The PRIMP will utilize the results of this Project's paleontological technical memorandum possibly refined by the results of geotechnical borings to specify the steps to be taken to mitigate impacts to paleontological resources. These steps may include but are not limited to a Worker's Environmental Awareness Program (WEAP) training prior to the start of Project-related ground disturbance and presented in-person to all field personnel to describe the types of fossils that may be found and the procedures to follow if any are encountered. Monitoring is currently recommended for any ground-disturbing activities,

particularly for the installation of traffic signals, drainage improvements, and utility relocation and/or replacement as these activities will occur at greater depths.

The PRIMP will provide details about fossil collection, analysis, and preparation for permanent curation at an approved repository. A report of findings, including an itemized inventory of recovered specimens, should be prepared upon completion of the procedures and consistent with the standards outlined in the PRIMP.

VIII. GREENHOUSE GAS EMISSIONS --Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐

Source(s): Webb(a)

The City of Indio adopted the City of Indio Climate Action Plan (CAP) on September 19, 2019, to support the Greenhouse Gas (GHG) reduction goals of the statewide policies, which outlines a review process for evaluating GHG impacts and determining significance for CEQA purposes by either: (1) applying an emissions level that is determined to be less than significant for small projects, or (2) utilizing the Climate-Ready Development Review Checklist as evaluation of the new project effectiveness at reducing GHG emissions and how well the projects comply with the City's GHG emissions reduction targets. The City of Indio CAP followed the California Air Pollution Control Officers Association (CAPCOA) guidance for quantifying greenhouse gas emissions and reduction measures. The report references 900 Metric Tons of Carbon Dioxide Equivalent ($MTCO_2E$) as a conservative threshold for determining when further analysis is required. This threshold is intended as a bright-line test that would exempt projects that are too small to have significant impacts from further analysis.

The AQ/GHG Analysis (Appendix A) indicates that an estimated total of 19.22 $MTCO_2E$ per year will occur from Project construction equipment and associated worker/vendor trips during the amortized construction period. As discussed in response XVII.b), below, the proposed Project would add roadway capacity and slightly increase automobile traffic due to added capacity. However, because it also improves the bicycle and pedestrian network in the area, it also reduces automobile travel and results in a net reduction of VMT in the City of Indio. Therefore, the Project would not result in long-term increases in GHG emissions. Operational emissions would also include infrequent visits by vehicles driven by existing maintenance personnel and are considered negligible. The Project's emissions were compared to the Indio CAP's 900 $MTCO_2E$/yr threshold for projects that are too small to have significant impacts. Due to the estimated amount of emissions from Project construction (19.22 $MTCO_2E$) and negligible operational emissions from infrequent maintenance vehicles related to the roadway and drainage improvements, the proposed Project will not generate GHG emissions that exceed the screening threshold of 900 $MTCO_2E$/yr. Therefore, the proposed Project will not generate GHG

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

emissions that may have a significant impact on the environment and the impact is considered to be **less than significant**.

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

Source(s): Webb(a)

See Response VIII.a), above. As the proposed Project involves the construction of roadway and drainage improvements, it is not considered a significant source of operational GHG emissions. Moreover, the Project results in a net reduction in VMT (and therefore GHG emissions) in the City and enhance mobility and safety for drivers, bicyclists, and pedestrians within the Project area consistent with the City and County General Plan. There are no applicable plans, policies, or regulations for smaller infrastructure improvements such as the proposed Project. The Project will not result in any changes to the existing land use patterns within the Project area and its construction does not generate significant amounts of GHG; therefore, the Project will not conflict with any applicable plan, policy, or regulation for the reduction in GHG emissions. As such, **no impact** would occur.

IX. HAZARDS AND 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?	☐	☐	☒	☐

Source(s): *CCR 8; CCR 13; CCR 22; CCR 26; CFR; CHSC 6.95*

Construction of the Project will involve the transport of fuels, lubricants, and various other liquids for operation of construction equipment. These materials will be transported to the Project site by equipment service trucks. In addition, workers will commute to the Project site via private and company owned vehicles and will operate construction vehicles and equipment on public streets. The United States Department of Transportation Office of Hazardous Materials Safety prescribes strict regulations for the safe transport of hazardous materials, as described in Code of Federal Regulations Title 49 (CFR) and implemented by California Code of Regulations Title 13 (CCR 13). Materials that are hazardous to humans and animals will be present during Project construction including diesel fuel, gasoline, equipment fuels, concrete, lubricant oils, adhesives, human waste, and chemical toilets. The potential exists for direct impacts to human health and the environment from accidental spills of small amounts of hazardous materials during Project construction. However, a variety of federal, state, and local laws govern the transport, generation, treatment, and disposal of hazardous materials and wastes; for instance, appropriate documentation for all hazardous waste that is transported in connection with this Project's activities will be provided as required for compliance with existing hazardous materials regulations codified in California Code of Regulations Titles 8 (CCR 8), 22 (CCR 22), and 26 (CCR 26), and their enabling legislation set forth in California Health and Safety Code Chapter 6.95 (CHSC 6.95). Further, hazardous materials are required to be stored in designated areas designed to prevent accidental release to the environment and disposed of according to the rules and regulations of federal and state agencies.

In addition, the presence of such hazardous materials will cease upon construction completion and will not be necessary during operation except in the infrequent maintenance or emergency repair-related activities. Compliance with all applicable laws and regulations will reduce the potential impacts associated with the routine transport, use, or disposal of hazardous materials. Therefore, the Project impacts will be **less than significant**.

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

Source(s): *CCR 8; CCR 13; CCR 22; CCR 26; CFR; CHSC 6.95*

See response to IX.a), above. A **less than significant** impact will occur.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒

Source(s): *CVUSD School; GP*

The Project site is located in an area served by the Coachella Valley Unified School District (CVUSD) (GP, Figure 9-2). CVUSD has no existing or proposed schools within one-quarter mile of the Project site. The nearest school is Coral Mountain Academy located at 51375 Van Buren Street in the City of Coachella, approximately 1 mile east of the Project site (CVUSD School). Therefore, **no impact** will occur in this regard.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

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?	☐	☐	☐	☒

Source(s): *EnviroStor*

According to the California Department of Toxic Substances Control's EnviroStor database, the Project site is not located on a hazardous materials site (EnviroStor). The closest hazardous materials site is a "State Response" cleanup site located at 1577 First Street, approximately 550 ft (0.1 mile) to the east of the Project site. This cleanup site is considered active; however, the soil at the cleanup site has been remediated to meet industrial and commercial standards. The cleanup site's only restrictions are that residential land uses cannot be developed on the site (EnviroStor). As the cleanup site is outside the Project boundary, and the Project does not include residential land uses, there is **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 result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒

Source(s): *GP; RCIT*

The nearest airports to the Project site are Bermuda Dunes Airport and Jacqueline Cochran Regional Airport (formerly Thermal Airport). The Project site is not located in either of these airports' respective land use plans (RCIT; GP, Figure 3-3); therefore, **no impact** will occur.

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

Source(s): *Project Description*

Once Project construction is complete, there will be no impairment to an emergency response plan or emergency evacuation plan. Project construction will be confined within the Project site and is not anticipated to physically impair access to other existing roadways within the Project vicinity. A full roadway closure within the Project site is not anticipated; however, Project construction may necessitate lane closure(s), which may have a potential impact on an emergency evacuation plan. Thus, as discussed in response XVII.a), the Project will incorporate mitigation measure **MM TRAFFIC 1** to ensure lane closures are adequately managed and impacts are less than significant through the preparation of a traffic management plan. Therefore, the impact will be **less than significant with mitigation**.

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

Source(s): *CalFire*

Per the California Department of Forestry and Fire Protection (CalFire), the Project site and surrounding area are not located in a very high fire hazard severity zone or a state responsibility zone for moderate, high, or very high fire hazard severity (CalFire). Therefore, **no impact** will occur with regard to exposure of people to structures to a significant risk of loss involving wildland fires.

X. HYDROLOGY AND WATER QUALITY -- Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐

Source(s): *Project Description, CGP, Webb(c)*

The proposed improvements include adding sidewalk, bike lane, curb and gutter, and drainage improvements per the City of Indio's MDP. Construction of the Project may result in the discharge of sediment and other construction by-products. This potential discharge will be minimized, however, by compliance with the National Pollutant Discharge Elimination System (NPDES) construction general stormwater permit (CGP) issued by the State Water Resources Control Board (SWRCB) (Order No. 2012-0006-DWQ, NPDES No. CAS000002). Prior to commencement of construction, the applicant will file a Notice of Intent indicating that the proposed Project's construction activities will be in compliance with the conditions of the CGP. The primary condition of the CGP is implementation of an effective SWPPP that includes BMPs to minimize soil erosion and the release of non-stormwater discharges to the maximum extent practicable. Through compliance with these existing regulations, the Project will not violate water quality standards or waste discharge requirements during construction.

According to the *Jackson Street Improvement Preliminary Hydrology & Hydraulics Report* prepared by Webb (Webb(c) and included as Appendix F to this IS/MND, the Project will provide drainage improvements currently not provided by the existing roadway. Said improvements will convey storm water runoff to underground infiltration chambers designed to handle runoff from the 100-year, 24-hour storm event (24-hour duration of the storm event yields the maximum of the storm volume). The proposed catch basins will be fitted with inserts for pre-treatment of debris and sediment removal. These future improvements in and of themselves will not contribute to a violation of water quality standards or waste discharge requirements, but rather they are expected to improve downstream water quality through the reduction of sediment. Through compliance with existing regulations related to water quality standards and waste discharge requirements, impacts will be **less than significant**.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒

Source(s): *Project Description, Webb(c)*

The proposed Project will not require the use of groundwater other than temporary use for construction purposes (e.g. dust control). The Project area is not a groundwater recharge site. The proposed drainage system will facilitate onsite infiltration of stormwater runoff and will not impede sustainable groundwater management activities in the area. Therefore, **no impact** will occur.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) Result in substantial erosion or siltation on- or off-site;	☐	☐	☒	☐

Source(s): *Project Description, Webb(c)*

Stormwater runoff within the Project area currently sheet flows over unfinished road shoulders resulting in drainage problems for the City. The proposed Project will create additional impervious areas including curb and gutters where none currently exist that will alter the drainage pattern of the area so that flows are directed and concentrated to reduce localized flooding. However, the proposed drainage system will convey all runoff in the Project area up to the 100-year, 24-hour storm event into underground infiltration chambers, which is a design that is consistent with the City MDP. Further, each catch basin will be fitted with pre-treatment inserts for debris and sediment removal. The additional impervious surfaces that are proposed will change the existing drainage pattern of the area but will reduce the erosion and siltation potential through the use of pre-treatment filters and an onsite infiltration system. Therefore, through Project design and the aforementioned water quality regulations in Threshold X.a., impacts will be **less than significant**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

ii) Substantially increase the rate of amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☐	☒

Source(s): *Project Description, Webb(c)*

The proposed improvements will introduce new impervious areas that will collect and convey stormwater runoff in curb and gutter. Through concentrating runoff in this way, the flow rate will increase. However, the proposed drainage system will convey all runoff in the Project area up to the 100-year, 24-hour storm event into onsite underground infiltration chambers, which is a design that is consistent with the City MDP. Further, each catch basin will be fitted with pre-treatment inserts for debris and sediment removal. The additional impervious surfaces that are proposed will change the existing drainage pattern of the area but will reduce the flooding potential through the use of an onsite infiltration system. Therefore, through Project design, the proposed Project would have a beneficial impact on flooding issues in the project area. As such **no impact** would occur.

iii) 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;	☐	☐	☐	☒

Source(s): *Webb(c)*

There are no existing drainage facilities near the project vicinity; therefore, the storm runoff in the Project area will be retained onsite. Because the Project is a linear project there is no additional offsite area available for an aboveground infiltration basin. An underground retention/infiltration system has been designed to retain the Project runoff for the 100-year, 24-hour storm event (24-hour duration of the storm event yields the maximum of the storm volume). This underground infiltration system is also consistent with the City of Indio MDP.

The proposed drainage system consists of storm drain lines in four locations along Jackson Street and two locations along Avenue 50. Each storm drain line is a 48-inch diameter or 60-inch diameter perforated HDPE pipe embedded in a trench filled with clean washed stones (gravel), located under the sidewalk/parkway on the east side of Jackson Street or on both sides of Avenue 50. Catch basins will be placed at the low points of the street and at the downstream end of each storm drain to collect and convey the street flow to the underground pipe for storage and infiltration. The catch basins will include inserts for pre-treatment of debris and sediment removal. Therefore, through Project design, there would be **no impact** to planned drainage systems or substantial additional sources of runoff.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

iv) Impede or redirect flood flows?	☐	☐	☐	☒

Source(s): *GP, Webb(c)*

The Project area is not within a flood hazard zone designated by the Federal Emergency Management Agency (FEMA). The proposed Project will redirect stormwater runoff into the proposed curb and gutter, then to catch basins and an underground infiltration system. The facilities have been designed to handle up to a 100-year, 24-hour storm event and is consistent with the City's MDP. Therefore, the Project will improve the drainage pattern of the area and will not impede or redirect flood flows, and **no impact** will occur in this regard.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒

Source(s): *GP, Project Description.*

The proposed Project is not located in a flood hazard, tsunami, or seiche zone. **No impact** will occur in this regard.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

Source(s): *Project Description, Webb(c)*

The proposed Project will improve existing roadways to ultimate width, as designated in the City's GP, with improvements that are currently lacking, which include curb, gutter, and drainage infrastructure. The water quality control plan (Basin Plan) that encompasses the Project area will be implemented through Project compliance with existing NPDES regulations including the CGP to minimize impacts to receiving waters during construction. Further, the proposed drainage system will include catch basin filter inserts for pre-treatment of debris and sediment removal prior to infiltration of all runoff in the Project area up to the 100-year storm event.

A sustainable groundwater management plan (GSP) is currently underway for the groundwater basin that underlies the Project site. The ultimate roadway dimensions are expected to be accounted for in the forthcoming GSP. Because the Project consists of the extension of an existing roadway to ultimate width with associated infrastructure improvements, the Project is not expected to conflict with the forthcoming GSP. Rather, the Proposed drainage system will facilitate infiltration of all onsite runoff up to the 100-year storm event. Through compliance with existing water quality regulations and project design features, the Project will not conflict or obstruct the Basin Plan or GSP and **no impacts** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

XI. LAND USE AND PLANNING - Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒

Source(s): *Project Description*

The Project includes improvements to an existing roadway that will not physically divide an established community. Therefore, **no impact** will occur.

b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

Source(s): *Project Description*

The purpose of the Project is to implement the Circulation Elements of the General Plans of the two jurisdictions in which the Project is located. Therefore, **no impact** will occur.

XII. 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?	☐	☐	☐	☒

Source(s): *GP*

The State Mining and Geology Board has defined Mineral Resource Zones (MRZ) for the City, which is included in the City's GP; the Project is located in an area designated MRZ-1, which the State Mining and Geology Board defines as areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources (GP, p. 8-6 and Figure 8-2). G Given that the Project is linear and traverses through already developed commercial and residential areas, it is highly unlikely that any surface mining or mineral recovery operation could feasibly take place within the Project site. For these reasons there will be **no impact** regarding the loss of mineral resources.

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?	☐	☐	☐	☒

Source(s): *GP*

See response to XII.a), above. **No impact** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. NOISE -- Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐

Source(s): *IMC; ORD 847; Entech*

To evaluate noise impacts from the Project, a *Noise Study Report* was prepared for the Project by Entech Consulting (Entech). This study is included as Appendix G to the IS/MND.

Construction

The County of Riverside and City of Indio have determined that certain noise levels are detrimental to public, health, safety and welfare; and are therefore, contrary to public interest. In order to control unnecessary, excessive, and/or annoying noise within each jurisdiction, minimize noise levels, and mitigate the effects of noise to provide a safe and healthy living environment, County Ordinance No. 847 and Chapter 95C of the Indio Municipal Code provide general noise regulations. The proposed Project consists of roadway and drainage improvements. The Project will generate noise during construction from the use of construction equipment. Construction noise levels were estimated using FTA guidance, which provides a method for calculating noise levels for the two noisiest pieces of equipment operating in each construction phase using reference noise levels for individual pieces of equipment. Full power operation for a time period of one hour was assumed because more construction equipment operates continuously for periods of one hour or more at some point in the construction period. No ground effects were considered. The maximum noise levels associated with equipment used during the grading and paving construction phases are 85.9 and 84.6 dBA Leq, respectively. However, the construction noise will not be focused in proximity to any particular receptor location as the work will vary according to the progress made along the Project site. Thus, although construction noise may be perceptible by residences along the Project alignment, due to the short duration of the noise exposure it is not considered substantial.

Construction-related noise is regulated by Indio Municipal Code Section 95C.08, which allows the operation of construction tools and machinery between the hours of:

(1) Pacific Standard Time

- (a) Monday through Friday, 7:00 a.m. through 6:00 p.m.
- (b) Saturday, 8:00 a.m. through 6:00 p.m.
- (c) Sunday, 9:00 a.m. through 5:00 p.m.
- (d) Government Holidays, 9:00 a.m. through 5:00 p.m.

(2) Pacific Daylight Time

(a) Monday through Friday, 6:00 a.m. through 6:00 p.m.

(b) Saturday, 7:00 a.m. through 6:00 p.m.

(c) Sunday, 9:00 a.m. through 5:00 p.m.

(d) Government Holidays, 9:00 a.m. through 5:00 p.m.

Exemptions to Indio Municipal Code Section 95C.08 include activities per Section 95C.09 (I), which states:

> The provisions of this chapter shall not preclude the construction, operation, maintenance and repairs of equipment, apparatus or facilities of park and recreation departments, public work projects or essential public services and facilities, including trash collection and those activities of public utilities subject to the regulatory jurisdiction of the California Public Utilities Commission.

Exemptions to County Ordinance No. 847 Regulating Noise, state:

> Sound emanating from the following sources is exempt from the provisions of this ordinance:
>
> a. Facilities owned or operated by or for a governmental agency.
>
> b. Capital improvement projects of a governmental agency.
>
> c. The maintenance or repair of public properties.
>
> i. Private construction projects located within one-quarter (1/4) of a mile from an inhabited dwelling, provided that:
>
> 1 Construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September; and
>
> 2 Construction does not occur between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May.

Because the Project's roadway improvements will be an Indio Public Works construction project, Project-related construction noise is exempt from the Indio Municipal Code, and Riverside County Ordinance. However, as discussed below, the Project will incorporate mitigation measures **MM NOI 1** through **MM NOI 3** to reduce potential short-term noise impacts, which will entail the Project's construction adhering to the most restrictive hours of these jurisdictions.

Operational Traffic Noise

Transportation-related noise impacts associated with the Project were evaluated. Noise level increases and impacts attributable to the development of the proposed Project are estimated by comparing the "with project" traffic volume to the "without project" traffic volume. For purposes of this analysis, roadway noise impacts would be considered significant if the Project increases noise levels for noise-sensitive land uses by 3 dBA and if: (1) the existing noise levels already exceed the 65 dBA residential standard, or (2) the projected increase noise levels from below the 65 dBA standard to above 65 dBA.

Noise sensitive receiver locations were identified near the Project site and the Project's traffic data was utilized to predict Existing, Future 2023, and 2035 Project noise levels at these locations. Changes in noise levels between existing and 2023 are negligible (less than 1 dBA increase). Noise levels continue to increase under 2035 future over existing conditions with Project conditions. Many of the 2035 Project noise increases are above 3 dBA.

Table 4.12-6, Potentially Significant Traffic Noise Level Increases, as contained in the City of Indio's 2040 General Plan Update Final Environmental Impact Report (GP FEIR), identifies Jackson Street along with other segments within the City, as one of the roadway segments adjacent to existing noise-sensitive land uses that would experience significant increases associated with growth. For consistency with GP Policy NE-2.6, the City of Indio's GP FEIR includes mitigation measure (MM-NOS-1), which recommends implementing noise-reducing paving materials on the roadway, such as open grade asphalt. Implementation of noise-reducing paving materials would reduce noise levels by 4 to 5 dBA. This noise reduction level would reduce the noise level to less than significant, bringing the resultant noise level within the acceptable noise compatibility levels near residential land uses. Consistent with the GP FEIR, the Project will implement noise-reducing paving materials in **MM NOI 4**, shown below.

Therefore, impacts regarding substantial temporary or permanent increase in generation of noise in excess of standards codified in the Indio noise ordinance are considered to be **less than significant with mitigation**.

To ensure potential short-term noise impacts from Project construction are less than significant, mitigation measures **MM NOI 1** through **MM NOI 3** shall be implemented. To reduce long-term noise impacts to from Project operation to less than significant level, mitigation measure **MM NOI 4** shall be implemented.

MM NOI 1: To prevent construction-related noise from disturbing sensitive receptors within proximity to the Project, construction hours shall be limited to the most restrictive hours contained in the City of Indio Municipal Code and County Ordinance: 7:00 a.m. to 5:30 p.m. Monday through Friday, and 8:00 a.m. to 5:00 p.m. on Saturdays for activities conducted between October 1st and April 30th. For construction activities conducted between May 1st and September 30th, construction shall be limited to 6:00 a.m. to 6:00 p.m. Monday through Friday, and 8:00 a.m. to 5:00 p.m. on Saturdays. No construction shall be allowed on Sundays or government holidays.

MM NOI 2: To minimize noise impacts resulting from poorly tuned or improperly modified vehicles and construction equipment, all vehicles and construction equipment shall be equipped with operating mufflers and shall maintain equipment engines in good condition and in proper tune per manufacturers' specifications to the satisfaction of the City of Indio. Equipment maintenance records and equipment design specification data sheets shall be kept on site during construction. Maintenance records shall be submitted monthly to the City of Indio. Compliance with this measure shall be subject to periodic inspections by the City of Indio.

MM NOI 3: To inform potential sensitive receptors of the pending Project construction, the City of Indio shall give written notification to immediately adjacent property owners and tenants that front the Project site 30 days prior to the start of construction. The written notification shall include a tentative construction schedule and contact information for use by the public if specific noise issues arise.

MM NOI 4: Consistent with GP Policy NE-2.6, the City shall incorporate noise-reducing paving materials, such as open-grade asphalt, into the Project's roadway improvement plans.

b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐

Source(s): *Project Description; Entech*

As a result of the proposed Project's construction, groundborne vibration may occur from heavy equipment during demolition, grading, and paving. Based on the FTA's reference vibration levels, a large bulldozer represents the peak source of vibration with a reference level of 0.089 (inches/second) at a distance of 25 feet. At the nearest residential receptor, the vibration level would be 0.004 inches/second. Based on the construction vibration assessment criteria provided by the FTA for buildings extremely susceptible to vibration damage (0.12 inches/second) and annoyance during infrequent events, the proposed Project site will not include nor require equipment, facilities, or activities that would result in causing building damage or perceptible human response (annoyance). Further, impacts at the site of the closest sensitive receptor are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating near the Project site perimeter. Moreover, construction at the Project site will be restricted to daytime hours consistent with City and County requirements, thereby eliminating potential vibration impact during the sensitive nighttime hours. On this basis, the potential for the proposed Project to result in persons' exposure to or generation of excessive ground-borne vibration is determined to be less than significant.

Groundborne vibration from vehicular traffic rarely causes a disturbance within buildings located in urban environments unless the pavement surface is uneven or the receptor is highly sensitive (e.g., a scientific research establishment) to groundborne vibration. Therefore, groundborne vibration levels within the Project area are not expected to increase as a result of the implementation of the proposed Project. For these reasons, impacts regarding groundborne vibration and groundborne noise will be **less than significant**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) For a project located within the vicinity of a private airstrip or 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?	☐	☐	☐	☒

Source(s): *RCALUCP Map BD-1; RCALUCP Map JC-1; Google Maps*

See Response IX.e), above. The nearest airports to the Project site are Jacqueline Cochran Regional Airport (formerly Thermal Airport) and Bermuda Dunes Airport. The Project site is not located in either of these airports' respective land use plans, nor would the Project conflict with such plans. The Project site is not located in the vicinity of a private airstrip. Therefore, with regards to exposing people to aircraft noise from private airstrips, **no impacts** will occur.

XIV. POPULATION AND HOUSING – Would the project:				
a) Induce substantial unplanned 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)?	☐	☐	☐	☒

Source(s): *Project Description*

The Project consists of roadway and drainage improvements and does not include the construction of new homes or businesses and will not directly induce unplanned population growth. The Project will not indirectly result in additional development within the area. Therefore, **no impact** will occur.

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

Source(s): *Project Description*

The Project consists of roadway and drainage improvements, and thus, will not result in the displacement of any persons or housing necessitate the construction of replacement housing elsewhere. Therefore, **no impact** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

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

Source(s): *Project Description*

The proposed Project consists of roadway and drainage improvements, as such, will not include population growth that would require additional public services. No new or altered fire protection services will be required nor will existing service levels be affected. Therefore, **no impact** will occur.

Police protection?	☐	☐	☐	☒

Source(s): *Project Description*

The proposed Project consists of roadway and drainage improvements, as such, will not include population growth that would require additional public services. No new or altered police protection services will be required nor will existing service levels be affected. Therefore, **no impact** will occur.

Schools?	☐	☐	☐	☒

Source(s): *Project Description*

The proposed Project consists of roadway and drainage improvements, as such, will not include population growth that would require additional public services. No new or altered school services will be required nor will existing service levels will be affected. Therefore, **no impact** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

Parks?	☐	☐	☐	☒

Source(s): *Project Description*

The proposed Project consists of roadway and drainage improvements, as such, will not include population growth that would require additional public services. No new or altered park services will be required nor will existing parkland ratios be affected. Therefore, **no impact** will occur.

Other public facilities?	☐	☐	☐	☒

Source(s): *Project Description*

The proposed Project consists of roadway and drainage improvements and will not include population growth that would require additional public services, that will not necessitate the construction of new governmental facilities or increase demand on other public services. Therefore, the Project will have **no impact**.

XVI. RECREATION				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

Source(s): *Project Description*

The Project does not involve new housing or employment opportunities that would directly or indirectly generate users which would result in an increased use of existing parks or recreational facilities. Therefore, **no impact** will occur.

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?	☐	☐	☐	☒

Source(s): *Project Description*

The Project does not include recreational facilities or involve the construction of housing or creation of employment opportunities that would directly or indirectly generate users that would result in a need for construction or expansion of recreational facilities. Therefore, **no impact** will occur.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION -- Would the project:				
a) Conflict with a program plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☒	☐	☐

Source(s): *Project Description; SunBus System Map: Translutions*

The Project improvements are consistent with the Riverside County and Indio GPs regarding the configuration of Jackson Street within the Project site. Regarding the circulation system, the vehicle miles traveled analysis (described in further detail in response XVII.b, below, demonstrates that widening Jackson Street and adding sidewalk, bike lane, curb and gutter, and drainage improvements per the City of Indio's MDP reduces automobile travel and as the Project area develops it will experience improved mobility than without the proposed improvements.

During Project construction, construction-related vehicles and equipment will use existing roads within the vicinity of the Project site. As previously discussed in response IX.f), Project construction may entail lane closures during construction. To address circulation and safety issues associated with Project construction, a TMP will be prepared as required by mitigation measure **MM TRAFFIC 1** and will be implemented.

> **MM TRAFFIC 1:** A Traffic Management Plan (TMP) shall be prepared by the contractor and jointly approved by Indio's Public Works Department and County of Riverside Transportation Department prior to initiation of construction activities to maintain safe traffic flow on local streets and permit adequate access by emergency vehicles. The TMP shall specify, as applicable, the designated haul route(s) and staging area(s) for construction activities, traffic control procedures, alternate routes in the event road closure is required, emergency access provisions, adequate sign postings, detours, provisions for local access to private property fronting the alignment, and permitted hours of construction. As deemed applicable by the City and County, the contractor shall coordinate with local police, schools, emergency personnel, etc.

Regarding pedestrian and bicycle paths, the Project includes the addition of sidewalks and bike lanes for use by bicyclists as well as golf carts.

Regarding transit, although the segment of Jackson Street within the Project boundary is not currently utilized or served by SunBus, the region's mass transit provider; there is nothing in the Project design that would preclude the Project boundary being served by mass transit in the future. Rather, once the Project is constructed, the roadway will better accommodate mass transit buses.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

In sum, the Project may temporarily affect alternative transportation during construction; however, proper precautions will be made to ensure the safety of the construction workers and alternative transportations users. The Project's improvement of Jackson Street will better facilitate alternative forms of transportation including use by mass transit buses, bicycling, and pedestrian use as a result of the new widened design, which will include a sidewalk and bicycle lane. Thus, the Project will not negatively impact alternative transportation performance or safety. It should also be noted that the segment of Jackson Street within the Project boundary is not currently utilized by SunBus, the region's mass transit bus service. For the reasons set forth above, the Project will not conflict with a program plan, ordinance, or policy addressing the circulation system. Therefore, impacts will be **less than significant with mitigation**.

b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☒	☐

Source(s): *Project Description, Translutions*

Senate Bill 743 (SB 743) was passed by the California State Legislature and signed into law by Governor Brown in 2013. SB 743 required the Office of Planning and Research and the California Natural Resources Agency to develop alternative methods of measuring transportation impacts under CEQA. In December 2018, the California Natural Resources Agency finalized updates to the CEQA Guidelines, which included SB743. Section 15064.3 of the 2019 CEQA Guidelines provide that transportation impacts of projects are, in general, best measured by evaluating the project's vehicle miles traveled (VMT). Automobile delay (often called Level of Service) will no longer be considered to be an environmental impact under CEQA. Automobile delay can, however, still be used by agencies to determine local operational impacts. The provisions of this section became mandatory July 1, 2020.

A *VMT Screening Analysis* was prepared by Translutions, Inc. (Translutions) for the Project and is included in Appendix H of this IS/MND. The City has not adopted specific guidelines for evaluation of VMT or specific VMT thresholds; therefore, this analysis uses the thresholds and analysis parameters based on the *County of Riverside Transportation Analysis Guidelines for Level of Service Vehicle Miles Traveled*, December 2020. The recommended threshold identified in the Riverside County Guidelines is based on increase in VMT, and an impact occurs if the Project results in a net increase in jurisdiction VMT.

The Riverside Transportation Analysis Model (RIVTAM) was run to evaluate the change in VMT for the Project. The model was run for the base and future conditions and for the without and with Project conditions. The model runs and data extraction process followed are consistent with the recommendations in the County guidelines. The Project results in an increase in VMT under both the base and future year conditions showing an increase of 106 miles under base year and 1,666 miles under future year conditions.

It should be noted that the model does not account for active transportation improvements, improved multimodal access to schools, and increased accessibility and availability of alternative modes. The County's mitigation measures for VMT reductions allows up to 2 percent reduction in VMT for pedestrian network improvements. Since the Project will provide pedestrian network improvements as well as bicycle network improvements in the area, the total VMT associated with the traffic analysis zones along the Project would result in reduced VMT due to pedestrian and bicycle improvements. This neighborhood enhancement strategy implements pedestrian network improvements throughout and around the Project site that encourages people to walk. The County maximum VMT reduction with implementation of this strategy is a 2 percent reduction in VMT. This strategy has a range of effectiveness of 0 to 2 percent reduction in VMT based on the context of the project being located in an urban, suburban, or rural area. If the project is located in an urban/suburban area, a reduction of 2 percent in VMT can be estimated if the extent of pedestrian accommodations is within the project site and connect off-site. The Project is located in a suburban area and will provide a pedestrian access network that can internally link all future uses contiguous with the Project site.

As a result of these improvements, the Project will result in a VMT reduction of 3,176 miles under base year and 5,907 miles under future conditions. It should be noted that while this strategy allows a 2 percent reduction in VMT from developments that have access to pedestrian connections on and off-site, the Project's impacts are reduced to less than significant if the VMT reduction is 0.067 percent in the base year conditions and 0.565 percent in the future year conditions.

The potential for induced travel demand was also evaluated. Induced travel is focused on congested areas. The explanation for this is that if the transportation network is severely congested, automobile users will not make certain trips. Then, when capacity is added, and as a result, the roadway becomes uncongested, the trip would be made. However, if the roadway is uncongested to begin with, there is nothing preventing the original trips, and adding additional capacity would not result in additional VMT. The existing and future demand on Jackson Street are 10,675 and 16,269, respectively and the capacity under no Project conditions is 27,000, which shows that the roadway is not congested, except at isolated intersections during the peak hours. Therefore, the Project is unlikely to induce latent demand.

In sum, the Project adds roadway capacity and increases automobile traffic due to added capacity in the area. However, because it also improves bicycle and pedestrian network in the area, it also reduces automobile travel and results in a net reduction of VMT in the City of Indio. Therefore, impacts with regard to being in conflict or inconsistent with CEQA Guidelines section 15064.3, subdivision (b) will be **less than significant**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

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

Source(s): *Project Description*

The segment of Jackson Street within the Project site and its intersections with Avenues 50, 51, and 52 are straight and do not include any curves. Improvements to an existing road will not result in incompatible uses or increase hazards within the Project Boundary. In addition, installation of new traffic signals at the intersections with Avenues 50, 51, and 52, sidewalks and bike lanes would improve safety for pedestrians and cyclists within the Project site as well as motorists. For these reasons, **no impact** will occur.

d) Result in inadequate emergency access?	☐	☒	☐	☐

Source(s): *Project Description*

As discussed in response IX. f), above, during construction, temporary lane closures may be necessary. Potential impacts to access resulting from lane closures will be reduced to less than significant with implementation of mitigation measure **MM TRAFFIC 1** (see above). Operation of the Project will improve emergency access as the improved roadway will facilitate emergency vehicles and/or evacuation if needed. For these reasons, **impacts will be less than significant with mitigation**.

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Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

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

Source(s): *(*AE (a))

As identified in Response V.a above, no eligible historic properties or significant historical resources have been recorded on the Project site (AE(a), p. 2). As discussed in Response XVIII.a.ii, below, no tribal cultural resources were identified during the City's AB 52 consultation. Therefore, impacts to tribal cultural resources that are listed or eligible for listing will be **less than significant**.

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

Source(s): *AB 52*

AB 52, signed into law in 2014, amended CEQA and established 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 established 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 October 3, 2019, the City notified nine local tribal governments in writing of the proposed Project pursuant to AB 52 pertaining to tribal cultural resources consultation:

- Cabazon Band of Mission Indians
- Soboba Band of Luiseño Indians
- Torres-Martinez Desert Cahuilla Indians
- Ramona Band of Cahuilla Indians
- Los Coyotes Band of Cahuilla and Cupeño Indians
- Augustine Band of Cahuilla Mission Indians
- Morongo Band of Mission Indians
- Santa Rosa Band of Cahuilla Indians
- Cahuilla Band of Indians

Table XVIII -A – AB 52 Response Log, shows the results of this October 3, 2019 notification from the City.

Table XVIII -A – AB 52 Response Log

Native American Group (Individual Responding)	Comment
Agua Caliente Band of Cahuilla Indians	In a response dated November 1, 2019, the Agua Caliente Band of Cahuilla Indians, noted that the Project area is not located within the boundaries of the Agua Caliente Band of Cahuilla Indians Reservation. However, the Project is located within their traditional use area; for this reason, they requested the following: • Formal government to government consultation under AB 52 • A cultural resources inventory of the project area by a qualified archaeologist prior to any development activities in this area • A copy of the records search with associated survey reports and site records from the information center • Copies of any cultural resource documentation (report and site records) generated in connection with this project • This letter does not conclude consultation. Upon receipt of requested materials the Agua Caliente Band of Cahuilla Indians' Tribal Historic Preservation Office may have additional recommendations or require further mitigation measures
Augustine Band of Cahuilla Indians (Victoria Martin)	In a response dated October 14, 2019, Victoria Martin, on behalf of the Augustine Band of Cahuilla Indians, stated that the tribe is unaware of specific cultural resources that may be affected by the proposed Project at this time.

Native American Group (Individual Responding)	Comment
	They request that should any cultural resources be discovered during the development of the Project, the City should contact the Augustine Band of Cahuilla Indians office immediately for further evaluation.
Cabazon Band of Mission Indians (Judy Stapp)	In a response dated October 25, 2019, Judy Stapp, on behalf of the Cabazon Band of Mission Indians, stated that the Project is located outside of the tribe's current reservation boundaries, and that they have no specific archival information on the Project site indicating that it may be a sacred/religious site or other site of Native American traditional cultural value.
Morongo Band of Mission Indians (Travis Armstrong)	In a response dated October 18, 2019, Travis Armstrong, on behalf of the Morongo Band of Mission Indians, states that the tribe does not have any comments to provide at this time, and defers to other tribes in the area for this Project.

In accordance with **MM CR 1** and as requested by the Augustine Band of Cahuilla Indians, the Augustine Band of Cahuilla Indians will be contacted if discovered resources are found during construction. As requested, the Agua Caliente Band of Cahuilla Indians was provided the requested Phase 1 Cultural Resource Assessment and on March 20,2020 the City concluded consultation as no recommendations or comments were provided by the tribe. With implementation of mitigation measure **MM CR 1**, impacts with regard to tribal cultural resources will be reduced to **less than significant with mitigation**.

XIX. UTILITIES AND SERVICE SYSTEMS -- Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐

Source(s): *Project Description*

The Project will not include any component that will require or result in the construction of new water, wastewater treatment, natural gas, or telecommunications facilities. The potential relocation of existing water and dry utilities will be within the Project footprint analyzed herein and thus would not cause significant adverse impacts upon the environment. The proposed traffic signals will require a nominal amount of electricity but will be located within the disturbed areas adjacent to the intersections within the Project footprint; therefore, the resulting impacts from these facilities will be less than significant.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

The Project incorporates catch basins and underground infiltration chambers that will reduce localized flooding consistent with the City MDP. These storm water drainage facilities have also been designed to handle the runoff from the increased impervious areas created by the Project. Other than the storm drain facilities proposed by the Project, no new storm water drainage facilities will be required. Therefore, **impacts will be less than significant**.

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒

Source(s): *Project Description*

The proposed Project consists of roadway and drainage improvements that will not necessitate the construction of new or expanded water supplies. Water is only necessary during construction, which is short term and currently available from the Indio Water Authority. Therefore, **no impact** will occur.

c) 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?	☐	☐	☐	☒

Source(s): *Project Description*

See response to XIX.a), above. The Project will not result in wastewater generation, and thus, will not impact existing wastewater facility capacity. Therefore, **no impact** will occur.

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐

Source(s): *Project Description, IMC*

Construction of the Project will generate some solid waste, which will be disposed of appropriately at a permitted landfill. The amount generated during construction is not expected to be excessive such that it would be in excess of State or local standards, or in excess of local infrastructure or other solid waste reduction goals. Operation of the Project in and of itself will not generate solid waste. Moreover, pursuant to Indio Municipal Code Section 51.47, the Project will be required to divert at least 50 percent of recyclable, reusable, and salvageable debris from landfills through implementation of a Construction and Demolition Debris Plan. Compliance with

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

existing regulations will ensure impacts associated with solid-waste generation during construction are **less than significant**.

e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

Source(s): *Project Description, IMC*

See response to XIX.e), above; the Project will comply with government regulations related to solid waste such as Indio Municipal Code Section 51.47. Therefore, **no impact** will occur.

XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒

Source(s): *CalFire*

CalFire identifies areas of Very High Fire Hazard Severity Zones (VHFHSZ) within local responsibility areas (LRA) and State Responsibility Areas (SRA). Mapping of the VHFHSZ is based on data and models of potential fuels over a 30- to 50-year time horizon and their associated expected fire behavior and expected burn probabilities which quantifies the likelihood and nature of vegetation fire exposure (including firebrands) to buildings. The Project site and the surrounding area is located in a non-VHFHSZ LRA, and not in a SRA. The nearest VHFHSZ and SRA is well outside the City boundaries, in the southwest portion of the City of La Quinta (CalFire). Since the Project site is not located in or near SRA or land classified as VHFHSZ, the Project would have **no impact**.

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒

Source(s): *See response XX.a), above*

See response XX.a) above; the Project would have **no impact**.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risks or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒

Source(s): *See response XX.a), above*

See response XX.a) above; the Project would have **no impact**.

d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Source(s): *See response XX.a), above*

See response XX.a), above; the Project would have **no impact**.

XXI. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to substantially 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, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐

Source(s): *Above checklist*

The Project site is located in a developing area consisting of the existing Jackson Street and cross streets, residential and commercial structures, and disturbed open area. As discussed in the preceding analysis, impacts resulting from implementation of this Project will not result in a significant impact regarding any of the environmental issues evaluated. Thus, the Project will not substantially degrade the quality of the environment.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

As discussed in responses IV.a) through IV.f), Project implementation will not substantially reduce fish or wildlife species, or threaten or eliminate plant or animal species. The Project site is not located within a CVMSHCP Conservation Area. No riparian habitat or other sensitive natural community was observed in the Project site or within its proximity. No wetlands occur within or in proximity to the Project site. The Project contains low quality habitat that may provide roost and forage for special status bats species in addition to trees and vegetation used by migratory birds. However, potential impacts to the special-status burrowing owl, bat species, and nesting migratory birds will be reduced to less than significant through the incorporation of mitigation measures **MM BIO 1, MM BIO 2,** and **MM BIO 3.** Further, vegetation, including palm trees, that will be removed as part of the Project are not special-status species or otherwise protected by a habitat conservation plan or local ordinance.

The Project will not eliminate important examples of major periods of California history or prehistory. As is discussed above in responses V.a) through V.c), no historic-period or archaeological resources are present on the Project site. Thus, the Project will not result in a significant impact to cultural resources or eliminate historical or pre-historical examples.

For the reasons stated above, the Project's impacts will 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)?	☐	☐	☒	☐

Source(s): *Above checklist*

The Project will not have any impacts that are individually limited but cumulatively considerable. Moreover, the Project will not result in any significant impacts.

The Project is consistent with local and regional plans, including the AQMP and CVMSHCP, and is not considered growth-inducing as defined by State *CEQA Guidelines* Section 15126.2(d). The Project will not induce either directly or indirectly, population and housing growth or increase traffic volumes along Jackson Street. The Project will construct Jackson Street within the Project site to its Circulation Element designated ultimate width as per the General Plans of the City of Indio and County of Riverside. Any cumulative impacts resulting from implementation of the Circulation Elements of these jurisdictions would have been previously evaluated in the EIRs for each General Plan.

Issues:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

Therefore, a **less than significant** impact will occur with regards to cumulative impacts.

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

Source(s): *Above checklist*

The Project will not have the potential for direct or indirect substantial adverse impacts on human beings with implementation of **MM NOI 1** through **MM NOI 4** and **MM TRAFFIC 1**, and further environmental analysis is not required. Therefore, impacts will be **less than significant with mitigation**.

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Acronyms and Abbreviations

The following acronyms and abbreviations are utilized within this document:

A-1	Light Agriculture
AB	Assembly Bill
ADA	Americans with Disabilities Act
APN	Assessor's Parcel Number
AASHTO	American Association of State Highway and Transportation Officials
AQMP	Air Quality Management Plan
Basin	Salton Sea Air Basin
BGS	Below Ground Surface
BMPs	Best Managements Practices
CalFire	California Department of Forestry and Fire Protection
CAP	City of Indio Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations

CC	Community Commercial
CE	Country Estate and Visitor Serving
CEIR	Country Estates Indio Ranchos
CEQA	California Environmental Quality Act
CET	Country Estates Transition
CGP	Construction General Stormwater Permit
City	City of Indio
CNDDB	California Natural Diversity Database
C-P-S	Scenic Highway Commercial
CRHR	California Register of Historical Resources
CVMSHCP	Coachella Valley Multiple Species Habitat Conservation Plan
CVUSD	Coachella Valley Unified School District
CVWD	Coachella Valley Water District
EE	Equestrian Estates
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GP	General Plan
GP FEIR	City of Indio, Final Environmental Impact Report for the City of Indio General Plan Update
GSP	Groundwater Management Plan
HDPE	high-density polyethylene
IID	Imperial Irrigation District
IMC	City of Indio Municipal Code
IPaC	Information for Planning and Consultation
IS/MND	Initial Study and Mitigated Negative Declaration
LRA	Local Responsibility Area
LST	Localized Significance Thresholds
MDP	Master Drainage Plan
NAHC	National American Heritage Association
NC	Neighborhood Commercial
NHD	National Hydrography Dataset
NPDES	National Pollutant Discharge Elimination System

NWI	National Wetland Inventory
P	Public
PRC	Public Resources Code
PRIMP	Paleontological Resource Impact Mitigation Program
Project	Jackson Street Improvement Project from Avenue 50 to Avenue 52
RH	Residential High
RL	Residential Low
RM	Residential Medium
ROW	Right-of-way
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SLF	Sacred Lands File
SPRR	Southern Pacific Railroad
SRA	State Responsibility Area
SWPPP	Storm water pollution prevention plan
SWRCB	State Water Resources Control Board
TMP	Traffic Management Plan
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Service
VHFHSZ	Very High Fire Hazard Severity Zone
VMT	Vehicle Miles Traveled

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Noemi Avila, Assistant Environmental Analyst
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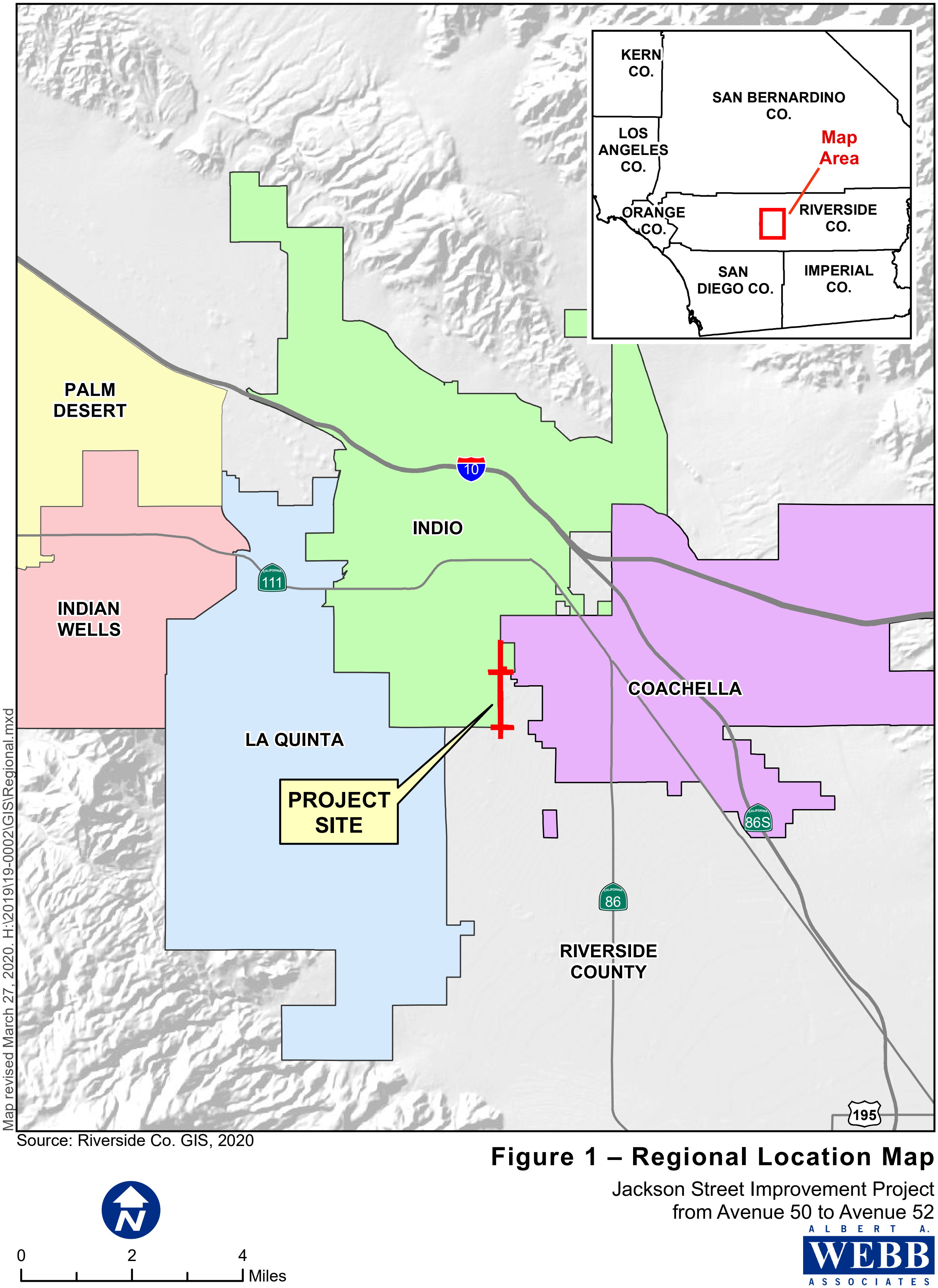
FIGURES

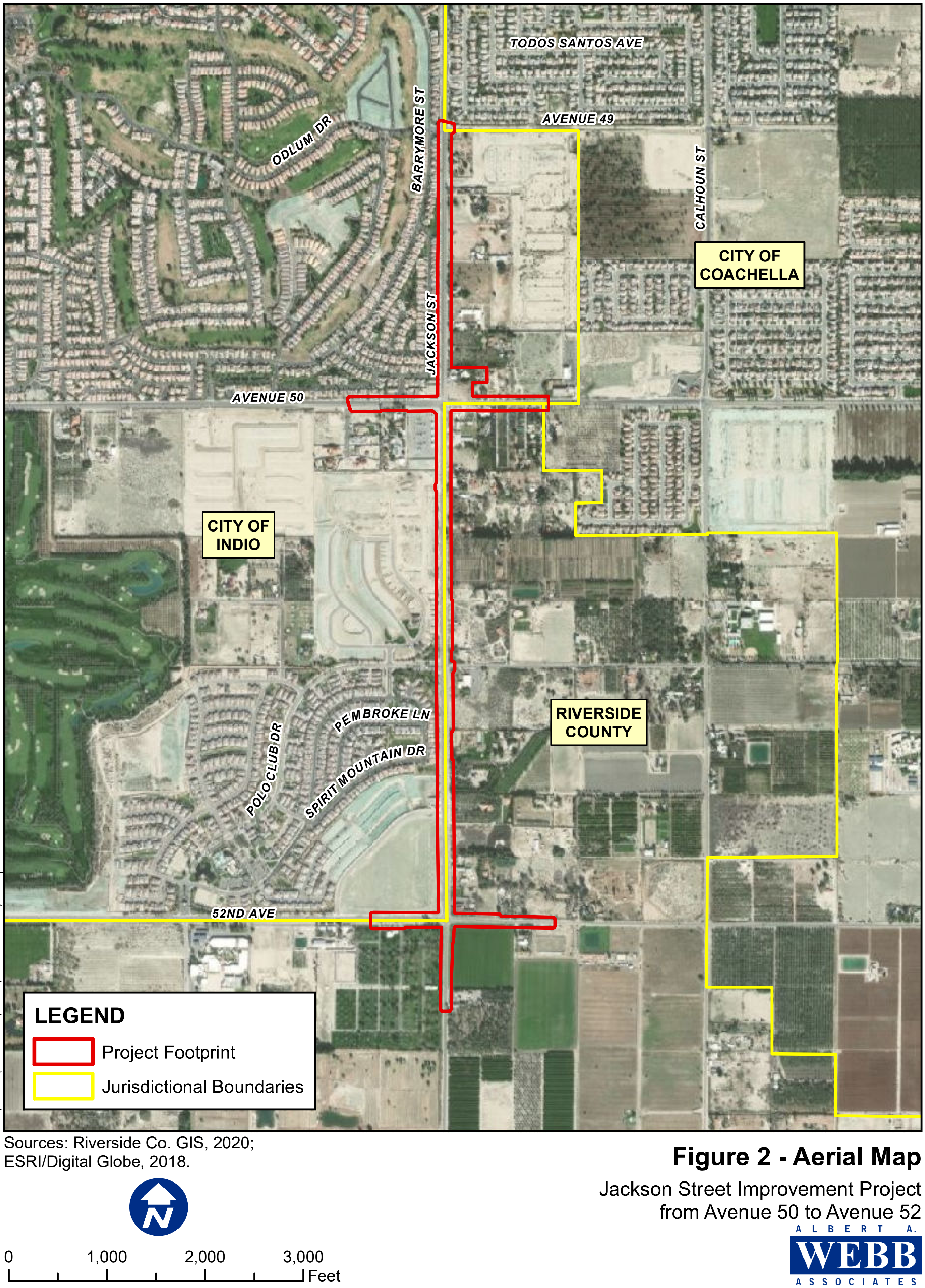


Source: Riverside Co. GIS, 2020

Figure 1 – Regional Location Map

Jackson Street Improvement Project
from Avenue 50 to Avenue 52

ALBERT A. WEBB ASSOCIATES



H:\2019\19-0002\GIS\Aerial.mxd; Map revised 24 Nov 2020

Sources: Riverside Co. GIS, 2020; ESRI/Digital Globe, 2018.

Figure 2 - Aerial Map

Jackson Street Improvement Project
from Avenue 50 to Avenue 52

ALBERT A. WEBB ASSOCIATES

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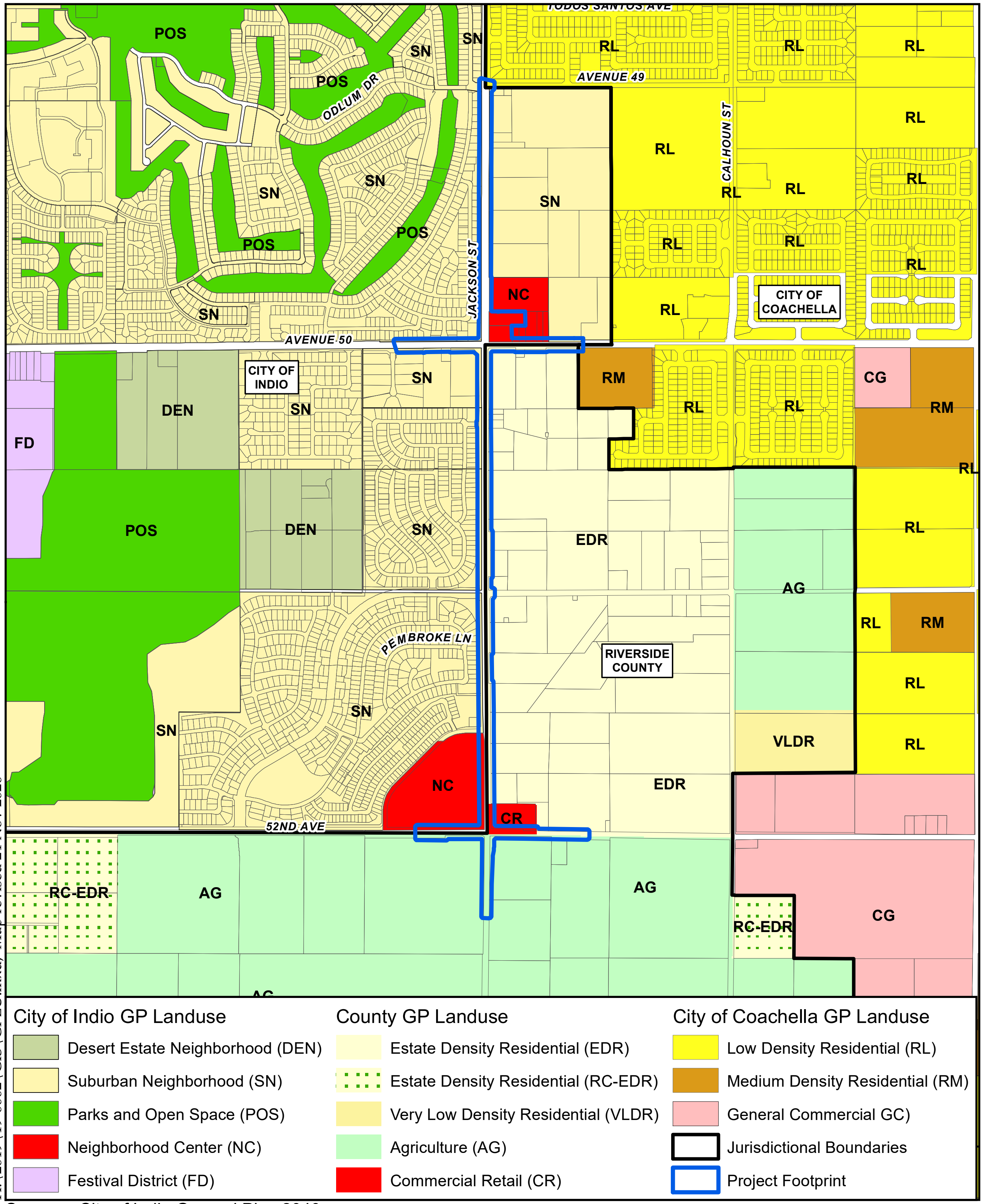


Sources: City of Indio General Plan 2040; City of Coachella 2013; Riverside Co. RCIP, 2003 (as updated through Oct. 2020).

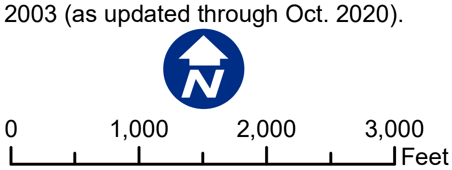
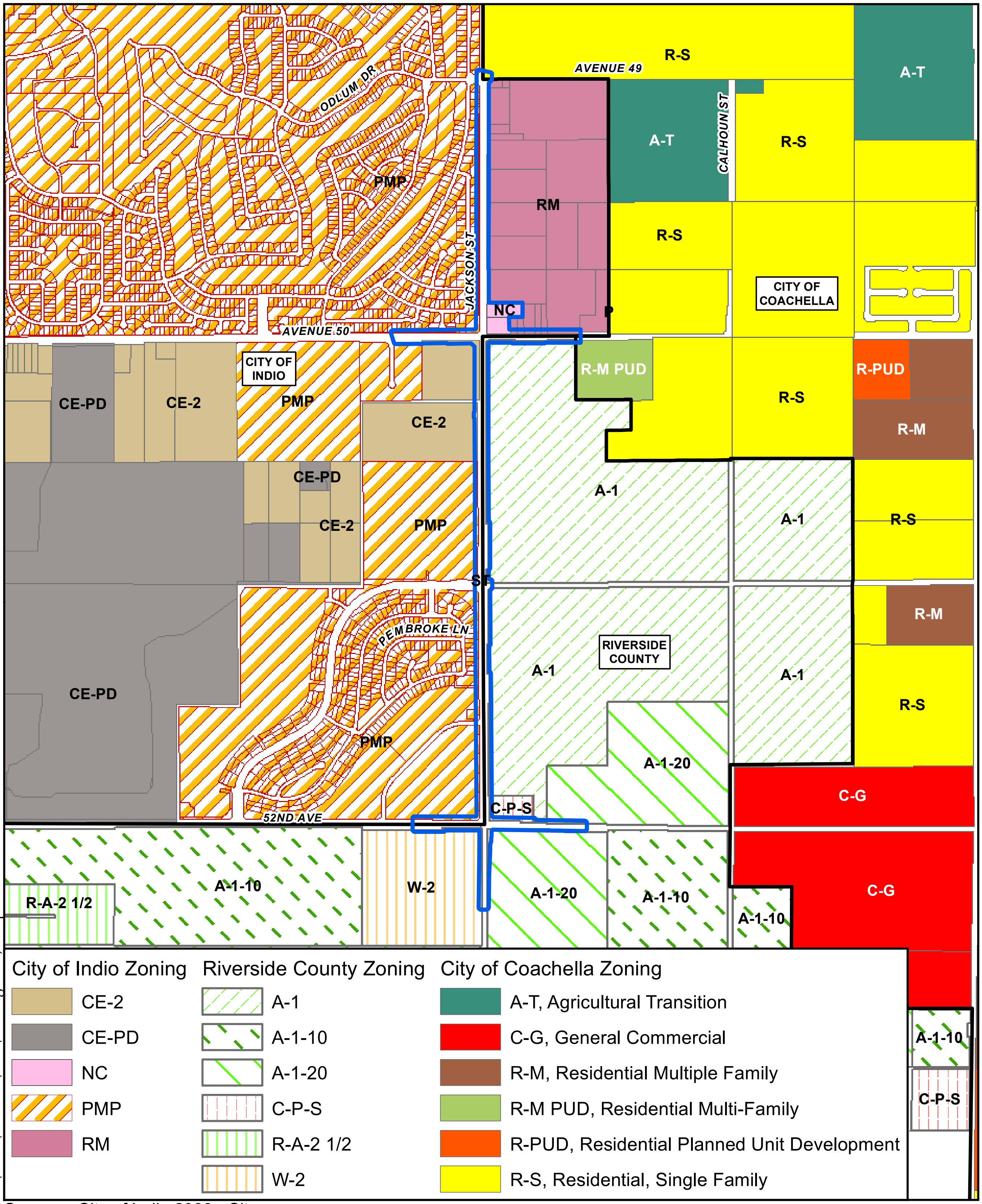


Figure 3 – General Plan Land Use Map

Jackson Street Improvement Project
from Avenue 50 to Avenue 52

ALBERT A. WEBB ASSOCIATES



H:\2019\19-0002\GIS\Zoning.mxd; Map revised 24 Nov 2020

Sources: City of Indio 2009;; City of Coachella 2013; Riverside Co. 2020

N

0 1,000 2,000 3,000 Feet

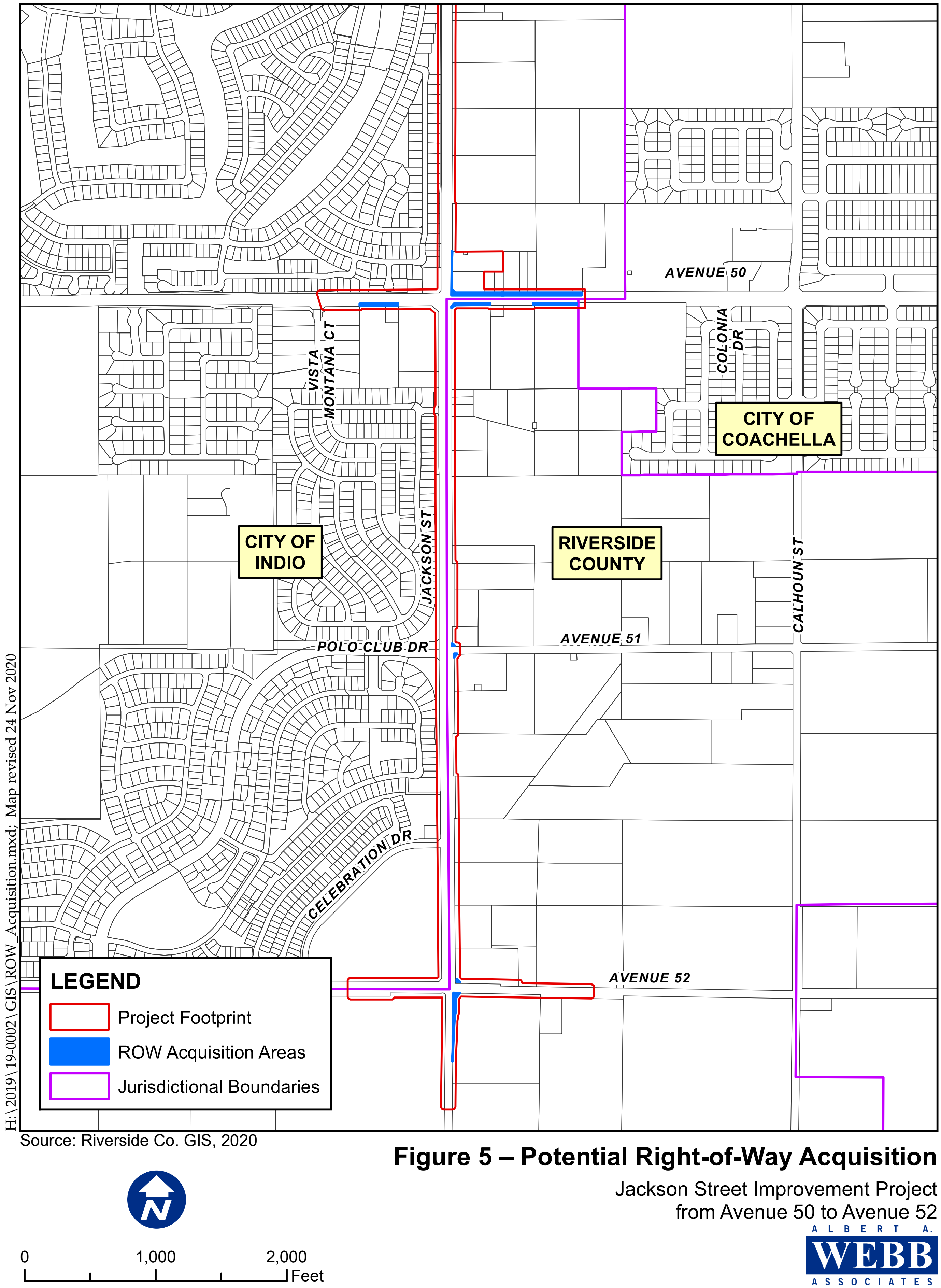
Project Footprint

Jurisdictional Boundaries

Figure 4 – Zoning Map

Jackson Street Improvement Project from Avenue 50 to Avenue 52

ALBERT A. WEBB ASSOCIATES



Source: Riverside Co. GIS, 2020

Figure 5 – Potential Right-of-Way Acquisition

Jackson Street Improvement Project
from Avenue 50 to Avenue 52

ALBERT A. WEBB ASSOCIATES

FIGURE 6

CITY INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
AVENUE 50 TO AVENUE 52
CITY OF INDIO PROJECT NO. XXXXXX

CITY OF INDIO'S STANDARD GENERAL NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CURRENT PUBLIC WORKS ENGINEERING STANDARDS FOR THE CITY OF INDIO; UNLESS OTHERWISE NOTED ON THE APPROVED PROJECT PLANS, OR AS DIRECTED BY THE CITY ENGINEER.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR (OR DEVELOPER/OWNER FOR A DEVELOPMENT PROJECT) TO OBTAIN FROM THE CITY OF INDIO, AND OTHER GOVERNING AGENCIES, ALL NECESSARY PERMITS PRIOR TO THE BEGINNING OF CONSTRUCTION.
3. THE CONTRACTOR (OR DEVELOPER/OWNER FOR A DEVELOPMENT PROJECT) IS RESPONSIBLE FOR SATISFACTORY COMPLIANCE WITH ALL CURRENT ENVIRONMENTAL REGULATIONS.
4. THE CONTRACTOR MUST NOTIFY THE ENGINEERING DIVISION OF THE CITY OF INDIO'S PUBLIC WORKS DEPARTMENT (760.391.4019) AT LEAST 48 HOURS IN ADVANCE OF BEGINNING ANY NEW PHASE OF WORK. ANY IMPROVEMENT(S) INSTALLED WITHOUT INSPECTION(S) BY THE CITY WILL BE SUBJECT TO REMOVAL.
5. THE LOCATIONS OF OF EXISTING UNDERGROUND UTILITIES ARE SHOWN ON THE PLANS IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING UNDERGROUND SERVICE ALERT AT LEAST 48 HOURS PRIOR TO BEGINNING ANY EXCAVATION AND AS OTHERWISE REQUIRED BY LAW.
6. CONTACT PHONE NUMBERS FOR SOME OF THE LOCAL UTILITIES IN INDIO ARE:

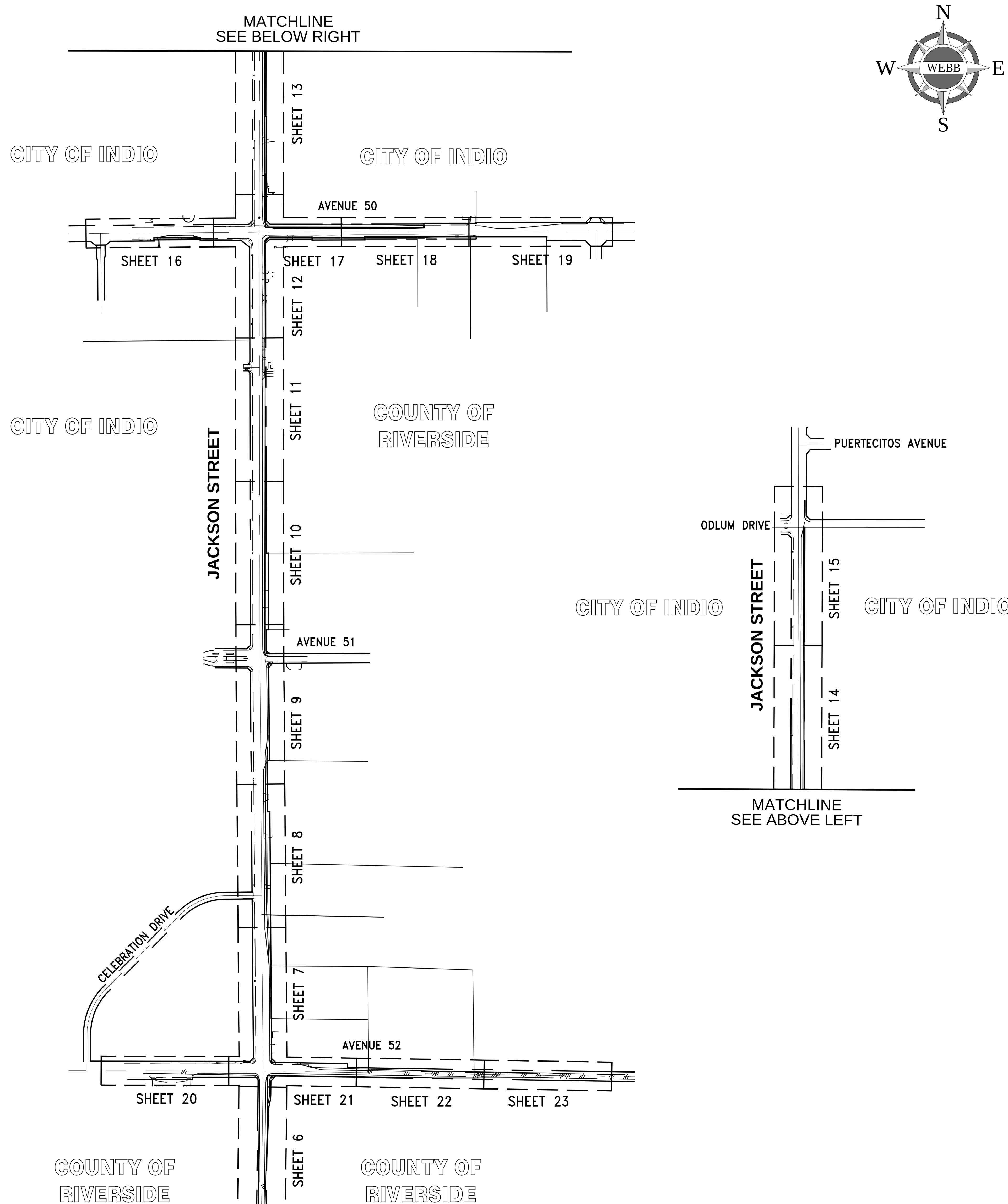
IMPERIAL IRRIGATION DISTRICT	ELECTRIC	760-339-9232
THE GAS COMPANY	GAS	909-335-7507
FRONTIER	TELEPHONE	760-864-1726
COACHELLA VALLEY WATER DISTRICT	SEWER	760-398-2651
SPECTRUM	CABLE	855-487-1629
CITY OF INDIO	ENGINEERING	760-391-4017
COACHELLA VALLEY WATER DISTRICT	WATER	760-398-2651

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL, REPLACEMENT, PROTECTION AND/OR RELOCATION OF ALL REGULATORY, WARNING, AND GUIDE SIGNS; AND FOR THE REMOVAL, REPLACEMENT, AND PROTECTION OF ANY PAVEMENT STRIPING, AND/OR PAVEMENT LEGENDS/MARKINGS. THE CONTRACTOR IS REQUIRED TO INSTALL NEW STRIPING AND PAVEMENT LEGEND/MARKINGS, AND SIGNING (INCLUDING STREET NAME SIGNS FOR ALL NEW STREETS OR AS OTHERWISE APPROVED OR DIRECTED BY THE CITY ENGINEER).
8. NO WALKWAY, TRAVEL LANE OR STREET CLOSURES ARE ALLOWED WITHOUT PRIOR APPROVAL OF THE CITY ENGINEER AND/OR CITY COUNCIL. WORK ZONE TRAFFIC CONTROL SHALL BE PER THE LATEST EDITION OF THE CALIFORNIA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
9. ALL TRAVELED WAYS MUST BE CLEANED DAILY OF ALL DIRT, MUD AND DEBRIS DEPOSITED ON THEM AS A RESULT OF THE CONTRACTOR'S WORK. CLEANING TO BE DONE PER THE SATISFACTION OF THE CITY ENGINEER.
10. IN GENERAL, THE CONTRACTOR SHALL NOT DISTURB EXISTING SURVEY MONUMENTS OR BENCH MARKS NOTED ON THE PLANS OR FOUND DURING CONSTRUCTION. IF THIS OCCURS DURING CONSTRUCTION, REPLACEMENT SHALL BE PERFORMED TO THE CITY/COUNTY STANDARDS BY A LICENSED LAND SURVEYOR (OR A LICENSED CIVIL ENGINEER WITH NUMBER BELOW 33,966).
11. THE REGISTERED CIVIL ENGINEER (R.C.E) SIGNING THESE DESIGN PLANS, AND ANY IMPROVEMENT PLAN (INCLUDING GRADING) SHALL BE RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN THROUGHOUT CONSTRUCTION. IN THE EVENT OF DISCREPANCIES DURING CONSTRUCTION , INCLUDING ANY ALTERATIONS OR VARIANCES NEEDED FROM THE APPROVED PLANS (EXCEPT MINOR ADJUSTMENTS IN THE FIELD TO MEET EXISTING CONDITIONS), SHALL BE THE RESPONSIBILITY OF THE R.C.E. TO DETERMINE AN ACCEPTABLE SOLUTION, TO REVISE THE PLANS, AND TO OBTAIN APPROVAL FROM THE CITY ENGINEER.
12. FOR ALL DEVELOPMENT PROJECTS, THE DEVELOPER/OWNER SHALL BE RESPONSIBLE FOR THE ACTIONS OF HIS CONTRACTORS.
13. "AS-BUILT", OR "RECORD" PLANS MUST BE SUBMITTED PRIOR TO ANY RELEASE OF SECURITIES AND/OR ISSUANCE OF A CERTIFICATE OF USE.
14. AT NO TIME SHALL PRIVATE PROPERTY BE USED IN CONJUNCTION WITH THE PROJECT UNLESS PROPERTY-OWNER APPROVAL IS OBTAINED IN WRITING AND GIVEN TO THE CITY.
15. FOR ALL DEVELOPMENT PROJECTS INVOLVING EARTHWORK, A FINAL SOILS REPORT SHALL BE SUBMITTED TO THE CITY ENGINEER. THIS FINAL SOILS REPORT SHALL SHOW, AT A MINIMUM, THE LOCATION AND RESULTS FOR ALL SOILS TESTS, AND SHALL CONTAIN AN APPROVAL STATEMENT FROM THE SOILS ENGINEER STATING THAT THE SOIL IS SUITABLE FOR ITS INTENDED USE. THIS SOILS REPORT SHALL BE SIGNED BY THE SOILS ENGINEER OF RECORD.
16. ALL IMPROVEMENT PLANS (INCLUDING GRADING) ARE APPROVED FOR A PERIOD OF EIGHTEEN (18) MONTHS FROM THE DATE SIGNED BY THE CITY ENGINEER. AFTER AN 18 MONTH LAPSE OF SIGNIFICANT WORK, THE "ENGINEER OF RECORD" SHALL BE REQUIRED TO SUBMIT AND PROCESS FOR CITY ENGINEER APPROVAL, UPDATED PLANS THAT COMPLY WITH THE MOST CURRENT CITY STANDARDS, PRACTICES, AND POLICIES.
17. CITY INSPECTION OF THE WORK CALLED FOR ON THE PLANS SHALL NOT IN ANY WAY RELIEVE THE CONTRACTOR OF THEIR OBLIGATION TO PERFORM THE WORK IN COMPLIANCE WITH THE PLANS AND SPECIFICATIONS.
18. NO TRENCHES SHALL BE LEFT OPEN OVERNIGHT WITHOUT PRIOR APPROVAL OF THE CITY ENGINEER.

Underground Service Alert
Call: TOLL FREE
811
WWW.call811.com
TWO WORKING DAYS BEFORE YOU DIG

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:

DATE



INDEX MAP

1" = 500'

1" = 500'

250 0 500

PLAN CHECKED BY:

BASIS OF BEARINGS

"THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA STATE PLANE COORDINATE SYSTEM, CCS83, ZONE 6, BASED LOCALLY ON CONTROL STATIONS "P600" AND "PIN1" NAD 83(NSRS2007) AS SHOWN HEREON. ALL BEARINGS SHOWN ON THIS MAP ARE GRID. QUOTED BEARINGS AND DISTANCES FROM REFERENCE MAPS OR DEEDS ARE AS SHOWN PER THAT RECORD REFERENCE. ALL DISTANCES SHOWN ARE GROUND DISTANCES UNLESS SPECIFIED OTHERWISE. GRID DISTANCES, MAY BE OBTAINED BY DIVIDING THE GROUND DISTANCE BY A COMBINATION FACTOR OF 1.00002148136891. CALCULATIONS ARE MADE AT POINT NUMBER 1 WITH COORDINATES OF: N: 2192564.084, E: 6570277.073, USING AN ELEVATION OF -11.581' (NAVD88). THE CONVERGENCE ANGLE AT POINT NO. 1 IS 00°00'55.99".

BENCHMARK DATA

CITY OF LA QUINTA BM 440.

FD. 3.5". BRASS DISK IN CONCRETE, FLUSH; STAMP "CITY OF LA QUINTA BENCHMARK", CENTER MARK IS PUNCH MARK, 260' SOUTH OF B.C.R. OF THE SOUTHEAST CURB RETURN AT THE INTERSECTION OF MADISON STREET AND AVENUE 54. ELEVATION = -7.116' (NAVD88). RAISED BY 500' = 488.419'

NOTE:500' HAS BEEN ADDED TO ALL ELEVATION.

CITY OF INDIO'S STANDARD STREET IMPROVEMENT NOTES:

1. THE "CITY OF INDIO'S STANDARD GENERAL NOTES" SHALL BE CONSIDERED PART OF THE "CITY OF INDIO'S STANDARD STREET IMPROVEMENT NOTES."
2. ALL UNDERGROUND FACILITIES, INCLUDING SERVICE LATERALS, SHALL BE IN PLACE WITH TRENCHES COMPACTED AND TESTED PRIOR TO BASE GRADE INSPECTION (AND PAVING). THE CONTRACTOR SHALL SUBMIT WRITTEN EVIDENCE TO THE CITY ISSUED BY THE RESPECTIVE UTILITY PURVEYER INDICATING THE SUBSURFACE PORTION OF THEIR UNDERGROUND FACILITIES HAVE BEEN INSTALLED AND ACCEPTED.
3. THE FOLLOWING ARE MINIMUM COMPACTION REQUIREMENTS FOR ITEMS CONSTRUCTED IN THE PUBLIC RIGHT-OF-WAY:
   - A. TRENCH BACKFILL = 95%
   - B. DIRT FILL = 95%
   - C. TOP 12" OF SUBGRADE UNDER IMPROVEMENTS NOT EXPECTED TO RECEIVE VEHICULAR TRAFFIC (INCLUDING SIDEWALK) = 90%
   - D. AGGREGATE BASE (NONVEHICULAR AREAS) = 90%
   - E. TOP 12" OF SUBGRADE OF ALL AREAS THAT MAY RECEIVE VEHICULAR TRAFFIC (INCLUDES ROADWAY, DRIVE APPROACH, CURB AND GUTTER, AND CROSS GUTTER) = 95%
   - F. AGGREGATE BASE (VEHICULAR AREAS) = 95%
   - G. ASPHALT CONCRETE = 95%
4. ALL AGGREGATE BASE SHALL CONFORM TO STATE OF CALIFORNIA STANDARD SPECIFICATIONS, SECTION 26, FOR CLASS 2 AGGREGATE BASE (CLASS 2 AB).
5. ALL ASPHALT CONCRETE (AC) SHALL CONFORM TO STATE OF CALIFORNIA STANDARD SPECIFICATIONS, SECTION 39 AND 92. THE AGGREGATE GRADING SHALL CONFORM AS FOLLOWS:
   - A. SURFACE COURSE (UPPER COURSE): TYPE B 1/2-INCH MAXIMUM, MEDIUM.
   - B. BASE COURSE (LOWER COURSE): TYPE B: 3/4-INCH MAXIMUM MEDIUM. PLEASE NOTE WHERE THERE IS ONLY ONE LIFT OF AC, THE AGGREGATE GRADING SHALL BE TYPE B: 1/2-INCH MAXIMUM, MEDIUM. PERFORMANCE GRADED ASPHALT BINDER CONFORMING TO PG 70-10 SHALL BE USED FOR BOTH AGGREGATE GRADING ABOVE. AC MIX DESIGNS SHALL BE SUBMITTED FOR THE CITY ENGINEER'S REVIEW AND APPROVAL AT LEAST 7 DAYS PRIOR TO THE PLANNED PAVING DATE.
6. THE MAXIMUM AC LIFT THICKNESS SHALL BE 3.0 INCHES; HOWEVER, THE PROPOSED ASPHALT THICKNESS OF 6.5" SHALL BE PLACED IN A MINIMUM OF 3 LIFTS. PROPOSED SURFACE COURSES OTHER THAN 1.5 INCHES (OR .10') THICK SHALL BE APPROVED BY THE CITY ENGINEER BEFORE ANY BASE LIFTS ARE PLACED.
7. A TACK COAT SHALL BE APPLIED TO EXISTING PAVEMENT, CONCRETE SURFACES, AND THE A.C. BASE COURSE(S) PRIOR TO PLACING A NEW LIFT OF ASPHALT CONCRETE. IF MULTIPLE AC LIFTS ARE PLACED ON THE SAME DAY AND THE SURFACE REMAINS "CLEAN", THE TACK COAT ON THE EXISTING FRESH AC SURFACE CAN BE WAIVED BY THE CITY ENGINEER, THE TACK COAT SHALL BE APPLIED AT A RATE OF 0.10 GAL/ SQ. YD.
8. NEW IMPROVEMENTS THAT JOIN EXISTING IMPROVEMENTS SHALL JOIN, OR MATCH, IN A MANNER SATISFACTORY TO THE CITY ENGINEER. CONSTRUCTION OPERATIONS REQUIRED TO ACHIEVE A SAFE, DURABLE, AESTHETICALLY PLEASING TRANSITION BETWEEN THE NEW AND EXISTING IMPROVEMENTS MAY INCLUDE CUTTING, REMOVAL, REPLACEMENT, CAPPING, AND/OR COLD PLANING AS NEEDED.
9. ALL MANHOLES AND VALVE BOX FRAMES SHALL BE ADJUSTED TO FINAL GRADE AFTER PAVEMENT INSTALLATION IS COMPLETED.
10. ALL ON-SITE IMPROVEMENTS, INCLUDING EARTHWORK GRADING, SHALL BE COMPLETED (AND/OR REPAIRED AS NEEDED) PRIOR TO PLACING THE SURFACE AC COURSE.
11. TEMPORARY ROADWAY STRIPING SHALL BE INSTALLED ON ALL UNFINISHED ROADWAY SURFACES AS NEEDED, AND AS DIRECTED BY THE CITY ENGINEER.

LEGEND

TC	TOP OF CURB	HORIZ.	HORIZONTAL
GB	GRADE BREAK	VERT.	VERTICAL
FL	FLOWLINE	INV	INVERT
EC	END CURVE	STA.	STATION
BC	BEGIN CURVE	S	SLOPE
ECR	END CURB RETURN	H	HEIGHT
BCR	BEGIN CURB RETURN	TW	TOP OF WALL
BVC	BEGIN VERTICAL CURVE	TF	TOP OF FOOTING
MVC	MIDDLE VERTICAL CURVE	SHT.	SHEET
EVC	END VERTICAL CURVE	PP#	POWER POLE NUMBER
T.S.	TRAFFIC SIGNAL	C&G	CURB AND GUTTER
EP	EDGE OF PAVEMENT	LT	LEFT
C/L	CENTERLINE	RT	RIGHT
FS	FINISH SURFACE	D/W	DRIVEWAY
AC	ASPHALT CONCRETE PAVEMENT	RET.	RETAINING
HMA	HOT MIX ASPHALT	PR.	PROPOSED
AP	ANGLE POINT	MAX.	MAXIMUM
TRMAC	TIRE RUBBER MODIFIED ASPHALT CONCRETE	ST	STREET
TRANS.	TRANSITION	SD	STORM DRAIN
BEG.	BEGIN	TYP.	TYPICAL
EX.	EXISTING	MIN.	MINIMUM
C.B.	CATCH BASIN	STD	STANDARD
T.G.	TOP OF GRATE	D.G.	DECOMPOSED GRANITE
S/W	SIDEWALK	CVWD	COACHELLA VALLEY WATER DISTRICT
IID	IMPERIAL IRRIGATION DISTRICT	SPPWC	STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
TBD	TO BE DETERMINED	R/W	RIGHT OF WAY
T.C.E.	TEMPORARY CONSTRUCTION EASEMENT	CTS	CATHODIC TESTING STATION
TG	TOP OF GRATE		
TM	TOP OF MANHOLE		
APN	ASSESSORS PARCEL NUMBER		

6" AC OVER 12" CLASS II BASE

1.5" GRIND AND INSTALL 1.5" AC OVERLAY
VARIABLE THICKNESS AC OVERLAY

PROPOSED UNDERGROUND STORAGE
STORM DRAIN PIPE

SLURRY SEAL EX. PAVEMENT

SAWCUT LINE

2:1 SLOPE

SHEET INDEX

FOR REVIEW ONLY

CONTRACTOR:					
INSPECTOR:					
DATE COMPLETED:					
AS BUILT COMP. DATE:	BY	DATE			
CONSTRUCTION RECORD	ENGINEER		REVISIONS	APP'D	DATE
BENCHMARK: SEE SHEET 1	BASIS OF BEARING:				

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL

REGISTERED PROFESSIONAL ENGINEER
EUGENE J. ABREGO
No. 73987
CIVIL
STATE OF CALIFORNIA

DESIGNED BY:

EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX

FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506

TELEPHONE: 951-686-1070

APPROVER'S SEAL

REGISTERED PROFESSIONAL ENGINEER
JUAN RAYA
No. 68510
CIVIL
STATE OF CALIFORNIA

APPROVED BY:

JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510

DATE:

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT

TITLE SHEET

SITE ADDRESS XX

SEC. X X T. X S., R. E., S.B.B. & M. APN.

I.P. No. XX

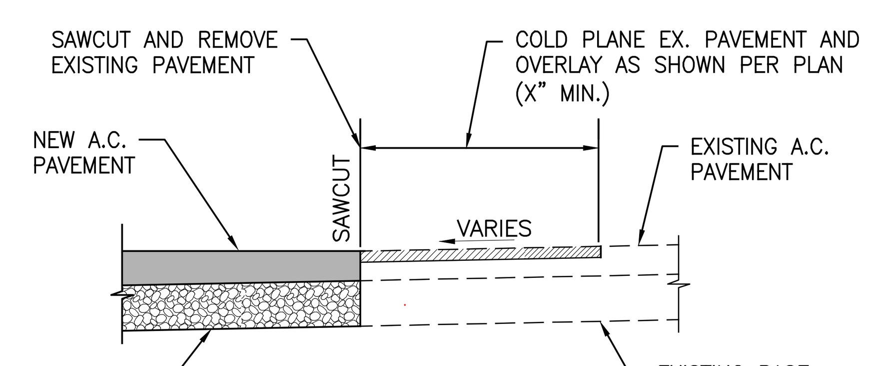
SHEET No.
1
OF 23
SHEETS

CITY FILE No.
XX

FIGURE 6

CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
4. CONSTRUCT CURB RAMP CASE A PER RIVERSIDE COUNTY STD. NO. 403
5. CONSTRUCT CROSS GUTTER PER RIVERSIDE COUNTY STD. NO. 209
6. CONSTRUCT CURB RAMP CASE D, TYPE 1 PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 111-5
7. CONSTRUCT COMMERCIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207A
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
12. INSTALL CHAIN LINK FENCE PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 600-3
13. INSTALL WOOD FENCE (MATCH EXISTING)
14. CONSTRUCT CURB RAMP CASE B PER RIVERSIDE COUNTY STD. NO. 403
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
16. REMOVE AND DISPOSE OF EXISTING SIDEWALK
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
18. REMOVE AND DISPOSE OF EXISTING CURB AND GUTTER
19. REMOVE AND DISPOSE OF EXISTING CROSS GUTTER
20. REMOVE AND DISPOSE OF EXISTING INLET (CAP PIPE)
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
22. REMOVE AND DISPOSE OF EXISTING TREE
23. REMOVE AND DISPOSE OF EXISTING DEFLECTORS
24. REMOVE OR RELOCATE EXISTING SIGN
25. REMOVE OR RELOCATE EXISTING UTILITY MARKER
26. REMOVE AND DISPOSE OF EXISTING BLOCK WALL
27. REMOVE AND REPLACE EXISTING CONCRETE SIGN
28. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
30. RELOCATE EXISTING TELEPHONE CABINET BY FRONTIER
31. RELOCATE EXISTING POWER POLE BY IID
32. RELOCATE EXISTING GUY ANCHOR BY IID
33. RELOCATE EXISTING MAILBOX
34. RELOCATE EXISTING TELEPHONE PULLBOX BY SPECTRUM
35. RELOCATE EXISTING FIRE HYDRANT PER CVWD STANDARDS
36. RELOCATE EXISTING WAGON WHEEL POST PER OWNER'S DIRECTION
37. RELOCATE STREET LIGHT STANDARD PER OWNER'S DIRECTION
38. RELOCATE EXISTING ELECTRIC RISER BY IID
39. RELOCATE EXISTING COMMUNICATION RISER BY SPECTRUM
40. RELOCATE EXISTING UTILITY POLE BY CONTRACTOR
41. ADJUST EXISTING COMMUNICATION PULLBOX TO GRADE BY SPECTRUM
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
43. RELOCATE EXISTING ELECTRIC PULLBOX BY IID
44. ADJUST EXISTING AIR VALVE TO GRADE PER CVWD STANDARDS
45. ADJUST EXISTING FIRE HYDRANT TO GRADE PER CVWD STABDARDS
46. ADJUST EXISTING BACKFLOW TO GRADE BY CONTRACTOR
47. ADJUST EXISTING TWC PULLBOX TO GRADE BY SPECTRUM
48. ADJUST EXISTING CATV HAND HOLE TO GRADE BY SPECTRUM
49. ADJUST EXISTING WATER METER TO GRADE PER CVWD STANDARDS
50. ADJUST EXISTING TELEPHONE RISER TO GRADE BY FRONTIER
51. ADJUST EXISTING BLOW-OFF TO GRADE PER CVWD STANDARDS
52. ADJUST EXISTING TELEPHONE MANHOLE TO GRADE BY FRONTIER
53. ADJUST EXISTING WATER VALVE TO GRADE BY CONTRACTOR
54. ADJUST EXISTING GAS VALVE TO GRADE BY GAS CO
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
56. CONSTRUCT TYPE "C" CURB PER RIVERSIDE COUNTY STD. NO. 202
57. CONSTRUCT CURB TRANSITION PER RIVERSIDE COUNTY STD. NO. 211
58. RELOCATE EXISTING WATER VALVE PER CVWD STANDARDS
59. REMOVE OR ADJUST TO GRADE EXISTING CONCRETE ADDRESS MONUMENT
60. ADJUST PULLBOX (UNKNOWN) TO GRADE
61. REMOVE EXISTING WOOD FENCE
62. RELOCATE EXISTING TOTEM POLE
63. REMOVE EXISTING FENCE AND PILASTERS
64. INSTALL FENCE WITH PILASTERS (MATCH EXISTING)
65. REMOVE AND REPLACE EXISTING OFF-SITE IRRIGATION (VALVES, ETC.)
66. ADJUST EXISTING MANHOLE TO GRADE (UNKNOWN)
67. RELOCATE EXISTING GUY POLE
68. ADJUST EXISTING WATER VAULT TO GRADE PER CVWD STANDARDS
69. INSTALL WROUGHT IRON FENCE (MATCH EXISTING)
70. REMOVE EXISTING WROUGHT FENCE
71. RELOCATE EXISTING COMMUNICATION PULLBOX
72. RELOCATE EXISTING DECORATIVE POLE
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT
74. CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
75. CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
76. CONSTRUCT CURB RAMP CASE A PER CITY OF INDIO STD. PLAN NO. 136
77. CONSTRUCT CROSS GUTTER PER CITY OF INDIO STD. PLAN NO. 137
78. CONSTRUCT RESIDENTIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 129
79. CONSTRUCT COMMERCIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 130



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PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
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DESIGNER'S SEAL: REGISTERED PROFESSIONAL ENGINEER, EUGENE J. ABREGO, No. 73987, CIVIL, STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO — DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL: REGISTERED PROFESSIONAL ENGINEER, JUAN RAYA, No. 68510, CIVIL, STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
CONSTRUCTION NOTES AND DETAILS

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SEC. X T. X S., R. X E., S.B.B. & M. APN.

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CITY FILE No. XX

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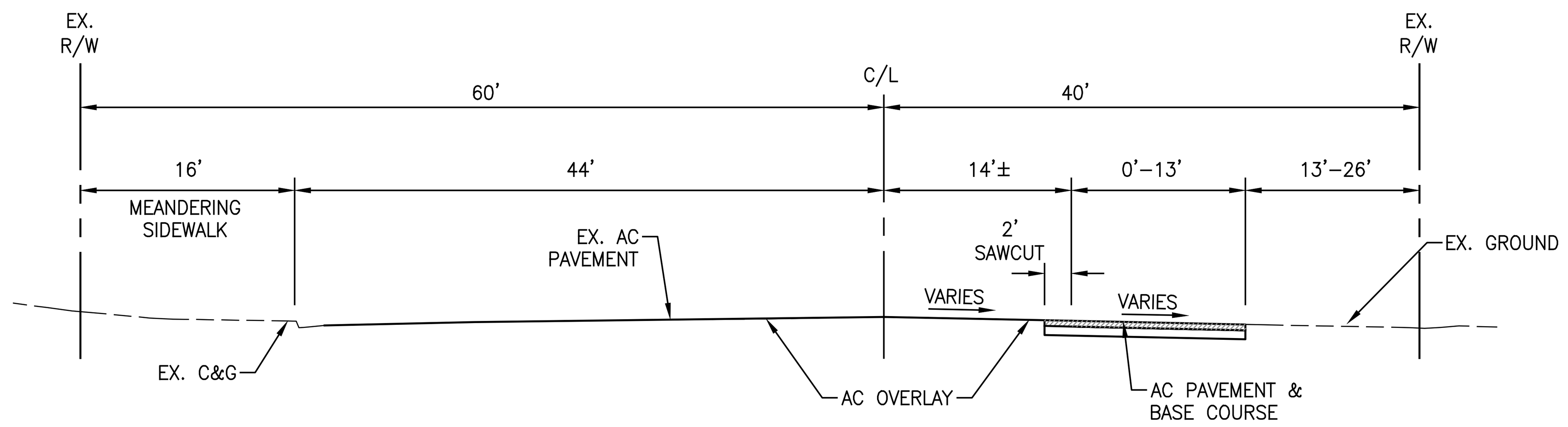
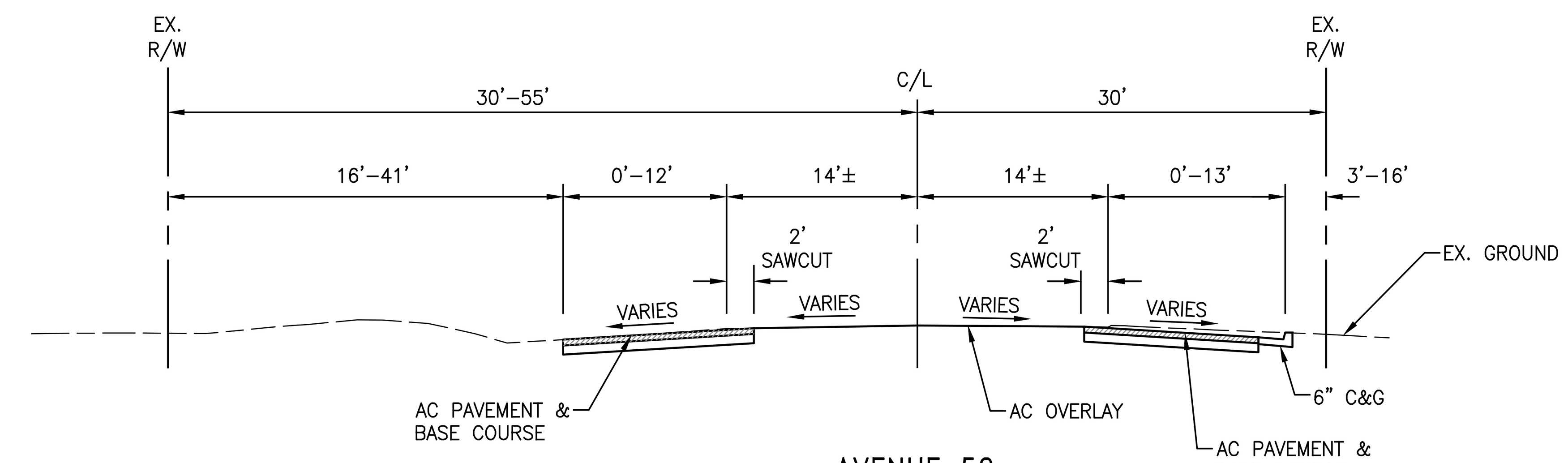
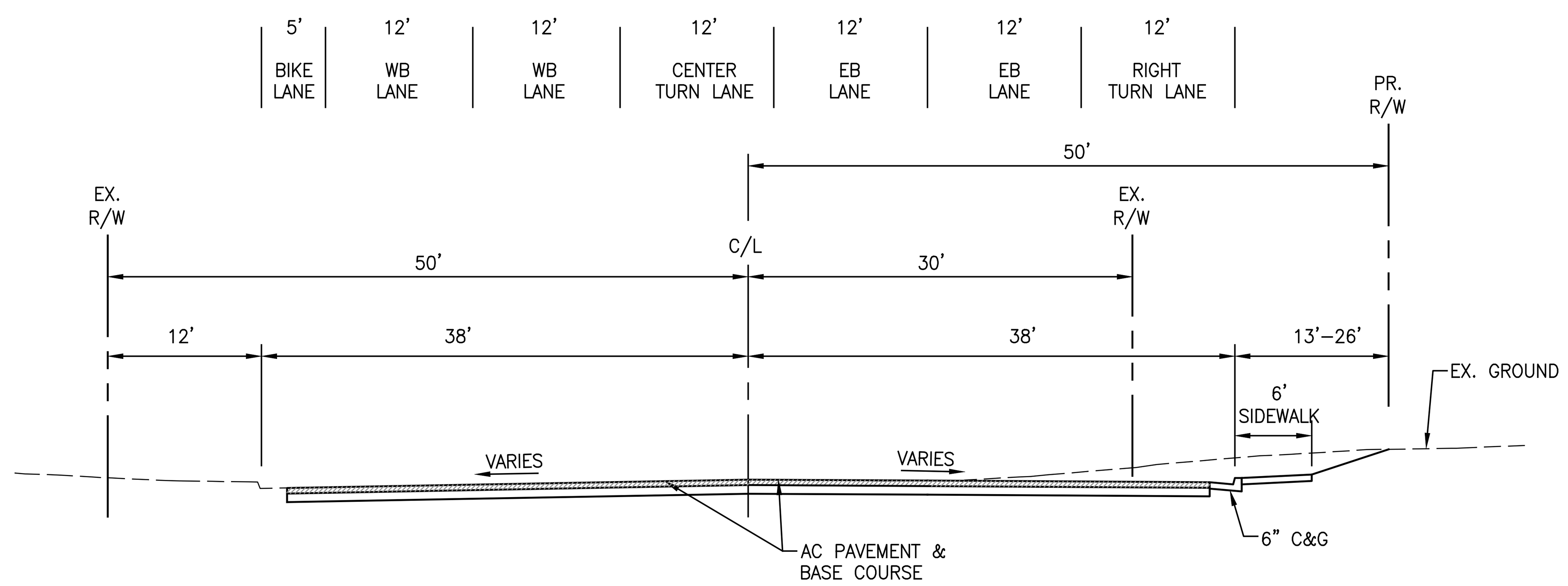
FIGURE 6



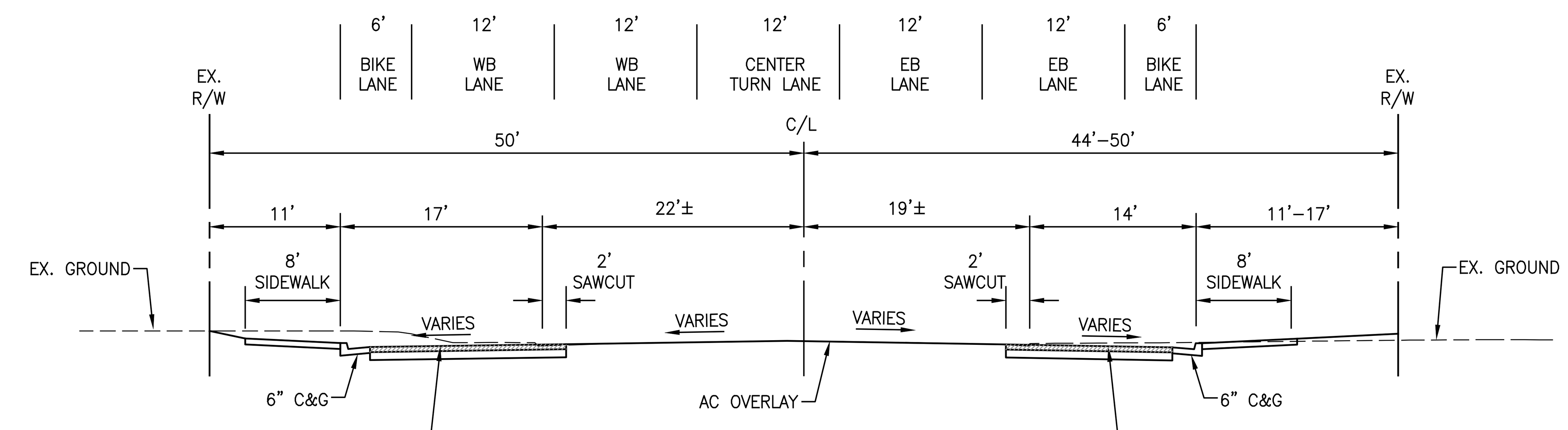
AVENUE 52
WEST OF JACKSON STREET
NTS



AVENUE 52
EAST OF JACKSON STREET
NTS



AVENUE 50
WEST OF JACKSON STREET
NTS



AVENUE 50
EAST OF JACKSON STREET
NTS

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PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
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REGISTERED PROFESSIONAL ENGINEER — EUGENE J. ABREGO — No. 73987 — CIVIL — STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER — JUAN RAYA — No. 68510 — CIVIL — STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE: ____________

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
TYPICAL SECTIONS

SITE ADDRESS XX
SEC. X X T. X S., R. E., S.B.B. & M. APN. ____________

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OF 23 SHEETS
CITY FILE No.
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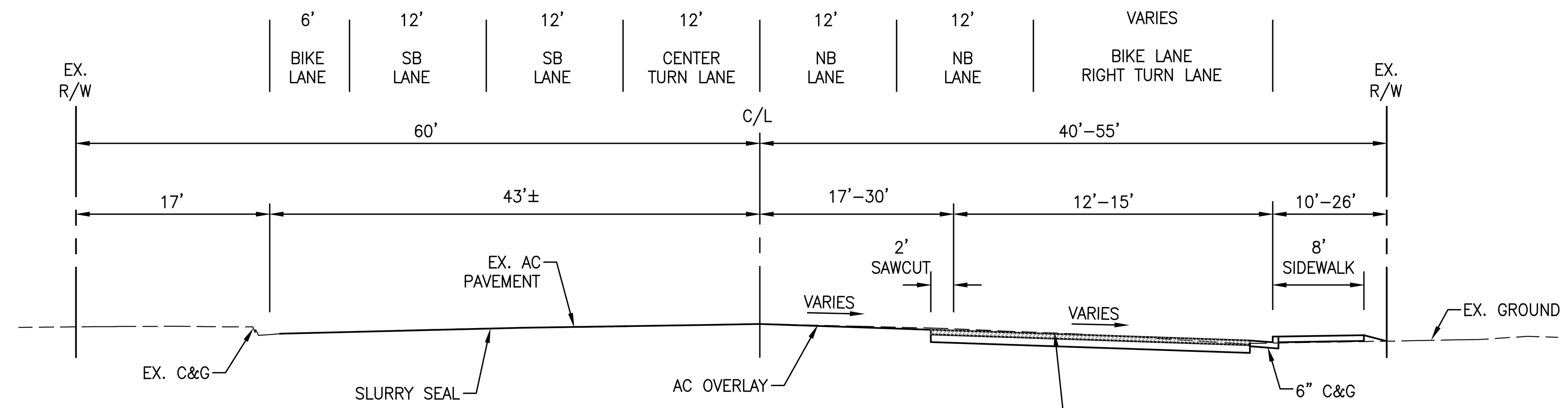
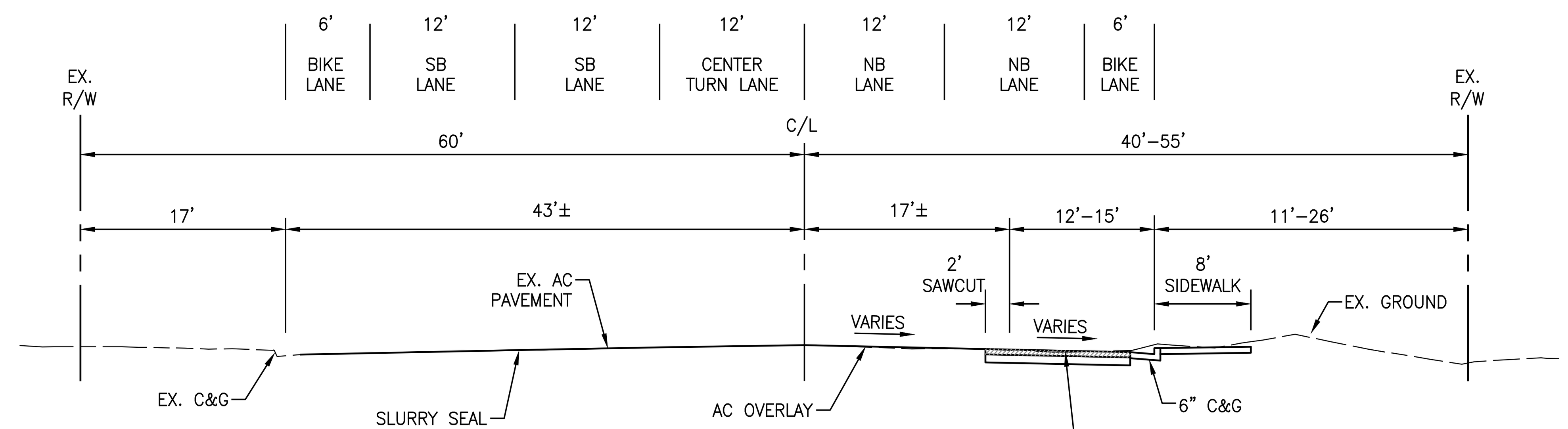
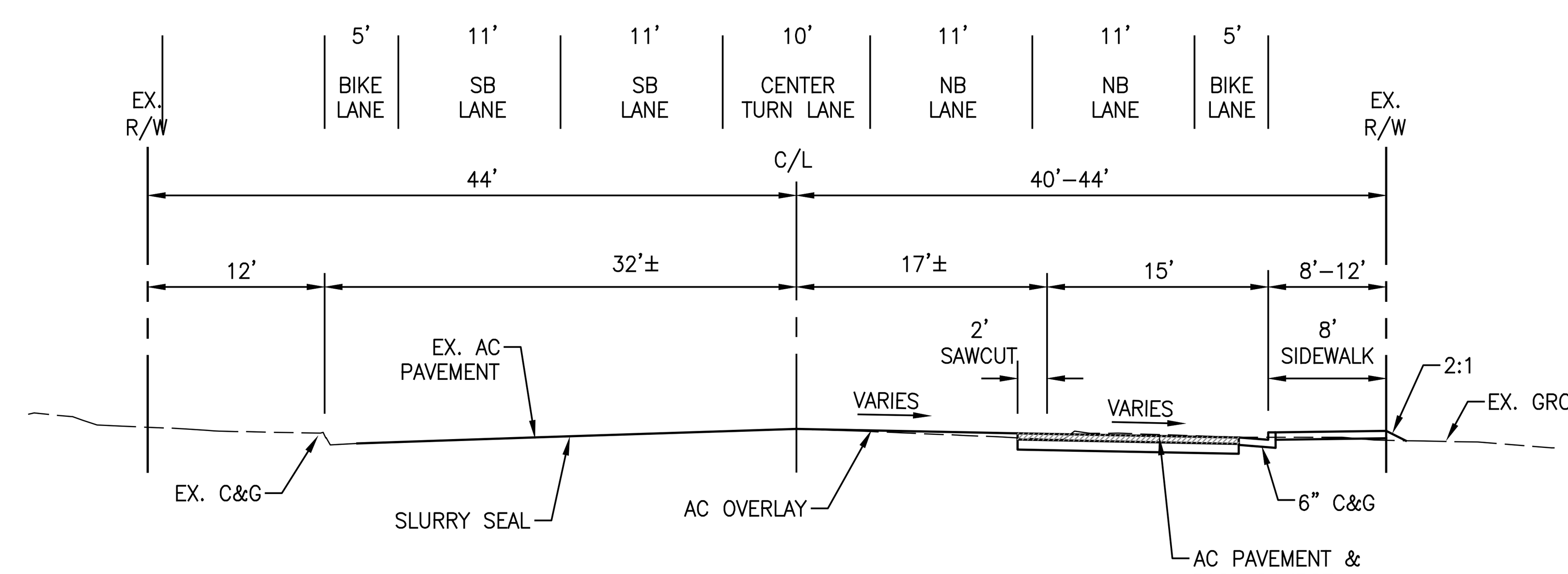
FIGURE 6



JACKSON STREET
BETWEEN AVENUE 52 AND AVENUE 51
NTS



JACKSON STREET
BETWEEN AVENUE 51 AND AVENUE 50
NTS



JACKSON STREET
NORTH OF AVENUE 50
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PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER — EUGENE J. ABREGO — No. 73987 — CIVIL — STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER — JUAN RAYA — No. 68510 — CIVIL — STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE: ____________

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
TYPICAL SECTIONS

SITE ADDRESS XX
SEC. X X T. X S., R. E., S.B.B. & M. APN. ____________

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OF 23 SHEETS
CITY FILE No.
XX

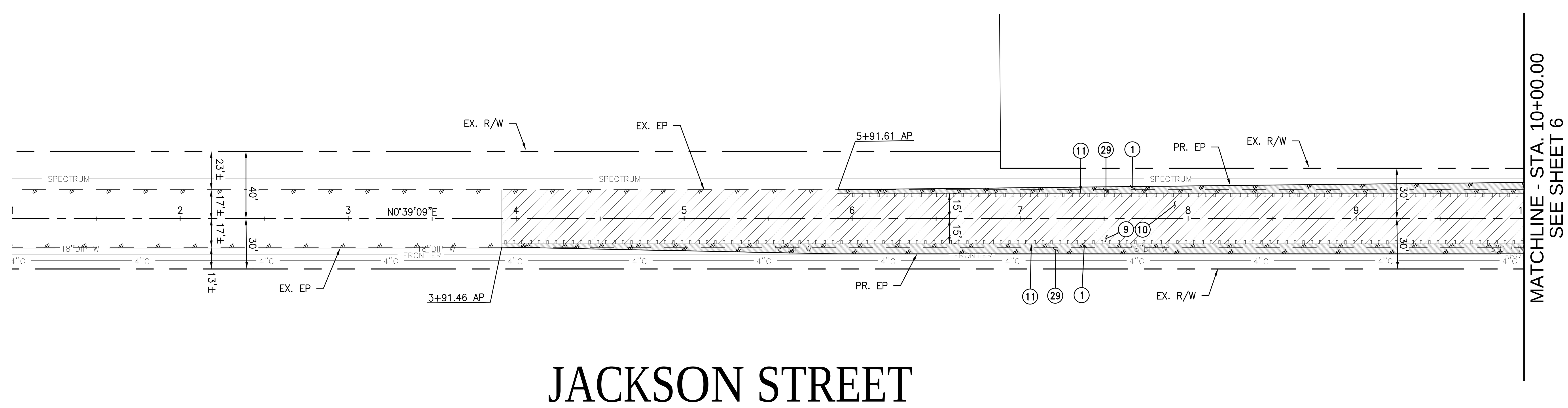
FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY

CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION



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INSPECTOR:	PREPARED FOR CITY OF INDIO		FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES, 3788 McCRAY STREET, RIVERSIDE, CA 92506		DATE:
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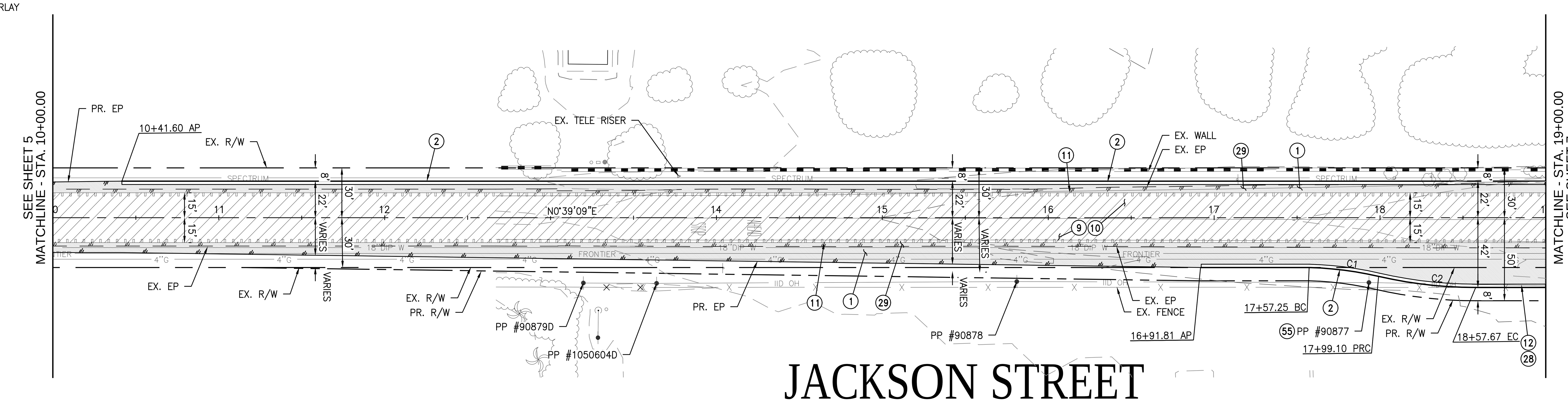
FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY



CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A–6 CURB PER RIVERSIDE COUNTY STD. NO. 200
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
12. INSTALL CHAIN LINK FENCE PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 600–3
28. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)

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1" = 40'
40 0 40 80 120

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	TANGENT
C1	42.26'	210.00'	11°31'48"	21.20'
C2	59.08'	260.00'	13°01'10"	29.67'

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DESIGNED BY:
EUGENE J. ABREGO — DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL: REGISTERED PROFESSIONAL ENGINEER, JUAN RAYA, No. 68510, CIVIL, STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

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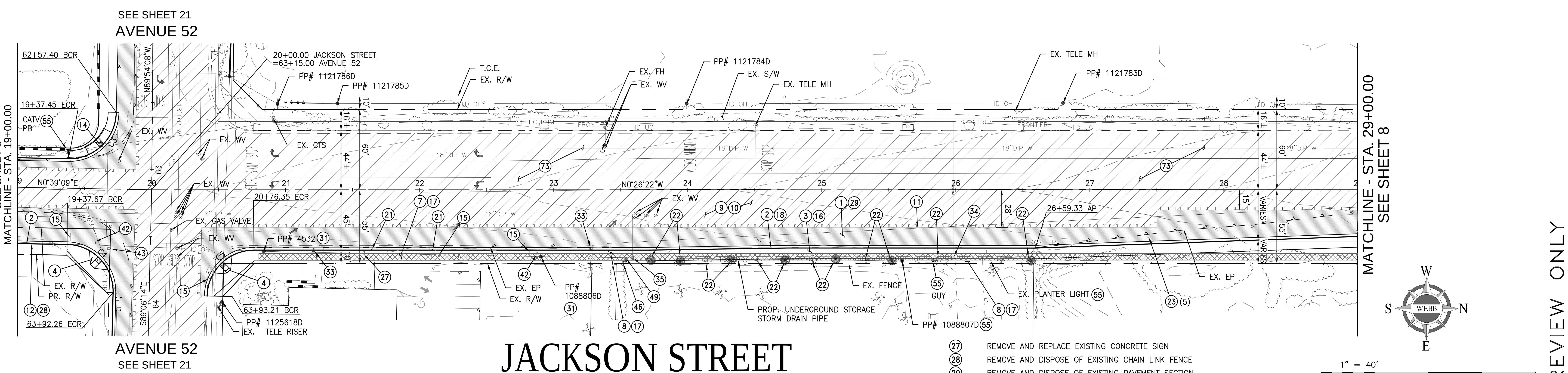
FIGURE 6



LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE
- SLURRY SEAL EX. PAVEMENT

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	TANGENT
C3	55.32'	35.00'	90°33'17"	35.34'
C4	55.13'	35.00'	90°14'37"	35.15'
C5	54.18'	35.00'	88°41'09"	34.21'

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CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
4. CONSTRUCT CURB RAMP CASE A PER RIVERSIDE COUNTY STD. NO. 403
7. CONSTRUCT COMMERCIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207A
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
12. INSTALL CHAIN LINK FENCE PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 600-3
14. CONSTRUCT CURB RAMP CASE B PER RIVERSIDE COUNTY STD. NO. 403
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
16. REMOVE AND DISPOSE OF EXISTING SIDEWALK
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
18. REMOVE AND DISPOSE OF EXISTING CURB AND GUTTER
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
22. REMOVE AND DISPOSE OF EXISTING TREE
23. REMOVE AND DISPOSE OF EXISTING DEFLECTORS
27. REMOVE AND REPLACE EXISTING CONCRETE SIGN
28. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE
29. REMOVE AND DISPOSE EXISTING PAVEMENT SECTION
31. RELOCATE EXISTING POWER POLE BY IID
33. RELOCATE EXISTING MAILBOX
34. RELOCATE EXISTING TELEPHONE PULLBOX BY SPECTRUM
35. RELOCATE EXISTING FIRE HYDRANT PER CVWD STANDARDS
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
43. RELOCATE EXISTING ELECTRIC PULLBOX BY IID
46. ADJUST EXISTING BACKFLOW TO GRADE BY CONTRACTOR
49. ADJUST EXISTING WATER METER TO GRADE PER CVWD STANDARDS
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT

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DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL: REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

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JACKSON STREET IMPROVEMENT PROJECT
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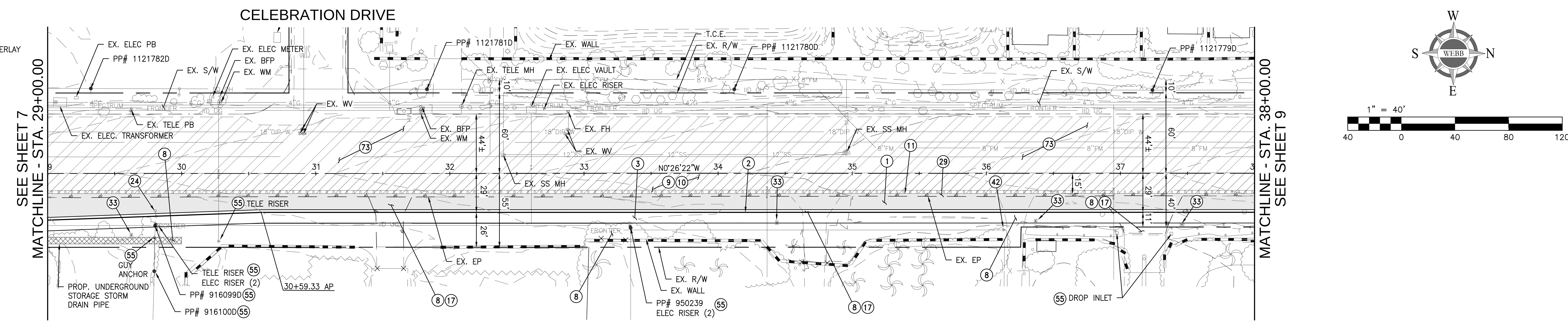
FIGURE 6

LEGEND

	6" AC OVER 12" CLASS II BASE
	1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
	PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE
	SLURRY SEAL EX. PAVEMENT



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2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
24. REMOVE OR RELOCATE EXISTING SIGN
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
33. RELOCATE EXISTING MAILBOX
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT

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DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

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CITY FILE No.
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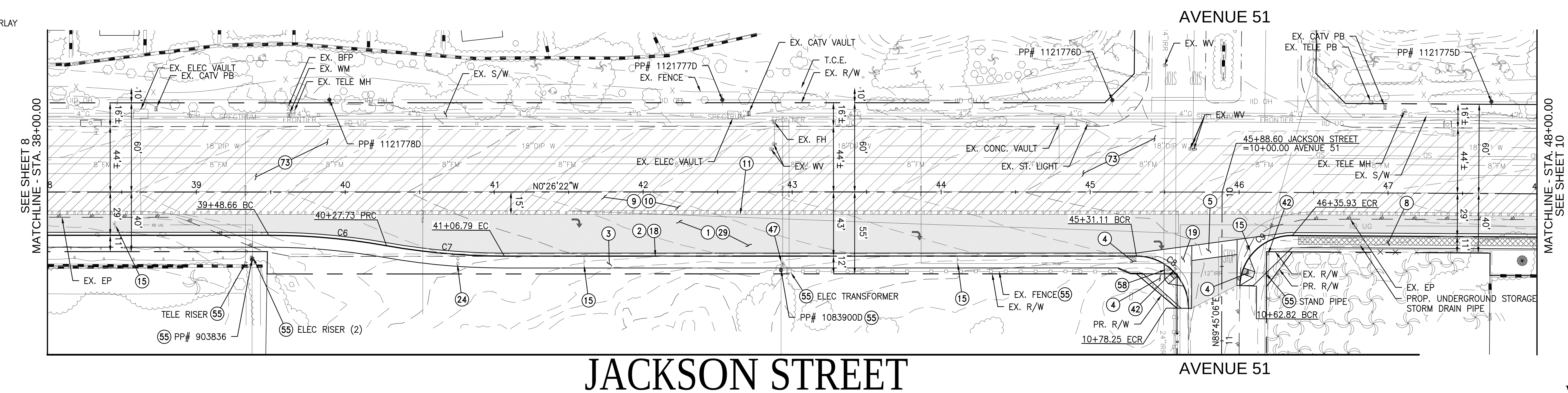
FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE
- SLURRY SEAL EX. PAVEMENT



CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	TANGENT
C6	79.48'	450.00'	10°07'09"	39.84'
C7	79.48'	450.00'	10°07'09"	39.84'
C8	55.15'	35.00'	90°16'48"	35.17'
C9	53.76'	35.00'	88°00'50"	33.81'

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CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
4. CONSTRUCT CURB RAMP CASE A PER RIVERSIDE COUNTY STD. NO. 403
5. CONSTRUCT CROSS GUTTER PER RIVERSIDE COUNTY STD. NO. 209
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
18. REMOVE AND DISPOSE OF EXISTING CURB AND GUTTER
19. REMOVE AND DISPOSE OF EXISTING CROSS GUTTER
24. REMOVE OR RELOCATE EXISTING SIGN
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
47. ADJUST EXISTING TWC PULLBOX TO GRADE BY SPECTRUM
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
58. RELOCATE EXISTING WATER VALVE PER CVWD STANDARDS
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT

PLAN CHECKED BY:

1" = 40'

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CONTRACTOR:
INSPECTOR:
DATE COMPLETED:
AS BUILT COMP. DATE:
CONSTRUCTION RECORD | BY ENGINEER | DATE | REVISIONS | APP'D | DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No. 19-0002
SCALE

DESIGNER'S SEAL

DESIGNED BY:
EUGENE J. ABREGO
R.C.E. No. 73987
EXP. DATE XX
DATE
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
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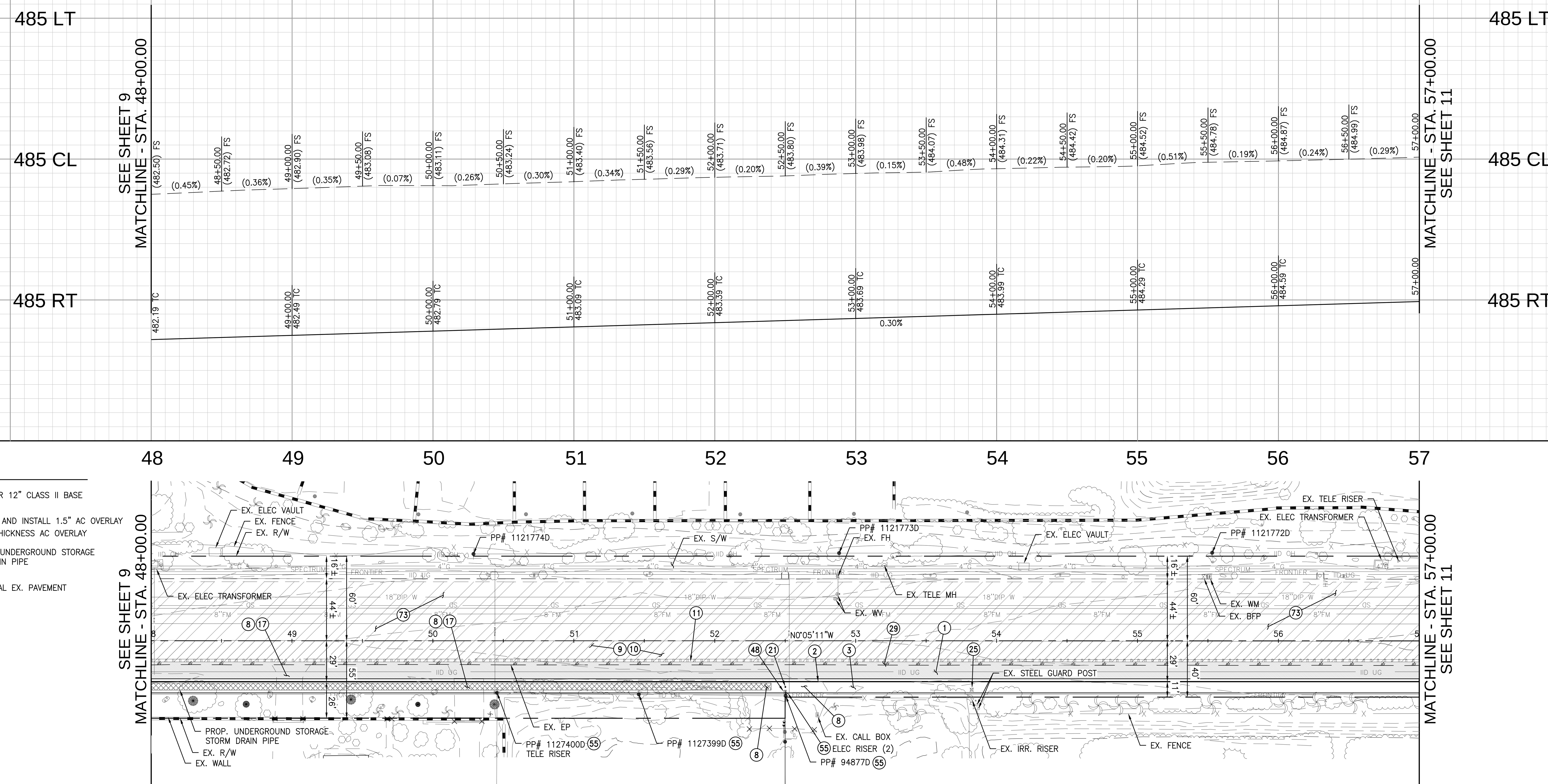
I.P. No. XX
SHEET No.
9
OF 23 SHEETS
CITY FILE No.
XX

FIGURE 6



PROFILE SCALES
HORIZ. 1"=40'
VERT. 1"=4'

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE
- SLURRY SEAL EX. PAVEMENT

JACKSON STREET

CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
25. REMOVE OR RELOCATE EXISTING UTILITY MARKER
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
48. ADJUST EXISTING CATV HAND HOLE TO GRADE BY SPECTRUM
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT

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1" = 40'
40 0 40 80 120

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CONTRACTOR:	
INSPECTOR:	
DATE COMPLETED:	
AS BUILT COMP. DATE:	
CONSTRUCTION RECORD	BY ENGINEER / DATE — REVISIONS — APP'D — DATE
BENCHMARK: SEE SHEET 1	BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL — REGISTERED PROFESSIONAL ENGINEER, EUGENE J. ABREGO, No. 73987, CIVIL, STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO — DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL — REGISTERED PROFESSIONAL ENGINEER, JUAN RAYA, No. 68510, CIVIL, STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
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FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- SLURRY SEAL EX. PAVEMENT

JACKSON STREET

CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
22. REMOVE AND DISPOSE OF EXISTING TREE
24. REMOVE OR RELOCATE EXISTING SIGN
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
32. RELOCATE EXISTING GUY ANCHOR BY IID
33. RELOCATE EXISTING MAILBOX
36. RELOCATE EXISTING WAGON WHEEL POST PER OWNER'S DIRECTION
41. ADJUST EXISTING COMMUNICATION PULLBOX TO GRADE BY SPECTRUM
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
49. ADJUST EXISTING WATER METER TO GRADE PER CVWD STANDARDS
50. ADJUST EXISTING TELEPHONE RISER TO GRADE BY FRONTIER
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
56. CONSTRUCT TYPE "C" CURB PER RIVERSIDE COUNTY STD. NO. 202
57. CONSTRUCT CURB TRANSITION PER RIVERSIDE COUNTY STD. NO. 211
59. REMOVE OR ADJUST TO GRADE EXISTING CONCRETE ADDRESS MONUMENT
60. ADJUST PULLBOX (UNKNOWN) TO GRADE
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT

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BY DATE ENGINEER
R E V I S I O N S APP'D DATE
BENCHMARK: SEE SHEET 1
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PROJECT No. 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

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CITY FILE No. XX

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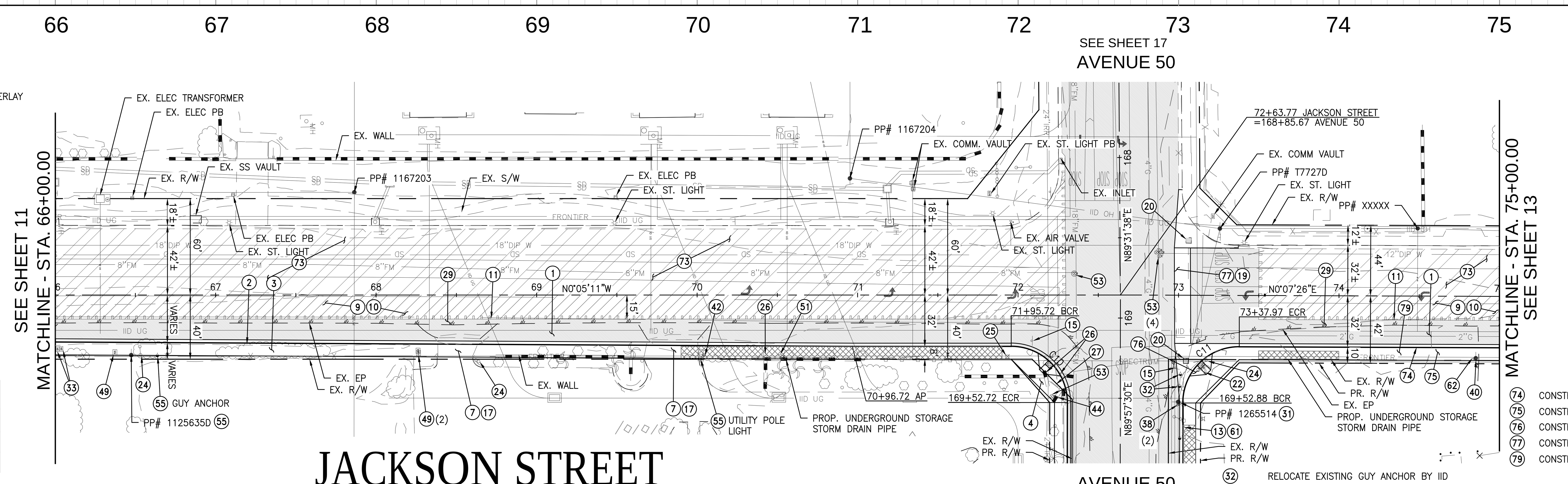
FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE
- SLURRY SEAL EX. PAVEMENT

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	TANGENT
C10	55.01'	35.00'	90°02'41"	35.03'
C11	55.08'	35.00'	90°09'55"	35.10'



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CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
4. CONSTRUCT CURB RAMP CASE A PER RIVERSIDE COUNTY STD. NO. 403
5. CONSTRUCT CROSS GUTTER PER RIVERSIDE COUNTY STD. NO. 209
7. CONSTRUCT COMMERCIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207A
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
13. INSTALL WOOD FENCE (MATCH EXISTING)
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
19. REMOVE AND DISPOSE OF EXISTING CROSS GUTTER
20. REMOVE AND DISPOSE OF EXISTING INLET (CAP PIPE)
22. REMOVE AND DISPOSE OF EXISTING TREE
24. REMOVE OR RELOCATE EXISTING SIGN
25. REMOVE OR RELOCATE EXISTING UTILITY MARKER
26. REMOVE AND DISPOSE OF EXISTING BLOCK WALL
27. REMOVE AND REPLACE EXISTING CONCRETE SIGN
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
31. RELOCATE EXISTING POWER POLE BY IID
32. RELOCATE EXISTING GUY ANCHOR BY IID
33. RELOCATE EXISTING MAILBOX
38. RELOCATE EXISTING ELECTRIC RISER BY IID
40. RELOCATE EXISTING UTILITY POLE BY CONTRACTOR
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
44. ADJUST EXISTING AIR VALVE TO GRADE PER CVWD STANDARDS
49. ADJUST EXISTING WATER METER TO GRADE PER CVWD STANDARDS
51. ADJUST EXISTING BLOW-OFF TO GRADE PER CVWD STANDARDS
53. ADJUST EXISTING WATER VALVE TO GRADE BY CONTRACTOR
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
61. REMOVE EXISTING WOOD FENCE
62. RELOCATE EXISTING TOTEM POLE
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT
74. CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
75. CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
76. CONSTRUCT CURB RAMP CASE A PER CITY OF INDIO STD. PLAN NO. 136
77. CONSTRUCT CROSS GUTTER PER CITY OF INDIO STD. PLAN NO. 137
79. CONSTRUCT COMMERCIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 130

PLAN CHECKED BY:

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1" = 40'
40 0 40 80 120

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REVISIONS APP'D DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:

DRAWN BY XXX
PREPARED FOR CITY OF INDIO
PROJECT No. 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

CITY OF INDIO
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JACKSON STREET IMPROVEMENT PROJECT
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CITY FILE No. XX

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FIGURE 6

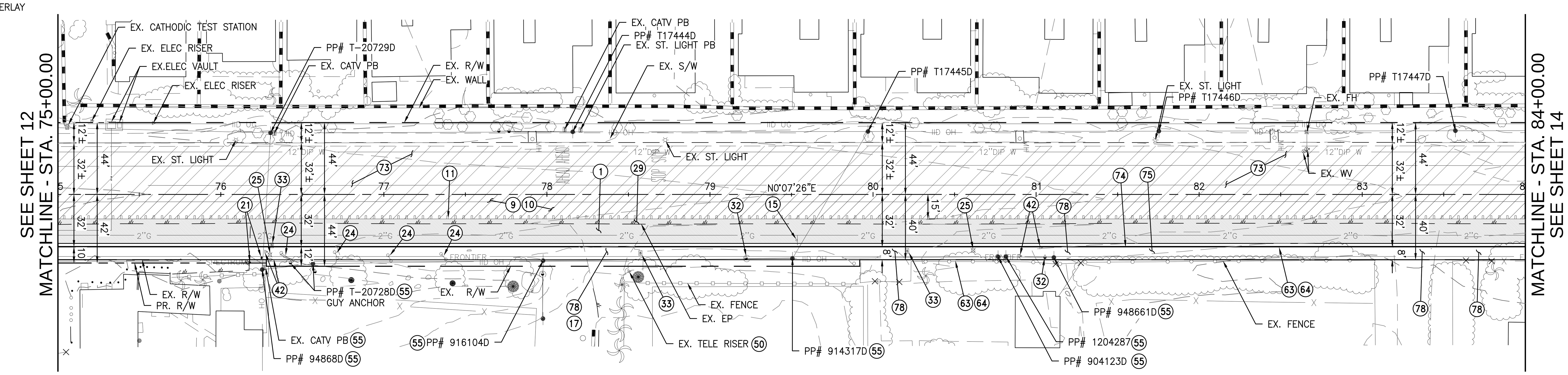
75 76 77 78 79 80 81 82 83 84

LEGEND

6" AC OVER 12" CLASS II BASE

1.5" GRIND AND INSTALL 1.5" AC OVERLAY
VARIABLE THICKNESS AC OVERLAY

SLURRY SEAL EX. PAVEMENT



JACKSON STREET

CONSTRUCTION NOTES:

1	CONSTRUCT 6" A.C. OVER 12" CL II A.B.
9	GRIND EXISTING A.C. PAVEMENT (1.5")
10	INSTALL A.C. OVERLAY (1.5" MIN)
11	SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
15	REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
17	REMOVE AND DISPOSE OF EXISTING DRIVEWAY
21	REMOVE AND DISPOSE OF EXISTING BOLLARD
24	REMOVE OR RELOCATE EXISTING SIGN
25	REMOVE OR RELOCATE EXISTING UTILITY MARKER
29	REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
32	RELOCATE EXISTING GUY ANCHOR BY IID
33	RELOCATE EXISTING MAILBOX
42	RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
50	ADJUST EXISTING TELEPHONE RISER TO GRADE BY FRONTIER
55	PROTECT IN PLACE (ITEM NOTED ON PLAN)
63	REMOVE EXISTING FENCE AND PILASTERS
64	INSTALL FENCE WITH PILASTERS (MATCH EXISTING)
73	INSTALL SLURRY SEAL TO EXISTING PAVEMENT
74	CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
75	CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
78	CONSTRUCT RESIDENTIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 129

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INSPECTOR:
DATE COMPLETED:
AS BUILT COMP. DATE:
CONSTRUCTION RECORD | BY ENGINEER | DATE | REVISIONS | APP'D | DATE
BENCHMARK: SEE SHEET 1 | BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL: REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL: REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

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OF 23 SHEETS
CITY FILE No.
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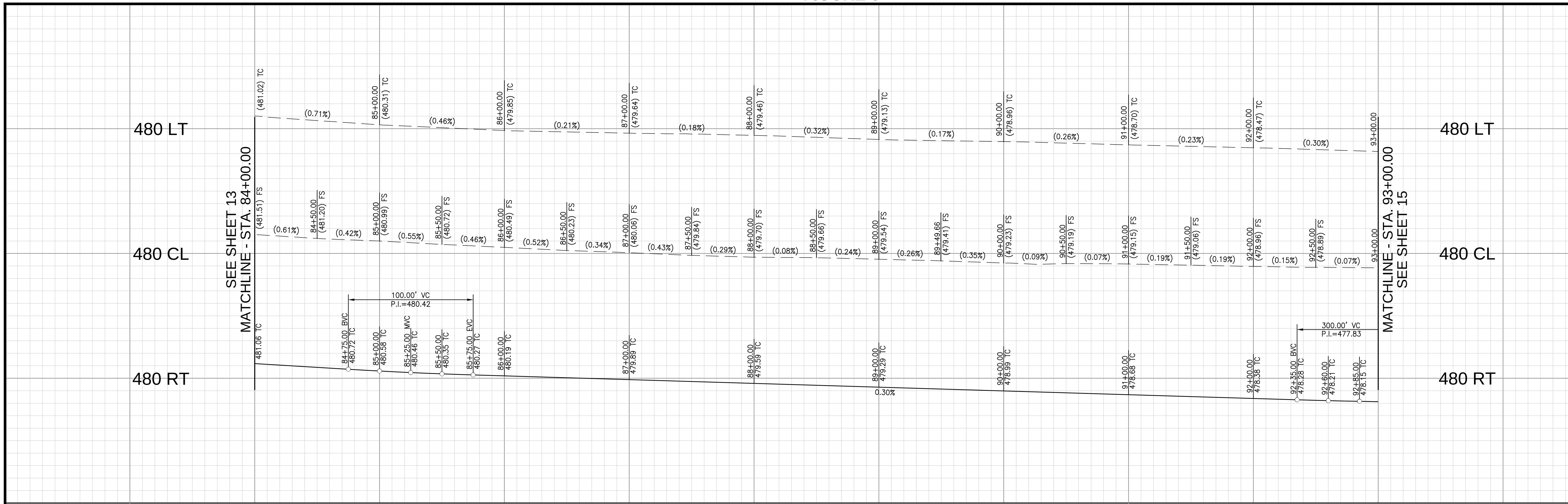
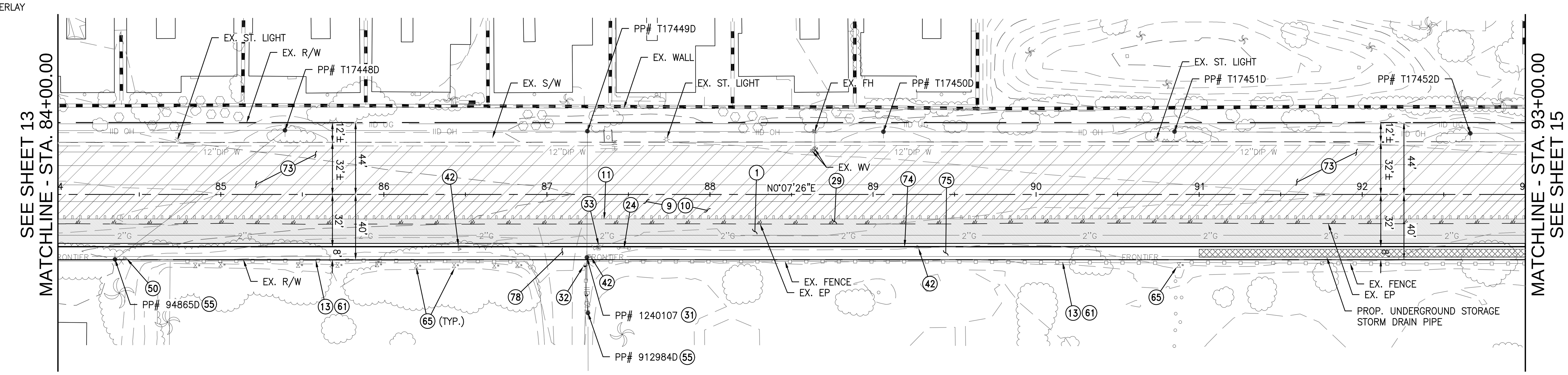
FIGURE 6



PROFILE SCALES
HORIZ. 1"=40'
VERT. 1"=4'

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE
- SLURRY SEAL EX. PAVEMENT



JACKSON STREET

CONSTRUCTION NOTES:

1	CONSTRUCT 6" A.C. OVER 12" CL II A.B.	33	RELOCATE EXISTING MAILBOX
9	GRIND EXISTING A.C. PAVEMENT (1.5")	42	RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
10	INSTALL A.C. OVERLAY (1.5" MIN)	50	ADJUST EXISTING TELEPHONE RISER TO GRADE BY FRONTIER
11	SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2	55	PROTECT IN PLACE (ITEM NOTED ON PLAN)
13	INSTALL WOOD FENCE (MATCH EXISTING)	61	REMOVE EXISTING WOOD FENCE
24	REMOVE OR RELOCATE EXISTING SIGN	65	REMOVE AND REPLACE EXISTING OFF-SITE IRRIGATION (VALVES, ETC.)
29	REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION	73	INSTALL SLURRY SEAL TO EXISTING PAVEMENT
31	RELOCATE EXISTING POWER POLE BY IID	74	CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
32	RELOCATE EXISTING GUY ANCHOR BY IID	75	CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
		78	CONSTRUCT RESIDENTIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 129

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1" = 40'
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CONTRACTOR:
INSPECTOR:
DATE COMPLETED:
AS BUILT COMP. DATE:
CONSTRUCTION RECORD — BY ENGINEER — DATE
REVISIONS — APP'D — DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER — EUGENE J. ABREGO — No. 73987 — CIVIL — STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO — DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER — JUAN RAYA — No. 68510 — CIVIL — STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

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PLAN AND PROFILE
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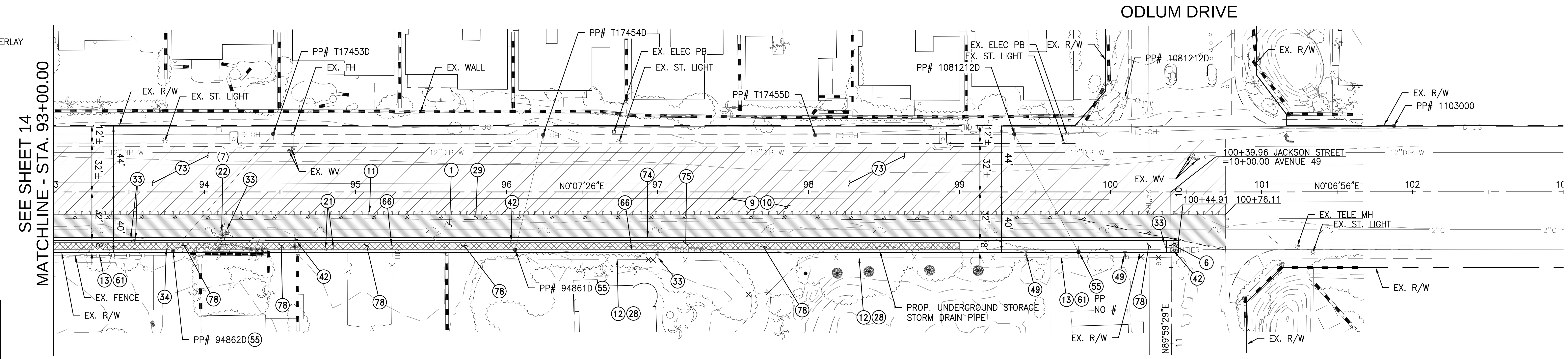
SEC. X T. X S., R. X E., S.B.B. & M. APN.

I.P. No. XX
SHEET No. 14 OF 23 SHEETS
CITY FILE No. XX

FIGURE 6



LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE
- SLURRY SEAL EX. PAVEMENT

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	TANGENT
C12	63.93'	39.95'	91°40'49"	41.14'

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CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
6. CONSTRUCT CURB RAMP CASE D, TYPE 1 PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 111–5
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
12. INSTALL CHAIN LINK FENCE PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 600–3
13. INSTALL WOOD FENCE (MATCH EXISTING)
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
22. REMOVE AND DISPOSE OF EXISTING TREE
28. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
33. RELOCATE EXISTING MAILBOX
34. RELOCATE EXISTING TELEPHONE PULLBOX BY SPECTRUM
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
49. ADJUST EXISTING WATER METER TO GRADE PER CVWD STANDARDS
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
61. REMOVE EXISTING WOOD FENCE
66. ADJUST EXISTING MANHOLE TO GRADE (UNKNOWN)
73. INSTALL SLURRY SEAL TO EXISTING PAVEMENT
74. CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
75. CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
78. CONSTRUCT RESIDENTIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 129

PLAN CHECKED BY:

1" = 40'
40 0 40 80 120

FOR 30% REVIEW ONLY

CONTRACTOR:
INSPECTOR:
DATE COMPLETED:
AS BUILT COMP. DATE:
CONSTRUCTION RECORD | BY ENGINEER | DATE | REVISIONS | APP'D | DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

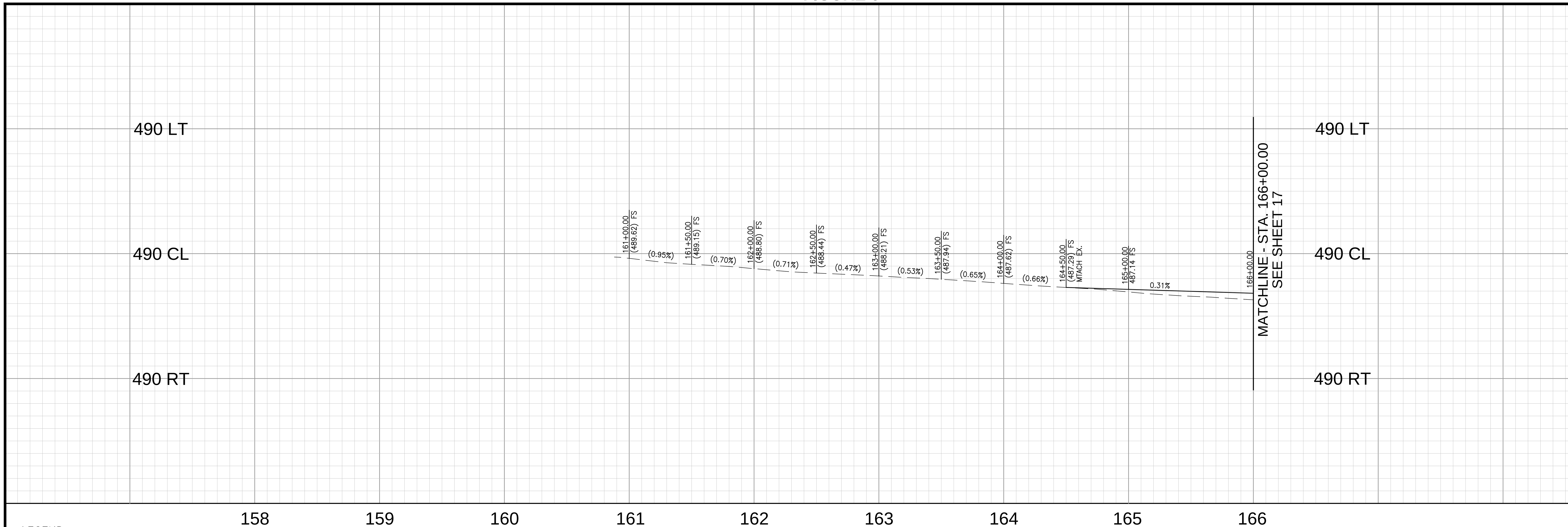
CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
PLAN AND PROFILE
JACKSON STREET
STA. 93+00.00 TO STA. 103+00.00

SITE ADDRESS XX
SEC. X X ,T. X S., R. E., S.B.B. & M. APN.

I.P. No. XX
SHEET No. 15 OF 23 SHEETS
CITY FILE No. XX

H:\2019\19-0002\DRAWINGS\PLAN SHEETS\19-0002-C-ST.DWG 5/14/2020 12:25:32 PM

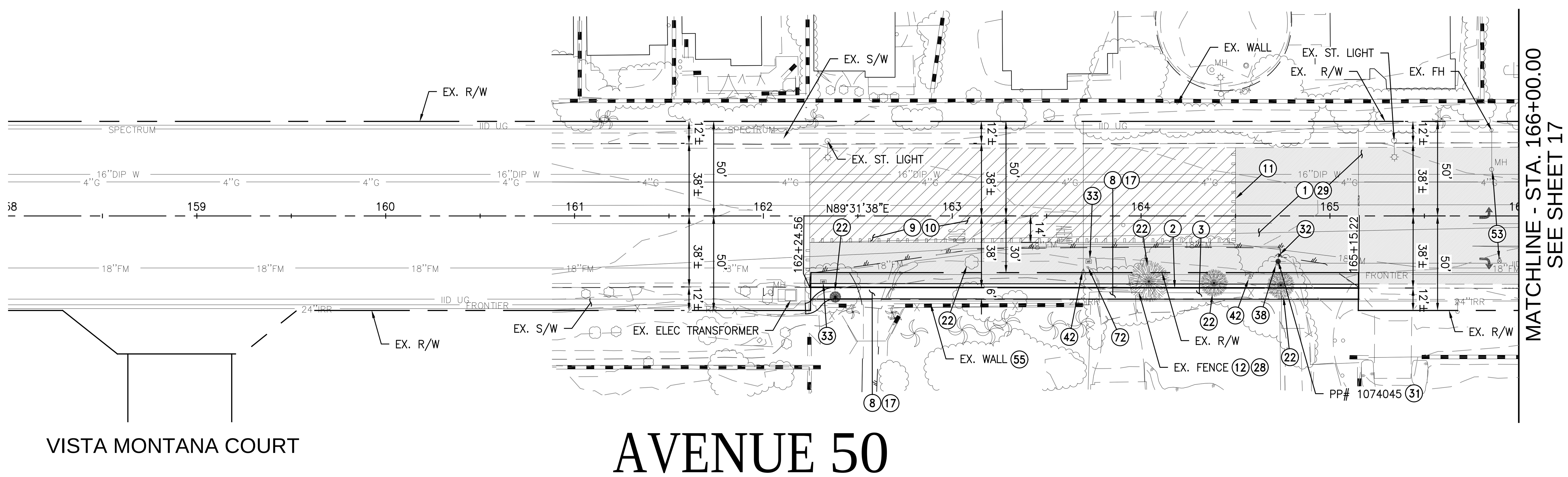
FIGURE 6



PROFILE SCALES
HORIZ. 1"=40'
VERT. 1"=4'

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY



CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
12. INSTALL CHAIN LINK FENCE PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 600-3
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
22. REMOVE AND DISPOSE OF EXISTING TREE
28. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
31. RELOCATE EXISTING POWER POLE BY IID
32. RELOCATE EXISTING GUY ANCHOR BY IID
33. RELOCATE EXISTING MAILBOX
38. RELOCATE EXISTING ELECTRIC RISER BY IID
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
53. ADJUST EXISTING WATER VALVE TO GRADE BY CONTRACTOR
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
72. RELOCATE EXISTING DECORATIVE POLE
74. CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
75. CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
78. CONSTRUCT RESIDENTIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 129

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TWO WORKING DAYS BEFORE YOU DIG

1" = 40'
40 0 40 80 120

PLAN CHECKED BY:

CONTRACTOR:
INSPECTOR:
DATE COMPLETED:
AS BUILT COMP. DATE:
CONSTRUCTION RECORD | BY ENGINEER | DATE | REVISIONS | APP'D | DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL
DESIGNED BY:
EUGENE J. ABREGO
R.C.E. No. 73987
EXP. DATE XX
DATE
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
PLAN AND PROFILE
AVENUE 50
STA. 158+00.00 TO STA. 166+00.00

SITE ADDRESS XX
SEC. X T. X S., R. X E., S.B.B. & M. APN.

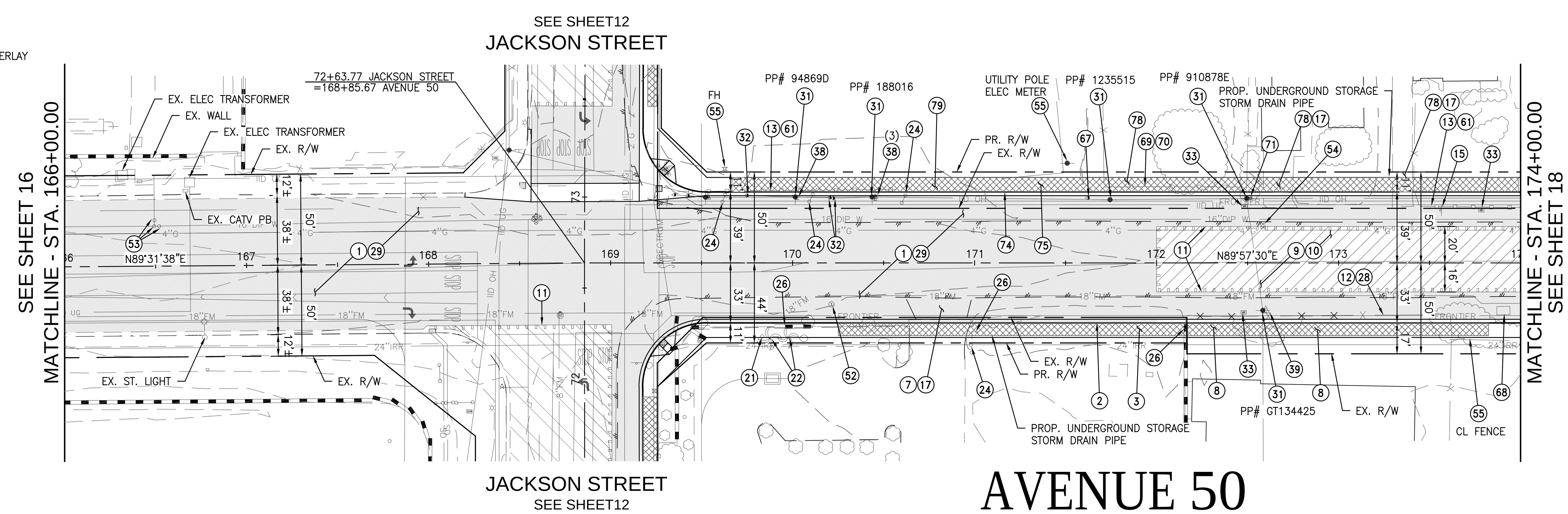
I.P. No. XX
SHEET No. 16 OF 23 SHEETS
CITY FILE No. XX

H:\2019\19-0002\DRAWINGS\PLAN SHEETS\19-0002-C-ST.DWG 5/14/2020 12:25:32 PM

FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE



CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
7. CONSTRUCT COMMERCIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207A
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
12. INSTALL CHAIN LINK FENCE PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 600-3
13. INSTALL WOOD FENCE (MATCH EXISTING)
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
22. REMOVE AND DISPOSE OF EXISTING TREE
24. REMOVE OR RELOCATE EXISTING SIGN
26. REMOVE AND DISPOSE OF EXISTING BLOCK WALL
28. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
31. RELOCATE EXISTING POWER POLE BY IID
32. RELOCATE EXISTING GUY ANCHOR BY IID
33. RELOCATE EXISTING MAILBOX
38. RELOCATE EXISTING ELECTRIC RISER BY IID
39. RELOCATE EXISTING COMMUNICATION RISER BY SPECTRUM
52. ADJUST EXISTING TELEPHONE MANHOLE TO GRADE BY FRONTIER
53. ADJUST EXISTING WATER VALVE TO GRADE BY CONTRACTOR
54. ADJUST EXISTING GAS VALVE TO GRADE BY GAS CO
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
61. REMOVE EXISTING WOOD FENCE
67. RELOCATE EXISTING GUY POLE
68. ADJUST EXISTING WATER VAULT TO GRADE PER CVWD STANDARDS
69. INSTALL WROUGHT IRON FENCE (MATCH EXISTING)
70. REMOVE EXISTING WROUGHT FENCE
71. RELOCATE EXISTING COMMUNICATION PULLBOX
74. CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
75. CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
78. CONSTRUCT RESIDENTIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 129
79. CONSTRUCT COMMERCIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 130

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INSPECTOR:
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AS BUILT COMP. DATE:
CONSTRUCTION RECORD | BY ENGINEER | DATE | REVISIONS | APP'D | DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
PLAN AND PROFILE
AVENUE 50
STA. 166+00.00 TO STA. 174+00.00
SITE ADDRESS XX
SEC. X T. X S., R. E., S.B.B. & M. APN.

I.P. No. XX
SHEET No.
17
OF 23 SHEETS
CITY FILE No.
XX

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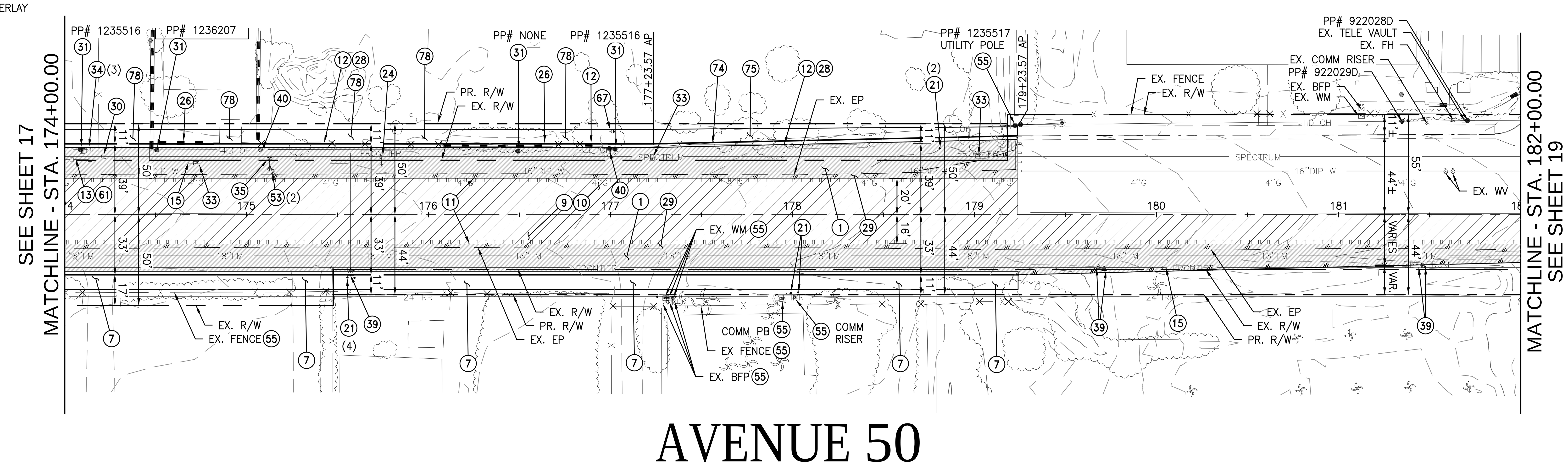
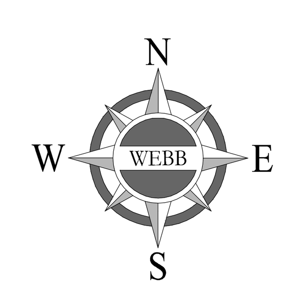
FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY
- PROPOSED UNDERGROUND STORAGE STORM DRAIN PIPE





1" = 40'

40 0 40 80 120

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CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
3. CONSTRUCT 8' WIDE SIDEWALK PER RIVERSIDE COUNTY STD. NO. 401
7. CONSTRUCT COMMERCIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207A
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
12. INSTALL CHAIN LINK FENCE PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION STD. PLAN 600-3
13. INSTALL WOOD FENCE (MATCH EXISTING)
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
24. REMOVE OR RELOCATE EXISTING SIGN
26. REMOVE AND DISPOSE OF EXISTING BLOCK WALL
28. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
30. RELOCATE EXISTING TELEPHONE CABINET BY FRONTIER
31. RELOCATE EXISTING POWER POLE BY IID
33. RELOCATE EXISTING MAILBOX
34. RELOCATE EXISTING TELEPHONE PULLBOX BY SPECTRUM
35. RELOCATE EXISTING FIRE HYDRANT PER CVWD STANDARDS
39. RELOCATE EXISTING COMMUNICATION RISER BY SPECTRUM
40. RELOCATE EXISTING UTILITY POLE BY CONTRACTOR
53. ADJUST EXISTING WATER VALVE TO GRADE BY CONTRACTOR
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
61. REMOVE EXISTING WOOD FENCE
67. RELOCATE EXISTING GUY POLE
74. CONSTRUCT 6" CURB & GUTTER PER CITY OF INDIO STD. PLAN NO. 120
75. CONSTRUCT 8' WIDE SIDEWALK PER CITY OF INDIO STD. PLAN NO. 149
78. CONSTRUCT RESIDENTIAL DRIVEWAY PER CITY OF INDIO STD. PLAN NO. 129

FOR 30% REVIEW ONLY

PLAN CHECKED BY:

CONTRACTOR:	DRAWN BY: XXX	DESIGNER'S SEAL	DESIGNED BY:	APPROVER'S SEAL	APPROVED BY:		CITY OF INDIO	I.P. No. XX
INSPECTOR:	PREPARED FOR: CITY OF INDIO	REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA	EUGENE J. ABREGO DATE R.C.E. No. 73987 EXP. DATE XX	REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA	JUAN RAYA, P.E. CITY ENGINEER RCE No. 68510	CITY OF INDIO	STREET IMPROVEMENT PLAN JACKSON STREET IMPROVEMENT PROJECT PLAN AND PROFILE AVENUE 50 STA. 174+00.00 TO STA. 182+00.00	SHEET No. 18 OF 23 SHEETS
DATE COMPLETED:	PROJECT No.: 19-0002		FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES 3788 McCRAY STREET RIVERSIDE, CA 92506		DATE:		SITE ADDRESS XX	CITY FILE No. XX
AS BUILT COMP. DATE: / CONSTRUCTION RECORD BY ENGINEER DATE / REVISIONS APP'D DATE	SCALE		TELEPHONE: 951-686-1070				SEC. X T. X S., R. E., S.B.B. & M. APN.	
BENCHMARK: SEE SHEET 1 / BASIS OF BEARING:								

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FIGURE 6

LEGEND

- 6" AC OVER 12" CLASS II BASE
- 1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY

CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION

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1" = 40'
40 0 40 80 120

PLAN CHECKED BY:

CONTRACTOR:
INSPECTOR:
DATE COMPLETED:
AS BUILT COMP. DATE:
CONSTRUCTION RECORD | BY ENGINEER | DATE | REVISIONS | APP'D | DATE
BENCHMARK: SEE SHEET 1 | BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE: ________

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
PLAN AND PROFILE
AVENUE 50
STA. 182+00.00 TO STA. 191+00.00
SITE ADDRESS XX
SEC. X X T. X S., R. E., S.B.B. & M. APN. ______

I.P. No. XX
SHEET No. 19 OF 23 SHEETS
CITY FILE No. XX

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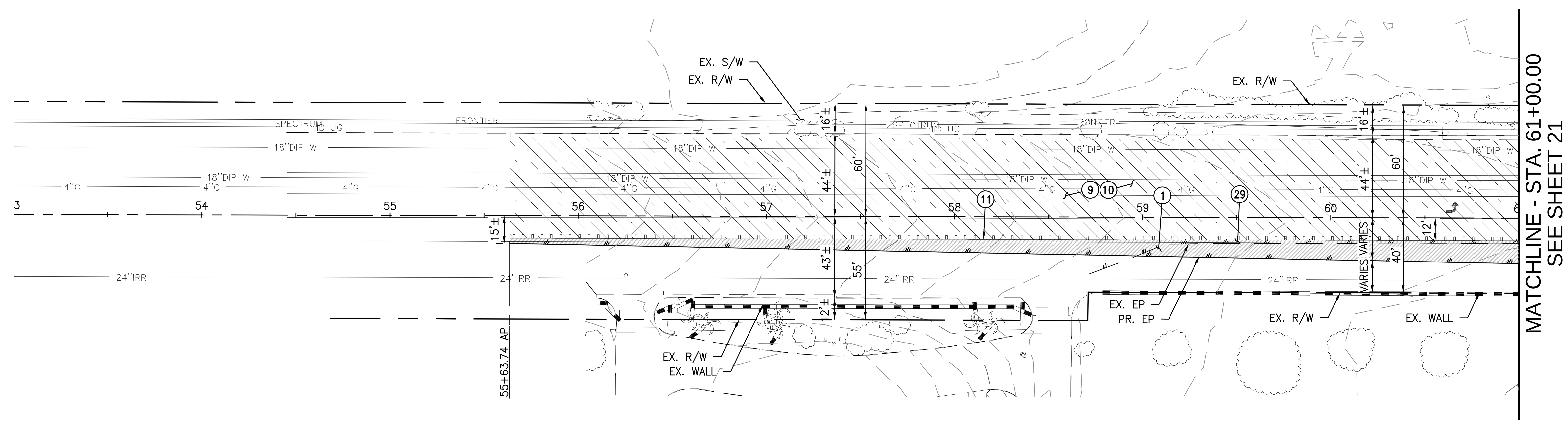
FIGURE 6

LEGEND

(solid shading)	6" AC OVER 12" CLASS II BASE
(hatching)	1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY



AVENUE 52

CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION

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N W E S WEBB

1" = 40'
40 0 40 80 120

PLAN CHECKED BY:

CONTRACTOR:
INSPECTOR:
DATE COMPLETED:
AS BUILT COMP. DATE:
CONSTRUCTION RECORD | BY ENGINEER | DATE | REVISIONS | APP'D | DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No.: 19-0002
SCALE

DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL
REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE: ____________

CITY OF INDIO

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
PLAN AND PROFILE
AVENUE 52
STA. 53+00.00 TO STA. 61+00.00
SITE ADDRESS XX
SEC. X T. X S. X R. E., S.B.B. & M. APN. ____________

I.P. No. XX
SHEET No.
20
OF 23 SHEETS
CITY FILE No.
XX

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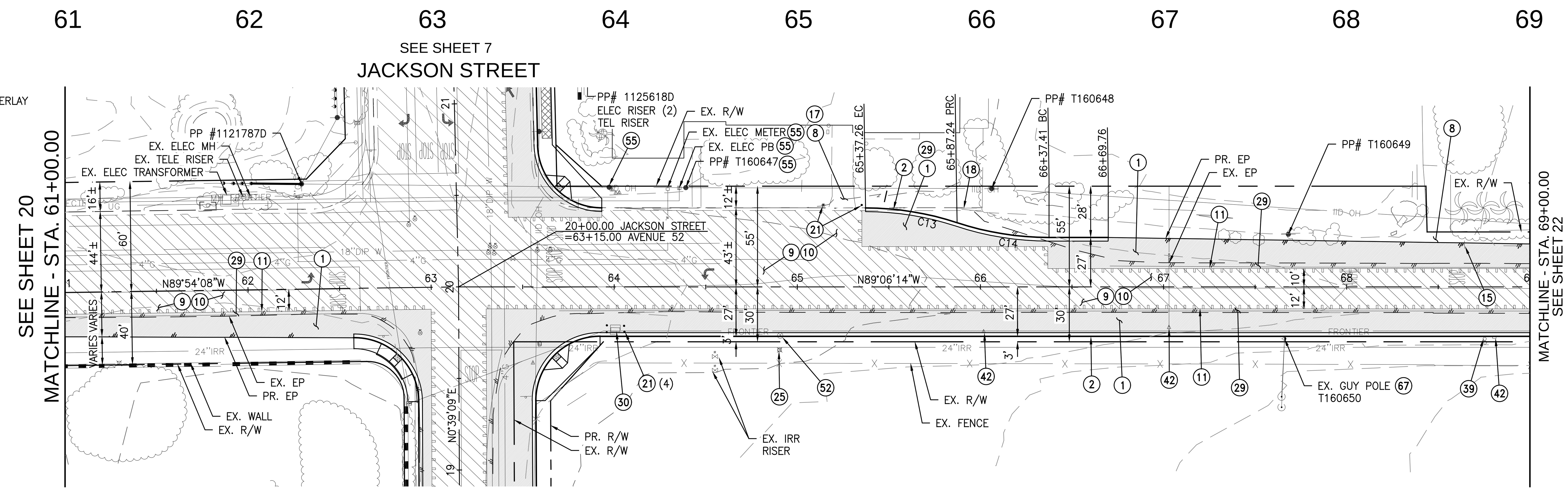
FIGURE 6



AVENUE 52

LEGEND

6" AC OVER 12" CLASS II BASE

1.5" GRIND AND INSTALL 1.5" AC OVERLAY VARIABLE THICKNESS AC OVERLAY

CONSTRUCTION NOTES:

1. CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2. CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
8. CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9. GRIND EXISTING A.C. PAVEMENT (1.5")
10. INSTALL A.C. OVERLAY (1.5" MIN)
11. SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
15. REMOVE AND RELOCATE EXISTING TRAFFIC SIGN PER SIGNING/STRIPING PLAN
17. REMOVE AND DISPOSE OF EXISTING DRIVEWAY
18. REMOVE AND DISPOSE OF EXISTING CURB AND GUTTER
21. REMOVE AND DISPOSE OF EXISTING BOLLARD
25. REMOVE OR RELOCATE EXISTING UTILITY MARKER
29. REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
30. RELOCATE EXISTING TELEPHONE CABINET BY FRONTIER
39. RELOCATE EXISTING COMMUNICATION RISER BY SPECTRUM
42. RELOCATE EXISTING TELEPHONE RISER BY FRONTIER
52. ADJUST EXISTING TELEPHONE MANHOLE TO GRADE BY FRONTIER
55. PROTECT IN PLACE (ITEM NOTED ON PLAN)
67. RELOCATE EXISTING GUY POLE

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CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	TANGENT
C13	50.85'	160.00'	18°12'29"	25.64'
C14	51.03'	160.00'	18°16'21"	25.73'

PLAN CHECKED BY:

CONTRACTOR:	
INSPECTOR:	
DATE COMPLETED:	
AS BUILT COMP. DATE:	
CONSTRUCTION RECORD	BY ENGINEER / DATE — REVISIONS — APP'D — DATE
BENCHMARK: SEE SHEET 1	BASIS OF BEARING:

DRAWN BY: XXX
PREPARED FOR: CITY OF INDIO
PROJECT No. 19-0002
SCALE

DESIGNER'S SEAL — REGISTERED PROFESSIONAL ENGINEER, EUGENE J. ABREGO, No. 73987, CIVIL, STATE OF CALIFORNIA

DESIGNED BY:
EUGENE J. ABREGO — DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070

APPROVER'S SEAL — REGISTERED PROFESSIONAL ENGINEER, JUAN RAYA, No. 68510, CIVIL, STATE OF CALIFORNIA

APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:

CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
PLAN AND PROFILE
AVENUE 52
STA. 61+00.00 TO STA. 69+00.00

SITE ADDRESS XX
SEC. X T. X S., R. X E., S.B.B. & M. APN.

I.P. No. XX
SHEET No. 21 OF 23 SHEETS
CITY FILE No. XX

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FIGURE 6

460 LT
460 CL
460 RT
SEE SHEET 21
MATCHLINE - STA. 69+00.00
(458.58) FS
(0.34%)
69+50.00
(458.41) FS
(0.40%)
70+00.00
(458.21) FS
MATCHLINE - STA. 77+00.00
SEE SHEET 23
PROFILE SCALES
HORIZ. 1"=40'
VERT. 1"=4'
69
70
71
72
73
74
75
76
77
LEGEND
6" AC OVER 12" CLASS II BASE
1.5" GRIND AND INSTALL 1.5" AC OVERLAY
VARIABLE THICKNESS AC OVERLAY
PP# 90220
EX. MB
EX. FENCE
EX. R/W
PR. EP
EX. EP
73+85.21 AP
EX. TELE RISER
GUY ANCHOR
CONSTRUCTION NOTES:
1 CONSTRUCT 6" A.C. OVER 12" CL II A.B.
2 CONSTRUCT A-6 CURB PER RIVERSIDE COUNTY STD. NO. 200
7 CONSTRUCT COMMERCIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207A
8 CONSTRUCT RESIDENTIAL DRIVEWAY PER RIVERSIDE COUNTY STD. NO. 207
9 GRIND EXISTING A.C. PAVEMENT (1.5")
10 INSTALL A.C. OVERLAY (1.5" MIN)
11 SAWCUT EXISTING PAVEMENT PER TYPICAL DETAIL ON SHEET 2
29 REMOVE AND DISPOSE OF EXISTING PAVEMENT SECTION
55 PROTECT IN PLACE (ITEM NOTED ON PLAN)
AVENUE 52
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S
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WWW.call811.com
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AS BUILT COMP. DATE:
CONSTRUCTION RECORD
BY ENGINEER
DATE
REVISIONS
APP'D
DATE
BENCHMARK: SEE SHEET 1
BASIS OF BEARING:
DRAWN BY XXX
PREPARED FOR CITY OF INDIO
PROJECT No. 19-0002
SCALE
DESIGNER'S SEAL
REGISTERED PROFESSIONAL ENGINEER
EUGENE J. ABREGO
No. 73987
CIVIL
STATE OF CALIFORNIA
DESIGNED BY:
EUGENE J. ABREGO
DATE
R.C.E. No. 73987
EXP. DATE XX
FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
TELEPHONE: 951-686-1070
APPROVER'S SEAL
JUAN RAYA
No. 68510
APPROVED BY:
JUAN RAYA, P.E.
CITY ENGINEER
RCE No. 68510
DATE:
CITY OF INDIO
CITY OF INDIO
STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
PLAN AND PROFILE
AVENUE 52
STA. 69+00.00 TO STA. 77+00.00
SITE ADDRESS XX
I.P. No. XX
SHEET No.
22
OF 23 SHEETS
CITY FILE No.
XX

FIGURE 6

Underground Service Alert
Call: TOLL FREE
811
WWW.call811.com
TWO WORKING DAYS BEFORE YOU DIG

FOR 30% REVIEW ONLY

PLAN CHECKED BY:

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CONTRACTOR:	DRAWN BY XXX	DESIGNER'S SEAL	DESIGNED BY:	APPROVER'S SEAL	APPROVED BY:	CITY OF INDIO	I.P. No. XX
INSPECTOR:	PREPARED FOR CITY OF INDIO	REGISTERED PROFESSIONAL ENGINEER EUGENE J. ABREGO No. 73987 CIVIL STATE OF CALIFORNIA	EUGENE J. ABREGO DATE R.C.E. No. 73987 EXP. DATE XX	REGISTERED PROFESSIONAL ENGINEER JUAN RAYA No. 68510 CIVIL STATE OF CALIFORNIA	JUAN RAYA, P.E. CITY ENGINEER RCE No. 68510	STREET IMPROVEMENT PLAN JACKSON STREET IMPROVEMENT PROJECT PLAN AND PROFILE AVENUE 52	SHEET No. 23 OF 23 SHEETS
DATE COMPLETED:	PROJECT No. 19-0002		FIRM ADDRESS: ALBERT A. WEBB ASSOCIATES 3788 McCRAY STREET RIVERSIDE, CA 92506		DATE:	STA. 77+00.00 TO STA. 80+45.10	CITY FILE No. XX
AS BUILT COMP. DATE: BY ENGINEER DATE	SCALE		TELEPHONE: 951-686-1070			SITE ADDRESS XX	
CONSTRUCTION RECORD REVISIONS APP'D DATE						SEC. X X T. X S., R. E., S.B.B. & M. APN.	
BENCHMARK: SEE SHEET 1 BASIS OF BEARING:							

APPENDIX A
AIR QUALITY/GREENHOUSE GAS ANALYSIS

ALBERT A. WEBB ASSOCIATES

Technical Memorandum

To: Eric Weck, City of Indio

From: Eliza Laws, Senior Environmental Analyst
Noemi Avila, Assistant Environmental Analyst

Date: February 4, 2020, Revised February 7, 2021

Re: Air Quality/Greenhouse Gas Analysis for Jackson Street Improvement Project from Avenue 50 to Avenue 52, City of Indio, County of Riverside, California

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 (SCAQMD) thresholds for air quality in the Project area. The greenhouse gas (GHG) assessment was prepared to evaluate whether the expected GHG emissions generated as a result of construction and operation of the proposed Project would exceed the screening significance threshold level for small projects identified in the Indio Climate Action Plan (CAP). 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 2016.3.2 (CalEEMod) was used to quantify Project-related emissions.

The Project proposes improvement of Jackson Street from Odlum Drive, approximately 0.5 miles north of the intersection of Jackson Street and Avenue 50 to approximately 0.25 miles south of the intersection of Jackson Street and Avenue 52 The Project encompasses approximately 48 acres, inclusive of temporary construction easements on both sides of the roadway that will extend up to 25 feet beyond the right of way. The Project consists of the widening of Jackson Street and adding sidewalk, bike lane, curb and gutter and drainage improvements. Intersection improvements on Jackson Street and Avenue 52 will include turn lanes, restriping, and Americans with Disabilities Act (ADA)-compliant curb ramps Project improvements would be constructed in the City of Indio and unincorporated areas of Riverside County.

▪ 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.

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

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	75	100	550	150	150	55

Note: [1] For the Coachella Valley, the daily thresholds for operation are the same as the construction thresholds.

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 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, SCAQMD Rule 403.1 is a supplement to Rule 403 and requires specific measures for reducing fugitive dust in the Coachella Valley. Compliance with this regulation includes having an approved Fugitive Dust Control Plan for activities disturbing more than 5,000 square feet, maintenance of a daily dust control log on-site, installation of construction project signage with contact information for complaints, and the presence of an environmental observer for construction sites larger than 50 acres. Based on the Project's total disturbance area (approximately 48.06 acres, a conservative estimate), an environmental observer would not be required. The fugitive dust control plan shall be submitted to and approved by the SCAQMD Executive Officer.

Short-Term Analysis

Short-term emissions from Project construction were evaluated using the CalEEMod version 2016.3.2 program. The estimated construction period for the proposed Project is approximately 10 months, beginning no sooner than September 2021. 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 September 2021 with grading, which will include construction activities such as installation utility trenching and relocation, installation of drainage improvements, roadway improvements, and traffic signal installation and end with paving:

Construction Activity	Start Date	End Date	Total Working Days
Grading	September 1, 2021	June 1, 2022	196
Paving	June 2, 2021	June 23, 2022	16

- The equipment to be used for each activity is shown below and represents program defaults, updated by Project-specific information from the Project engineer. 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 Dozer	1
	Tractors/Loaders/Backhoes	3
	Roller	1
	Scraper	1
	Concrete/Industrial Saw	1
	Air Compressor	1
Paving	Pavers	1
	Paving Equipment	1
	Rollers	2
	Tractor/Loaders/Backhoes	2
	Scraper	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 per day were added to the grading and paving activity to account for water truck trips.

- Sixteen (16) one-way vendor truck trips per day were included during grading to account for material delivery and/or soil import/export.

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 2021	**4.22**	**44.05**	**31.83**	**0.06**	**5.04**	**3.28**
Grading 2022	3.69	37.73	30.51	0.06	4.70	2.96
Paving 2022	2.88	19.78	20.51	0.04	1.07	0.88
Maximum[1]	**4.22**	**44.05**	**31.83**	**0.06**	**5.04**	**3.28**
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

Note: [1] Maximum emissions are either the greater of grading in 2021, grading in 2022, or paving in 2020 as these activities do not overlap. Maximum emissions are shown in bold.

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 proposed Project would not result in a change in land use or introduce new vehicle trips and would be consistent with the roadway classifications in the City of Indio General Plan (a Boulevard) and Riverside County General Plan (as a secondary roadway north of Avenue 50 and an Arterial south of Avenue 50).

Based on the traffic data provided by Translutions, Inc.,[2] the proposed Project would add roadway capacity and slightly increases automobile traffic due to added capacity. However, because it also improves the bicycle and pedestrian network in the area, it also reduces automobile travel and results in a net reduction of vehicle miles traveled (VMT) in the City of Indio. Therefore, the Project would not result in long-term increases in emissions. Operational emissions would also include infrequent visits by vehicles driven by existing maintenance personnel and are considered negligible.

▪ 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[3] 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) to sensitive receptors. SCAQMD considers a sensitive receptor to be a location where a sensitive individual could remain for 24 hours, such as residences, hospitals, or convalescent facilities. 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 in SRA 30.

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[4] 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. The Project's total disturbance area is approximately 48.06 acres. However, based on SCAQMD guidance, the daily disturbance area is approximately 2.5 acres. [5] Therefore, the two-acre LST Look-Up Table was compared with the on-site emissions estimated by CalEEMod to provide a conservative analysis.

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 residential houses and a church along Jackson Street, adjacent to the Project boundary. The closest receptor distance 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 (82 feet) was used to ensure a conservative analysis. The results are summarized below.

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2 Translutions, Inc., *Jackson Street Widening, City of Indio, California – VMT Screening Analysis*, February 2, 2021.

3 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 January 31, 2020.)

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

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

Table 3 – LST Results for Daily Construction Emissions

Pollutant	Peak Daily Emissions (lb/day)			
	NO_X	CO	PM-10	PM-2.5
LST Threshold for 2 acres at 25 meters	**191**	**1,299**	**7**	**5**
Grading 2021	**42.44**	**30.84**	**4.74**	**3.19**
Grading 2022	36.20	29.59	4.39	2.87
Paving 2022	19.58	20.00	0.91	0.84
Maximum[1]	**42.44**	**30.84**	**4.74**	**3.19**
Exceeds Threshold?	**No**	**No**	**No**	**No**

Note: [1] Maximum emissions are either the greater of grading in 2021, grading in 2022, or paving in 2020 as these activities do not overlap. Maximum emissions are shown in bold.

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 roadway and drainage improvements, including utility relocation. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a project, if the project includes stationary sources (e.g. flares and turbines) and/or on-site mobile equipment or attracts mobile sources that may spend long periods of time 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 or on-site mobile equipment, 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)[6] and the Revised 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan). [7] 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.

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

[6] SCAQMD, *2003 Air Quality Management Plan, August 1, 2003.* (Available at http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/2003-aqmp , accessed December 2, 2020.)

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

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)[8] 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). This hot spot analysis was conducted at intersections subject to extremes in vehicle volumes and vehicle congestion, and did not predict any violation of CO standards. The highest average daily traffic volumes on study roadway segments occur in 2035 and would be 17,411 trips on Avenue 50 east of Jackson Street, which is lower than the values studied by SCAQMD.[9] Therefore, it can reasonably be concluded that traffic on Project-related roadways would not 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 intersections or segments affected by the Project 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. Several agencies, at various levels, have proposed draft GHG significance thresholds for use in CEQA documents. The City of Indio adopted the City of Indio Climate Action Plan (CAP)[10] on September 19, 2019, to support the GHG reduction goals of the statewide policies, which outlines a review process for evaluating GHG impacts and determining significance for CEQA purposes by either: (1) applying an emissions level that is determined to be less than significant for small projects, or (2) utilizing the Climate-Ready Development Review Checklist as evaluation of the new project effectiveness at reducing GHG emissions and how well the projects comply with the City's GHG emissions reduction targets. The City of Indio CAP followed the California Air Pollution Control Officers Association (CAPCOA) guidance for quantifying greenhouse gas emissions and reduction measures. The report references 900 $MTCO_2E$ as a conservative threshold for determining when further analysis is required. This threshold is intended as a bright-line test that would exempt projects that are too small to have significant impacts from further analysis. (CAP, p. 40)

Therefore, if Project-related emissions are below the 900 $MTCO_2E$ threshold, a project can be considered to have less than significant GHG impacts and no further analysis is required. The following analysis summarizes the CalEEMod output results for construction-related GHG emissions and present the GHG emissions estimates for the Project for CO_2, methane (CH_4), nitrous oxide (N_2O), and CO_2E.[11]

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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8 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 December 2, 2020.)

9 Albert A. Webb Associates, *Traffic Study for Jackson Street Improvement Project,* December 2020.

10 City of Indio, City of Indio Climate Action Plan, September 2019. (Available at https://www.indio.org/civicax/filebank/blobdload.aspx?t=54675.67&BlobID=29171, accessed February 3, 2020).

11 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 4 – Project Construction Equipment GHG Emissions

Year	Metric Tons per year (MT/yr)			
	Total CO_2	Total CH_4	Total N_2O	Total CO_2E
2021	245.70	0.06	0.00	247.28
2022	327.31	0.09	0.00	329.45
Total	573.01	0.15	0.00	576.73
			Amortized[1]	**19.22**

Note: [1] Construction emissions were amortized over a 30-year period, as recommended by SCAQMD.

Evaluation of the table above indicates that an estimated 576.73 $MTCO_2E$ will occur from Project construction equipment over the course of the estimated construction period. The draft SCAQMD GHG threshold guidance document released in October 2008[12] 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.

Long-Term Analysis

As stated above, the proposed Project would not result in a change in land use or introduce new vehicle trips and would be consistent with the roadway classifications in the City of Indio General Plan (a Boulevard) and Riverside County General Plan (as a secondary roadway north of Avenue 50 and an Arterial south of Avenue 50).

Because the Project improves the bicycle and pedestrian network in the area, it also reduces automobile travel and results in a net reduction of VMT in the City of Indio. Therefore, the Project would not result in long-term increases in GHG emissions. Operational emissions would also include infrequent visits by vehicles driven by existing maintenance personnel and are considered negligible.

Total Project GHG Emissions

The Project's emissions were compared to the Indio CAP's 900 $MTCO_2E$/yr threshold for projects that are too small to have significant impacts. Due to the estimated amount of emissions from Project construction (**Table 4**) and negligible operational emissions from infrequent maintenance vehicles related to the roadway and drainage improvements, the proposed Project will not generate GHG emissions that exceed the screening threshold.

▪ 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. The Project will also not create a CO hot spot. The Project will also not exceed the CAP screening threshold meaning no further GHG analysis is required of the Project. No mitigation is required.

Should you have any questions, please contact me at (951) 686-1070.

[12] 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

CALEEMOD OUTPUT FILES

Jackson Street Widening

Riverside-Salton Sea County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	251.00	1000sqft	5.76	251,000.00	0
Other Non-Asphalt Surfaces	1,842.49	1000sqft	42.30	1,842,493.60	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	15			**Operational Year**	2021
Utility Company	Imperial Irrigation District				
CO2 Intensity (lb/MWhr)	1270.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Per Improvement Plans and buffer area.

Construction Phase - Per engineer estimates.

Off-road Equipment - Per Engineer Estimates.

Off-road Equipment - Per engineer estimates. 1 TLB representative of a curb machine.

Trips and VMT - 2 vendor trips for Grading and Paving per Rule 403. 16 Vendor trips for material delivery.

Construction Off-road Equipment Mitigation - Per Rule 403

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	75.00	196.00
tblConstructionPhase	NumDays	55.00	16.00
tblGrading	AcresOfGrading	294.00	187.50
tblLandUse	LandUseSquareFeet	1,842,490.00	1,842,493.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	3.00
tblTripsAndVMT	VendorTripNumber	0.00	18.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

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					
2021	4.2220	44.0522	31.8306	0.0636	7.3361	1.9963	9.3324	3.5013	1.8606	5.3619	0.0000	6,179.028 4	6,179.0284	1.5849	0.0000	6,218.651 1
2022	3.6916	37.7325	30.5067	0.0635	7.3361	1.6519	8.9880	3.5013	1.5406	5.0419	0.0000	6,170.660 4	6,170.6604	1.5800	0.0000	6,210.159 6
Maximum	**4.2220**	**44.0522**	**31.8306**	**0.0636**	**7.3361**	**1.9963**	**9.3324**	**3.5013**	**1.8606**	**5.3619**	**0.0000**	**6,179.028 4**	**6,179.0284**	**1.5849**	**0.0000**	**6,218.651 1**

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					
2021	4.2220	44.0522	31.8306	0.0636	3.0438	1.9963	5.0401	1.4152	1.8606	3.2758	0.0000	6,179.0284	6,179.0284	1.5849	0.0000	6,218.6511
2022	3.6916	37.7325	30.5067	0.0635	3.0437	1.6519	4.6957	1.4152	1.5406	2.9558	0.0000	6,170.6604	6,170.6604	1.5800	0.0000	6,210.1596
Maximum	**4.2220**	**44.0522**	**31.8306**	**0.0636**	**3.0438**	**1.9963**	**5.0401**	**1.4152**	**1.8606**	**3.2758**	**0.0000**	**6,179.0284**	**6,179.0284**	**1.5849**	**0.0000**	**6,218.6511**

	ROG	NOx	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	58.51	0.00	46.86	59.58	0.00	40.10	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	9/1/2021	6/1/2022	5	196	
2	Paving	Paving	6/2/2022	6/23/2022	5	16	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 48.06

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Air Compressors	1	8.00	78	0.48
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rollers	1	8.00	80	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	1	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Scrapers	1	8.00	367	0.48
Paving	Tractors/Loaders/Backhoes	2	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	10	25.00	18.00	0.00	11.00	5.40	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	2.00	0.00	11.00	5.40	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2021

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					7.0366	0.0000	7.0366	3.4198	0.0000	3.4198			0.0000			0.0000
Off-Road	4.0860	42.4374	30.8401	0.0576		1.9925	1.9925		1.8570	1.8570		5,561.8576	5,561.8576	1.5459		5,600.5060
Total	**4.0860**	**42.4374**	**30.8401**	**0.0576**	**7.0366**	**1.9925**	**9.0291**	**3.4198**	**1.8570**	**5.2768**		**5,561.8576**	**5,561.8576**	**1.5459**		**5,600.5060**

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	0.0385	1.5626	0.2753	3.9500e-003	0.0903	2.5500e-003	0.0929	0.0260	2.4400e-003	0.0285		416.5960	416.5960	0.0341		417.4486
Worker	0.0975	0.0523	0.7152	2.0100e-003	0.2092	1.2700e-003	0.2104	0.0555	1.1700e-003	0.0567		200.5748	200.5748	4.8700e-003		200.6965
Total	**0.1361**	**1.6148**	**0.9905**	**5.9600e-003**	**0.2995**	**3.8200e-003**	**0.3033**	**0.0815**	**3.6100e-003**	**0.0851**		**617.1708**	**617.1708**	**0.0390**		**618.1451**

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					2.7443	0.0000	2.7443	1.3337	0.0000	1.3337			0.0000			0.0000
Off-Road	4.0860	42.4374	30.8401	0.0576		1.9925	1.9925		1.8570	1.8570	0.0000	5,561.8576	5,561.8576	1.5459		5,600.5060
Total	**4.0860**	**42.4374**	**30.8401**	**0.0576**	**2.7443**	**1.9925**	**4.7368**	**1.3337**	**1.8570**	**3.1907**	**0.0000**	**5,561.8576**	**5,561.8576**	**1.5459**		**5,600.5060**

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	0.0385	1.5626	0.2753	3.9500e-003	0.0903	2.5500e-003	0.0929	0.0260	2.4400e-003	0.0285		416.5960	416.5960	0.0341		417.4486
Worker	0.0975	0.0523	0.7152	2.0100e-003	0.2092	1.2700e-003	0.2104	0.0555	1.1700e-003	0.0567		200.5748	200.5748	4.8700e-003		200.6965
Total	**0.1361**	**1.6148**	**0.9905**	**5.9600e-003**	**0.2995**	**3.8200e-003**	**0.3033**	**0.0815**	**3.6100e-003**	**0.0851**		**617.1708**	**617.1708**	**0.0390**		**618.1451**

3.2 Grading - 2022

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					7.0366	0.0000	7.0366	3.4198	0.0000	3.4198			0.0000			0.0000
Off-Road	3.5646	36.2037	29.5917	0.0577		1.6486	1.6486		1.5374	1.5374		5,564.3728	5,564.3728	1.5433		5,602.9565
Total	**3.5646**	**36.2037**	**29.5917**	**0.0577**	**7.0366**	**1.6486**	**8.6852**	**3.4198**	**1.5374**	**4.9572**		**5,564.3728**	**5,564.3728**	**1.5433**		**5,602.9565**

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	0.0359	1.4818	0.2558	3.9100e-003	0.0903	2.1400e-003	0.0924	0.0260	2.0500e-003	0.0281		413.0377	413.0377	0.0323		413.8441
Worker	0.0911	0.0470	0.6593	1.9400e-003	0.2092	1.2400e-003	0.2104	0.0555	1.1400e-003	0.0566		193.2499	193.2499	4.3700e-003		193.3591
Total	**0.1270**	**1.5288**	**0.9151**	**5.8500e-003**	**0.2995**	**3.3800e-003**	**0.3029**	**0.0815**	**3.1900e-003**	**0.0847**		**606.2875**	**606.2875**	**0.0366**		**607.2032**

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					2.7443	0.0000	2.7443	1.3337	0.0000	1.3337			0.0000			0.0000
Off-Road	3.5646	36.2037	29.5917	0.0577		1.6486	1.6486		1.5374	1.5374	0.0000	5,564.3728	5,564.3728	1.5433		5,602.9564
Total	**3.5646**	**36.2037**	**29.5917**	**0.0577**	**2.7443**	**1.6486**	**4.3928**	**1.3337**	**1.5374**	**2.8711**	**0.0000**	**5,564.3728**	**5,564.3728**	**1.5433**		**5,602.9564**

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	0.0359	1.4818	0.2558	3.9100e-003	0.0903	2.1400e-003	0.0924	0.0260	2.0500e-003	0.0281		413.0377	413.0377	0.0323		413.8441
Worker	0.0911	0.0470	0.6593	1.9400e-003	0.2092	1.2400e-003	0.2104	0.0555	1.1400e-003	0.0566		193.2499	193.2499	4.3700e-003		193.3591
Total	**0.1270**	**1.5288**	**0.9151**	**5.8500e-003**	**0.2995**	**3.3800e-003**	**0.3029**	**0.0815**	**3.1900e-003**	**0.0847**		**606.2875**	**606.2875**	**0.0366**		**607.2032**

3.3 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8664	19.5831	20.0023	0.0354		0.9128	0.9128		0.8398	0.8398		3,430.7058	3,430.7058	1.1096		3,458.4448
Paving	0.9432					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.8096**	**19.5831**	**20.0023**	**0.0354**		**0.9128**	**0.9128**		**0.8398**	**0.8398**		**3,430.7058**	**3,430.7058**	**1.1096**		**3,458.4448**

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	3.9900e-003	0.1647	0.0284	4.3000e-004	0.0100	2.4000e-004	0.0103	2.8900e-003	2.3000e-004	3.1200e-003		45.8931	45.8931	3.5800e-003		45.9827
Worker	0.0656	0.0338	0.4747	1.4000e-003	0.1506	8.9000e-004	0.1515	0.0400	8.2000e-004	0.0408		139.1399	139.1399	3.1500e-003		139.2186
Total	**0.0696**	**0.1985**	**0.5031**	**1.8300e-003**	**0.1606**	**1.1300e-003**	**0.1618**	**0.0428**	**1.0500e-003**	**0.0439**		**185.0330**	**185.0330**	**6.7300e-003**		**185.2012**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8664	19.5831	20.0023	0.0354		0.9128	0.9128		0.8398	0.8398	0.0000	3,430.7058	3,430.7058	1.1096		3,458.4448
Paving	0.9432					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.8096**	**19.5831**	**20.0023**	**0.0354**		**0.9128**	**0.9128**		**0.8398**	**0.8398**	**0.0000**	**3,430.7058**	**3,430.7058**	**1.1096**		**3,458.4448**

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	3.9900e-003	0.1647	0.0284	4.3000e-004	0.0100	2.4000e-004	0.0103	2.8900e-003	2.3000e-004	3.1200e-003		45.8931	45.8931	3.5800e-003		45.9827
Worker	0.0656	0.0338	0.4747	1.4000e-003	0.1506	8.9000e-004	0.1515	0.0400	8.2000e-004	0.0408		139.1399	139.1399	3.1500e-003		139.2186
Total	**0.0696**	**0.1985**	**0.5031**	**1.8300e-003**	**0.1606**	**1.1300e-003**	**0.1618**	**0.0428**	**1.0500e-003**	**0.0439**		**185.0330**	**185.0330**	**6.7300e-003**		**185.2012**

CalEEMod Version: CalEEMod.2016.3.2

Date: 2/3/2020 9:00 AM

Jackson Street Widening

Riverside-Salton Sea County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	251.00	1000sqft	5.76	251,000.00	0
Other Non-Asphalt Surfaces	1,842.49	1000sqft	42.30	1,842,493.60	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	15			**Operational Year**	2021
Utility Company	Imperial Irrigation District				
CO2 Intensity (lb/MWhr)	1270.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Per Improvement Plans and buffer area.

Construction Phase - Per engineer estimates.

Off-road Equipment - Per Engineer Estimates.

Off-road Equipment - Per engineer estimates. 1 TLB representative of a curb machine.

Trips and VMT - 2 vendor trips for Grading and Paving per Rule 403. 16 Vendor trips for material delivery.

Construction Off-road Equipment Mitigation - Per Rule 403

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	75.00	196.00
tblConstructionPhase	NumDays	55.00	16.00
tblGrading	AcresOfGrading	294.00	187.50
tblLandUse	LandUseSquareFeet	1,842,490.00	1,842,493.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	3.00
tblTripsAndVMT	VendorTripNumber	0.00	18.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

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					
2021	4.2205	44.0342	31.7550	0.0632	7.3361	1.9964	9.3325	3.5013	1.8607	5.3620	0.0000	6,139.9864	6,139.9864	1.5883	0.0000	6,179.6946
2022	3.6904	37.7136	30.4377	0.0632	7.3361	1.6520	8.9881	3.5013	1.5407	5.0419	0.0000	6,132.4313	6,132.4313	1.5833	0.0000	6,172.0133
Maximum	**4.2205**	**44.0342**	**31.7550**	**0.0632**	**7.3361**	**1.9964**	**9.3325**	**3.5013**	**1.8607**	**5.3620**	**0.0000**	**6,139.9864**	**6,139.9864**	**1.5883**	**0.0000**	**6,179.6946**

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					
2021	4.2205	44.0342	31.7550	0.0632	3.0438	1.9964	5.0402	1.4152	1.8607	3.2759	0.0000	6,139.9864	6,139.9864	1.5883	0.0000	6,179.6946
2022	3.6904	37.7136	30.4377	0.0632	3.0437	1.6520	4.6958	1.4152	1.5407	2.9559	0.0000	6,132.4313	6,132.4313	1.5833	0.0000	6,172.0133
Maximum	**4.2205**	**44.0342**	**31.7550**	**0.0632**	**3.0438**	**1.9964**	**5.0402**	**1.4152**	**1.8607**	**3.2759**	**0.0000**	**6,139.9864**	**6,139.9864**	**1.5883**	**0.0000**	**6,179.6946**

	ROG	**NOx**	**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**	**58.51**	**0.00**	**46.86**	**59.58**	**0.00**	**40.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	9/1/2021	6/1/2022	5	196	
2	Paving	Paving	6/2/2022	6/23/2022	5	16	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 48.06

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Air Compressors	1	8.00	78	0.48
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rollers	1	8.00	80	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	1	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Scrapers	1	8.00	367	0.48
Paving	Tractors/Loaders/Backhoes	2	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	10	25.00	18.00	0.00	11.00	5.40	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	2.00	0.00	11.00	5.40	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2021

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					7.0366	0.0000	7.0366	3.4198	0.0000	3.4198			0.0000			0.0000
Off-Road	4.0860	42.4374	30.8401	0.0576		1.9925	1.9925		1.8570	1.8570		5,561.8576	5,561.8576	1.5459		5,600.5060
Total	**4.0860**	**42.4374**	**30.8401**	**0.0576**	**7.0366**	**1.9925**	**9.0291**	**3.4198**	**1.8570**	**5.2768**		**5,561.8576**	**5,561.8576**	**1.5459**		**5,600.5060**

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	0.0411	1.5427	0.3299	3.7800e-003	0.0903	2.6500e-003	0.0930	0.0260	2.5300e-003	0.0285		398.0960	398.0960	0.0381		399.0491
Worker	0.0934	0.0541	0.5850	1.8100e-003	0.2092	1.2700e-003	0.2104	0.0555	1.1700e-003	0.0567		180.0328	180.0328	4.2700e-003		180.1394
Total	**0.1345**	**1.5968**	**0.9149**	**5.5900e-003**	**0.2995**	**3.9200e-003**	**0.3034**	**0.0815**	**3.7000e-003**	**0.0852**		**578.1288**	**578.1288**	**0.0424**		**579.1885**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					2.7443	0.0000	2.7443	1.3337	0.0000	1.3337			0.0000			0.0000
Off-Road	4.0860	42.4374	30.8401	0.0576		1.9925	1.9925		1.8570	1.8570	0.0000	5,561.8576	5,561.8576	1.5459		5,600.5060
Total	**4.0860**	**42.4374**	**30.8401**	**0.0576**	**2.7443**	**1.9925**	**4.7368**	**1.3337**	**1.8570**	**3.1907**	**0.0000**	**5,561.8576**	**5,561.8576**	**1.5459**		**5,600.5060**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	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	0.0411	1.5427	0.3299	3.7800e-003	0.0903	2.6500e-003	0.0930	0.0260	2.5300e-003	0.0285		398.0960	398.0960	0.0381		399.0491
Worker	0.0934	0.0541	0.5850	1.8100e-003	0.2092	1.2700e-003	0.2104	0.0555	1.1700e-003	0.0567		180.0328	180.0328	4.2700e-003		180.1394
Total	**0.1345**	**1.5968**	**0.9149**	**5.5900e-003**	**0.2995**	**3.9200e-003**	**0.3034**	**0.0815**	**3.7000e-003**	**0.0852**		**578.1288**	**578.1288**	**0.0424**		**579.1885**

3.2 Grading - 2022

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					7.0366	0.0000	7.0366	3.4198	0.0000	3.4198			0.0000			0.0000
Off-Road	3.5646	36.2037	29.5917	0.0577		1.6486	1.6486		1.5374	1.5374		5,564.3728	5,564.3728	1.5433		5,602.9565
Total	**3.5646**	**36.2037**	**29.5917**	**0.0577**	**7.0366**	**1.6486**	**8.6852**	**3.4198**	**1.5374**	**4.9572**		**5,564.3728**	**5,564.3728**	**1.5433**		**5,602.9565**

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	0.0384	1.4613	0.3077	3.7400e-003	0.0903	2.2300e-003	0.0925	0.0260	2.1300e-003	0.0281		394.5912	394.5912	0.0361		395.4938
Worker	0.0875	0.0486	0.5383	1.7400e-003	0.2092	1.2400e-003	0.2104	0.0555	1.1400e-003	0.0566		173.4673	173.4673	3.8300e-003		173.5631
Total	**0.1258**	**1.5099**	**0.8461**	**5.4800e-003**	**0.2995**	**3.4700e-003**	**0.3029**	**0.0815**	**3.2700e-003**	**0.0848**		**568.0585**	**568.0585**	**0.0399**		**569.0569**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					2.7443	0.0000	2.7443	1.3337	0.0000	1.3337			0.0000			0.0000
Off-Road	3.5646	36.2037	29.5917	0.0577		1.6486	1.6486		1.5374	1.5374	0.0000	5,564.3728	5,564.3728	1.5433		5,602.9564
Total	**3.5646**	**36.2037**	**29.5917**	**0.0577**	**2.7443**	**1.6486**	**4.3928**	**1.3337**	**1.5374**	**2.8711**	**0.0000**	**5,564.3728**	**5,564.3728**	**1.5433**		**5,602.9564**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	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	0.0384	1.4613	0.3077	3.7400e-003	0.0903	2.2300e-003	0.0925	0.0260	2.1300e-003	0.0281		394.5912	394.5912	0.0361		395.4938
Worker	0.0875	0.0486	0.5383	1.7400e-003	0.2092	1.2400e-003	0.2104	0.0555	1.1400e-003	0.0566		173.4673	173.4673	3.8300e-003		173.5631
Total	**0.1258**	**1.5099**	**0.8461**	**5.4800e-003**	**0.2995**	**3.4700e-003**	**0.3029**	**0.0815**	**3.2700e-003**	**0.0848**		**568.0585**	**568.0585**	**0.0399**		**569.0569**

3.3 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8664	19.5831	20.0023	0.0354		0.9128	0.9128		0.8398	0.8398		3,430.7058	3,430.7058	1.1096		3,458.4448
Paving	0.9432					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.8096**	**19.5831**	**20.0023**	**0.0354**		**0.9128**	**0.9128**		**0.8398**	**0.8398**		**3,430.7058**	**3,430.7058**	**1.1096**		**3,458.4448**

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	4.2600e-003	0.1624	0.0342	4.2000e-004	0.0100	2.5000e-004	0.0103	2.8900e-003	2.4000e-004	3.1300e-003		43.8435	43.8435	4.0100e-003		43.9438
Worker	0.0630	0.0350	0.3876	1.2500e-003	0.1506	8.9000e-004	0.1515	0.0400	8.2000e-004	0.0408		124.8964	124.8964	2.7600e-003		124.9654
Total	**0.0673**	**0.1974**	**0.4218**	**1.6700e-003**	**0.1606**	**1.1400e-003**	**0.1618**	**0.0428**	**1.0600e-003**	**0.0439**		**168.7399**	**168.7399**	**6.7700e-003**		**168.9092**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8664	19.5831	20.0023	0.0354		0.9128	0.9128		0.8398	0.8398	0.0000	3,430.7058	3,430.7058	1.1096		3,458.4448
Paving	0.9432					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.8096**	**19.5831**	**20.0023**	**0.0354**		**0.9128**	**0.9128**		**0.8398**	**0.8398**	**0.0000**	**3,430.7058**	**3,430.7058**	**1.1096**		**3,458.4448**

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	4.2600e-003	0.1624	0.0342	4.2000e-004	0.0100	2.5000e-004	0.0103	2.8900e-003	2.4000e-004	3.1300e-003		43.8435	43.8435	4.0100e-003		43.9438
Worker	0.0630	0.0350	0.3876	1.2500e-003	0.1506	8.9000e-004	0.1515	0.0400	8.2000e-004	0.0408		124.8964	124.8964	2.7600e-003		124.9654
Total	**0.0673**	**0.1974**	**0.4218**	**1.6700e-003**	**0.1606**	**1.1400e-003**	**0.1618**	**0.0428**	**1.0600e-003**	**0.0439**		**168.7399**	**168.7399**	**6.7700e-003**		**168.9092**

Jackson Street Widening

Riverside-Salton Sea County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	251.00	1000sqft	5.76	251,000.00	0
Other Non-Asphalt Surfaces	1,842.49	1000sqft	42.30	1,842,493.60	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	15			**Operational Year**	2021
Utility Company	Imperial Irrigation District				
CO2 Intensity (lb/MWhr)	1270.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Per Improvement Plans and buffer area.

Construction Phase - Per engineer estimates.

Off-road Equipment - Per Engineer Estimates.

Off-road Equipment - Per engineer estimates. 1 TLB representative of a curb machine.

Trips and VMT - 2 vendor trips for Grading and Paving per Rule 403. 16 Vendor trips for material delivery.

Construction Off-road Equipment Mitigation - Per Rule 403

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	75.00	196.00
tblConstructionPhase	NumDays	55.00	16.00
tblGrading	AcresOfGrading	294.00	187.50
tblLandUse	LandUseSquareFeet	1,842,490.00	1,842,493.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	3.00
tblTripsAndVMT	VendorTripNumber	0.00	18.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

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					
2021	0.1853	1.9387	1.3973	2.7900e-003	0.3774	0.0878	0.4652	0.1599	0.0819	0.2418	0.0000	245.6968	245.6968	0.0633	0.0000	247.2797
2022	0.2218	2.1962	1.8072	3.7200e-003	0.4418	0.0965	0.5383	0.1942	0.0899	0.2841	0.0000	327.3119	327.3119	0.0856	0.0000	329.4509
Maximum	**0.2218**	**2.1962**	**1.8072**	**3.7200e-003**	**0.4418**	**0.0965**	**0.5383**	**0.1942**	**0.0899**	**0.2841**	**0.0000**	**327.3119**	**327.3119**	**0.0856**	**0.0000**	**329.4509**

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					
2021	0.1853	1.9387	1.3973	2.7900e-003	0.1551	0.0878	0.2429	0.0645	0.0819	0.1464	0.0000	245.6966	245.6966	0.0633	0.0000	247.2794
2022	0.2218	2.1962	1.8072	3.7200e-003	0.1828	0.0965	0.2793	0.0786	0.0899	0.1685	0.0000	327.3115	327.3115	0.0856	0.0000	329.4506
Maximum	**0.2218**	**2.1962**	**1.8072**	**3.7200e-003**	**0.1828**	**0.0965**	**0.2793**	**0.0786**	**0.0899**	**0.1685**	**0.0000**	**327.3115**	**327.3115**	**0.0856**	**0.0000**	**329.4506**

	ROG	**NOx**	**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**	**58.76**	**0.00**	**47.96**	**59.59**	**0.00**	**40.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**9-1-2021**	**11-30-2021**	1.5685	1.5685
2	**12-1-2021**	**2-28-2022**	1.4067	1.4067
3	**3-1-2022**	**5-31-2022**	1.3609	1.3609
4	**6-1-2022**	**8-31-2022**	0.1928	0.1928
		Highest	1.5685	1.5685

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	9/1/2021	6/1/2022	5	196	
2	Paving	Paving	6/2/2022	6/23/2022	5	16	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 48.06

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Air Compressors	1	8.00	78	0.48
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rollers	1	8.00	80	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	1	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Scrapers	1	8.00	367	0.48
Paving	Tractors/Loaders/Backhoes	2	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	10	25.00	18.00	0.00	11.00	5.40	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	2.00	0.00	11.00	5.40	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2021

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					0.3644	0.0000	0.3644	0.1564	0.0000	0.1564	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1798	1.8673	1.3570	2.5400e-003		0.0877	0.0877		0.0817	0.0817	0.0000	222.0078	222.0078	0.0617	0.0000	223.5505
Total	**0.1798**	**1.8673**	**1.3570**	**2.5400e-003**	**0.3644**	**0.0877**	**0.4521**	**0.1564**	**0.0817**	**0.2381**	**0.0000**	**222.0078**	**222.0078**	**0.0617**	**0.0000**	**223.5505**

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	1.7400e-003	0.0690	0.0133	1.7000e-004	3.9200e-003	1.1000e-004	4.0300e-003	1.1300e-003	1.1000e-004	1.2400e-003	0.0000	16.3188	16.3188	1.4300e-003	0.0000	16.3545
Worker	3.8100e-003	2.4600e-003	0.0271	8.0000e-005	9.0500e-003	6.0000e-005	9.1100e-003	2.4000e-003	5.0000e-005	2.4500e-003	0.0000	7.3703	7.3703	1.8000e-004	0.0000	7.3747
Total	**5.5500e-003**	**0.0715**	**0.0403**	**2.5000e-004**	**0.0130**	**1.7000e-004**	**0.0131**	**3.5300e-003**	**1.6000e-004**	**3.6900e-003**	**0.0000**	**23.6890**	**23.6890**	**1.6100e-003**	**0.0000**	**23.7292**

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					0.1421	0.0000	0.1421	0.0610	0.0000	0.0610	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1798	1.8672	1.3570	2.5400e-003		0.0877	0.0877		0.0817	0.0817	0.0000	222.0076	222.0076	0.0617	0.0000	223.5503
Total	**0.1798**	**1.8672**	**1.3570**	**2.5400e-003**	**0.1421**	**0.0877**	**0.2298**	**0.0610**	**0.0817**	**0.1427**	**0.0000**	**222.0076**	**222.0076**	**0.0617**	**0.0000**	**223.5503**

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	1.7400e-003	0.0690	0.0133	1.7000e-004	3.9200e-003	1.1000e-004	4.0300e-003	1.1300e-003	1.1000e-004	1.2400e-003	0.0000	16.3188	16.3188	1.4300e-003	0.0000	16.3545
Worker	3.8100e-003	2.4600e-003	0.0271	8.0000e-005	9.0500e-003	6.0000e-005	9.1100e-003	2.4000e-003	5.0000e-005	2.4500e-003	0.0000	7.3703	7.3703	1.8000e-004	0.0000	7.3747
Total	**5.5500e-003**	**0.0715**	**0.0403**	**2.5000e-004**	**0.0130**	**1.7000e-004**	**0.0131**	**3.5300e-003**	**1.6000e-004**	**3.6900e-003**	**0.0000**	**23.6890**	**23.6890**	**1.6100e-003**	**0.0000**	**23.7292**

3.2 Grading - 2022

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					0.4246	0.0000	0.4246	0.1895	0.0000	0.1895	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1925	1.9550	1.5980	3.1100e-003		0.0890	0.0890		0.0830	0.0830	0.0000	272.5874	272.5874	0.0756	0.0000	274.4775
Total	**0.1925**	**1.9550**	**1.5980**	**3.1100e-003**	**0.4246**	**0.0890**	**0.5136**	**0.1895**	**0.0830**	**0.2725**	**0.0000**	**272.5874**	**272.5874**	**0.0756**	**0.0000**	**274.4775**

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	1.9900e-003	0.0803	0.0151	2.1000e-004	4.8100e-003	1.2000e-004	4.9300e-003	1.3900e-003	1.1000e-004	1.5000e-003	0.0000	19.8544	19.8544	1.6600e-003	0.0000	19.8959
Worker	4.3800e-003	2.7100e-003	0.0306	1.0000e-004	0.0111	7.0000e-005	0.0112	2.9500e-003	6.0000e-005	3.0100e-003	0.0000	8.7154	8.7154	1.9000e-004	0.0000	8.7203
Total	**6.3700e-003**	**0.0830**	**0.0457**	**3.1000e-004**	**0.0159**	**1.9000e-004**	**0.0161**	**4.3400e-003**	**1.7000e-004**	**4.5100e-003**	**0.0000**	**28.5698**	**28.5698**	**1.8500e-003**	**0.0000**	**28.6162**

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					0.1656	0.0000	0.1656	0.0739	0.0000	0.0739	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1925	1.9550	1.5980	3.1100e-003		0.0890	0.0890		0.0830	0.0830	0.0000	272.5870	272.5870	0.0756	0.0000	274.4772
Total	**0.1925**	**1.9550**	**1.5980**	**3.1100e-003**	**0.1656**	**0.0890**	**0.2546**	**0.0739**	**0.0830**	**0.1569**	**0.0000**	**272.5870**	**272.5870**	**0.0756**	**0.0000**	**274.4772**

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	1.9900e-003	0.0803	0.0151	2.1000e-004	4.8100e-003	1.2000e-004	4.9300e-003	1.3900e-003	1.1000e-004	1.5000e-003	0.0000	19.8544	19.8544	1.6600e-003	0.0000	19.8959
Worker	4.3800e-003	2.7100e-003	0.0306	1.0000e-004	0.0111	7.0000e-005	0.0112	2.9500e-003	6.0000e-005	3.0100e-003	0.0000	8.7154	8.7154	1.9000e-004	0.0000	8.7203
Total	**6.3700e-003**	**0.0830**	**0.0457**	**3.1000e-004**	**0.0159**	**1.9000e-004**	**0.0161**	**4.3400e-003**	**1.7000e-004**	**4.5100e-003**	**0.0000**	**28.5698**	**28.5698**	**1.8500e-003**	**0.0000**	**28.6162**

3.3 Paving - 2022

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	0.0149	0.1567	0.1600	2.8000e-004		7.3000e-003	7.3000e-003		6.7200e-003	6.7200e-003	0.0000	24.8983	24.8983	8.0500e-003	0.0000	25.0996
Paving	7.5500e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0225**	**0.1567**	**0.1600**	**2.8000e-004**		**7.3000e-003**	**7.3000e-003**		**6.7200e-003**	**6.7200e-003**	**0.0000**	**24.8983**	**24.8983**	**8.0500e-003**	**0.0000**	**25.0996**

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	3.0000e-005	1.3200e-003	2.5000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.3268	0.3268	3.0000e-005	0.0000	0.3275
Worker	4.7000e-004	2.9000e-004	3.2600e-003	1.0000e-005	1.1800e-003	1.0000e-005	1.1900e-003	3.1000e-004	1.0000e-005	3.2000e-004	0.0000	0.9297	0.9297	2.0000e-005	0.0000	0.9302
Total	**5.0000e-004**	**1.6100e-003**	**3.5100e-003**	**1.0000e-005**	**1.2600e-003**	**1.0000e-005**	**1.2700e-003**	**3.3000e-004**	**1.0000e-005**	**3.4000e-004**	**0.0000**	**1.2565**	**1.2565**	**5.0000e-005**	**0.0000**	**1.2577**

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	0.0149	0.1567	0.1600	2.8000e-004		7.3000e-003	7.3000e-003		6.7200e-003	6.7200e-003	0.0000	24.8982	24.8982	8.0500e-003	0.0000	25.0996
Paving	7.5500e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0225**	**0.1567**	**0.1600**	**2.8000e-004**		**7.3000e-003**	**7.3000e-003**		**6.7200e-003**	**6.7200e-003**	**0.0000**	**24.8982**	**24.8982**	**8.0500e-003**	**0.0000**	**25.0996**

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	3.0000e-005	1.3200e-003	2.5000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.3268	0.3268	3.0000e-005	0.0000	0.3275
Worker	4.7000e-004	2.9000e-004	3.2600e-003	1.0000e-005	1.1800e-003	1.0000e-005	1.1900e-003	3.1000e-004	1.0000e-005	3.2000e-004	0.0000	0.9297	0.9297	2.0000e-005	0.0000	0.9302
Total	**5.0000e-004**	**1.6100e-003**	**3.5100e-003**	**1.0000e-005**	**1.2600e-003**	**1.0000e-005**	**1.2700e-003**	**3.3000e-004**	**1.0000e-005**	**3.4000e-004**	**0.0000**	**1.2565**	**1.2565**	**5.0000e-005**	**0.0000**	**1.2577**

APPENDIX B.1
INFORMATION FOR PLANNING AND CONSULTATION (IPAC) RESOURCE LIST

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Riverside County, California

Local office

Carlsbad Fish And Wildlife Office

(760) 431-9440
(760) 431-5901

2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385

http://www.fws.gov/carlsbad/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS

Least Bell's Vireo Vireo bellii pusillus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/5945	Endangered
Southwestern Willow Flycatcher Empidonax traillii extimus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6749	Endangered
Yuma Clapper Rail Rallus longirostris yumanensis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3505	Endangered

Reptiles

NAME	STATUS
Coachella Valley Fringe-toed Lizard Uma inornata There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2069	Threatened
Desert Tortoise Gopherus agassizii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4481	Threatened

Flowering Plants

NAME	STATUS
Coachella Valley Milk-vetch Astragalus lentiginosus var. coachellae There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7426	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE.

"BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Burrowing Owl Athene cunicularia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9737	Breeds Mar 15 to Aug 31
Costa's Hummingbird Calypte costae This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9470	Breeds Jan 15 to Jun 10

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

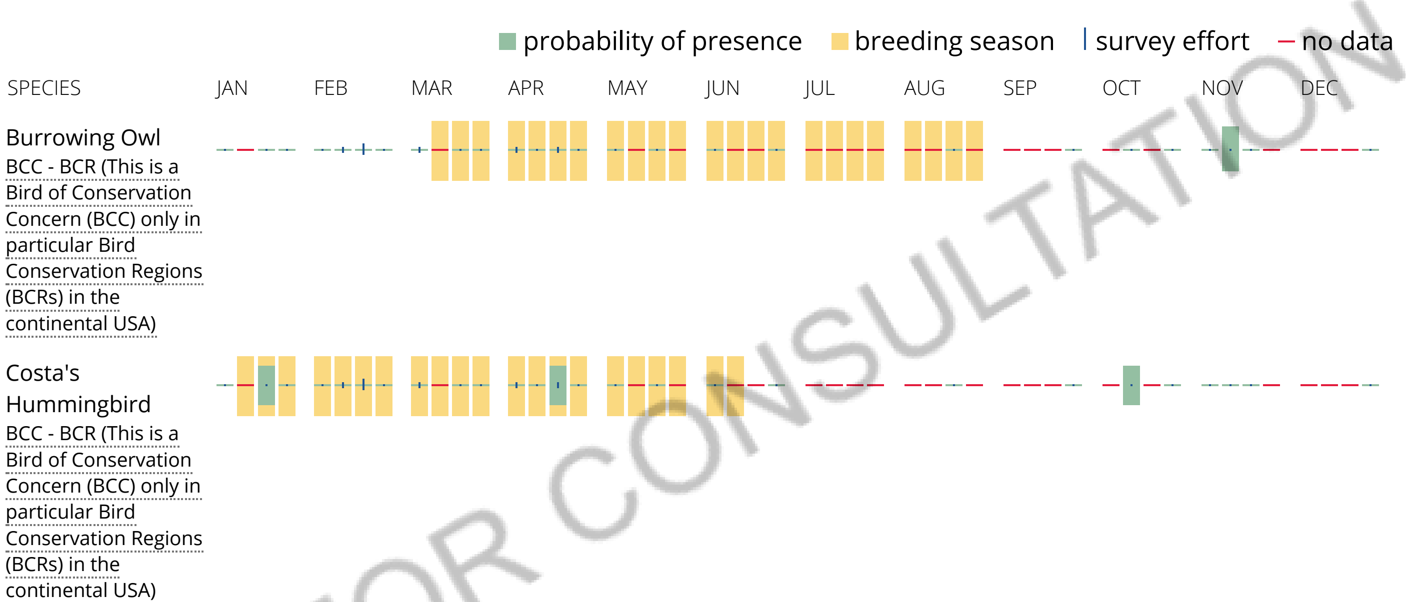
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER POND

PUBHx

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

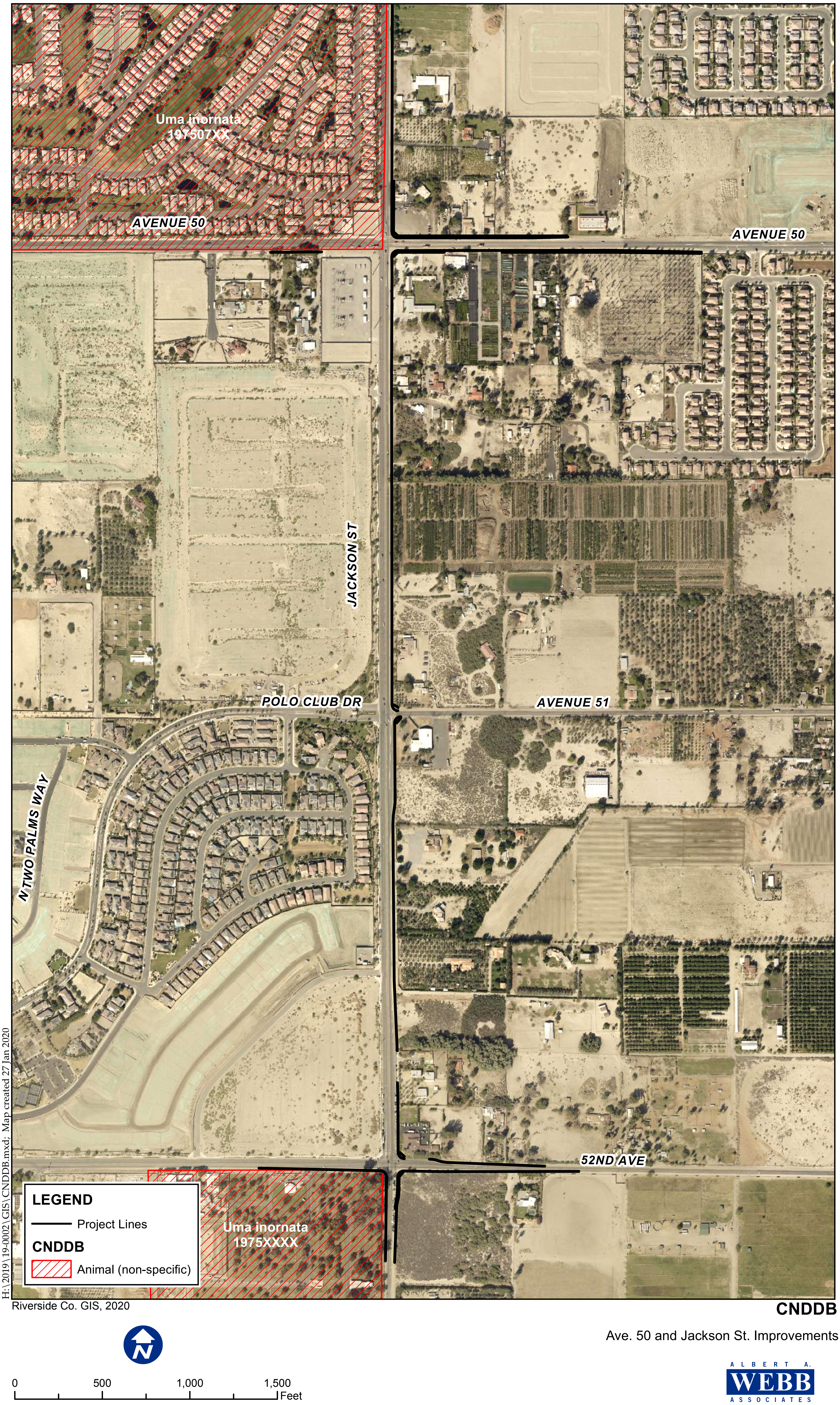
Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX B.2
CALIFORNIA NATURAL DIVERSITY DATABASE MAP



CNDDB

Ave. 50 and Jackson St. Improvements

ALBERT A. WEBB ASSOCIATES

APPENDIX C
PHASE I CULTURAL RESOURCE ASSESSMENT

Phase I Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project in the Cities of Indio and Unincorporated Riverside County, California

Kholood Abdo

Prepared By

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January 2021
Draft

USGS 7.5' Topographic Quadrangle: Indio, CA
Level of Investigation: CEQA Phase I
Key Words: City of Indio; CEQA; 4.9 acres

MANAGEMENT SUMMARY

Under contract to Albert A. Webb Associates (WEBB), Applied EarthWorks, Inc. (Æ) conducted a Phase I cultural resource investigation for the Avenue 50 and Jackson Street Intersection Improvements Project (Project) in Riverside County, California. The Project area encompasses the Jackson Street right-of-way (ROW) from the intersection with Odlum Drive, approximately 0.5 miles north of the intersection with Avenue 50, to approximately 0.25 miles south of the intersection with Avenue 52, as well as along the Avenue 50 and Avenue 52 ROWs in both eastward and westward directions. The majority of the Project area is within the City of Indio with additional portions in unincorporated Riverside County. The Project area is located within Sections 35 and 36 in Township 5 South, Range 7 East and Sections 1, 2, 11 and 12 in Township 6 South, Range 7 East. The City of Indio is the lead agency for the compliance with the California Environmental Quality Act (CEQA).

This report summarizes the methods and results of the Phase I cultural resource investigation of the Project area. Æ's assessment included a records search and literature review, communication with Native American tribal representatives, and an archaeological survey of the Project area. The purpose of the investigation was to determine the potential for the proposed Project to impact historical resources eligible for or listed on the California Register of Historical Resources (CRHR).

The literature and records search at the Eastern Information Center (EIC) of the California Historical Resources Information System (CHRIS) indicates 53 previous cultural resource investigations and 41 cultural resources documented within 1 mile of the Project area (Study Area). Approximately 50 percent of the Project area has been investigated by 12 of the 53 previous studies. Two of the 41 previously identified cultural resources, historic-period refuse scatters ([33-002082/CA-RIV-2082/H] and [33-013131/CA-RIV-7130/H]), are located within the Project area.

As part of the present cultural resource investigation, Æ sent a request to the Native American Heritage Commission (NAHC) for a search of their Sacred Lands File (SLF). Results of the SLF search indicate no known Native American cultural resources within the Project area. Æ also contacted seven Native American individuals and organizations to elicit information on Native American resources within the Project area, if any. At the time this report was written, Æ had received only one response from the Cabazon Band of Mission Indians.

Æ Archaeologist Evan Mills completed an intensive pedestrian surface reconnaissance survey of the Project area on January 31, 2020. The two previously recorded historic-period refuse scatters ([33-002082/CA-RIV-2082H] and [33-013131/CA-RIV-7130/H]) within the Project area were not found; fieldwork confirmed the recorded locations of both resources are currently within a housing development. No other prehistoric or historic archaeological sites, features, or isolated artifacts were encountered within the Project area during the survey. However, Æ's survey did identify and document seven built-environment resources that are at least 50 years old within the

Project area. None of the built-environment resources were formally evaluated for the CRHR as a part of this study because none of them will be affected by the Project as presently proposed. If Project plans change in the future or a new project is planned that will directly impact any of the built-environment resources (e.g., demolitions of buildings or realignments of roads), formal evaluations CRHR evaluations will need to be completed.

Field notes documenting the current investigation are on file at Æ's Hemet office. A copy of this report also will be submitted to the EIC.

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1
INTRODUCTION

Under contract to Albert A. Webb Associates (WEBB), Applied EarthWorks, Inc. (Æ) conducted a Phase I cultural resource investigation for the Avenue 50 and Jackson Street Intersection Improvements Project (Project) in Riverside County, California. The majority of the Project area is within the City of Indio with additional portions in unincorporated Riverside County. The City of Indio is the lead agency for the compliance with the California Environmental Quality Act (CEQA).

Æ Managing Principal Amy L. Ollendorf, Ph.D., M.S., RPA (12588), served as Æ's principal investigator and was responsible for overall quality control. Æ Associate Archaeologist Kholood Abdo M.A., RPA, served as project manager and report author. Fieldwork was conducted by Æ Associate Archaeologist Evan Mills, M.A., RPA (18026).

1.1 PROJECT LOCATION AND DESCRIPTION

The majority of the Project area is within the City of Indio (Figure 1-1) within Sections 35 and 36 in Township 5 South, Range 7 East and Sections 1, 2, 11 and 12 in Township 6 South, Range 7 East (Figure 1-2). The Project area encompasses the Jackson Street right-of-way (ROW) from the intersection with Odlum Drive, approximately 0.5 miles north of the intersection with Avenue 50, to approximately 0.25 miles south of the intersection with Avenue 52, as well as along the Avenue 50 and Avenue 52 ROWs in both eastward and westward directions. Since Jackson Street between Avenues 50 and 52 is the boundary between the City of Indio to the west and unincorporated Riverside County to the east, some of the Project improvements in the east will be within the County's jurisdiction. The Project entails improvements consistent with the City of Indio's General Plan which include the widening of Jackson Street and the addition of sidewalks, bike lanes, and curbs and gutters, as well as drainage improvements per the City of Indio's Master Drainage Plan. The proposed street improvements within the County are consistent with the agencies' general plan.

The proposed improvements include signalizing the existing 4-way stop. The existing Jackson Street south of Avenue 52 is a two-lane road with one lane of travel in each direction. The project proposes to construct curb and gutter west side and provide a lane taper to accommodate through traffic. The east side will be widened approximately 24 feet with curb and gutter to accommodate a northbound right turn lane. Avenue 52, west of the intersection will be widened approximately 12 feet and taper westerly back to existing pavement to also accommodate a right turn lane onto southbound Jackson Street. There are no improvements proposed along the north side of Avenue 52, west of Jackson Street. Avenue 52, east of Jackson Street will be widened approximately 13 feet on the south side with curb and gutter to accommodate a lane taper. The north side of Avenue 52, east of Jackson will be widened approximately 12 feet without curb and gutter to accommodate a right turn pocket onto northbound Jackson street. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

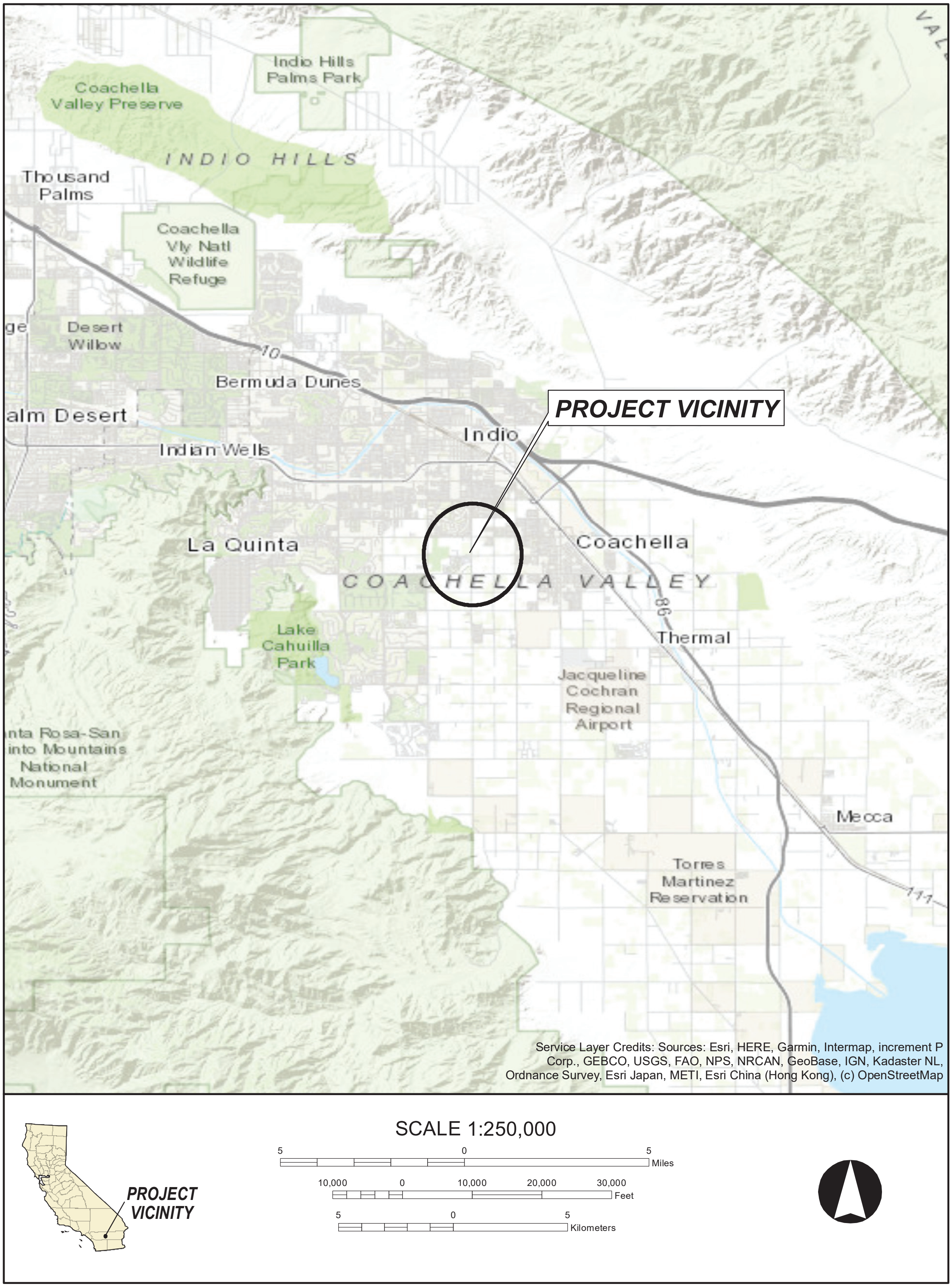

Figure 1-1 Project vicinity map.

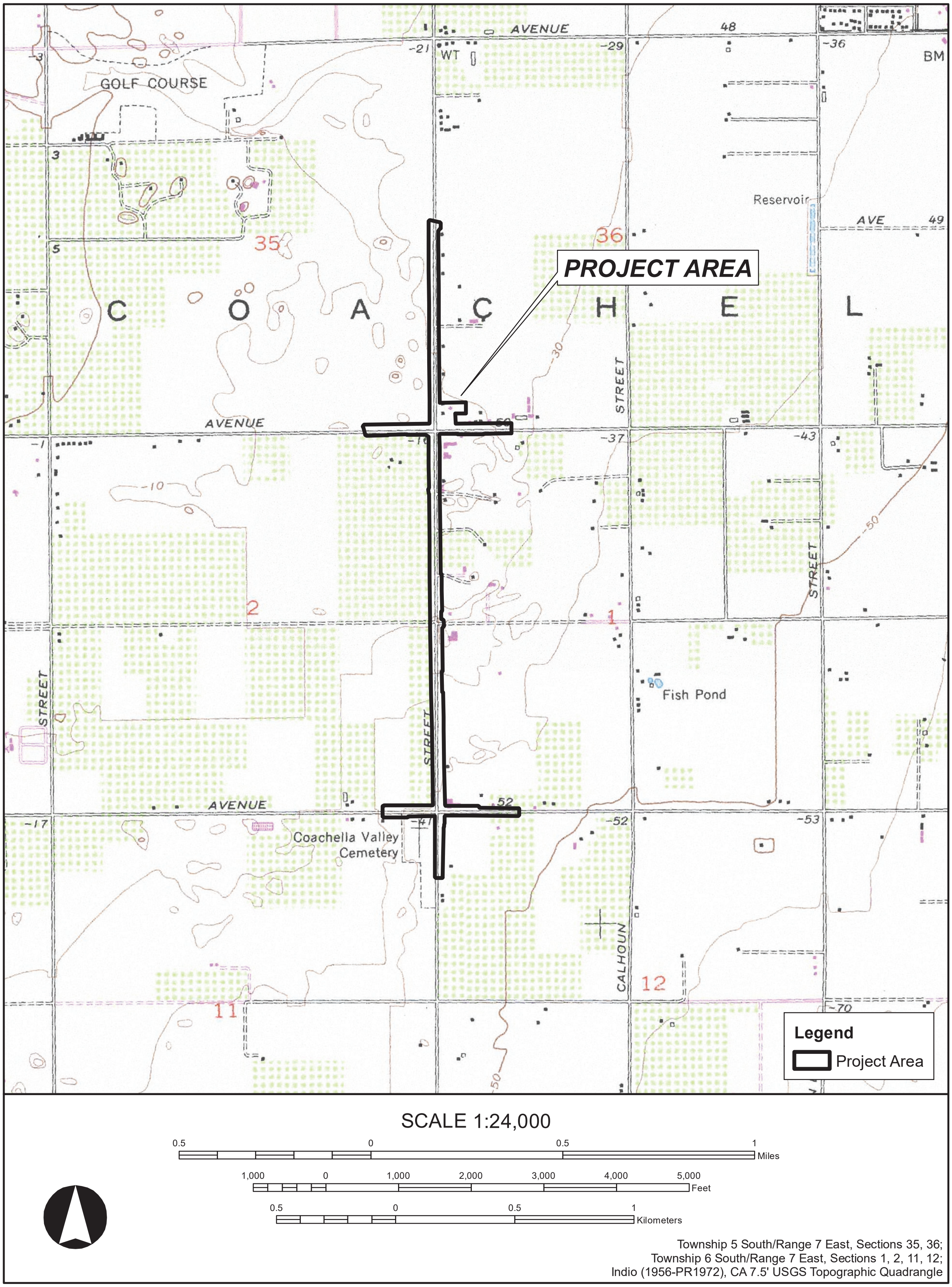

Figure 1-2 Project location map.

Jackson Street (From Avenue 52 to Avenue 51)

The proposed improvements include widening the easterly side of Jackson Street approximately 12 feet and construct an 8' wide, curb-adjacent sidewalk. Existing power poles along this section will be protected in place. All private driveways will be reconstructed with standard residential driveway curb cuts. Approaching the Avenue 51 intersection, the existing right turn pocket to head eastbound on Avenue 51 will be removed and replaced to meet turn pocket design standards. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate storm water, 48" HDPE underground storage pipes are proposed underneath portions of the sidewalk.

Jackson Street at Avenue 51

The proposed improvements include signalizing the existing 2-way stop. ADA ramps are proposed at both northeast and southeast curb returns. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

Jackson Street (From Avenue 51 to Avenue 50)

The proposed improvements include widening the easterly side of Jackson Street approximately 12 feet and construct an 8' wide, curb-adjacent sidewalk. All private driveways will be reconstructed with standard residential driveway curb cuts. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate storm water, 48" HDPE underground storage pipes are proposed underneath portions of the sidewalk.

Approximately 800 feet south of Avenue 50, there are four single family residences located on the east side of Jackson. Removal and reconstruction of said driveways is proposed to accommodate the roadway widening and construction of 8 foot wide sidewalk.

Jackson Street at Avenue 50

The proposed improvements include signalizing the existing 4-way stop. ADA ramps are proposed at both northeast and southeast curb returns. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

There is an existing local market store located at the northeast corner of the intersection. An adjacent 1-acre unpaved lot provided parking for the market customers. The proposed improvements will include paving and striping of the existing lot, along with driveway cuts for lot access.

Along the south side of Avenue 50, west of Jackson Street, there is a 300 foot "gap" of unimproved frontage. The proposed improvements will construct this gap to ultimate width by widening the existing pavement approximately 22 feet, constructing curb & gutter, and sidewalk. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

The south side of Avenue 50, east of Jackson Street will be widened approximately 14 feet and includes construction of curb, gutter, and sidewalk. The proposed ultimate improvements will terminate at the City limit line and include a short pavement transition into the City of Coachella.

The north side of Avenue 50, east of Jackson Street will be widened approximately 16 feet and includes construction of curb, gutter, and sidewalk. The proposed ultimate improvements will terminate approximately 320 feet short of the City limit line, where ultimate improvements have been constructed. Approximately 1,000 linear feet of Imperial Irrigation District (IID) is proposed to be undergrounded.

Jackson Street (From Avenue 50 to Avenue 49)

The proposed improvements include widening the easterly side of Jackson Street approximately 14 feet and construct an 8' wide, curb-adjacent sidewalk. All private driveways will be reconstructed with standard residential driveway curb cuts. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate storm water, 48" HDPE underground storage pipes are proposed underneath portions of the sidewalk.

The width of proposed improvements ranges from12 to 24 feet. Restriping will occur along the alignment on both sides of Jackson Street. Intersection improvements will occur along Jackson Street at Odlum Street as well as at Avenues 50 and 52. Intersection improvements will include turn lanes, restriping, and curb ramps compliant with the Americans with Disabilities Act (ADA). The intersections of Jackson Street at Avenues 50, 51, and 52 also will include the installation of traffic signals. The improvements to Avenue 50 east of the intersection with Jackson Street will include the addition of sidewalks and a bike lane.

Some areas proposed for improvements require ROW acquisition of approximately 1.2 acres; these areas are along Jackson Street north of Avenue 50 and along Avenue 50 east and west of Jackson Street. Project construction will require temporary easements extending up to 25 feet outside of street ROW adjacent to the Project area. Reconstruction of private property will be required at four residences located approximately 800 feet south of Avenue 50. Fence, wall, and driveway reconstruction may be necessary for affected properties.

Project construction also will require relocations of Imperial Irrigation District (IID) power poles and/or undergrounding of power lines. Relocation and/or replacement of existing irrigation facilities owned and operated by Coachella Valley Water District (CVWD) will also be required as necessary. The CVWD irrigation line facilities are located at several locations along Jackson Street. These facilities typically run in the east-west direction, crossing the proposed improvements. Finally, the improvements to Jackson Street will necessitate modification to the existing parking area for the L&G Desert Store on the east side of Jackson Street, just north of Avenue 50.

The maximum depths of disturbance anticipated for the Project are:

- 2 feet below ground surface (bgs) for roadway improvements;
- 10 to 14 feet bgs for traffic signals;

- 10 feet bgs for drainage improvements;
- 8 feet bgs for utility relocation and/or replacement;
- 2 feet bgs for L&G Desert Store parking area improvements; and
- 3 feet bgs for private property reconstruction (fence, wall, driveway).

1.2 REGULATORY CONTEXT

Neither the California Department of Transportation (Caltrans) nor the Federal Highway Administration (FHWA) are involved in this Project (i.e., no federal lands, funds, or permits). The Project requires discretionary approval from the City of Indio. Therefore, the Project is subject to the requirements of CEQA and the City of Indio is the lead agency for CEQA compliance.

The CEQA Statute and Guidelines direct lead agencies to determine whether a project will have a significant impact on historical resources. A cultural resource considered "historically significant" is considered a "historical resource," if it is included in a local register of historical resources or is listed in or determined eligible for listing on the California Register of Historical Resources (CRHR), or if it meets the requirements for listing on the CRHR under any one of the following criteria (Title 14, California Code of Regulations [CCR], § 15064.5):

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

Compliance with CEQA's cultural resource provisions typically involves several steps. Briefly, archival research and field surveys are conducted, and identified cultural resources are inventoried and evaluated in prescribed ways. Prehistoric and historical archaeological sites, standing structures, buildings, and objects) deemed historically significant and sufficiently intact (i.e., historical resources), must be considered in project planning and development.

A project with an effect that may cause a substantial adverse effect to the significance and/or integrity of a historical resource is a project that may have a significant effect on the environment (14 CCR § 15064.5[b]). The lead agency is responsible for identifying potentially feasible measures to mitigate significant adverse changes in the significance of a historical resource (14 CCR § 15064.5[b]4).

1.3 REPORT ORGANIZATION

This report documents the results of a cultural resource investigation of the proposed Project area. Chapter 1 has described the Project and its location, defined the scope of cultural resource investigation, and stated the regulatory context. Chapter 2 summarizes the natural and cultural setting of the Project area and surrounding region. Chapter 3 presents the results of the archaeological literature and records search. Chapter 4 summarizes the Sacred Lands File (SLF) search with the Native American Heritage Commission (NAHC) and Native American communications. The field cultural survey methods and results are discussed in Chapter 5. Cultural resource management recommendations are provided in Chapter 6, and bibliographic references are cited in Chapter 7. Results of the literature and records search are included as Appendix A. The California Department of Parks and Recreation (DPR) 523 recording forms are included in Appendix B, and the results of the SLF search and correspondence with Native Americans are included in Appendix C.

2
SETTING

This chapter describes the prehistoric, ethnographic, and historical cultural setting of the Project to provide a context for understanding the nature and significance of cultural resources known in the region. Prehistorically, ethnographically, and historically, the nature and distribution of human activities in the region have been affected by such factors as topography and the availability of water and natural resources. Therefore, prior to a discussion of the cultural setting, the environmental setting of the area is summarized below.

2.1 ENVIRONMENTAL SETTING

The Project is situated east of the Peninsular Ranges in the southern portion of the Coachella Valley at the western edge of the Colorado Desert. The Coachella Valley is bordered to the southwest by the San Jacinto and Santa Rosa mountains (part of the Peninsular Ranges) and to the northeast by the low, rolling Indio and Mecca hills. From the steep slopes of the San Jacintos surmounted by San Jacinto Peak (3,274 meters [10,804 feet]) above mean sea level (amsl), the desert floor descends sharply at less than 3 kilometers (2 miles) eastward to sea level at the City of Indio.

To the south, elevations gradually drop to 90 meters (300 feet) below mean sea level (bmsl) at the Salton Sea Basin. This basin has filled periodically throughout the Pleistocene and Holocene, when the Colorado River shifted its course near its mouth at the Gulf of California, flowing north into the basin, forming a large freshwater lake commonly known as Lake Cahuilla. A major water source flowing through the central valley is the Whitewater River, which, prior to the development of the Coachella Valley, drained the southern slope of the San Bernardino Mountains for thousands of years (Laflin 2001) and flowed in a generally south-southeast direction 80.5 kilometers (50 miles) toward the Salton Sea. The Whitewater River was likely the largest perennial stream that entered the Salton Basin during prehistoric time, replenishing the underground aquifer during nonlacustrine intervals. A few small streams, such as Snow, Chino, Tahquitz, and Andreas creeks, form high on the San Jacinto and Santa Rosa mountains, descending into the northern end of the Coachella Valley. Several minor drainages of ephemeral streams coming off the Mecca Hills are also evidenced across the landscape east of the Project area. Additionally, numerous springs are located along the San Andreas fault zone at the southwestern base of the Indio Hills. These are usually marked by native fan palm oases.

Prior to the mid-1900s, the climate of the Project region was characterized by low relative humidity, very low rainfall, high summer temperatures of up to 52° C (125 °F), and mild winters. Precipitation occurs primarily during the winter months and varies radically from one area to another. Within the desert areas, the average annual rainfall is as sparse as 6 centimeters (2.5 inches) per year; however, at the higher elevations in the San Jacinto Mountains, the average annual precipitation may range from 25 centimeters (10 inches) to as much as 76 centimeters (30 inches) per year. During the spring and late fall, high winds are common and are accompanied by blowing sand and dust.

As topographic features greatly influence the regional climate, the character of the biotic environment historically exploited by native populations, in turn, was largely controlled by the climate. For instance, the Cahuilla, known ethnographically to have occupied the Coachella Valley, exploited three primary life zones: Lower Sonoran, Upper Sonoran, and Transitional (Bean and Saubel 1972). Characteristic plants and animals found in these life zones are listed below.

The Lower Sonoran life zone, which extends from the desert floor to approximately 1,067 meters (3,500 feet) amsl, is characterized by low rainfall (about 10 centimeters [4 inches] per year), fine-textured alluvial to sandy soils, and xerophytic plant communities. Creosote bush (*Larrea tridentata*) and bursage (*Ambrosia dumosa*) are the dominant plants, replaced by saltbush (*Atriplex* spp.) in areas of more saline or alkaline soils. Adjacent to washes and ephemeral streams, desert willow (*Chilopsis linearis*), smoke tree (*Dalea spinosa*), palo verde (*Cercidium floridum*), desert ironwood (*Olneya tesota*), and catclaw (*Acacia greggii*) are found. California fan palm (*Washingtonia filifera*), mesquite (*Prosopis juliflora*), screwbean mesquite (*Prosopis pubescens*), and arrowweed (*Pluchea sericea*) occur adjacent to more permanent water sources and in areas with a very shallow groundwater table. Frost-sensitive plants such as ocotillo (*Fouquieria splendens*), barrel cactus (*Ferocactus splendens*), prickly pear cactus (*Opuntia* spp.), century plant (*Agave deserti*), creosote bush (*Larrea tridentata)*, and Mojave yucca (*Yucca schidigera*) exist on the well-drained slopes adjacent to the desert floor. Approximately 40 percent of the plant species exploited by the Cahuilla are found in this biotic region; the fruits of the fan palm and the flowers and pods of mesquite and screw bean were highly favored (Bean and Saubel 1972:13). Economically important animals found in this life zone include kangaroo rats (*Dipodomys* spp.), ground squirrels (*Citellus* spp.), wood rats (*Neotoma* spp.), desert cottontail (*Sylvilagus audubonii*), and black-tailed jackrabbit (*Lepus californicus*); desert bighorn sheep (*Ovis canadensis*) are found at the upper reaches of this life zone.

The Upper Sonoran life zone, extending from 1,067 to 1,524 meters (3,500 to 5,000 feet) amsl, is characterized by warm summers and cold winters with rainfall averaging 38 centimeters (15 inches) annually. Pinyon pines (*Pinus monophylla, P. quadrofolia*) and California juniper (*Juniperus californica*) are the dominant plant species of this zone. Other species include red shank or ribbon wood (*Adenostoma sparsifolium*), chamise (*A. fasciculatum*), desert ironwood (*Olneya tesota*), antelope bitterbrush (*Purshia glandulosa*), scrub oak (*Quercus dumosa*), ocotillo (*Fouquieria splendens*), manzanita (*Arctostaphylos* spp.), buckthorn (*Rhamnus* spp.), and barrel cactus (*Ferocactus splendens*). Approximately 45 percent of the food plant species used by the Cahuilla are found in this life zone, with pinyon pine nuts, manzanita, and elderberry highly favored. Important animal resources found in this life zone include woodrats, kangaroo rats, black-tailed jackrabbits, ground squirrels, desert bighorn sheep, and mule deer (*Odocoileus hemionus*).

The Transitional life zone, ranging from 1,524 to 2,134 meters (5,000 to 7,000 feet) amsl, is characterized by relatively cool summers and cold winters with an annual precipitation of 50 to 76 centimeters (20 to 30 inches). This zone is composed primarily of coniferous forests with scattered groves of oak (*Quercus* spp.). Willows (*Salix* spp.) and cottonwood (*Populus* spp.) occur along stream courses. Common species include ponderosa pine (*Pinus ponderosa*), Jeffery pine (*P. jeffreyi*), incense cedar (*Calocedrus decurrens*), bigcone spruce (*Pseudotsuga macrocarpa*), manzanita, mountain mahogany (*Cercocarpus* spp.), and elderberry (*Sambucus* spp.). Probably the most important plant food species from this life zone are the black oak (*Q. kelloggii*), manzanita, and elderberry. Approximately 15 percent of the plants utilized by the Cahuilla are found in this life zone. Important animal resources found in this life zone include ground squirrel and mule deer.

Three soil series are mapped in the Project area by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)—Coachella, Gilman and Myoma (Soil Survey Staff 2020a, 2020b).

Coachella soils are distributed at the north end of the Project area. These young and thin soils belong to the Entisol soil order and their development has been prevented by repeated deposition of sediment in periodic floods. Soils in the Coachella series are forming in lacustrine basins from sediments dominantly derived from igneous rocks. Slopes are gently sloping to nearly level. According to the official series description, the typical pedon of Coachella soils lacks A and B horizons and consists solely of light olive gray (5Y 6/2, dry) C horizons composed of fine sands grading downward to very fine sands, some with silt lenses, to a sampled depth of (152 centimeters) 60 inches. Uncultivated areas have a sparse cover of desert shrubs and weeds.

Gilman soils are mapped in the northern, northeast, and southern portions of the Project area. As the Coachella soils described above, these soils are also young, thin, and belong to the Entisol soil order. Their development also has been prevented by repeated deposition of sediment in periodic floods. Unlike Coachella soils, however, the Gilman loams formed on slopes of 0 to 3 percent in stratified stream alluvium on floodplains and alluvial fans, such as the Whitewater River north of the Project area. According to the official series description, the typical pedon for this soil series consists of a pale brown (10YR 6/3, dry) plowzone (Ap horizon) to 13 inches depth underlain by stratified pale brown (10YR 6/3, dry) very fine sandy loam C horizons to the maximum sampled depth of 60 inches (152 centimeters). Native vegetation is mesquite, catclaw, creosote, arrow weed, and saltbush with cottonwood, willow, and salt cedar in open areas.

Myoma soils are mapped throughout the center and into the northern and southern portions of the Project area. Like the Coachella and Gilmore soils, these soils are also young, thin, and belong to the Entisol soil order. Unlike the other two soil series, however, Myoma soils are derived from sand blown from recent alluvium. They are distributed on nearly level to rolling topography, although they have hummocky micro relief where unprotected. The typical pedon for the Myoma soil series is similar to the Coachella soil series in that it lacks A and B horizons and consists solely of light olive gray (5Y 6/2, dry) C horizons composed of fine sands grading downward to very fine sands. Unlike Coachella soils, conch and/or clam shells are present in some of the Myoma soils' C horizons, which is correlated to slight to strong effervescence. Native vegetation is ephemeral grasses and forbs, and a sparse cover of creosote, bush sunflower (*Encelia californica*), and mesquite.

None of the mapped soil series has a buried A (Ab) horizon and all of the soils lack well-developed A and B soil horizons. The depth for roadway improvements and private property reconstruction is 3 feet bgs, and the maximum depth of proposed disturbances for traffic signals, drainage improvements, and utility relocation/replacement (8–14 feet) will penetrate far deeper. These construction-related activities are unlikely to affect intact and significant buried archaeological resources, because of the lack of well-developed soils within the Project area. The most likely settings for buried archaeological resources in the vicinity of the Project area are soils in well-developed overbank deposits on the Whitewater River floodplain and under sand dunes as well as on former shorelines of ancient Lake Cahuilla (see below).

2.2 LAKE CAHUILLA

Probably the most important environmental change in the Colorado Desert in the past 2,000 years was the formation of Lake Cahuilla, also known geologically as Lake Le Conte and historically as Blake's Lake, located approximately 9 miles south of the Project. Lake Cahuilla formed numerous times throughout the Pleistocene and Holocene in response to the western diversion of the Colorado River into the Salton Trough. During each filling of Lake Cahuilla, water was impounded north of the barrier created by the Colorado River Delta. The lake continued to fill until the water reached an altitude of 12 meters (40 feet) amsl, the minimum crest of the delta at Cerro Prieto, where excess discharge would overflow into the Gulf of California (Waters 1983:374). Wilke (1976) calculated that about 12 to 20 years would be required to fill Lake Cahuilla to an altitude of 12 meters (40 feet) if the lake were to receive the entire flow of the Colorado River; as well, Wilke determined that 60 years would be required to completely desiccate the lake without input from the Colorado River.

Utilizing radiocarbon assays, historical accounts, and cross-dating artifacts found along a former Lake Cahuilla shoreline, Wilke (1976:90–93) posited three lacustrine intervals in the Salton Basin representing an unknown number of stands of Lake Cahuilla during the past 2,000 years. The earliest of these was dated to approximately 2,100 to 1,400 years ago, the second occurred between 1,100 to 750 years ago, and the final lake stand occurred between 700 and 500 years ago.

More recent archaeological research by Waters (1983) in the Salton Basin has further refined Wilke's original estimates of the Lake Cahuilla lacustrine intervals. Based on additional radiocarbon assays, historical evidence, Late Holocene sedimentological history of the Gulf of California, and interpretation of sedimentation rates, Waters (1983) refined Wilke's timing of lacustrine intervals of Lake Cahuilla; this research suggested that there were four lacustrine intervals that reached the 12 meter (40-foot) shoreline during the last 1,500 years (Waters 1983:382–385). The first and earliest of these events has been dated to A.D. 700–890, apparently followed by a gradual, but complete, desiccation of the lake at about A.D. 950. The second interval began shortly after A.D. 950 and peaked at approximately A.D. 965–1150; again, this was followed by a gradual, but complete, desiccation of the lake at A.D. 1210. The third interval began shortly after A.D. 1210 and peaked between A.D. 1225 and 1360. The third interval was followed by a gradual desiccation of the lake to an altitude of 40 meters (132 feet) bmsl by A.D. 1450, although the lake was still approximately 50 meters (165 feet) deep at this time. This desiccation was quickly reversed shortly after A.D. 1450, resulting in the fourth interval that lasted until approximately A.D. 1520. By A.D. 1580, Lake Cahuilla had once again dried up completely.

Additional archaeological research by Cleland (1999), Laylander (2006), and Schaefer (1986) suggests that a fifth, more recent lacustrine interval of Lake Cahuilla occurred sometime between the Spanish explorations of the region in 1540 and again in 1775; radiocarbon dating indicates that this high stand may have occurred between 1685 and 1740 (Cleland 1999:13). The Lake

Cahuilla chronology in calendar years before present (1950; cal B.P.) corrected for variations in 14C is as follows: Lacustrine Interval 5: 330–270 cal B.P.; Lacustrine Interval 4: 520–370 cal B.P.; Lacustrine Interval 3: 740–580 cal B.P.; Lacustrine Interval 2: 1010–740 cal B.P.; and Lacustrine Interval 1: 1250–1010 cal B.P. It should be noted that the dates for the duration of the lake high stands represent maximum spans. The stratigraphic record reveals that the next oldest lacustrine intervals are associated with radiocarbon assays from two distinct sedimentary strata dating to approximately 2285 and 2300 cal B.P. The stratigraphic continuity evident between these older late Holocene lacustrine sediments and the overlying unit representing Lacustrine Unit 1, above, indicates that there were no Lake Cahuilla episodes between about 2300 and 1250 cal B.P. (Waters 1983).

The lacustrine chronology is important not only for understanding occupational sequences and changing land-use, settlement, and subsistence strategies in Coachella Valley prehistory, but also for determining when volcanic glass was available from the Obsidian Butte source (Hughes 1986) near the southern end of the Salton Sea in Imperial County. In late prehistoric times, especially after A.D. 1000, toolstone from Obsidian Butte was used widely in Southern California. However, the source was inundated and its glass was inaccessible whenever Lake Cahuilla's surface elevation was higher than -40 meters (-131 feet) (Schaefer and Laylander 2007). Thus, whether expanding or receding, the lake would have prevented access to Obsidian Butte glass whenever the water level stood between 40 meters bmsl and 12 meters amsl.

Significant new information about the late Holocene chronology of Lake Cahuilla has recently come to light as a result of a paleoseismic study by a team of geologists from the California Institute of Technology, University of Oregon, and U.S. Geological Survey. Three benched trenches totaling more than 950 meters (3,116 feet) in length were excavated in 2006 across the San Andreas Fault zone in the City of Coachella. Although the primary purpose of this work was to investigate the nature and frequency of past earthquakes, the excavations also revealed stratified lacustrine, fluvial, and shoreline deposits that, together with numerous radiocarbon dates, elucidate the late Holocene fluctuations of ancient Lake Cahuilla (Philibosian et al. 2009:1).

The observed strata indicate five or six high stands of ancient Lake Cahuilla since circa A.D. 800. The age and duration of each interval were obtained "by projecting the thickness of the lake sediment through the date-constrained sedimentation rate" (Philibosian et al. 2011:33). As reconstructed by Philibosian et al. (2011:Figure 18), the highstand chronology of Lake Cahuilla at the 9-meter site in Coachella is as follows:

- Lake Interval 1: A.D. 1650–1710
- Lake Interval 2: A.D. 1500–1610
- Lake Interval 3: A.D. 1390–1470
- Lake Interval 4: A.D. 1100–1180
- Lake Interval 5: A.D. 950–1050
- Lake Interval 6: A.D. 850–920

Philibosian et al. (2011:34–35) compare their lacustrine sequence with chronologies developed by other researchers elsewhere at higher and lower elevations in the Salton Trough and find general correspondence among the chronologies when allowances are made for local geologic conditions and archaeometric factors. Interestingly, it would appear that the basin was not completely dry during the two periods (circa A.D. 1470–1500 and A.D. 1610–1650 separating the three most recent high stands (supra), and that a body of water similar to the Salton Sea remained in the lower part of the basin during those periods (Brothers 2009; Philibosian et al. 2011:34).

In summary, the shoreline of the most recent documented stands of Lake Cahuilla extended from about 32 kilometers (20 miles) south of the international border with Mexico to just northwest of the City of Indio. Inundating the entire lower portion of the Coachella Valley, Lake Cahuilla was approximately 184 kilometers (115 miles) long, about 54 kilometers (34 miles) wide, and nearly 97 meters (320 feet) deep; during these periods (circa 1,500 years ago), the elevation of the lake was 12 meters (40 feet) amsl (Wilke 1976:53). When inflow from the Colorado River was sufficient to maintain a relatively stable lake level, extensive marshes would have formed around its margins and freshwater fish and shellfish populations would have flourished. Thus, Lake Cahuilla offered an especially productive environment for aboriginal populations of the western Colorado Desert. When filled, Lake Cahuilla was on the Pacific Flyway for migratory birds; hence, ducks, geese, and other migratory birds as well as fish would have been available. Wilke (1976:15) estimated that an annual loss by evaporation of approximately 1.7 meters (5.5 feet) of surface elevation would have dried Lake Cahuilla within 60 years, assuming no renewed inflow from the Colorado River occurred. Thus, it is likely that 30 years of progressive recession, or lowering the surface of the lake by approximately 18 meters (60 feet), would have sufficiently altered the chemical and ecological balance of the lake to all but eliminate its economically important plant and animal resources. However, as Lake Cahuilla gradually desiccated, the expansion of mesquite thickets followed the retreating shoreline, resulting in different resource, exploitation patterns by the prehistoric inhabitants of the region (Smith and Brock 1998).

2.3 PREHISTORIC SETTING

General overviews of archaeological research and prehistory in southeastern California have been compiled by various scholars, notably Arnold et al. (2004), Cleland (1999), Jertberg (1982), Sutton (2011), Sutton et al. (2007), Wallace (1962), Warren (1984), and Weide and Barker (1975). For the Coachella Valley specifically, archaeology and prehistory have been summarized by Dahdul (2013), Kaldenberg et al. (2013), Love and Dahdul (2002), McDougall and Mirro (2012), Schaefer (1994), Schaefer and Laylander (2007), Waters (1982), and Wilke (1976, 1978). Recently, Laylander (2010) published a detailed examination of linguistic prehistory as it relates to the Archaic-to-Late Period transition in this area (see also Golla 2011:254–256). The following sections provide a brief synthesis of cultural chronology in southeastern California with emphasis on late prehistoric developments in the Coachella Valley.

2.3.1 Cultural Chronology

Excluding various controversial claims of human activity in the California deserts 20,000 to more than 100,000 years ago (see the critical assessments by Moratto [1984:39–49] and Taylor et al. [1985]), scholars have not yet determined when people first entered the Colorado Desert.

Based upon the facts that: (1) fluted Clovis points and "Clovis-like" bifaces have been found throughout much of North America, including at dozens of sites in California (Dillon 2002; Moratto 1984; Rondeau 2015), (2) such artifacts evidently were produced as early as approximately 13,250–12,800 cal B.P. (Waters and Stafford 2007:1123), and (3) evidence for pre-Clovis occupation has been found widely in South and North America (Adovasio and Pedler 2013; Collins et al. 2013; Graff et al. 2013; Jenkins et al. 2013; Waters et al. 2011), it seems quite probable that humans first arrived in southeastern California more than 130 centuries ago.

People who lived in this area witnessed great environmental changes. During the Pleistocene-to-Holocene transition, temperatures became warmer, precipitation declined, evapotranspiration increased, and desert conditions spread northward from Mexico into the American Southwest. Preceding or coincident with these changes, the great Rancholabrean animals ("megafauna") vanished, and a host of smaller, desert-adapted creatures came to occupy the emerging arid environments (Grayson 2016; Kurtén and Anderson 1980; Martin 2005). By middle Holocene times, the earlier steppe and woodland landscapes featuring numerous pluvial lakes had given way to xerophytic vegetation, dry lakebeds (playas), and sere desert landscapes.

However, the environmental changes were neither permanent nor unidirectional. Rather, they fluctuated throughout the Holocene epoch. As a result of variable climatic regimes and geomorphic conditions: droughts came and went; lakes appeared, filled, and receded; the species composition, density, and distribution of vegetation were dynamic; and the availability of faunal resources (mollusks, fish, reptiles, waterfowl, upland birds, and game animals) varied concomitantly. These environmental changes significantly affected human adaptive strategies and demographic patterns. Thus, the archaeological record of late Pleistocene and early-through-middle Holocene prehistory is one of "punctuated equilibrium," characterized by abrupt cultural change separating intervals of relatively stable adaptation. Many of the cultural and environmental shifts seem to be correlated, and some of the former may reflect not only the advent of new adaptive modes but also the replacement of older populations by new arrivals.

Many attempts have been made over the years to relate, classify, and determine the age of archaeological cultures in the California deserts (see Altschul 1993; Hall 2000; Laylander 2010; McDonald 1992; Rogers 1966; Schaefer 1994, 1995; Schaefer and Laylander 2007; Sutton 1996, 2011; Sutton et al. 2007; Warren 1984; M. Weide 1976). Without delving into minute details of local sequences, the following broad "periods" are employed in this report:

- **Historic Period** (A.D. 1540–1850). The initial date for this period varies from one locality to another, depending on when contacts between Native Americans and outsiders actually began.
- **Late Prehistoric Period** (circa A.D. 700–1800). Various local cultural manifestations are recognized. In the Coachella Valley, Patayan I–III phases (previously called Yuman I–III) are assigned to this period. Recently, Sutton (2011) has defined Peninsular I, II, and III phases of the Palomar Tradition within what was previously called Patayan III.
- **Late Archaic Period** (circa 2500 B.C.–A.D. 700). This interval coincides more or less with the Gypsum, Newberry, and Amargosa periods (see Sutton 2011:Figure 2).
- **Early Archaic Period** (circa 6500–2500 B.C.). This is largely synonymous with the Pinto period as used elsewhere in the deserts of southeastern California (see Schroth 1994).

- **Late Paleoindian Period** (circa 10,800–6500 B.C.). This period coincides with the Western Pluvial Lakes Tradition in interior southern California (and in the Great Basin) and the related, perhaps entailed, San Dieguito Complex.
- **Middle Paleoindian Period** (circa 11,300–10,800 B.C.). The Clovis cultural tradition was widespread in North America during this period. Early manifestations of the Western Stemmed Point Tradition also appeared during this interval.
- **Early Paleoindian Period** (pre-11,300 B.C.). This is an undefined Pre-Clovis period as indicated by the discovery of pre-Clovis cultural remains elsewhere in North (as well as South) America (cf. Graff et al. 2013; Waters et al. 2011).

2.3.2 Late Prehistory

The Late Prehistoric Period in the Colorado Desert and far western Arizona is marked by certain kinds of artifacts and technological innovations, and is defined as the Patayan Pattern (Cleland 1999; Cordell 1997; Cultural Systems Research, Inc. [CSRI] 1986; Reid and Whittlesey 1997:111–130; Schaefer 1994, 1995) or the Palomar Tradition, including Patayan I, II, and III, and Peninsular I, II, and III phases of the Palomar Tradition within what was previously referred to as Patayan III (cf. Sutton 2011). This period is characterized by the introduction of ceramics, including Tizon Brown Ware from the Peninsular Range, Colorado Buff Wares from the Colorado River region, and the use of Salton Buff Ware from the Lake Cahuilla shoreline (Schaefer 1995; Waters 1982). New projectile point types, including Desert Side-notched and Cottonwood Triangular points, signify the advent of the bow and arrow (Justice 2002). Floodplain horticulture also appears along the Colorado River at about the same time as ceramics. Additionally, mortuary practices changed from extended burial to cremation, with the burned remains sometimes buried in ceramic vessels. Typical of the Hohokam culture in southern Arizona (cf. Haury 1976), these traits were introduced to the Colorado River inhabitants and gradually spread west to the Peninsular Range and coastal plains of southern California. Only agriculture remains a problematic trait in regard to its uncertain spread beyond the Colorado River and Imperial Valley in late prehistoric times (CSRI 1986:35).

The Patayan Pattern or Palomar Tradition (Sutton 2011) is typified by several different settlement and economic systems (Schaefer 1995). Along the Colorado River, dispersed seasonal settlements featured *jacal* structures, semisubterranean pit houses, *ramadas*, or brush huts, depending on the season, type of settlement, and resources available locally. Occupants of larger villages would disperse to upper terraces of the Colorado River and to special collection areas during the summer months, coinciding with the flood phase of the river, and return to the lower terraces for crop harvesting. At the eastern base of the Peninsular Range, the settlement pattern was typified by dispersed villages situated at the mouths of canyons with perennial streams, at the base of alluvial fans near springs, or where wells could be dug (e.g., at Indian Wells). In addition to such villages, specialized sites were located in microenvironmental zones that were exploited seasonally. Archaeologically, the sites range from bedrock mills and pot-drops along trails, to tool stone quarries and workshops, to temporary camps containing bone, shell, ceramics, flaked and ground stone tools, and ornamental items such as beads and pendants as well as other occupational debris.

Three phases of Patayan are generally recognized in addition to the pre-ceramic phase (Schaefer 1995). These are defined by changes in pottery frequencies and by the cultural and demographic effects of the filling and desiccation of ancient Lake Cahuilla. The Patayan I phase appears to have been confined to the Colorado River vicinity and began approximately 1,200 years ago with the introduction of pottery. The artifacts typical of this phase bear the closest similarity to those of the Hohokam (cf. Cordell 1997; Haury 1976; Schaefer 1995; Waters 1982).

The Patayan II phase, beginning about 950 years ago, is contemporary with Lacustrine Interval 5 of Lake Cahuilla (see above). Attracted to highly productive microenvironments along the Lake Cahuilla shoreline, people on both its eastern and western shores were making pottery by the time the lake was full. New ceramic types indicate that sedimentary, non-marine clays from the Peninsular Range were being selected.

The final phase, Patayan III, began approximately 500 years ago, coinciding with Lake Cahuilla Lacustrine Interval 2. This phase, encompassing Sutton's (2011) Peninsular I–III phases, is characterized by new pottery types that reflect changes in settlement patterns, as well as intensified communication among tribes of the Colorado River and Peninsular Range. Long-distance travel increased as people living around the former Lake Cahuilla shore dispersed to their base territories, and the Imperial and Coachella valleys became increasingly xeric (Schaefer 1995). Wilke (1976) has postulated that, by approximately 250 years ago with the final desiccation of Lake Cahuilla prior to the twentieth century, the native occupants of its shores began moving westward into areas such as Anza-Borrego, Coyote Canyon, the Upper Coachella Valley, the Little San Bernardino Mountains, the San Jacinto Valley, and Perris Plain. The Patayan III phase continued into the early historic period, ending in the late nineteenth century when Euro-American incursions disrupted the traditional culture. The Patayan III peoples include the Cahuilla who occupied the western Colorado Desert region, as well as the Quechan, Mojave, and Cocopa of the Colorado River region.

Recently, Sutton (2011) proposed that the proto-Cahuilla cultures occupying the Peninsular Range and northern Coachella Valley during the Late Prehistoric Period resulted from an eastward movement of people of Yuman ethnicity speaking Takic (a branch of Uto-Aztecan) languages from the inland valley areas of coastal Orange County and northern San Diego County. Sutton (2011:6) proposed that the impetus for this migration was the filling of Lake Cahuilla after circa 1070 B.P. Sutton identifies this eastward movement of people, and the concomitant introduction of new technologies and ideas into the region, as Peninsular I, II, and III phases of the Palomar Tradition (Sutton 2011:1–74).

The Peninsular I phase, dating from circa 900 to 750 B.P., reflects: the initial movement of people into the northern Coachella Valley from the interior valleys as Lake Cahuilla filled; the establishment of major villages along the Lake Cahuilla shoreline; and the adoption of a lacustrine-based subsistence system. The arriving Peninsular I groups would have encountered existing Yuman (Patayan I) groups and either "absorbed or replaced them" (Sutton 2011:21). Material culture traits associated with Peninsular I groups include: the introduction of Cottonwood (arrow) points, augmenting the existing bow and arrow technology (e.g., Desert Side-notched points) in the northern Coachella Valley; arrow shaft straighteners; the retention of existing Patayan II pottery (Tumco Buff and Salton Buff); few stone ornaments and/or stone pipes; the appearance of shell ornaments; use of obsidian from the Coso Volcanic Field, Obsidian Butte, Bagdad, and unknown sources; bedrock milling slicks but few mortars and pestles; and addition of technology related to lacustrine-based adaptations. The principal mortuary practice of Peninsular I groups involved primary pit cremation (Sutton 2011:5, 21).

Groups associated with the Peninsular II phase in the northern Coachella Valley, dating from circa 750 to 300 B.P., are thought to have been the proto-Cahuilla (Sutton 2011:5). Peninsular II is "proposed to reflect the changes in settlement and subsistence that were instituted to adapt to the fluctuations of Lake Cahuilla, prior to its 'final' desiccation" (Sutton 2011:42). Peninsular II material culture traits include: the addition of Tizon Brown pottery, ceramic pipes, and few ceramic figurines; increased usage of Tumco Buff and Salton Buff pottery in lakeshore sites; use of glass from the Coso Volcanic Field, Obsidian Butte, and some unknown sources; and the addition of stone fish traps along the fluctuating shoreline of Lake Cahuilla. Additionally, the Peninsular Funerary Complex (PFC) appeared during this phase, with secondary cremations placed in "containers," as did associated with mourning ceremonies. The Peninsular II phase ended with the final desiccation of Lake Cahuilla about 300 B.P. (Sutton 2011:5, 42).

The Peninsular III phase, dating from circa 300 to 150 B.P., represents the historic Cahuilla who were encountered by the first European explorers to visit the region. With the final desiccation of Lake Cahuilla, lacustrine-based subsistence strategies were abandoned, and terrestrial-based subsistence systems adopted. Critical economic resources (e.g., cultigens) may also have been obtained from Yuman groups along the Colorado River and from Euroamericans. Additionally, with the demise of the lake, some people may have moved westward into the northern Peninsular Ranges and/or into areas such as Anza-Borrego, Coyote Canyon, the Upper Coachella Valley, the Little San Bernardino Mountains, the San Jacinto Valley, and Perris Plain (see Patayan III discussion above). Cultural traits associated with the Peninsular III phase include: continued use of Desert Side-notched and Cottonwood arrow points and Tizon Brown pottery; the absence of Tumco Buff and Salton Buff, and addition of Colorado Buff pottery; primary use of Obsidian Butte glass; the addition of new figurine types; and the introduction of Euroamerican artifacts (e.g., glass beads and metal tools). Primary pit cremation once again became the preferred mortuary practice, with the retention of mourning ceremonies (Sutton 2011:5).

2.3.3 Interpreting Variability in Mortuary Patterns

Concerning the periodic infilling of the Salton Basin by Lake Cahuilla and how human populations may have adapted to the cyclical changes in the ecological conditions of the basin, Dahdul (2013) recently examined the data from mortuary remains and habitation sites to investigate questions concerning hunter-gatherer adaptations to this dynamic environment. More specifically, Dahdul's research explores the "relationship between funerary practices and three broader issues: mobility, resource competition and social differentiation" (Dahdul 2013:ix).

In the past, two models have been developed to explain the effects of the periodic filling of the Salton Basin by Lake Cahuilla on hunter-gatherer settlement and subsistence systems. The first model suggests that lacustrine events were of short duration and marked by frequent fluctuations that resulted in unproductive and unpredictable subsistence bases (e.g., D. Weide 1976; M. Weide 1976). To cope with such unstable conditions, populations would have had to maintain flexible mobility strategies that could rapidly adapt to the ecological conditions within the basin. Under this scenario, Dahdul hypothesized that the entire shoreline would have been exploited by residentially mobile groups "who buried the dead in temporary camps, resulting in the occurrence of isolated burials amidst habitation debris in the vicinity of the lake margin" (Dahdul 2013:235).

The second model assumes that at least some high lake stands were sufficiently stable and of long enough duration to establish highly productive freshwater marshes at the northwest end of the lake where the topographic contours would have resulted in relatively shallow, gradually sloping shoreline depths. Consequently, this marsh zone would have been occupied by more sedentary, logistically mobile groups than those groups occupying less productive (i.e., steeper, rockier) shoreline areas (Wilke 1978:39–40). Under this scenario, Dahdul hypothesized that logistically mobile populations living near the marsh zone "would have buried the dead within or near long-term settlements, resulting in clusters of burials," and that such groups exploiting relatively large catchment areas would transport the already-cremated remains of at least some of the deceased back to the primary residential sites for final interment, resulting in the presence of secondary burials as well as primary ones (Dahdul 2013:235).

To conduct her research, Dahdul (2013) compiled the mortuary and settlement/subsistence data from 47 sites in the vicinity of Lake Cahuilla's shorelines spanning from Late Archaic to Ethnohistoric times. Most of these sites were located near the marsh zone at the northwestern end of the lake. Nearly all the mortuary features identified in the study consisted of cremation remains. Two sites in particular, CA-RIV-3013 (Love et al. 2000; Hogan et al. 2005) and CA-RIV-5211/H (McDougall and Mirro 2012), contributed especially important data concerning mortuary practices within the basin.

For settlement data, Dahdul obtained information pertaining to site structure, food remains, and artifact types. These data were then used to extrapolate the type of settlement represented by the cultural evidence. The data collected from mortuary deposits and features included information on spatial location, the physical structure of cremation facilities, and grave associations of funerary items. Skeletal data included age and sex of the deceased, total cremated bone weight, pattern of burning on bone, and any visible osteopathology. This data were then used to define the distribution and organization of mortuary sites in relation to settlement types (Dahdul 2013:ix–x).

The results of Dahdul's in-depth research indicate that groups in the northern Salton Basin practiced both logistical and residential mobility throughout the period studied, *regardless of whether a lake stand was present*, and that the number of mortuary features present at a site was not dependent on the type of settlement, but rather the duration of occupation and/or recurrence of use at a location. Further, the data examined from two formal cemeteries (i.e., CA-RIV-3013 and CA-RIV-5211/H) indicated to Dahdul that these two cremation grounds were established and maintained by corporate groups as a means of legitimizing and maintaining use-rights of critical resources, and that the uniformity in burial treatment and paucity of prestige goods accompanying the deceased at these two sites indicate that these corporate groups "maintained an ethos of egalitarianism" (Dahdul 2013:x, 234–241).

2.3.4 Lake Cahuilla and Laguna Macuata: Alternative Models of Cultural Ecology

In discussing the cyclical filling of the Salton Basin by Lake Cahuilla and its effects on the settlement and subsistence strategies of the prehistoric groups occupying this portion of the

Colorado Desert, a brief discussion of Laguna (Lake) Macuata and its role in Colorado Desert prehistory also seems warranted. The Laguna Macuata basin lies immediately south of the U.S./Mexican border and the Yuha Desert and is situated between the Sierra Juárez on the west, and the Sierra Cucapá and its southern extension, the Sierra Mayor, on the east. In the southern end of the basin, a broad low gap between the Sierra Mayor and the Sierra Las Pintas farther to the south opens the basin to the lower Colorado River delta. Like the much larger Salton Basin to the north (Laguna Macuata only covers a surface area of 820 square kilometers, similar to that of the modern-day Salton Sea at 890 square kilometers), Laguna Macuata's floor extends below sea level, and evidence indicates that the basin was periodically flooded by fresh water from the Colorado River, and possibly also by sea water penetrating north and inland from the Gulf of California (Laylander et al. 2016:27–29).

Accounts by early explorers attest to the periodic flooding of the Laguna Macuata basin by water from the Colorado River and/or the Gulf of California. During the Oñate expedition in 1604–1605, Francisco de Escobar concluded that the Gulf of California extended much farther to the north beyond the mouth of the Colorado River, around the southern end of the Sierra Mayor, and into the Laguna Macuata basin. In September 1771, Francisco Garcés, traveling west from the Colorado River delta, reached the Sierra Cucapá where he was told of Indians near a large body of water three days west of the mountains. The people, or water (or both?) were referred to as Maqueque, or Maquete. Garcés never did reach the lake during the expedition in 1771, but did reach the northern edge of the Laguna Macuata basin in 1774, which he described as a dry lake with the remains of many fish of various sizes on the beach. From the sizes of the larger fish, Garcés concluded that these were saltwater fish that must have entered the basin when it had been open to the Gulf of California. Observations of the Laguna Macuata basin made by others in 1785, 1796, 1828, 1890, 1893, 1905, and 1907 recount the basin as dry, full, or partially inundated (Laylander et al. 2016:30–33).

Ethnographically, the Laguna Macuata basin was occupied by the Cocopa, Tipai, and Paipai. During times when the basin was partially flooded with fresh water the Cocopa planted crops. Travel to the delta at the southern end of the basin provided the Tipai and Paipai access to its agricultural products. During an interview conducted between 2013 and 2015, Antonio Porcayo Michelini was told by one Cocopa man, Rosario García González (Don Chayo)—a fisherman on Laguna Macuata—that the lake provided an inexhaustible supply of fish that were taken by the Cocopa for food (Laylander et al. 2016:33–34).

Prehistoric archaeological sites within the Laguna Macuata basin can be found both at the mouths of the major canyons that enter the basin from the surrounding mountains, and also along the lake's high shoreline contours. While the shoreline sites likely evince use during times when the basin was inundated, the canyons provided their own sources of fresh water and biotic resources, and sites found at these locations could have been occupied when the lake was either present or absent (Laylander et al. 2016:29). However, the full spectrum of prehistoric use and occupation of the Laguna Macuata basin has yet to be determined. Most sites identified thus far appear to date to either the Late Prehistoric Period, or to an earlier, undated, period. The latter consist mostly of lithic scatters containing highly patinated and weathered artifacts suggesting considerable antiquity, possibly dating to the early Holocene and associated with the San Dieguito Complex (cf. Moratto 1984; Warren 1984). The late sites typically contain Patayan pottery (i.e., Colorado Buff, Tizon Brown, Salton Brown, and Tumco Buff) associated with a variety of flaked and ground stone artifacts and, in some cases, marine shellfish remains and anthropic sediments.

Other archaeological manifestations around the basin include bedrock milling features, rock art panels (both pictographs and petroglyphs), cleared ("sleeping") circles, and aboriginal trails. Lithic materials used for flaked stone artifacts include silicified rhyolite, wonderstone, and glassy scoria—materials available locally in the mountains and canyons surrounding the basin and on desert pavement surfaces along the edges of the basin. Obsidian from a number of sources is present, as well. Glass from the Lágrimas de Apache (Apache Tears) source in the Sierra Las Pintas along the basin's southern margin is present at a number of sites; however, within the northern portion of the basin, that source is displaced by glass from the Obsidian Butte source in the Salton Basin. A type of glass used extensively in prehistoric Baja California whose precise geological source has yet to be determined, identified as Unknown Santa Catalina, can also be found at sites around the basin (Laylander et al. 2016:34–38).

Research into how prehistoric groups adapted to the periodic infilling and evaporation of Laguna Macuata is ongoing. However, by comparing the similarities and differences between Laguna Macuata and ancient Lake Cahuilla, some inferences in its role in the lives of the prehistoric inhabitants of the Colorado Desert can be made.

Size differences between the two lakes were likely responsible for differing adaptive strategies. Lake Cahuilla might have taken one human generation to fill and several generations to evaporate completely after the Colorado River diverted itself away from the Salton Basin (see above). In stark contrast, the infilling of Laguna Macuata by the river might have taken only a few months, and it might have disappeared again after about six years, assuming complete diversion of the river. Because of Lake Cahuilla's much larger volume and longer period of evaporation, recessional shorelines could be successively occupied, perhaps for several decades. Because the much shallower depth of Laguna Macuata (14 meters versus 96 meters at Lake Cahuilla) tended to make the lake's cycles much shorter than Lake Cahuilla, use during recessional periods was probably minimal. The shorter cycles of Laguna Macuata also may have prohibited the development of sustainable populations of freshwater fish and extensive stands of shoreline vegetation like those at Lake Cahuilla. This may be evinced archaeologically; whereas stone fish traps are common along Lake Cahuilla's western high stand and recessional shorelines, no similar features have been reported at Laguna Macuata (Laylander et al. 2016:39). However, it is conceivable that fish may have been captured at Laguna Macuata using techniques that have not yet been identified in archaeological contexts or may not be amenable to preservation, such as nets or weirs.

Differing settlement strategies likely were adaptive to the differing environmental conditions. Whereas the longer cycles of Lake Cahuilla likely made it possible for longer-term occupations at shoreline residential sites, due to a comparatively rapid evaporation rate once the Colorado River returned to its original course the shorter lake cycles of Laguna Macuata may not have been conducive to long-term, shoreline residential occupations. Alternatively, if the Gulf of California extended into the Laguna Macuata basin for extended periods of time, more permanent residential sites may have been established where fresh water was available from springs, or rivers and streams debouching into the basin from the adjacent mountain ranges. It is also possible that higher, more prolonged periods of freshwater run-off from the nearby mountains during the late Pleistocene resulted in a much slower evaporation rate of Laguna Macuata, creating a more permanent freshwater lake more conducive to the establishment of sustainable biotic resources and longer-term residential occupations (Laylander et al. 2016:40).

As discussed above, two models have been offered to explain the effects of the periodic infilling of the Salton Basin by Lake Cahuilla on hunter-gatherer settlement and subsistence systems. The first model suggests that lacustrine events were of short duration and marked by frequent fluctuations that resulted in unproductive and unpredictable subsistence bases (e.g., D. Weide 1976; M. Weide 1976), and to cope with such unstable conditions, populations would have had to maintain flexible strategies, including mobility, that could rapidly adapt to changing conditions within the Salton Basin. The data suggest that Laguna Macuata's cycles were much briefer but more frequent than those of Lake Cahuilla's. If the data are correct, then human responses to the briefer and more frequent fillings of Laguna Macuata may have preconditioned the prehistoric inhabitants of the Colorado River delta and parts of the Peninsular Ranges to respond more rapidly and with a greater degree of success to the much more productive environmental conditions and bio-diversity afforded by Lake Cahuilla, and to the challenges of adapting to the lake's cycles of filling, recession, and desiccation (Laylander et al. 2016:41).

2.4 ETHNOGRAPHIC SETTING

At the time of Spanish contact, the APE was likely utilized by the Cahuilla. The Cahuilla have been studied extensively by Dr. Lowell Bean and much of the following discussion is derived from Bean's description of the Cahuilla in Volume 8 of the *Handbook of North American Indians* (Bean 1978:575–587).

The Cahuilla belong to the nonpolitical, cultural nationalities speaking a language belonging to the Takic branch of the Shoshonean family, part of the larger Uto-Aztecan language stock. The Cahuilla in precontact times had nonpolitical, nonterritorial patrimoieties that governed marriage patterns as well as patrilineal clans and lineages. The Cahuilla words for these moieties mean "Coyote" and "Wildcat."

The Cahuilla had "political-ritual-corporate units (clans) composed of 3 to 10 lineages, dialectically different, named, claiming a common genitor, with one lineage recognized as the founding one" (Bean 1978:580). Clans owned a large territory in which each lineage owned a village site with specific resource areas. Clan lineages cooperated in defense, in large communal subsistence activities, and in performing rituals. Founding lineages often owned the office of ceremonial leader, the ceremonial house, and a ceremonial bundle (Bean 1978:580). Settlements, occupied by one or more lineages, could be politically autonomous or allied with several villages under one chief. The hereditary chiefs had religious, economic, and military power and were role models for their people. They were aided in their duties by one or more assistants. The chiefs and their families, along with the very wealthy, were the elites of the society. The acquisition of wealth was important, but the acquisition of extreme material wealth was prevented by the custom of burning or burying the possessions of the deceased.

The Cahuilla were, for the most part, hunting, collecting, harvesting, and protoagricultural peoples. Clans were apt to own land in valley, foothill, and mountain areas, providing them with the resources of many different ecological niches. Individual lineages or families owned specific resource areas within the clan territory. Although any given village had access to a wide array of necessary resources, briskly flourishing systems of trade and exchange gave them access to the resources of their neighboring villages and of distant peoples. Rules that forbade marriage to anyone related within five generations or belonging to the same moiety ensured that everyone had relatives living in many ecozones, an important arrangement because relatives were invited to ceremonies. The ceremonial exchange of gifts between hosts and guests under the direction of the chiefs and shamans at such events provided a way for drought-stricken groups to get food in exchange for treasure goods. Thus, oscillations in the subsistence goods supply were dampened by "banking" human effort in the production of treasure goods.

As in most of California, acorns were a major staple, but the roots, leaves, seeds, and fruit of many other plants also were used. Fish, birds, insects, and large and small mammals were available. Bighorn sheep, mule deer, and antelope (*Antilocapra americana*) are some of the large mammals hunted. Mountain lion (*Puma concolor*), black bear (*Ursus americanus*), grizzly bear (*Ursus arctos horribilis*), and wild boar (*Sus scrofa*) also were hunted in historic times.

To gather and prepare these food resources, the Cahuilla had an extensive inventory of equipment. Bows and arrows were the most important hunting tools, but traps, nets, disguises, blinds, throwing sticks, and slings were also part of the hunting technology. For fishing, nets, traps, spears, hooks and lines, and fish poisons were used. Gathering required few tools: poles for shaking down pine nuts and acorns, pickers from cactus spines, seed beaters, digging sticks, weights for digging sticks, and pry bars. Materials associated with transportation mainly were used to move food and include burden baskets, carrying nets, game bags, and saddle pads. Some food was stored in large baskets. Pottery ollas and baskets treated with asphaltum were used to store and carry water and seeds. Wood, clay, and steatite were used to make jars, bowls, and trays. Skin and woven grass were used to make bags. Food processing required hammers and anvils for cracking nuts; mortars and pestles for grinding acorns; manos and metates for grinding seeds and berries; winnowing shells and baskets; strainers; leaching baskets and bowls; knives of stone, bone, wood, and carrizo cane (*Arundo donax*); bone saws; and drying racks made of wooden poles to dry fish. Basket mortars, with asphaltum or pine pitch used to attach an open-bottomed basket to a mortar, were important for food processing. Food was served in wooden and gourd dishes and cups and in basket bowls that were sometimes tarred. Wood, shell, and horn were used for spoons.

Cahuilla shelters were often made of brush, fan palm fronds, or arrowweed. In prehistoric times, they were dome shaped; later they tended to be rectangular. Near such dwellings usually stood brush-covered ramadas under which domestic chores were done. Earth-covered sweathouses for purification and curing rituals and ceremonial houses with fenced areas for ceremonial use were found in most villages. The chief's house was the largest and was usually next to the ceremonial house. Each village also had several granaries (Bean 1978:578).

The Cahuilla, like other California Indians, understand the universe in terms of power. They assume power to be the principal causative agent for all phenomena. Power is believed to be sentient and to have will. Unusual natural phenomena are viewed as especially sacred, being the repositories of concentrations of power. Mountain tops, and especially particular mountain tops, are held sacred, as are unusual rock formations, springs, and streams. Rock art sites are sacred, having been the sites of ceremonies. Burial and cremation sites are also sacred, as are many other places of residual power. Various birds, especially eagles, condors, hawks, and other birds of prey are revered as sacred beings of great power and sometimes were killed ritually and mourned in mortuary ceremonies similar to those for important individuals. For this reason, bird cremation sites are sacred.

As part of his doctoral research, Wilke (1976) examined Cahuilla oral tradition as it related to the prehistoric lakeside adaptation of Lake Cahuilla. Ethnographic sources indicate that during the 1853 Pacific Railroad Survey expedition, W. P. Blake, while encamped at a Cahuilla village about 16 kilometers (10 miles) south of the present City of Indio, inquired if the Indians had any knowledge of the lake that formerly stood in the Salton Basin. The head man of the village related to Blake a tradition of a great water which filled the basin and abounded in fish and waterfowl (Wilke 1976:7). The head man stated that his people's ancestors then lived in the mountains (presumably the Santa Rosa Mountains to the west) and came down to the lake to fish and hunt. After a time the water receded, and they moved their villages down from the mountains onto the exposed lakebed (Wilke 1976:8 after Blake 1856:98). Later the Cahuilla told ethnographer Stephen Bowers that their ancestors had formerly caught fish in the lake with "stone fish traps" along the foot of the San Jacinto and Santa Rosa mountains (Wilke 1976:8 after Bowers 1891:229–230). As well, Bowers was informed that when the lake receded, Coyote (a mythical character to many Native American groups) came down from the mountains and planted mesquite beans on the lakebed so that mesquite thickets would grow and help feed the people (Wilke 1976:9 after Bowers 1888, 1891). These fragments of oral literature, coupled with archaeological data collected over the years, attest to the economically rich resource base that Lake Cahuilla offered to the local inhabitants of the region.

2.5 HISTORICAL SETTING

The history of the California desert region has been reviewed in detail by von Till Warren et al. (1981:85–105). A very brief summary of historical events in the Project area is provided below.

2.5.1 Coachella Valley

Very little is known about the historic developments in the Coachella Valley prior to 1820. However, in 1821, a party of Cocomaricopa Indians arrived at the San Gabriel Mission, announcing they had traveled from the Colorado River in only 6 days using the Cocomaricopa trail (von Till Warren et al. 1981:85). This Indian trail began east of Blythe and approximated the present route of I-10 across the Chuckwalla Valley, traversing the Mecca-Indio area and Coachella Valley to the San Gorgonio Pass (northwest of the Project area).

In the early 1850s, the Maricopa-Bradshaw route, paralleling the old Cocomaricopa trail, was established to serve the mining camps developing near La Paz, Arizona (von Till Warren et al. 1981:85). Also in the 1850s, the U.S. government strongly promoted the establishment of a railroad route to connect the east and west coasts. Because of competing economic and political considerations, however, it was not until 1877 that the Southern Pacific Railroad (SPRR) transected the western Colorado Desert (von Till Warren et al. 1981:89). This route connected the San Gorgonio Pass to the town of Yuma via the eastern shore of the Salton Sea.

The process of surveying and mapping the Colorado Desert began in 1852, when Henry Washington and a small party of surveyors ascended the San Bernardino Mountains and established the San Bernardino Baseline and Meridian. From 1854 to 1857, Washington extended this line to the Colorado River, working his way through uncharted territory all the way (von Till Warren et al. 1981:94).

Also in the 1850s, the U.S. government sent Indian Commissioners into the deserts of southern California. Although not authorized to make any commitments to the Native Americans, the Commissioners set aside large tracts of land for reservations (von Till Warren et al. 1981:94). Most of these areas were never fully developed as reservations, although the Torres Martinez and Agua Caliente (Palm Springs) reservations were eventually set aside from the larger reserves delineated by the Indian Commission. Once the Indian population was confined to the reservations, the remaining land was made available for mining, ranching, and other uses.

Management of the desert lands was largely the responsibility of the General Land Office, and later the Department of Agriculture Grazing Administration. Until the passage of the Taylor Grazing Act of 1934, however, no control was exercised over the California desert lands. Because of the extremely arid nature of the California deserts, this act had virtually no impact on the region; not until the responsibility for managing the desert came under control of the Bureau of Land Management (BLM) in 1946 were the first attempts made at range management. Since that time, the BLM also has been engaged in evaluating lands for their "uses," and classifying them for different types of management (von Till Warren et al. 1981:95).

The paucity of water in many areas of the Colorado Desert discouraged farming, and agricultural development only flourished when water could be imported in significant quantities. Because of the relatively high water table in the Coachella Valley, however, the agricultural industry began to develop prior to the importation of water by means of drilling artesian wells. Beginning in the first decade of the twentieth century, Coachella Valley farmers planted extensive date (*Phoenix* spp.), fig (*Ficus* spp.), and grape (*Vitis* spp.) acreage. Towns that developed with the agricultural growth include Thermal, Mecca, Indio, and Coachella. Because of the extensive farming efforts, the water table in the Coachella Valley was seriously depleted, stimulating the formation of the Coachella Valley County Water District (CVCWD) in 1918 to promote conservation and replenish the groundwater basin. Following passage of the Boulder Canyon Project Act of 1928, the waters of the Colorado River were harnessed for the development of agriculture in Imperial and Coachella valleys. The CVCWD cooperated with the Imperial Irrigation District to develop the All-American Canal and the Coachella Valley extension. Branching off from the All-American Canal, the Old Coachella Canal extends 123.5 miles north to the northern Coachella Valley, bringing the first imported irrigation water to the valley in 1949 (Nordland 1978).

2.5.2 Development of the City of Indio

The City of Indio came about because the SPRR was in need of a station between Yuma, Arizona and Los Angeles, California, the last link of the southern transcontinental railroad. An oasis near a Cahuilla village site, called Indian Wells, halfway between the two cities, was the ideal spot to refuel and hydrate in the desert. The United States granted the SPRR a generous land grant which forced the Native Americans to live on reservations and work manual labor jobs. It was discovered that the name, Indian Wells, was already being used on maps for an area a few miles away so the SPRR decided on the name Indio for the new depot site. The railroad arrived in Indio in 1876 (Laflin 2008). For water, the SPRR drilled into the ground to access the plentiful underground aquifer. The SPRR depot and hotel was completed in 1879 which became the social hub of the new town for homesteaders, travelers, and railroad workers (Laflin 2008).

Homesteader A. G. Tingman was a key player in the development of Indio. He was the SPRR station agent and telegrapher in 1883. He built Indio's first store in 1885 and was the town's postmaster in 1888. The Indio post office was the first in Coachella Valley. Tingman also developed Indio's original townsite (Laflin 2008).

Many early homesteaders lived in tents shaded by palm frond structures. In 1896, Indio had a population of 50 people, mostly men. Supplies were transported along the Bradshaw Trail through the western mountains. In 1897, the SPRR built an infirmary called the Southern Pacific Hospital which attracted more homesteaders to this small desert town (Laflin 2008).

Although Indio began as a railroad town it soon turned into an agricultural center. The Coachella branch of the All-American Canal brought more water for irrigation allowing many crops to thrive. Onions, cotton, grapes, and dates were grown in Indio with great success. Exotic date palms from the Middle East and North Africa thrived and became a cultural icon for the town. The annual National Date Festival started inIndio and was advertised as the Date Capital of the World (Laflin 2008).

The City of Indio was incorporated in 1930, making it the first city in the Coachella Valley. In the 1930s the Metropolitan Water District of Southern California constructed the Colorado River Aqueduct (CRA) as part of the Boulder Dam project to provide water from the Colorado River to the Los Angeles basin via the Los Angeles Aqueduct. This was the largest construction project in the United States during the Great Depression (Laflin 2008).

During World War II, General George Patton's Desert Training Center was nearby, which brought soldiers into town for rest and relaxation. The completion of the Coachella Branch of the All-American Canal brought Colorado River water to the desert in the late 1940s, and a land boom ensued. Today, the City of Indio is currently the largest and fastest growing city in Riverside County's Coachella Valley with over 89,000 residents (City of Indio 2018; Laflin 2008).

3
CULTURAL RESOURCE LITERATURE AND RECORDS SEARCH

On July 25, 2019 prior to the field survey of the Project area, Æ conducted an archaeological literature and records search at the Eastern Information Center (EIC) of the California Historical Resource Information System (CHRIS), housed at the University of California, Riverside. The objective of this records search was to determine whether any prehistoric or historical cultural resources had been recorded previously within an area encompassing a 1-mile-wide buffer around the Project area (Study Area). The records search indicated 53 cultural resource investigations have been conducted previously within the Study Area (Appendix A). Twelve of these previous investigations (Table 3-1) involved portions of the Project area; 50 percent of the Project area has been previously surveyed as a result.

Table 3-1
Previous Cultural Resource Investigations Involved the Project Area

Author(s)	Date	EIC Reference #	Title
Berryman, Stanley	1980	RI-01101	Results of an Archaeological Survey of the Indian Palms Country Club, Indio, California
Love, Bruce	1998	RI-01102	Cultural Resources Report: Indian Palms Country Club, City of Indio, Riverside County, California
Love, Bruce and Karl Lorenzen	1991	RI-03366	Cultural Resources Assessment: Tentative Parcel 26826, City of Indio, Riverside County, CA
Brock, James	2002	RI-04552	Phase I Cultural Resources Assessment for a 116-Acre Property in the City of Coachella, Riverside County, California (APN 612-220-002, 612-220-004, 612-240-1, 612-240-002, 612-240-003, And 612-240-004)
Brock, James	2003	RI-04669	Phase I Cultural Resources Assessment for A 60-Acre Property in the Cities of Coachella and Indio, Riverside County, California (Tentative Tract 31433 Indio)
O'Neil, Stephen	2002	RI-04684	Cultural Resources Reconnaissance of the Indio Ranchos Polo Estates, City of Indio, Riverside County, California
Demcak, Carol R.	2004	RI-04817	Report of Archaeological and Paleontological Monitoring at Tract 30684, Coachella, Riverside County, California
Hogan, Michael, Bai Tang, and Mariam Dahdul	2003	RI-05988	Historical/Archaeological Resources Survey Report, County Estates, City of Indio, Riverside County, CA
Clark, Tiffany	2015	RI-09563	Cultural Resource Monitoring Report for the Las Plumas West Project, City of Indio, Riverside County, California
Horne, Melinda, Molly Valasik, and Sherri Gust	2012	RI-09622	82266 Avenue 50 Cultural Resources Assessment City of Coachella, Riverside County, California
Olson, John	2017	RI-09879	Re: Archaeological and Paleontological Resources Monitoring Program Tower market/Revella Project

Table 3-1
Previous Cultural Resource Investigations Involved the Project Area

Author(s)	Date	EIC Reference #	Title
Tang, Bai "Tom" and Deirdre Encarnacion	2010	RI-10342	Cultural Resources Technical Report City of La Quinta General Plan (2010 Update)

These previous investigations resulted in the identification of a total of 41 previously recorded cultural resources in the Study Area (Table 3-2). Thirty-six of the resources are archaeological and five are built environment. The archaeological resources consist of 13 prehistoric archaeological sites, 7 historical archaeological sites, 3 sites with both prehistoric and historical artifacts, and 13 isolated finds. One of the previously documented resources is on the Office of Historic Preservation (OHP) Historic Property Directory (HPD), although outside of the Project area—Wittier Ranch/Astor Ranch (33-008302). Only two of the 41 previously documented resources appear to be located within the Project area—CA-RIV-2082/H (prehistoric ceramic scatter and historic refuse scatter) and CA-RIV-7310/H (historic refuse scatter, now destroyed).

Table 3-2
Cultural Resources in the Study Area

Primary	Trinomial	Description
Prehistoric Archaeological Sites		
33-002083	CA-RIV-2083	Lithic and ceramic scatter
33-002084	CA-RIV-2084	Ceramic scatter
33-002085	CA-RIV-2085	Seasonal camp with ceramic scatter
33-008270	CA-RIV-6087	Lithic and ceramic scatter
33-008271	CA-RIV-6088	Ceramic scatter
33-008272	CA-RIV-6089	Ceramic scatter
33-008291	CA-RIV-6090	Ceramic scatter
33-011124	CA-RIV-6689	Ceramic scatter
33-011410	CA-RIV-6797	Lithic and ceramic scatter
33-011411	CA-RIV-6798	Ceramic scatter
33-012294	CA-RIV-7017	Lithic and ceramic scatter
33-013130	CA-RIV-7309	Subsurface ceramic scatter (destroyed during construction for the Indian Palms Country Club Development).
33-013250		Cremation (collected and handed over to Cabazon Band of Mission Indians)
Historical Archaeological Sites		
33-011412	CA-RIV-6799H	Refuse scatter, primarily 1940s-1960s
33-013064	CA-RIV-7297H	Agricultural complex remnants
33-01313[a]	CA-RIV-7310	Refuse scatter (destroyed during construction for the Indian Palms Country Club Development)
33-014901	CA-RIV-7932	Irrigation well with four concentrated refuse scatters
33-015674	CA-RIV-8167	Water conveyance system

Table 3-2
Cultural Resources in the Study Area

Primary	Trinomial	Description
33-15997	CA-RIV-8292	Coachella (Bundschuch) Cemetery 1880s-1928
33-022298		Water conveyance system
Sites with both Prehistoric and Historic components		
33-002082[a]	CA-RIV-2082	Prehistoric ceramic scatter and historic refuse scatter (destroyed during construction for the Indian Palms Country Club Development)
33-012379	CA-RIV-7031	Prehistoric lithic and ceramic scatter with historic refuse scatter
33-026887	CA-RIV-6079	Prehistoric lithic and ceramic scatter with historic refuse scatter
Isolated Finds		
33-011125		Prehistoric chert debitage
33-011269		Prehistoric ceramic sherd
33-011393		Prehistoric discoidal
33-011584		Historic amethyst glass fragment
33-011585		Prehistoric bifacial mano
33-012510		Prehistoric ceramic sherd
33-013094		Prehistoric mano, and charcoal (collected during monitoring)
33-013095		Prehistoric mano, three pieces of fire-affected rock and charcoal (collected during monitoring)
33-014902		Prehistoric mano
33-014904		Prehistoric mano
33-015303		Prehistoric ceramic sherd
33-022299		Prehistoric ceramic sherd (in three pieces)
33-022300		Prehistoric ceramic sherd
Built-Environment Resources		
33-008302[b]		Wittier Ranch/Astor Ranch; Mission Revival style house constructed ca. 1925
33-011583		Clayton house, vernacular architecture, constructed in 1941
33-013204		Date farm complex, wood-frame house of vernacular architecture, constructed in 1916
33-014798		A single-story Spanish Eclectic-style building, Celebrity House, constructed ca. 1934
33-014903		Carian farm/Chuchian farm, Ranch style house constructed c. 1945-1954 (83859 Avenue 52)

[a] within the Project Area, [b] properties listed on the HPD

The prehistoric archaeological sites are lithic scatters, ceramic scatters, and a cremation. The historical archaeological sites include surface and subsurface refuse scatters, agricultural features, water conveyance features, and a historic cemetery. Five built-environment resources were also identified within the Study Area. Four of these consist of historical residential structures and one is a date farm complex.

The Two previously recorded cultural resources within the Project area are described below and in Appendix B:

- 33-002082/CA-RIV-2082/H, a historic-period trash scatter containing prehistoric ceramic sherds. The site was first recorded and tested in 1980. Testing determined no subsurface prehistoric deposit or association with habitation or known source. In May 2002, CRM TECH performed archaeological mitigation and a data recovery program at the site and determined the site does not meet the criteria for listing in the CRHR. The site location is currently the location of the Indian Palms Country Club housing development (Eddy 2005).

- 33-01313 /CA-RIV-7310/H, a historic-period domestic refuse scatter, was encountered and recorded in 2003 during construction monitoring for the Indian Palms Country Club housing development. All the artifacts were collected and recorded. The site was destroyed during construction grading (Smallwood 2003).

In addition to the EIC research, Æ also consulted the Indio 1904 30-minute U.S. Geological Survey (USGS) topographic quadrangle map, the Coachella 1941 and 1956 15-minute USGS topographic quadrangle maps, and the Indio 1956 and 1972 7.5-minute USGS topographic quadrangle maps to assess historical land uses in the Study Area. The 1904 shows the Project area is located west of the Cabazon Indian Reservation. The Coachella historic topographic quadrangle maps (USGS 1941, 1956a) and Indio historic topographic quadrangle map (USGS 1956b) show the development of Jackson Street, Avenue 50, and Avenue 52 and improvements from the early 1940s and into the1950s. No residences or other structures are depicted on any of the historic maps.

4
NATIVE AMERICAN COMMUNICATIONS

Æ contacted the NAHC on July 22, 2019, for a review of the SLF, to determine if any known Native American cultural resources (e.g., traditional use or gathering areas, places of religious or sacred activity) are present within or adjacent to the Project area. The NAHC responded on August 15, 2019, stating the SLF search was completed with negative results. The NAHC requested Æ contact Native American individuals and organizations to elicit information regarding cultural resource issues related to the Project, if any.

Upon review of the Native American contact list and by removing redundancies and adding individuals and organizations geographically and culturally affiliated with the Project area, Æ contacted seven individuals and/or organizations regarding the Project. Æ sent a letter via electronic mail on February 3, 2020 describing the Project and asking these individuals and organizations for their input. Copies of the letters, the list of contacts, and received responses are included in Appendix C. Æ sent follow-up email correspondence to the organizations who had not responded to the initial request on February 17, 2020.

Individuals/organizations contacted include:

- Patricia Garcia-Plotkin, Director of the Agua Caliente Band of Cahuilla Indians
- Amanda Vance, Chairperson of the Augustine Band of Cahuilla Mission Indians
- Doug Welmas, Chairperson of the Cabazon Band of Mission Indians
- Travis Armstrong, Tribal Historic Preservation Officer of the Morongo Band of Mission Indians
- Joseph Ontiveros, Cultural Resource Department of the Soboba Band of Luiseño Indians
- Michael Mirelez, Cultural Resource Coordinator of the Torres-Martinez Desert Cahuilla Indians
- Anthony Madrigal, Tribal Historic Preservation Officer of the Twenty-Nine Palms Band of Mission Indians

As of the date of this report, only one response had been received. The Cabazon Band of Mission Indians Cahuilla Indians stated the Project area is located outside of the Tribe's current reservation boundaries and the Tribe has no specific information about the Project area.

5
CULTURAL RESOURCE SURVEY METHODS AND RESULTS

5.1 SURVEY METHODS

Æ Associate Archaeologist Evan Mills performed an intensive pedestrian field reconnaissance survey of the Project area on January 31, 2020. The survey began at the east end of Avenue 50 east of Jackson Street and was completed at the south end of the Project area approximately 0.25 mile south of the intersection of Jackson Street and Avenue 52. The Survey involved walking near the shoulders of the asphalt paved roads within the Project area:

- Avenue 50 east between Jackson Street and Colonia Drive, and Avenue 50 west between Jackson Street and Vista Montana Circle.
- Jackson Street from Odlum Drive north of Avenue 50 to approximately 0.25 miles south of the intersection of Jackson Street and Avenue 52.
- The Intersection of Avenue 52 and Jackson Street.

Æ's archaeologist also documented structures within or adjacent to but outside the Project area that appeared to be 50 years of age or older by inspecting the exteriors of the buildings in order to assess their current conditions and recording any evidence of renovations or alterations. Private residences were observed and documented from the public ROW and no private property was accessed. Æ's archaeologist took photographs of each of the buildings as part of the documentation process. However, because this cultural assessment was limited to identification only, none of the resources were formally evaluated for eligibility for listing in the CRHR. The DPR 523 series site records were updated for the two previously recorded archaeological sites. In addition, new DPR forms were prepared for the built-environment resources encountered during the survey (see Appendix B).

5.2 SURVEY RESULTS

The Project area is heavily developed with a combination of hard- and softscape (i.e., living landscape) in which no assessment of sediments could be made. Ground surface visibility within open areas (i.e., not covered with hardscape) was excellent (100 percent). Figure 5-1, 5-2, and 5-3 are overview photographs of the Project area.

Æ's archaeologist inspected the few subareas where the ground surface appeared to be lightly developed or undeveloped, along the east side of Jackson Street and along Avenues 50 and 52. However, no native, undisturbed soils were observed on the ground surface during the intensive survey. The previously recorded sites (CA-RIV-2082/H and CA-RIV-7310/H) within the Project area have been developed into residential housing. No prehistoric or historic-period archaeological resources were encountered within the Project area during the field survey.

Figure 5-1 Project area overview from Avenue 50 east of Jackson Street, facing east.

Figure 5-2 Project area overview form Jackson Street north, facing north.

Figure 5-3 Project area overview from Avenue 52 east of Jackson Street, facing east.

Three historic-period roads and four historic standing structures older than 50 years of age were encountered during the field survey. The three historic roads are Jackson Street, Avenue 50, and Avenue 52, whereas the four buildings are L&G Desert Store (east side of Jackson Street north of Avenue 50) and three residences at 50120, 50140, and 50320 Jackson Street (all on the east side of the street). These seven built-environment resources are depicted on Figure 5-4, summarized below, and discussed in detail in the DPR forms (Appendix B).

5.2.1 Segment of Jackson Street (Æ-4072-1H)

The segment of Jackson Street within the Project area extends from Avenue 52 (south) to Odlum Drive (north). Generally, the west side of the street is within the City of Indio and the east side of the street is in the County of Riverside. This segment is 9,025 feet long (1.7 miles), 50 feet wide with four lanes two lanes southbound, one lane northbound, and a turning lane in the center). Sidewalk only exists on the west side of Jackson Street. This road segment within the Project area is paved, highly traveled, and in good condition. With respect to the historic maps reviewed for the Project, the earliest representation of this road segment is on the USGS (1941) topographic quadrangle map.

5.2.2 Segment of Avenue 50 (Æ-4072-2H)

The segment of Avenue 50 within the Project area is centered on the intersection with Jackson Street. This segment is 2,043 feet long, 50 feet wide with four lanes west of Jackson Street to 1,760 feet east of Jackson Street where it narrows eastward to 35 feet wide with two lanes.

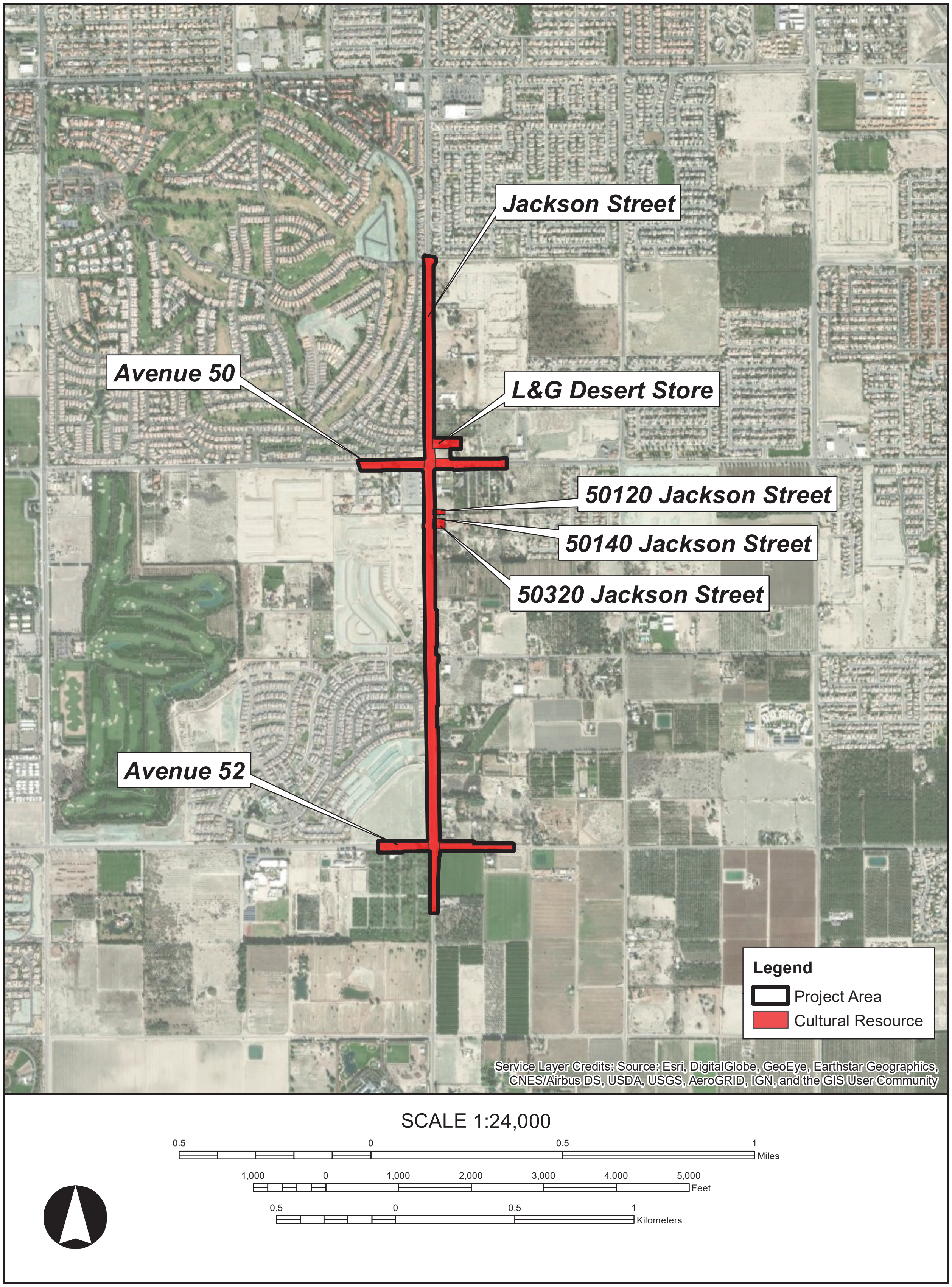

Figure 5-4 Cultural resources within the Project area.

Sidewalk exists only along the wider portion of Avenue 50 west of Jackson Street. This road segment within the Project area is paved, highly traveled, and in good condition. Similar to the segment of Jackson Street described above (Æ-4072-1H), the earliest representation of this road segment is also on the USGS (1941) topographic quadrangle map.

5.2.3 Segment of Avenue 52 (Æ-4072-3H)

The segment of Avenue 52 within the Project area is also centered on the intersection with Jackson Street. This documented segment is 1,815 feet long, 50 feet wide with four lanes west of Jackson Street and 35 feet wide with two lanes east of Jackson Street. Sidewalk only exists on the north side of Avenue 52 west of Jackson Street. This road segment within the Project area is paved, highly traveled, and in good condition. Like the other two road segments within the Project area described above (Æ-4072-1H and -2H), the earliest representation of this road segment is also on the USGS (1941) topographic quadrangle map.

5.2.4 L&G Desert Store (AE-4072-4H)

Located on the east side of Jackson Street north of Avenue 50 at 49900 Jackson Street in the City of Indio, the L&G Desert Store consists of two buildings. Building 1 is a single-story commercial facility (Figure 5-5) and Building 2 is a small, single-story residence/storage facility(Figure 5-6). According to historic aerials Riverside County Assessor information (NETROnline 2020), both buildings date to 1956.

The L&G Desert Store (Building 1) is a vernacular design with a shallow-angle to flat roof with painted red trim. The shallow-angle portion is a gable roof covering the store, whereas the flat roof overhangs the store's entrance. The exterior of Building 1 is clad with wood siding painted brown; the flooring of the entryway and interior of the building is concrete slab. Multiple past repairs, alterations, and modifications to Building 1 were evident; the building likely does not retain the character or appearance of the original construction. Therefore, level of integrity of Building 1 is poor.

Building 2 is directly north of and detached from Building 1. This building is clad with wooden shingles painted white and a shallow-angle asphalt roof. Building 2 is currently used as storage for overflow of Building 1 stock.

5.2.5 Assessor's Parcel Number (APN) 767-120-006

Located at 50140 Jackson Street (APN 767-120-006) on the east side of the street south of Avenue 50 in unincorporated Riverside County, this resource is a single-family, single-story ranch-style stucco house (Figure 5-7) with a detached outbuilding at the far east end of the backyard. The exterior stucco is painted gray with darker gray trim. A cinderblock wall painted white stands at the Jackson Street entrance to the parcel. According to Historic Aerials (NETROnline 2020), the residence was initially constructed in 1953 with additions constructed in 1972. No details are known about the outbuilding in the backyard. The construction date and function of the outbuilding are unknown at this time.

Figure 5-5 South façade/entrance of L&G Desert Store (Building 1), facing north.

Figure 5-6 Southwest façade/entrance of Building 2, facing north.

Figure 5-7 West façade of residence at 50140 Jackson Street, facing east.

5.2.6 APN 767-120-007

Another residence on the east side of the street south of the intersection with Avenue 50 in unincorporated Riverside County is located at 50320 Jackson St (APN number is 767-120-007). This resource is a multiple-family, single-story stucco house (Figure 5-8) with a detached outbuilding at the far east end of the backyard. The house is painted tan with white trim. A cinder block wall painted white with a metal gate and topped with short metal fencing stands at the Jackson Street entrance to the parcel. Since the entrance gate to the parcel and foliage obscures the residence from the street, no further descriptive information is available at this time. According to Historic Aerials (NETROnline 2020), the residence was initially constructed in 1953 with at least one addition constructed in 1972.

5.2.7 APN 767-120-027

A third residence on the east side of the street south of the intersection with Avenue 50 in unincorporated Riverside County was documented for the Project. Located at 50120 Jackson Street (APN 767-120-027), this single-family, single-story stucco house with a hipped roof (Figure 5-9) and detached garage. The house is painted tan with brown trim. A chain-link fence surrounds the parcel. Since the entrance gate to the parcel and foliage obscures the residence from the street, no further descriptive information is available at this time. According to Historic Aerials (NETROnline), the residence was initially constructed in 1953 with at least one addition constructed in 1972 . The detached garage is located off the southeast corner of the house.

Figure 5-8 Residential property at 50320 Jackson, facing northeast.

Figure 5-9 West façade/entrance to Residence at 50120 Jackson Street, facing east-northeast.

6
MANAGEMENT RECOMMENDATIONS

The two previously recorded cultural resources (historic-period refuse scatter [33-002082/CA-RIV-2082] and [33-013131/CA-RIV-7130]**)** within the Project area were not found. Æ's fieldwork confirmed the recorded location of both resources is currently within a housing development. No other prehistoric, historical sites, features, or isolated artifacts were encountered within the Project area during the survey. However, Æ's survey did identify and document seven built-environment resources that are at least 50 years old within the Project area: a segment of Jackson Street, a segment of Avenue 50, a segment of Avenue 52, the L&G Desert Store Building, and APNs 767-120-006, -007, and -027).

None of the seven built-environment resources were formally evaluated for the CRHR as a part of this study. The three roads were constructed in the early 1940s and appear on USGS maps dated to 1941. Although these roads are more than 50 years old, the survey indicates the structures have been substantially altered and appear to be modern construction that is regularly maintained. In addition, the Project is proposing standard improvement to the roads and the original alignments will not be altered. The Project proposes to modify the existing parking area for the L&G Desert Store. Therefore, the Project as presently planned has no potential to directly impact the L&G Desert Store structures. Finally, the Project proposes reconstruction at residences south of Avenue 50. Reconstruction of fence, wall, and driveways at these residential locations may be necessary. However, the houses at APNs 767-120-006, -007, and -027 will not be altered as a part of the Project. Therefore, no further cultural resource management of any of the documented built-environment resources is proposed at this time. However, if Project plans change in the future such that direct impacts will occur to these structures (i.e., demolition), all seven of these resources should be formally evaluated against CRHR criteria to determine their historical significance and integrity.

The Project area is heavily developed with a combination of hard- and softscape (i.e., living landscape). None of the mapped soil series in the Project area has a buried A (Ab) horizon and all the soils lack well-developed A and B soil horizons. The depth for roadway improvements and private property reconstruction is 3 feet bgs, and the maximum depth of proposed disturbances for traffic signals, drainage improvements, and utility relocation/replacement (8–14 feet) will penetrate far deeper. These construction-related activities are unlikely to affect intact and significant buried archaeological resources, because of the lack of well-developed soils within the Project area. No further cultural resource management of the Project area is recommended.

In the event that potentially significant archaeological materials are encountered during construction, all work must be halted in the vicinity of the discovery until a qualified archaeologist can visit the site of discovery and assess the significance and integrity of the find. If intact and significant archaeological remains are encountered, the impacts of the Project must be mitigated appropriately. Any such discoveries, and subsequent evaluation and treatment, should be documented in a cultural resource report, which should be submitted to the EIC for archival purposes.

Additionally, Health and Safety Code Section 7050.5, CEQA Guidelines Section 15064.5(e), and Public Resources Code Section 5097.98 mandate the process to be followed in the unlikely event of an accidental discovery of human remains in a location other than a dedicated cemetery.

Finally, if the Project area is expanded to include locations not covered by this survey or other recent cultural resource investigations elsewhere in the Study Area, additional cultural resource investigations may be required.

7
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APPENDIX A

Previous Cultural Resource Studies in the Study Area

Previous Cultural Resource Investigations in the Study Area

Author(s)	Date	EIC Reference #	Title
Berryman, Stanley	1980	RI-01101	Results of an Archaeological Survey of the Indian Palms Country Club, Indio, California
Love, Bruce	1998	RI-01102	Cultural Resources Report: Indian Palms Country Club, City of Indio, Riverside County, California
Breece, William H. and Laurel A. Harrison	1985	RI-01975	The Results of a Cultural Resources Survey in Coachella, California
Love, Bruce and Karl Lorenzen	1991	RI-03366	Cultural Resources Assessment: Tentative Parcel 26826, City of Indio, Riverside County, CA
Love, Bruce and Bai "Tom" Tang	2001	RI-04432	Historical / Archaeological Resources Survey Report: Astor Ranch Property, City of Indio, Riverside County, California
Brock, James	2001	RI-04491	Phase I Cultural Resources Assessment for Tentative Tract Map No. 30095, Unincorporated Riverside County, Near Coachella, California (APN 767-220-007; EA 38267)
Brock, James	2002	RI-04552	Phase I Cultural Resources Assessment for a 116-Acre Property in the City of Coachella, Riverside County, California (APN 612-220-002, 612-220-004, 612-240-1, 612-240-002, 612-240-003, And 612-240-004)
Brock, James	2002	RI-04556	Phase I Cultural Resources Assessment for Tentative Tract Map No. 30582, City of Coachella, Riverside County, California (APN 612-220-003)
Brock, James	2002	RI-04558	Phase I Cultural Resources Assessment for Tentative Tract No. 30728, City of Coachella, Riverside County, California
Brock, James	2002	RI-04560	Phase I Cultural Resources Assessment For Tentative Tract Map No. 30830, City of Coachella, Riverside County, California
Brock, James	2002	RI-04561	Phase I Cultural Resources Assessment for Tentative Tract Map No. 30829, City of Coachella, Riverside County, California
Brock, James	2003	RI-04668	Phase I Cultural Resources Assessment for Tentative Tract 30354-1, City of Coachella, Riverside County, California
Brock, James	2003	RI-04669	Phase I Cultural Resources Assessment for A 60-Acre Property in the Cities of Coachella and Indio, Riverside County, California (Tentative Tract 31433 Indio)
Brock, James	2003	RI-04671	Phase I Cultural Resources Assessment for Tentative Tract Map 31551, City of Coachella, Riverside County, California
O'neil, Stephen	2002	RI-04684	Cultural Resources Reconnaissance of the Indio Ranchos Polo Estates, City of Indio, Riverside County, California
Brock, James And Mary Anne Eason	2004	RI-04771	Report on Archaeological Monitoring of Rough Grading for Tract 30935, City of Indio, Riverside County, California
Demcak, Carol R.	2004	RI-04817	Report of Archaeological And Paleontological Monitoring at Tract 30684, Coachella, Riverside County, California
Demcak, Carol R.	2003	RI-04819	Report of Phase I (Survey Level) Archaeological Assessment for 7-Acre Parcel in City of Indio, Riverside County, California

Previous Cultural Resource Investigations in the Study Area

Author(s)	Date	EIC Reference #	Title
Demcak, Carol R.	2004	RI-04823	Report Of Phase I Archaeological Assessment for Two Parcels (APNS 612-270-002, -003, and -004), Avenue 49 at Calhoun Street, Coachella, California
Demcak, Carol R.	2003	RI-04825	Report Of Phase II (Test Level) Archaeological Investigations at TTM 30910, City of Coachella, Riverside County, California
Demcak, Carol. R.	2003	RI-04826	Report Of Extended Phase II (Test Level) Archaeological Investigations at TTM 30910, City of Coachella, Riverside County, California
Demcak, Carol R.	2003	Ri-04827	Final Report of Extended Phase II (Test Level) Archaeological Investigations At TTM 30910, City Of Coachella, Riverside County, California
White, Robert S. and Laura S. White	2003	Ri-05606	A Cultural Resources Assessment of a +/-17 Acre Parcel. Located Southeast of The Intersection Of Jackson Street and Avenue 48, City of Coachella, Riverside County
White, Robert S. and Laura S. White	2004	RI-05644	A Cultural Resources Assessment of A 9.3 Acre Parcel Located Adjacent to Calhoun Street South of Avenue 52, Coachella, Unincorporated, Riverside County, California
Quinn, Harry M. and Mariam Dahdul	2003	RI-05740	Historical/Archaeological Resources Survey Report, Tentative Tract No. 31074, City of Indio, Riverside County, California
Love, Bruce, Bai Tang, Mariam Dahdul, and Daniel Ballester	2002	RI-05861	Historical/Archaeological Resources Survey Report, Jordon Outreach Ministries, APN 767-150-004; Pp17669, Avenue 51 and Calhoun Street, Indio/Coachella Area, Riverside County, CA
Hogan, Michael, Harry M. Quinn, And Mariam Dahdul	2002	RI-05886*	Archaeological Mitigation and Data Recovery Report, Indian Palms Country Club, City of Indio, Riverside County, California
Hogan, Michael, Bai Tang, and Mariam Dahdul	2003	RI-05988	Historical/Archaeological Resources Survey Report, County Estates, City of Indio, Riverside County, CA
Hogan, Michael	2003	Ri-06014	Letter Report: Archaeological Monitoring of Earth-Moving Activities, Tentative Tract Map No. 30728, City Of Coachella, Riverside County, CA
Hogan, Michael, Bai Tang, Josh Smallwood, and Harry M. Quinn	2004	RI-06201	Archaeological Monitoring Report, Indian Palms Tracts 3075-3, 501-1, -2, -3, And 30019-2, City of Indio, Riverside County, California
Tang, Bai "Tom" and Casey Tibbet	2004	RI-06303	The "Patton House", Northwest Corner of Avenue 48 and Jackson Street, City of Indio, Riverside County, California
Hogan, Michael, Bai Tang, Ayşe Taskiran-Johnson, Harry Quinn, Daniel Ballester, and Josh Smallwood	2005	RI-06527	Final Cultural Resources Report, Archaeological Investigations at Villa Montego II, Tract No. 31385, City of Indio, Riverside County, CA
Tang, Bai, Michael Hogan, Josh Smallwood, and Daniel Ballester	2005	RI-06529	Historical/Archaeological Resources Report, The Chuchian Property, City of Coachella, Riverside County, CA

Previous Cultural Resource Investigations in the Study Area

Author(s)	Date	EIC Reference #	Title
Tang, Bai "Tom"	2006	RI-06680	Letter Report: Cultural Resources Documentation Review and Update, Celebrity House, Indian Palms Country Club and Resort, 48-630 Monroe Street; APN 614-220-007, City of Indio, County of Riverside, California
W&S Consultants	2004	RI-06862	Phase I Archaeological Survey of the TTM 32417 Study Area, Coachella, Riverside County, Ca
W&S Consultants	2004	RI-06864	Phase I Archaeological Survey of the TTM 32454 Study Area, Coachella, Riverside County, California
W&S Consultants	2004	RI-06865	Phase I Archaeological Survey of the TTM 32415 Study Area, Coachella, Riverside County, California
Brown, Joan C., Stephen O'Neil, and James W. Steely	2006	RI-06870	Cultural Resources Reconnaissance of an 85 Acre Parcel for the Chucian Project, Riverside County, California.
Sanka, Jennifer	2006	RI-07522	Phase I Cultural Resources Assessment Van Buren Street Project Coachella, Riverside County, California
Clownery-Moreno, Sara and Brian F. Smith	2008	RI-08000	A Phase I Archaeological Assessment for the Coachella Commerical Center Project, Coachella, Riverside County, California.
Gust, Sherri and Steven McCormick	2006	RI-08008	Cultural Resources Assessment Report for Van Buren at 52nd St. Project, City of Coachella, California
Gust, Sherri	2008	RI-08017	Treatment Plan For Coachella's Pioneer Cemetery (P33-15997), Coachella, California
Kim Scott, Steve McCormick, and Sherri Gust	2004	RI-08107	Archaeological & Paleontological Evaluation and Mitigation Plan Indio-40 Parcel, Indio, Riverside County, California
Jacquemain, Terri and Daniel Ballester	2010	RI-08345	Historical / Archaeological Resources Study Report: Fred Young Farm Labor Center, City of Indio, Riverside Country, California.
Mirro, Michael	2010	RI-08496	Letter Report: Cultural Resources Records Search for Shot Points Located on Private Lands for the U.S. Geological Survey (USGS) Salton Seismic Imaging Project Addendum
Atkins	2013	RI-08899	Letter Report: Addendum to the Cultural Resources Assessment for the Public Safety Enterprise Communication (PSEC) Project (MBA 2008a)
Clark, Tiffany	2015	RI-09563	Cultural Resource Monitoring Report for the Las Plumas West Project, City of Indio, Riverside County, California
Horne, Melinda, Molly Valasik, and Sherri Gust	2012	RI-09622	82266 Avenue 50 Cultural Resources Assessment City of Coachella, Riverside County, California
Olson, John	2017	RI-09879	Re: Archaeological And Paleontological Resources Monitoring Program Towermarket/Revella Project
C. Duran and H. Haas	2017	RI-10167	Raven Ridge Project, Cultural Resource Study
Don, Lewis	2002	RI-10229	Cultural Resource Assessment Cingular Wireless SB-200-01

Previous Cultural Resource Investigations in the Study Area

Author(s)	Date	EIC Reference #	Title
Tang Bai "Tom" and Deirdre Encarnacion	2010	RI-10342	Cultural Resources Technical Report City of La Quinta General Plan (2010 Update)
Wills, Carrie D. and Bonnie Bruce	2018	RI-10619	Cultural Resource Records Search and Site Visit Results for Cellco Partnership and its Controlled Affiliates doing Business as Verizon Wireless Candiate 'Calhoun', 53555 Calhoun Street, Coachella, Riverside County, California (EBI Project # 6118004064)

APPENDIX B

Confidential Site Records

(Not for Public Distribution)

APPENDIX C

Native American Communication

LIST OF NATIVE AMERICAN CONTACTS AND RECORD OF RESPONSES

Name	Date & Time	Responses
Patricia Garcia-Plotkin Director Tribal Historic Preservation Office (THPO) Agua Caliente Band of Cahuilla Indians (ACBCI)	February 3, 2020 February 17,2020	Scoping letter sent via email. E-mailed follow-up effort for correspondence. No response received.
Amanda Vance Chairperson Augustine Band of Cahuilla Indians	February 3, 2020 February 17,2020	Scoping letter sent via email. E-mailed follow-up effort for correspondence. No response received.
Doug Welmas Chairperson Cabazon Band of Mission Indians	February 3, 2020 February 6, 2020	Scoping letter sent via email. Received letter from Ms. Judy Stapp via UPSP. Ms. Stapp stated that the Project is located outside of Tribe's current reservation boundaries. The Tribe has no specific archival information indicating that the Project area may be a sacred/religious site or other site of Native American traditional cultural value.
Joseph Ontiveros Cultural Resource Department Soboba Band of Luiseño Indians	February 3, 2020 February 17, 2020	Scoping letter sent via email. E-mailed follow-up effort for correspondence. No response received.
Michael Mirelez Cultural Resource Coordinator Torres-Martinez Desert Cahuilla Indians	February 3, 2020 February 17, 2020	Scoping letter sent via email. E-mailed follow-up effort for correspondence. No response received.
Anthony Madrigal, Jr. Tribal Historic Preservation Officer Twenty-Nine Palms Band of Mission Indians	February 3, 2020 February 17, 2020	Scoping letter sent via email. E-mailed follow-up effort for correspondence. No response received.
Travis Armstrong Tribal Historic Preservation Officer Morongo Band of Mission Indians	February 3, 2020 February 17, 2020	Scoping letter sent via email E-mailed follow-up effort for correspondence. No response received.

Sacred Lands File & Native American Contacts List Request

Native American Heritage Commission
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
916-373-3710
916-657-5390 – Fax
nahc@nahc.ca.gov

Information Below is Required for a Sacred Lands File Search

Date: July 22, 2019

Project: Avenue 50 and Jackson Street Intersection Improvements

County: Riverside, CA

USGS Quadrangle Name: Indio (1956-PR1972), CA 7.5'

Township: 5 South	**Range:** 7 East	**Section(s):** 35, 36
Township: 6 South	**Range:** 7 East	**Section(s):** 1, 2, 11, 12

Company/Firm/Agency: Applied EarthWorks, Inc.

Contact Person: Kholood Abdo

Street Address: 3550 East Florida Avenue, Suite H

City: Hemet **Zip:** 92544

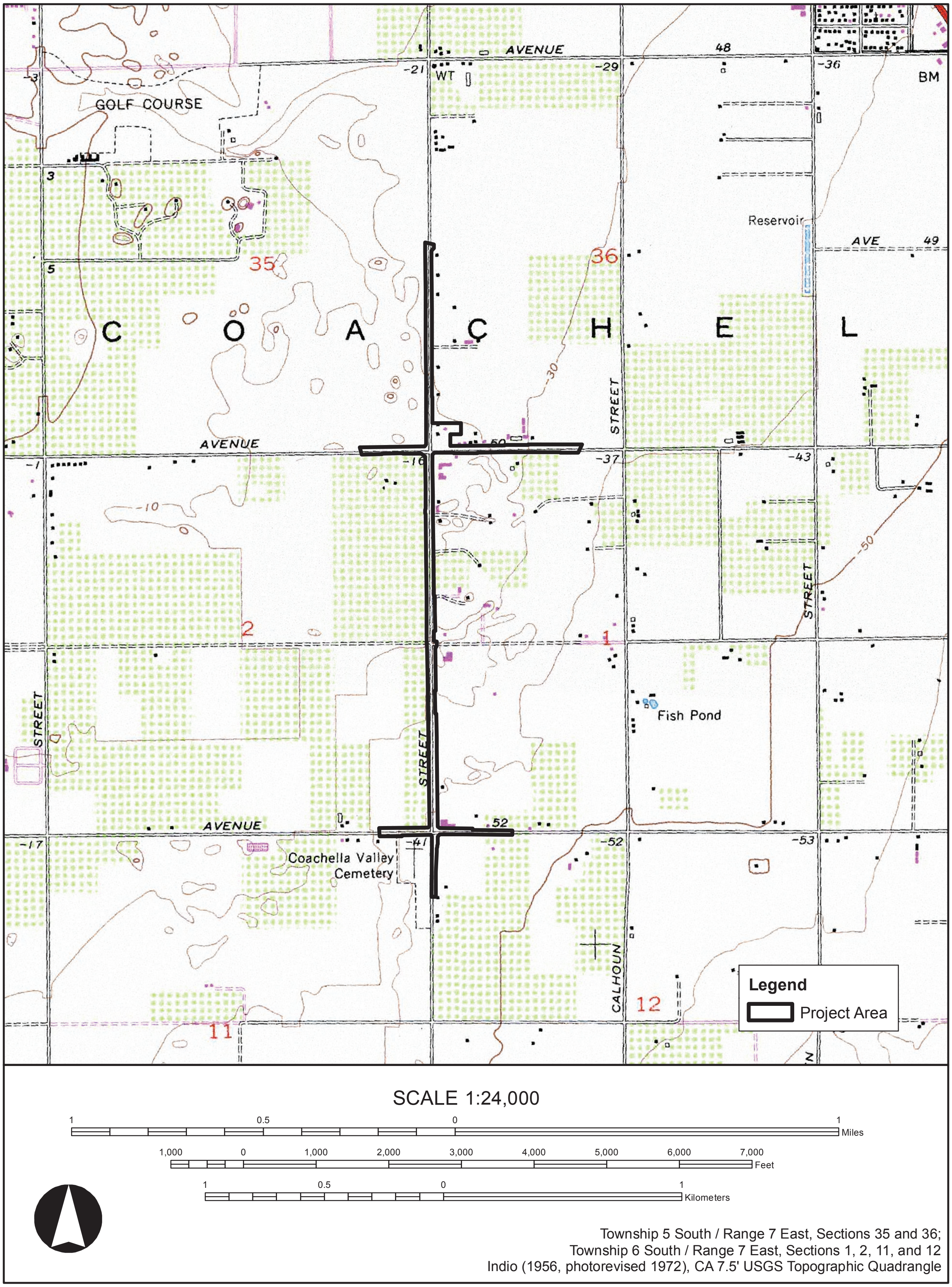
Phone: (951) 766-2000

Fax: (951) 766-0020

Email: kahintzman@appliedearthworks.com

Project Description:

The proposed Project is an intersection improvements construction along Avenue 50 and Jackson Street in the City of Indio for California Environmental Quality Act (CEQA) compliance. The Project area is approximately 2.09 miles long totaling 4.9-acre Project area. The Project will involve ground disturbance.



Location map for the *Avenue 50 and Jackson Street Project - AE4072*.

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov
Twitter: @CA_NAHC

August 15, 2019

Kholood Abdo
Applied EarthWorks

VIA Email to: kahintzman@appliedearthworks.com

RE: Avenue 50 and Jackson Street Intersection Improvements Project, Riverside County

Dear Mr. Abdo:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information. If you have any questions or need additional information, please contact me at my email address: steven.quinn@nahc.ca.gov.

Sincerely,

Steven Quinn

Steven Quinn
Associate Governmental Program Analyst

Attachment

Native American Heritage Commission
Native American Contact List
Riverside County
8/15/2019

Agua Caliente Band of Cahuilla Indians
Jeff Grubbe, Chairperson
5401 Dinah Shore Drive — Cahuilla
Palm Springs, CA, 92264
Phone: (760) 699 - 6800
Fax: (760) 699-6919

Agua Caliente Band of Cahuilla Indians
Patricia Garcia-Plotkin, Director
5401 Dinah Shore Drive — Cahuilla
Palm Springs, CA, 92264
Phone: (760) 699 - 6907
Fax: (760) 699-6924
ACBCI-THPO@aguacaliente.net

Augustine Band of Cahuilla Mission Indians
Amanda Vance, Chairperson
P.O. Box 846 — Cahuilla
Coachella, CA, 92236
Phone: (760) 398 - 4722
Fax: (760) 369-7161
hhaines@augustinetribe.com

Cabazon Band of Mission Indians
Doug Welmas, Chairperson
84-245 Indio Springs Parkway — Cahuilla
Indio, CA, 92203
Phone: (760) 342 - 2593
Fax: (760) 347-7880
jstapp@cabazonindians-nsn.gov

Cahuilla Band of Indians
Daniel Salgado, Chairperson
52701 U.S. Highway 371 — Cahuilla
Anza, CA, 92539
Phone: (951) 763 - 5549
Fax: (951) 763-2808
Chairman@cahuilla.net

Los Coyotes Band of Cahuilla and Cupeño Indians
Shane Chapparosa, Chairperson
P.O. Box 189 — Cahuilla
Warner Springs, CA, 92086-0189
Phone: (760) 782 - 0711
Fax: (760) 782-0712

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Rroad — Cahuilla
Banning, CA, 92220 — Serrano
Phone: (951) 849 - 8807
Fax: (951) 922-8146
dtorres@morongo-nsn.gov

Morongo Band of Mission Indians
Denisa Torres, Cultural Resources Manager
12700 Pumarra Rroad — Cahuilla
Banning, CA, 92220 — Serrano
Phone: (951) 849 - 8807
Fax: (951) 922-8146
dtorres@morongo-nsn.gov

Ramona Band of Cahuilla
John Gomez, Environmental Coordinator
P. O. Box 391670 — Cahuilla
Anza, CA, 92539
Phone: (951) 763 - 4105
Fax: (951) 763-4325
jgomez@ramona-nsn.gov

Ramona Band of Cahuilla
Joseph Hamilton, Chairperson
P.O. Box 391670 — Cahuilla
Anza, CA, 92539
Phone: (951) 763 - 4105
Fax: (951) 763-4325
admin@ramona-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Avenue 50 and Jackston Street Intersection Improvements Project, Riverside County.

Native American Heritage Commission
Native American Contact List
Riverside County
8/15/2019

Santa Rosa Band of Cahuilla Indians
Mercedes Estrada,
P. O. Box 391820 — Cahuilla
Anza, CA, 92539
Phone: (951) 659 - 2700
Fax: (951) 659-2228
mercedes.estrada@santarosacahuilla-nsn.gov

Santa Rosa Band of Cahuilla Indians
Steven Estrada, Chairperson
P.O. Box 391820 — Cahuilla
Anza, CA, 92539
Phone: (951) 659 - 2700
Fax: (951) 659-2228
mflaxbeard@santarosacahuilla-nsn.gov

Soboba Band of Luiseno Indians
Joseph Ontiveros, Cultural Resource Department
P.O. BOX 487 — Cahuilla
San Jacinto, CA, 92581 — Luiseno
Phone: (951) 663 - 5279
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Soboba Band of Luiseno Indians
Scott Cozart, Chairperson
P. O. Box 487 — Cahuilla
San Jacinto, CA, 92583 — Luiseno
Phone: (951) 654 - 2765
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Torres-Martinez Desert Cahuilla Indians
Michael Mirelez, Cultural Resource Coordinator
P.O. Box 1160 — Cahuilla
Thermal, CA, 92274
Phone: (760) 399 - 0022
Fax: (760) 397-8146
mmirelez@tmdci.org

Twenty-Nine Palms Band of Mission Indians
Anthony Madrigal, Tribal Historic Preservation Officer
46-200 Harrison Place — Chemehuevi
Coachella, CA, 92236
Phone: (760) 775 - 3259
amadrigal@29palmsbomi-nsn.gov

Twenty-Nine Palms Band of Mission Indians
Darrell Mike, Chairperson
46-200 Harrison Place — Chemehuevi
Coachella, CA, 92236
Phone: (760) 863 - 2444
Fax: (760) 863-2449
29chairman@29palmsbomi-nsn.gov

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Phone: (951) 763 - 5549
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3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

February 3, 2020

Travis Armstrong
Tribal Historic Preservation Officer
Morongo Band of Mission Indians
12700 Pumarra Road,
Banning, CA, 92220

Re: Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, City of Indio, Riverside County, California.

Dear Mr. Armstrong:

On behalf of Albert A. Webb Associates, Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study for the Avenue 50 and Jackson Street Intersection Improvements Project (Project). The proposed Project involves the improvement of Jackson Street including widening and adding sidewalk, bike lane and curb gutter and drainage. The Project is subject to the California Environmental Quality Act (CEQA) and the City of Indio is the lead CEQA agency. As indicated on the attached map, the Project is located on the Indio (1956), CA 7.5' USGS quadrangle map within Sections 35 and 36 Township 5 S / Range 7 E, and Sections 1, 2, 11 and 12, Township 6 S/Range 7 E, San Bernardino Baseline and Meridian (S.B.B.M.).

The archaeological literature and records search conducted at the Eastern Information Center housed at the University of California, Riverside, indicates that 53 cultural resources studies have been conducted within a one-mile radius of the Project area. Twelve of these studies involved the Project area. Forty-one cultural resources have been recorded within a one-mile radius of the Project area. Two of these resources are historic refuse deposits documented within the Project area. However, both resources were destroyed during grading for previous development.

Æ was contracted to perform an archaeological survey of the Project area. The survey was completed on January 31, 2020. Transects spacing was 10 meters. No cultural resources including the two previously recorded historic refuse deposits were observed during the survey. As part of the cultural resource assessment of the Project area, Æ requested a search of the *Sacred Lands File* by the Native American Heritage Commission (NAHC) on July 22, 2019. The NAHC responded on August 15, 2019 noting that *Sacred Lands File* search was completed with negative results.

Should your records show that cultural properties exist within or near the Project area shown on the enclosed map, or if you have any concerns regarding Native American issues related to the overall Project, please contact me at (951) 766-2000 or via letter expressing your concerns. You may also e-mail me at Kahintzman@appliedearthworks.com. If I do not hear from you within the next two weeks, I will contact you with a follow-up phone call or email.

Please be aware that your comments and concerns are very important to us, as well as to the successful completion of this Project. I look forward to hearing from you in the near future. Thank you, in advance, for taking the time to review this request.

Respectfully yours,

Kholood Abdo, MA, RPA
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

February 3, 2020

Doug Welmas
Chairperson
Cabazon Band of Mission Indians
84-245 Indio Springs Parkway
Indio, CA 92203

Re: Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, City of Indio, Riverside County, California.

Dear Mr. Welmas:

On behalf of Albert A. Webb Associates, Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study for the Avenue 50 and Jackson Street Intersection Improvements Project (Project). The proposed Project involves the improvement of Jackson Street including widening and adding sidewalk, bike lane and curb gutter and drainage. The Project is subject to the California Environmental Quality Act (CEQA) and the City of Indio is the lead CEQA agency. As indicated on the attached map, the Project is located on the Indio (1956), CA 7.5' USGS quadrangle map within Sections 35 and 36 Township 5 S / Range 7 E, and Sections 1, 2, 11 and 12, Township 6 S/Range 7 E, San Bernardino Baseline and Meridian (S.B.B.M.).

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Respectfully yours,

Kholood Abdo, MA, RPA
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

February 3, 2020

Patricia Garcia-Plotkin
Director/Tribal Historic Preservation Officer
Agua Caliente Band of Cahuilla Indians
5401 Dinah Shore Drive
Palm Springs, CA 92264

Re: Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, City of Indio, Riverside County, California.

Dear Ms. Garcia-Plotkin:

On behalf of Albert A. Webb Associates, Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study for the Avenue 50 and Jackson Street Intersection Improvements Project (Project). The proposed Project involves the improvement of Jackson Street including widening and adding sidewalk, bike lane and curb gutter and drainage. The Project is subject to the California Environmental Quality Act (CEQA) and the City of Indio is the lead CEQA agency. As indicated on the attached map, the Project is located on the Indio (1956), CA 7.5' USGS quadrangle map within Sections 35 and 36 Township 5 S / Range 7 E, and Sections 1, 2, 11 and 12, Township 6 S/Range 7 E, San Bernardino Baseline and Meridian (S.B.B.M.).

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Respectfully yours,

Kholood Abdo, MA, RPA
Associate Archaeologist
Applied EarthWorks, Inc.

Applied
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3550 E. Florida Ave, Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

February 3, 2020

Anthony Madrigal
Tribal Historic Preservation Officer
Twenty-Nine Palms Band of Mission Indians
46-200 Harrison Place
Coachella, CA 92236

Re: Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, City of Indio, Riverside County, California.

Dear Mr. Madrigal:

On behalf of Albert A. Webb Associates, Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study for the Avenue 50 and Jackson Street Intersection Improvements Project (Project). The proposed Project involves the improvement of Jackson Street including widening and adding sidewalk, bike lane and curb gutter and drainage. The Project is subject to the California Environmental Quality Act (CEQA) and the City of Indio is the lead CEQA agency. As indicated on the attached map, the Project is located on the Indio (1956), CA 7.5' USGS quadrangle map within Sections 35 and 36 Township 5 S / Range 7 E, and Sections 1, 2, 11 and 12, Township 6 S/Range 7 E, San Bernardino Baseline and Meridian (S.B.B.M.).

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Please be aware that your comments and concerns are very important to us, as well as to the successful completion of this Project. I look forward to hearing from you in the near future. Thank you, in advance, for taking the time to review this request.

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O: (951) 766-2000 | F: (951) 766-0020

February 3, 2020

Michael Mirelez
Cultural Resource Coordinator
Torres-Martinez Desert Cahuilla Indians
P. O. Box 1160
Thermal, CA 92274

Re: Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, City of Indio, Riverside County, California.

Dear Mr. Mirelez:

On behalf of Albert A. Webb Associates, Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study for the Avenue 50 and Jackson Street Intersection Improvements Project (Project). The proposed Project involves the improvement of Jackson Street including widening and adding sidewalk, bike lane and curb gutter and drainage. The Project is subject to the California Environmental Quality Act (CEQA) and the City of Indio is the lead CEQA agency. As indicated on the attached map, the Project is located on the Indio (1956), CA 7.5' USGS quadrangle map within Sections 35 and 36 Township 5 S / Range 7 E, and Sections 1, 2, 11 and 12, Township 6 S/Range 7 E, San Bernardino Baseline and Meridian (S.B.B.M.).

The archaeological literature and records search conducted at the Eastern Information Center housed at the University of California, Riverside, indicates that 53 cultural resources studies have been conducted within a one-mile radius of the Project area. Twelve of these studies involved the Project area. Forty-one cultural resources have been recorded within a one-mile radius of the Project area. Two of these resources are historic refuse deposits documented within the Project area. However, both resources were destroyed during grading for previous development.

Æ was contracted to perform an archaeological survey of the Project area. The survey was completed on January 31, 2020. Transects spacing was 10 meters. No cultural resources including the two previously recorded historic refuse deposits were observed during the survey. As part of the cultural resource assessment of the Project area, Æ requested a search of the *Sacred Lands File* by the Native American Heritage Commission (NAHC) on July 22, 2019. The NAHC responded on August 15, 2019 noting that *Sacred Lands File* search was completed with negative results.

Should your records show that cultural properties exist within or near the Project area shown on the enclosed map, or if you have any concerns regarding Native American issues related to the overall Project, please contact me at (951) 766-2000 or via letter expressing your concerns. You may also e-mail me at Kahintzman@appliedearthworks.com. If I do not hear from you within the next two weeks, I will contact you with a follow-up phone call or email.

Please be aware that your comments and concerns are very important to us, as well as to the successful completion of this Project. I look forward to hearing from you in the near future. Thank you, in advance, for taking the time to review this request.

Respectfully yours,

Kholood Abdo, MA, RPA
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

February 3, 2020

Joseph Ontiveros
Tribal Historic Preservation Officer
Soboba Band of Luiseno Indians
P.O. Box 487
San Jacinto, CA 92581

Re: Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, City of Indio, Riverside County, California.

Dear Mr. Ontiveros:

On behalf of Albert A. Webb Associates, Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study for the Avenue 50 and Jackson Street Intersection Improvements Project (Project). The proposed Project involves the improvement of Jackson Street including widening and adding sidewalk, bike lane and curb gutter and drainage. The Project is subject to the California Environmental Quality Act (CEQA) and the City of Indio is the lead CEQA agency. As indicated on the attached map, the Project is located on the Indio (1956), CA 7.5' USGS quadrangle map within Sections 35 and 36 Township 5 S / Range 7 E, and Sections 1, 2, 11 and 12, Township 6 S/Range 7 E, San Bernardino Baseline and Meridian (S.B.B.M.).

The archaeological literature and records search conducted at the Eastern Information Center housed at the University of California, Riverside, indicates that 53 cultural resources studies have been conducted within a one-mile radius of the Project area. Twelve of these studies involved the Project area. Forty-one cultural resources have been recorded within a one-mile radius of the Project area. Three of these resources are documented within the Project area including one prehistoric artifact scatter, and two historic refuse deposits. However, all of these resources were destroyed during grading for previous development.

Æ was contracted to perform an archaeological survey of the Project area. The survey was completed on January 31, 2020. Transects spacing was 10 meters. No cultural resources including the three previously recorded resources were observed during the survey. As part of the cultural resource assessment of the Project area, Æ requested a search of the *Sacred Lands File* by the Native American Heritage Commission (NAHC) on July 22, 2019. The NAHC responded on August 15, 2019 noting that *Sacred Lands File* search was completed with negative results.

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Respectfully yours,

Kholood Abdo, MA, RPA
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
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February 3, 2020

Amanda Vance
Chairperson
Augustine Band of Cahuilla Mission Indians
P.O. Box 846
Coachella, CA 92236

Re: Cultural Resource Assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, City of Indio, Riverside County, California.

Dear Ms. Vance:

On behalf of Albert A. Webb Associates, Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study for the Avenue 50 and Jackson Street Intersection Improvements Project (Project). The proposed Project involves the improvement of Jackson Street including widening and adding sidewalk, bike lane and curb gutter and drainage. The Project is subject to the California Environmental Quality Act (CEQA) and the City of Indio is the lead CEQA agency. As indicated on the attached map, the Project is located on the Indio (1956), CA 7.5' USGS quadrangle map within Sections 35 and 36 Township 5 S / Range 7 E, and Sections 1, 2, 11 and 12, Township 6 S/Range 7 E, San Bernardino Baseline and Meridian (S.B.B.M.).

The archaeological literature and records search conducted at the Eastern Information Center housed at the University of California, Riverside, indicates that 53 cultural resources studies have been conducted within a one-mile radius of the Project area. Twelve of these studies involved the Project area. Forty-one cultural resources have been recorded within a one-mile radius of the Project area. Two of these resources are historic refuse deposits documented within the Project area. However, both resources were destroyed during grading for previous development.

Æ was contracted to perform an archaeological survey of the Project area. The survey was completed on January 31, 2020. Transects spacing was 10 meters. No cultural resources including the two previously recorded historic refuse deposits were observed during the survey. As part of the cultural resource assessment of the Project area, Æ requested a search of the *Sacred Lands File* by the Native American Heritage Commission (NAHC) on July 22, 2019. The NAHC responded on August 15, 2019 noting that *Sacred Lands File* search was completed with negative results.

Should your records show that cultural properties exist within or near the Project area shown on the enclosed map, or if you have any concerns regarding Native American issues related to the overall Project, please contact me at (951) 766-2000 or via letter expressing your concerns. You may also e-mail me at Kahintzman@appliedearthworks.com. If I do not hear from you within the next two weeks, I will contact you with a follow-up phone call or email.

Please be aware that your comments and concerns are very important to us, as well as to the successful completion of this Project. I look forward to hearing from you in the near future. Thank you, in advance, for taking the time to review this request.

Respectfully yours,

Kholood Abdo, MA, RPA
Associate Archaeologist
Applied EarthWorks, Inc.

February 6, 2020

Kholood Abdo, MA, RPA
Associate Archaeologist
Applied EarthWorks, Inc.
3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937

Re.: Cultural Resource Assessment for the **Avenue 50 and Jackson Street Intersection Improvements Project**
City of Indio
Riverside County, California

Dear Mr. Abdo,

Thank you for contacting the Cabazon Band of Mission Indians concerning cultural resource information relative to the above referenced project.

The project is located outside of the Tribe's current reservation boundaries. The Tribe has no specific archival information on the site indicating that it may be a sacred/religious site or other site of Native American traditional cultural value within the project area.

We look forward to continued collaboration in the preservation of cultural resources or areas of traditional cultural importance in the Project area.

Best regards,

Judy Stapp
Director of Cultural Affairs

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Appendix D
Energy Tables

Table 1 – Total Construction-Related Fuel Consumption

Jackson Street Widening

Fuel	Consumption	
Diesel		
On-Road Construction Trips[1]	2,878	Gallons
Off-Road Construction Equipment[2]	53,300	Gallons
Diesel Total	**56,179**	**Gallons**
Gasoline		
On-Road Construction Trips[1]	2,814	Gallons
Off-Road Construction Equipment[3]	-	Gallons
Gasoline Total	**2,814**	**Gallons**

Notes:

1. On-road mobile source fuel use based on vehicle miles traveled (VMT) from CalEEMod for construction in 2021 and fleet-average fuel consumption in gallons per mile from EMFAC2017 web based data for Salton Sea Air Basin. See Table 2 for calculation details.
2. Off-road mobile source fuel usage based on a fuel usage rate of 0.05 gallons of diesel per horsepower (HP)-hour, based on SCAQMD CEQA Air Quality Handbook, Table A9-3E.
3. All emissions from off-road construction equipment were assumed to be diesel.

Table 2 – On-Road Construction Trip Estimates

Jackson Street Widening

Trip Type	Trips	Trip length	Vehicle Miles Traveled (VMT)	Fuel Efficiency	Annual Fuel Usage[1]	
	(trips)	(miles)	(miles)	(mpg)	(Fuel)	(gallon)
Worker[2,3]	5,188	14.7	76,264	26.5	Gasoline	2,814
Vendor[4]	3,560	6.9	24,564	8.9	Diesel	2,878
Hauling[5]	0	20	0	7.1	Diesel	0

Notes:

1. On-road mobile source fuel use based on vehicle miles traveled (VMT) from CalEEMod output for construction and fleet-average fuel consumption in gallons per mile from EMFAC2017 web based data for 2021 in Salton Sea Air Basin.
2. Worker trips were assumed to be 100% gasoline powered vehicles.
3. Per CalEEMod, worker Trips were assumed to be 50% LDA, 25% LDT1, and 25% LDT2.
4. Vendor trips were assumed to be 50% MHDT and 50% HHDT, split evenly between the MHDT and HHDT construction categories.
5. Per CalEEMod, hauling trips were assumed to be 100% HHDT.

APPENDIX E
PALEONTOLOGICAL TECHNICAL MEMORANDUM

Applied EARTHWORKS Inc.

133 N. San Gabriel Blvd., Suite 201
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O: (626) 578-0119 | F: (626) 204-5500

January 5, 2021

Ms. Stephanie Standerfer
Vice President
Albert A. Webb Associates
3788 McCray Street
Riverside, CA 92506
Transmitted via email to stephanie.standerfer@webbassociates.com

RE: Paleontological Technical Memorandum for the Avenue 50 and Jackson Street Intersection Improvements Project in the City of Indio and in Unincorporated Riverside County, California

Dear Ms. Standerfer:

At the request of Webb Associates, Applied EarthWorks, Inc. (Æ) completed a paleontological resource assessment for the Avenue 50 and Jackson Street Intersection Improvements Project, Riverside County, California (Project). The Project area is within the City of Indio (City) as well as a portion of unincorporated Riverside County (County). The City is the lead agency for the compliance with the California Environmental Quality Act (CEQA).

Written by Æ's paleontology staff who meet Society of Vertebrate Paleontology (SVP, 2010) qualifications standards, this memo follows guidelines set forth by the County of Riverside (2015a, 2015b) and the City of Indio (2019b). Æ's scope of work included desktop review of geologic maps, paleontological literature, museum records searches, a reconnaissance field survey, and preparation of this technical memorandum (memo). As such, this memo satisfies the requirements of the CEQA.

PROJECT DESCRIPTION AND BACKGROUND

The Project area is mostly in the southeast portion of the City as well as in an unincorporated portion of the County. Specifically, the Project area is located along the Jackson Street right-of-way (ROW) from the intersection with Odlum Drive, approximately 0.5-mile north of the intersection with Avenue 50, to approximately 0.25-mile south of the intersection with Avenue 52, as well as along the Avenue 50 and Avenue 52 ROWs in both the eastward and westward directions. The Project area is mapped in Sections 35 and 36 in Township 5 South, Range 7 East and in Sections 1, 2, 11, and 12 in Township 6 South, Range 7 East, San Bernardino Baseline and Meridian, as shown on the Indio, California 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle map.

The proposed street improvements within the County and City are consistent with the respective agencies' general plans. The Project improvements include the widening of Jackson Street and the addition of sidewalks, bike lanes, and curbs and gutters, as well as drainage improvements per the City's Master Drainage Plan. Since Jackson Street between Avenues 50 and 52 is the boundary between the City to the west and an unincorporated portion of the County to the east, some of the Project improvements in the east will be within the County's jurisdiction.

The width of proposed improvements ranges from 12 to 24 feet. Restriping will occur along alignment on both sides of Jackson Street. Intersection improvements will occur along Jackson Street at Odlum Drive as well as at Avenues 50 and 52. Intersection improvements will include turn lanes, restriping, and curb ramps compliant with the Americans with Disabilities Act (ADA). The intersections of Jackson Street at Avenues 50, 51, and 52 also will include the installation of traffic signals. The improvements to Avenue 50 east of the intersection with Jackson Street will include the addition of sidewalks and a bike lane.

Some areas proposed for improvements require ROW acquisition of approximately 1.2 acres; these areas are along Jackson Street north of Avenue 50 and along Avenue 50 east and west of Jackson Street. Project construction will require temporary easements extending up to 25 feet outside of street ROW for properties adjacent to the Project area. Reconstruction of private property will be required at four residences located approximately 800 feet south of Avenue 50. Fence, wall, and driveway reconstruction may be necessary for affected properties.

Project construction also will require relocations of Imperial Irrigation District (IID) power poles and/or undergrounding of power lines. Relocation and/or replacement of existing irrigation facilities owned and operated by Coachella Valley Water District (CVWD) will also be required as necessary. The CVWD irrigation line facilities are located at several locations along Jackson Street. These facilities typically run in the east-west direction, crossing the proposed improvements. Finally, the improvements to Jackson Street may necessitate modification to the existing parking area for the L&G Desert Store on the east side of Jackson Street, just north of Avenue 50.

The maximum depths of disturbance anticipated for the Project are:

- 2 feet below ground surface (bgs) for roadway improvements;
- 10 to 14 feet bgs for traffic signals;
- 10 feet bgs for drainage improvements;
- 8 feet bgs for utility relocation and/or replacement;
- 2 feet bgs for L&G Desert Store parking area improvements; and
- 3 feet bgs for private property reconstruction (fence, wall, driveway).

REGULATORY CONTEXT

Neither the California Department of Transportation (Caltrans) nor the Federal Highway Administration (FHWA) are involved in this Project (i.e., no federal lands, funds, or permits). However, the City is the lead agency for CEQA compliance and this Project is subject to state laws in addition to local goals and policies. The following section provides an overview of the relevant laws and regulations.

State

Paleontological resources are protected under CEQA, which requires detailed studies that analyze the environmental effects of a proposed project. If a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered. Specifically, in Section VII(f) of Appendix G of the CEQA Guidelines, the Environmental Checklist Form, the question is posed, “Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” If paleontological resources are identified as being within the proposed project area, the sponsoring agency must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource.

Local

There are several policies covering paleontological resources within the County's *General Plan*, *Multipurpose Open Space (OS) Element* (County of Riverside, 2015b:OS-51):

- **OS 19.6:** Whenever existing information indicates that a site proposed for development has high paleontological sensitivity as shown on Figure OS-8, paleontological resource impact mitigation program (PRIMP) shall be filed with the Riverside County Geologist prior to site grading. The PRIMP shall specify the steps to be taken to mitigate impacts to paleontological resources.

- **OS 19.**7**:** Whenever existing information indicates that a site proposed for development has low paleontological sensitivity as shown on Figure OS-8, no direct mitigation is required unless a fossil is encountered during site development. Should a fossil be encountered, the Riverside County Geologist shall be notified and a paleontologist shall be retained by the project proponent. The paleontologist shall document the extent and potential significance of the paleontological resources on the site and establish appropriate mitigation measures for further site development.

- **OS 19.8:** Whenever existing information indicates that a site proposed for development has undetermined paleontological sensitivity as shown on Figure OS-8, a report shall be filed with the Riverside County Geologist documenting the extent and potential significance of the paleontological resources on site and identifying mitigation measures for the fossil and for impacts to significant paleontological resources prior to approval of that department.

- **OS 19.9:** Whenever paleontological resources are found, the County Geologist shall direct them to a facility within Riverside County for their curation, including the Western Science Center in the City of Hemet.

In addition to County policies and guidance, the City's General Plan also includes policies and guidance regarding preservation of paleontological resources. Specifically, the Conservation Element of the *Interim Final Draft General Plan* includes two policies designed to assist with achieving "Goal CE-8: Historic, Archaeological, and Paleontological Resources" (City of Indio, 2019b:8-19):

- **CE-8.1 Site Plan Review.** Ensure adequate site plan review and mitigation measures are implemented for the development of sites with the potential to contain historic, archaeological, and paleontological resources.

- **CE-8.4 Monitoring.** Require monitoring on sites where grading has the potential to impact subsurface cultural and paleontological resources during excavation and construction activities.

PALEONTOLOGICAL RESOURCE POTENTIAL

Most professional paleontologists in California adhere to the SVP (2010) guidelines to determine the course of paleontological mitigation for a given project unless specific city, county, state, or federal guidelines are available. Both the County and the City have assessed the paleontological sensitivity of geologic units on countywide and citywide scales, respectively, and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development (City of Indio, 2019a, 2019c; County of Riverside, 2015a).

The County has assigned various paleontological sensitivity to the various geologic units exposed within its boundaries—Low, Undetermined, High A (Ha), and High B (Hb) Potential (County of Riverside, 2015a). Geologic units are considered to be "sensitive" for paleontological resources and have a High paleontological resource potential if they are known to contain significant fossils anywhere in their extent, even if outside the Project area. High A (Ha) sensitivity is based on the occurrence of fossils that may be present at the ground surface of the Project area, while High B (Hb) sensitivity is based on the occurrence of fossils at or below 4 feet of depth, which may be impacted during construction activities (County of Riverside, 2015a). A coarse-grained paleontological sensitivity map of Riverside County is included in the OS Element, which indicates the sensitivity rankings across the ground surface (County of Riverside, 2015a:Figure OS-8, OS-55). In contrast to the County, the City includes only three categories for ranking the sensitivity of a geologic unit—High, Undetermined, and Low Potential (City of Indio, 2019a, 2019c). Areas of High paleontological sensitivity correlate to the surface mapping of the Mecca Formation, Palm Springs Formation, Canebrake Conglomerate, and Lake Cahuilla beds. Areas of Undetermined Potential correspond to surface exposures of the Ocotillo Conglomerate. All other geologic units are assigned Low Potential.

While the County does not include specific mitigation measures in their regulatory documents, the City's General Plan Update Final Environmental Impact Report (FEIR) includes Mitigation Measure MM-CR-4, which requires project applicants to conduct a paleontological field survey or construction monitoring in areas ranked High and Undetermined Potential (City of Indio, 2019a).

Methodology

To assess the paleontological sensitivity of geologic units exposed at the ground surface and those likely to occur in the subsurface of the Project area, Æ conducted desktop studies and a reconnaissance field survey. The desktop studies included a review of published geologic maps and paleontological literature, as well as museum records searches. For the records searches, Æ first retained the Natural History Museum of Los Angeles County (NHMLAC) to conduct a search of vertebrate fossil localities recorded in their collections (McLeod, 2019). Since the NHMLAC collections are divided by fossil type, Æ requested the search for vertebrate fossil localities as the geologic units in and near the Project area are more conducive to the preservation of vertebrate fossils than significant invertebrate, plant, and trace fossils. To augment these results, Æ also conducted a search of the online database of the University of California Museum of Paleontology (UCMP) and the Raymond M. Alf Museum of Paleontology (RAM) since both have paleontological collections from across California. Lastly, Æ compared the results of these efforts with the County of Riverside (2015b) and City of Indio (2019c) paleontological sensitivity maps.

Æ's Project Paleontologist Chris Shi conducted a reconnaissance field survey of the Project area on January 31, 2020. Prior to the survey, Shi examined the findings from the desktop studies as well as recent aerial photographs of the Project area in Google Earth to determine survey routes and potential locations of geologic outcrops. Shi completed the survey by using a combination of windshield and pedestrian survey. As much of the Project area is heavily developed with a combination of hard- and softscape, Shi primarily drove throughout and stopped to closely inspect subareas where the ground surface appeared to be lightly developed or undeveloped. Such locations are scattered throughout the

Project area, but are most prominent along the east side of Jackson Street and along Avenues 50 and 52. In these subareas, Shi walked along closely spaced transects to cover as much of the ground surface as possible, using Google Maps and an aerial photograph map of the Project area as navigational guides. He examined soils and sediments in exposed subareas and took photographs to document his progress.

RESOURCE CONTEXT

The Project area is northwest of the Salton Sea in the Coachella Valley portion of the Colorado Desert geomorphic province (California Geological Survey, 2002). A geomorphic province is a region of unique topography and geology that is distinguished from other regions based on its landforms and tectonic history (American Geological Institute, 1976). Bounded by Mexico to the south, the Colorado Desert is bordered by the Transverse Ranges to the north, the Peninsular Ranges to the west, and the Mojave Desert to the east. Much of the Colorado Desert lies within the Salton Trough; a large structural depression that extends from the San Gorgonio Pass in the north to the Gulf of California in the south (Norris and Webb, 1976). The Salton Trough is a graben, bounded by roughly parallel northwest-trending faults, including the San Andreas Fault Zone to the northeast and the San Jacinto fault zone to the southeast.

The Salton Trough formed as a topographic depression from spreading and subsidence associated with the rift system that opened the Gulf of California (Alles, 2011). Rifting initiated in the Late Miocene (Dorsey et al., 2007), as evidenced from magnetostratigraphy and biostratigraphy dating the oldest basin-filling deposits at approximately 8 million years old (Dorsey et al., 2007). Seawater spilled into the trough and undisputed marine sequences began in the Pliocene (Alles, 2011). From the Pliocene to Late Pleistocene, an immense volume of sediment eroded from downcutting of the Grand Canyon, resulting in the formation of a massive delta across the seaway by deposition from the ancestral Colorado River. This delta eventually separated the marine waters of the Gulf of California from the brackish and fresh waters of the Salton Trough, evidenced by the transition from marine to terrestrial fossils preserved in sedimentary strata (Dorsey et al., 2007).

Since the Late Pleistocene to Early Holocene, the Salton Trough was periodically occupied by the ancient freshwater Lake Cahuilla. This lake formed, drained, and reformed several times between approximately 10,000 to 240 years before present (B.P.) due to fluctuations in the course of the Colorado River and the subsequent diversion of the river’s mouth from the Gulf of California to the Salton Trough (Deméré, 2018; Norris, 1979). During its last high stand, Lake Cahuilla measured approximately 105 miles long by 35 miles wide and reached a maximum depth of 300 feet.

According to Dibblee and Minch (2008), the surficial geology of the Project area consists entirely of young, unindurated, undissected alluvial deposits from the Holocene (Qa). These are sands, silts, and clays derived from recent alluvial fans and streams. They are interstratified with Holocene-age wind-laid dune sands (Qs) approximately 4 miles west of the Project area on both sides of the Whitewater River/Coachella Valley Stormwater Channel. The former shoreline of Lake Cahuilla is exposed at the ground surface near the San Andreas Fault Zone approximately 7 miles east-southeast of the Project area, which suggests these surficial lacustrine deposits correspond to the most recent interval of inundation of the ancient lake (Deméré, 2018; Dibblee and Minch, 2008; Norris, 1979; Waters, 1983). The close proximity of the Lake Cahuilla beds to the Project area indicates they likely also occur at shallow depth beneath the surficial Holocene-age alluvial deposits or may be interstratified with the deposits in the immediate subsurface and difficult to distinguish, particularly in fresh cuts. For instance, tufa and travertine coatings are occasionally present on silts and clays of the Lake Cahuilla beds (Norris, 1979; Waters, 1983). A surface exposure of the Pliocene-age Ocotillo Formation (Qo) is mapped on the same side of the San Andreas Fault Zone as the Project area, approximately 5 miles to the northeast. The younger Holocene and Pleistocene deposits unconformably overlie the Ocotillo Formation (Dibblee and Minch, 2008), but at depth this formation likely extends much farther westward into the basin beneath the younger sediments.

Holocene-age deposits, particularly those less than 5,000 years old, are typically too young for the fossilization process to occur (SVP, 2010). However, certain factors can speed the mineralization process and result in partial, if not complete fossilization of microbe, plant, and animal remains. The physical and chemical environment of dry, playa lakes is particularly suitable for fossil preservation due to their arid and often alkaline conditions that promote abundant carbonate precipitation required for tufa and travertine formation. A diverse assemblage of fossils is known from Late Holocene localities within the Lake Cahuilla beds approximately 2 miles southwest of the Project area, southeast of the City of La Quinta (Whistler et al., 1995). These fossiliferous strata are radiocarbon-dated to 1125 ± 80 and 2545 ± 50 years B.P. Fossils include various freshwater diatoms, land plants, sponges, ostracods, mollusks, fish, small terrestrial vertebrates, and traces found in shallow excavations. These Holocene deposits are stratigraphically above Pleistocene and Pliocene deposits; however, the contact depth is unknown and the Lake Cahuilla beds can be up to 300 feet thick in the center of the Salton Trough (Norris and Webb, 1976). The proximity of these fossiliferous beds to the Project area indicates they may be present at shallow depths beneath the surficial alluvial deposits. McLeod (2019, pers. comm.) supports this assessment, suggesting the beds are typically obscured by surficial sediments and soil in the region.

RECORDS SEARCH RESULTS

No fossil localities among the NHMLAC vertebrate collections area are within the Project area (McLeod, 2019). However, their collections include the Lake Cahuilla localities reported by Whistler et al. (1995)—LACM 6252, 6253, and 6255—which are southwest of the Project area, on both sides of Madison Street north of Avenue 58. The collections came from a single trench west of Madison Street, although another trench east of Madison Street yielded a similar fauna that was not collected. Depths at which fossils were collected or observed ranged from 1 to 2 meters bgs (McLeod, pers. comm.). The terrestrial and freshwater vertebrate fauna includes:

- **Bony fish (Osteichthyes)** - razorback sucker (*Xyrauchen texanus*), bonytail (*Gila elegans*), and desert pupfish (*Cyprinodon macularius*);

- **Reptiles (Reptilia)** - desert horned lizard (*Phrynosoma platyrhinos*), desert spiny lizard (*Sceloporus magister*), Coachella Valley fringe-toed lizard (*Uma inornata*), long-tailed brush lizard (*Urosaurus graciosus*), western shovel-nosed snake (*Chionactis occipitalis*), night snake (*Hypsiglena torquata*), gopher snake (*Pituophis melanoleucas*), western ground snake (*Sonora semiannulata*), and sidewinder rattlesnake (*Crotalus cerastes*);

- **Birds (Aves)** – advanced land birds (Passeriformes);

- **Mammals (Mammalia)** – cottontail rabbit (*Sylvilagus*), desert wood rat (*Neotoma lepida*), white-footed mouse (*Peromyscus*), kangaroo rat (*Dipodomys*), pocket mouse (*Perognathus longimembris*), and antelope ground squirrel (*Ammospermophilus leucurus*).

In addition to the vertebrate fauna, the trench assemblage also includes diatoms, land plants, clams, snails, and crustaceans. Another locality (LACM 6256) also east of Madison Street yielded a single jaw of the bighorn sheep (*Ovis canadensis*).

McLeod (2019) concludes any excavations below the very uppermost layers of soil and younger Quaternary (Holocene) alluvium may well encounter significant fossil remains associated with the Lake Cahuilla beds. Any substantial excavations in the Project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Also, sediment samples should be collected and processed to determine the potential for small-fraction fossils within the Project area. Fossils uncovered during mitigation activities should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

The UCMP online paleontological database reports thousands of fossil specimens from Riverside County; however, none of the localities fall within 10 miles of the Project area (UCMP, 2019). The nearest fossil locality, about 13 miles east of the Project area, is a Late Miocene deposit with a variety of fossil plants, but no reported vertebrates. Within the same area are also Eocene foraminifera.

The RAM online database lists approximately 50 results for vertebrate fossils from Riverside County, mostly within the Salton Trough. None of the fossil localities are within 10 miles of the Project area, and most occur to the southeast on the other side of the San Andreas Fault Zone (RAM, 2019). Among these fossil localities, the closest is VI-2010005, a Pleistocene deposit with bones from camels, bison, horses, and mammoths.

FIELD SURVEY RESULTS

The Project area is largely developed into soft- and hardscape for residential neighborhoods, particularly on the west side of Jackson Street (Figure 1). There are only a few locations where native sediments are visible, such as small subareas on the east side of Jackson Street and the north side of Avenue 52 east and west of Jackson Street (Figure 2). Where visible, the ground surface consists of fine sandy loams with sparse to moderate low-lying vegetation. This soil cover partially obscures the underlying sedimentary deposits, which hinders verification of the surficial geology mapped by (Dibblee and Minch, 2008). Consequently, the presence of Holocene-age alluvial deposits (Qa) and/or Lake Cahuilla sediments, could not be confirmed. No paleontological resources were encountered during Æ's survey. Due to the extent of prior ground disturbance within the Project area and the presence of intact soils in undeveloped subareas, Æ concludes shallow ground disturbances for the Project are unlikely to impact significant and intact paleontological resources.

FINDINGS AND RECOMMENDATIONS

Æ used the results from the desktop studies and the reconnaissance field survey to determine the paleontological sensitivity of the Project area. When placed over the County of Riverside (2015b) paleontological sensitivity map, the entire Project area is mapped as High A. Similarly, the City of Indio (2019c) sensitive paleontological resources map indicates the entire Project area is High Potential. Æ's desktop studies support these assessments, although the field survey did not verify the High A and High sensitivity rankings because the ground surface is obscured throughout most of the Project area by vegetation and/or hardscape and exposed stratigraphy is absent (e.g., riverbanks that could confirm geologic units and paleontology below the ground surface). Upon subsurface soil sampling or artificial exposure by earthmoving activities (e.g., grading or excavating), the paleontological sensitivity of the Project area could potentially be reassigned to the County of Riverside (2015b) High B ranking, which is based on the occurrence of fossils at or below 4 feet bgs. This minimum depth for High B geologic units is actually closer to the depths reported for the nearby Lake Cahuilla fossils (McLeod, 2019; Whistler et al., 1995). However, the maximum depth of previous disturbance from prior developments within the Project area also remains unverified. Therefore, the Project requires additional investigation, such as geotechnical boring and construction monitoring.

Prior to the issuance of grading permits, Æ recommends a paleontological resource impact mitigation program (PRIMP) be prepared by a qualified professional paleontologist who meets the SVP (2010) standards (Project Paleontologist). The PRIMP will utilize the results of this paleontological technical memorandum possibly refined by the results of geotechnical borings to specify the steps to be taken to mitigate impacts to paleontological resources. For instance, Worker's Environmental Awareness Program (WEAP) training should be prepared prior to the start of Project-related ground disturbance and presented in-person to all field personnel to describe the types of fossils that may be found and the procedures to follow if any are encountered.

A PRIMP also will indicate where construction monitoring will be required for the Project and the frequency of required monitoring (i.e., full-time, spot-checks, etc.). Based on the findings thus far, Æ recommends monitoring for any ground-disturbing activities, particularly for the installation of traffic signals, drainage improvements, and utility relocation and/or replacement as these activities will occur at greater depths. In addition to monitoring procedures, a PRIMP also will provide details about fossil collection, analysis, and preparation for permanent curation at an approved repository, such as the Western Science Center in Hemet. Lastly, the PRIMP describes the different reporting standards to be used—monitoring with negative findings versus monitoring resulting in fossil discoveries.

It has been a pleasure assisting you with this Project. If you have any questions, please do not hesitate to contact me at (626) 578-0119 x403.

Sincerely,

Chris Shi
Project Paleontologist
Applied EarthWorks, Inc.

Win McLaughlin
Senior Paleontologist
Applied EarthWorks, Inc.

Edited and Approved By:

Amy Ollendorf, Ph.D., M.S., RPA 12588
Paleontology Program Manager
Applied EarthWorks, Inc.

Encl. Figures 1 and 2, References

Figure 1 North end of Project area at the intersection of Jackson Street and Odlum Drive, facing south.

Figure 2 North side of Avenue 52 west of Jackson Street showing vegetation and soil, facing northeast.

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APPENDIX F
PRELIMINARY HYDROLOGY & HYDRAULICS REPORT

Jackson Street Improvement
Hydrology & Hydraulics Report

City of Indio, California
County of Riverside, California
City Project Number TS1901

Prepared for:

City of Indio
100 Civic Center Mall
Indio, CA 92201

Prepared By:

Albert A. Webb Associates
3788 McCray Street
Riverside, CA 92506

Updated
July 2021

This Drainage Report has been prepared by or under the direction of the following Registered Civil Engineer. The undersigned attests to the technical information contained herein and the qualifications of any technical specialist providing engineering data upon which recommendations, conclusions, and decisions are based:

Dilesh Sheth

______________________________ ______7/20/2021___________

Dilesh Sheth, P.E. Date

Sr. Vice President

SECTION 1 - Summary

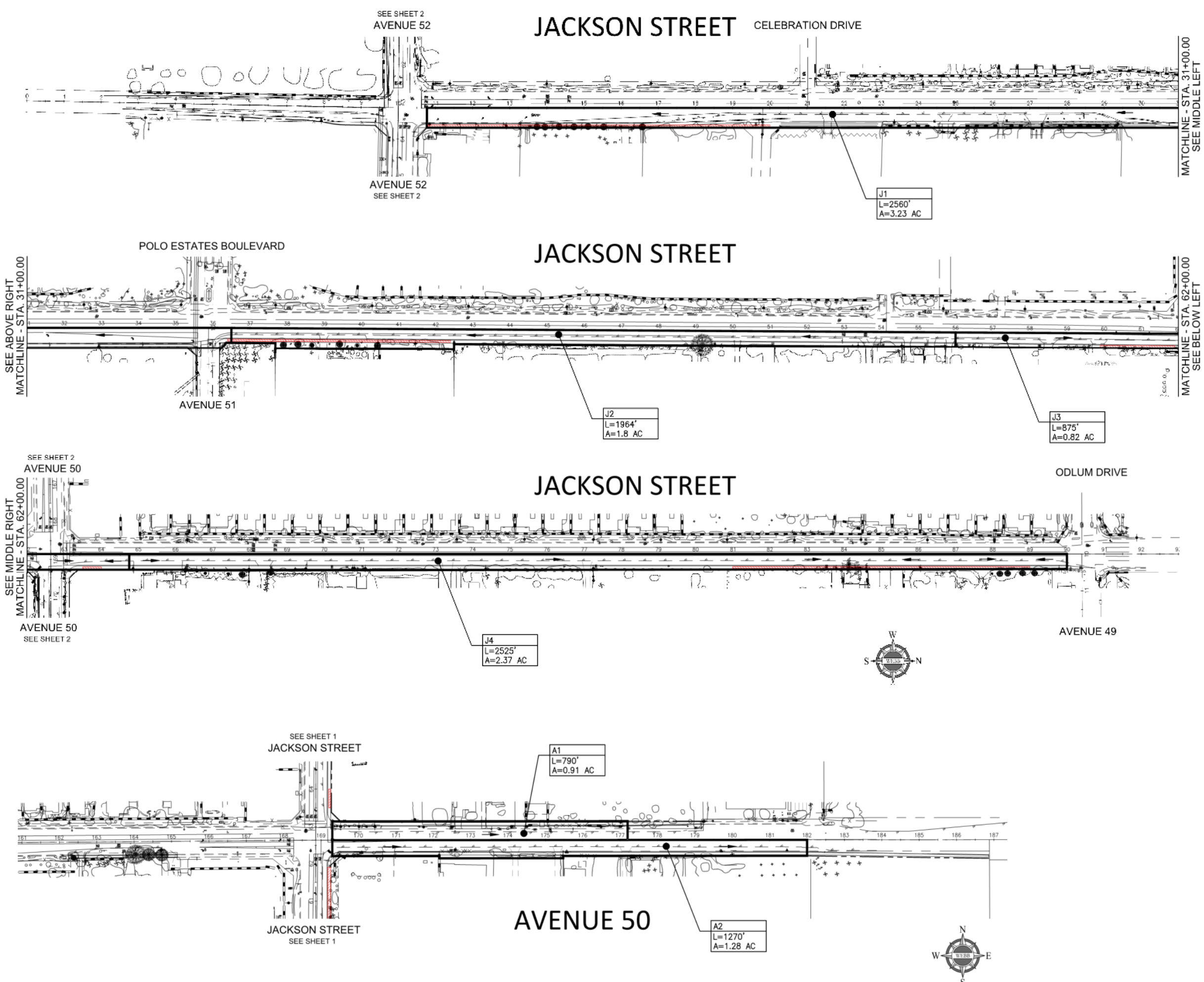
Introduction

Jackson Street Improvement project located within the Whitewater River watershed, in the City of Indio, south of Highway 111, west of the City of Coachella, and the County of Riverside, between Avenue 49 and Avenue 52, approximately 1.6 miles in length.

The proposed improvements include street widening, construction of curb & gutter, sidewalk, traffic signal, and drainage improvements.

The purpose of this report is to present the hydrologic and hydraulic analysis prepared with the Storm Drain improvements and to determine that the proposed drainage facilities meet the design criteria set forth by the City of Indio, which is to ensure no on-site 100-year stormwater leaves the site through retention and infiltration facilities.

Project Locations



Existing Drainage Facilities

The project is located in the 'South City' per the City of Indio MDP. The South City areas are located between Avenue 48 and Avenue 52. The existing drainage pattern is from the northwest to the southeast, towards the Whitewater and the Salton Sea. More than half of the areas are newer, self-contained residential developments and golf courses. Future developments will also be required to retain on-site 100-year, 24-hour storm volume. Currently, there are no regional or master plan drainage facilities within the project vicinity. The nearest receiving water is the Coachella Valley Stormwater (Whitewater River) Channel, approximately 2.5 miles measured along Avenue 49 and 4 miles along Avenue 52 east of Jackson Street. The MDP recommends street parkway infiltration trenches used for street runoffs only similar to the recently constructed Madison Street Drainage System.

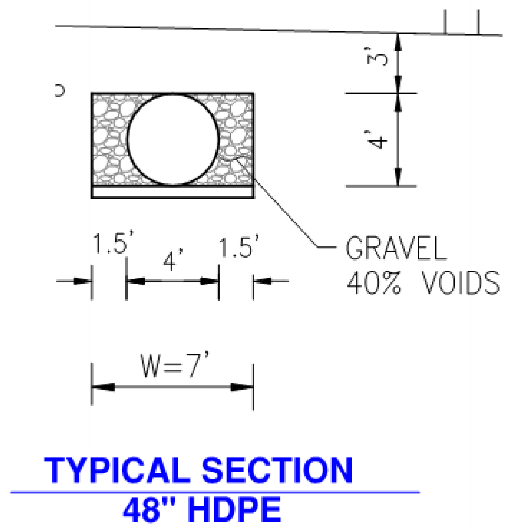
Proposed Drainage Facilities

Since there are no existing drainage facilities near the project vicinity, the storm runoff will be retained on site. During the project preliminary design phase, several options were discussed with the City and County. Jackson Street Improvement is a linear project; no additional offsite area is available for an open retention/infiltration basin. An underground retention/infiltration system is designed to retain the project runoff for the 100-year 24-hour storm event (24-hour duration of the storm event yields maximum of the storm volume). This infiltration trench system is also consistent with the updated City of Indio MDP.

The proposed drainage system consists Storm Drain Line J1 through Line J4 on Jackson Street, Line A1, and A2 on Avenue 50. Each storm drain line is a 48" or 60" perforated HDPE pipe embedded in a trench filled with clean washed stones (gravel), located under the sidewalk/parkway on the east side of Jackson Street or on both sides of Avenue 50. The storm drain disconnects at the major utility crossing and at the street intersections. Catch basin with local depression is placed at the low points of the street and at the downstream end of each storm drain to collect and convey the street flow to the underground pipe for storage and infiltration. ADS Flexstorm Pure or equivalent will be utilized for pre-treatment inserting in the catch basins for debris and sediments removal.

GEOCON has conducted site percolation testing for the project. The infiltration rates from the borings range between 2.82 inches to 4.41 inches per hour. The average infiltration rate is 3.63 inches per hour. With a safety factor over 2.5, the design infiltration rate of 1.4 inches per hour is used for this study. To provide comparisons, for the Madison Street Improvements Project, an infiltration rate of 1.5 inches per hour was utilized to size the infiltration trench length.

Typical Cross-Section of Storm Drain Pipe for 48" HDPE



The storage and infiltration volume provided included three components:

- Infiltration volume for the 24 hour period (based on the estimated length of pipe and 80% of the gravel trench width)
- 48" or 60" pipe volume
- Stone (gravel) trench backfill porosity (40%).

The minimum required pipe length is calculated based on the above-listed capacities. Maxwell Plus or equivalent deep dry well will be installed for each segment of the infiltration trench to ensure the groundwater infiltration not to be blocked by the clay layer.

Proposed Post Construction BMP's

The proposed post construction water quality management plan may include, but may not be limited to the following measures:

- Public education programs
- Scheduled street sweeping by the City
- Catch basin stenciling
- Install and maintain the catch basin pre-treatment filters
- Retention / Infiltration Trench
- MaxWell Plus / Deep Dry Wells

Methodology

Civil Design Version 9.2 Computer Software Program was utilized for the hydrology studies. The Synthetic Unit Hydrograph Method was used for the storm volume calculous for the purpose of sizing the retention/infiltration facility.

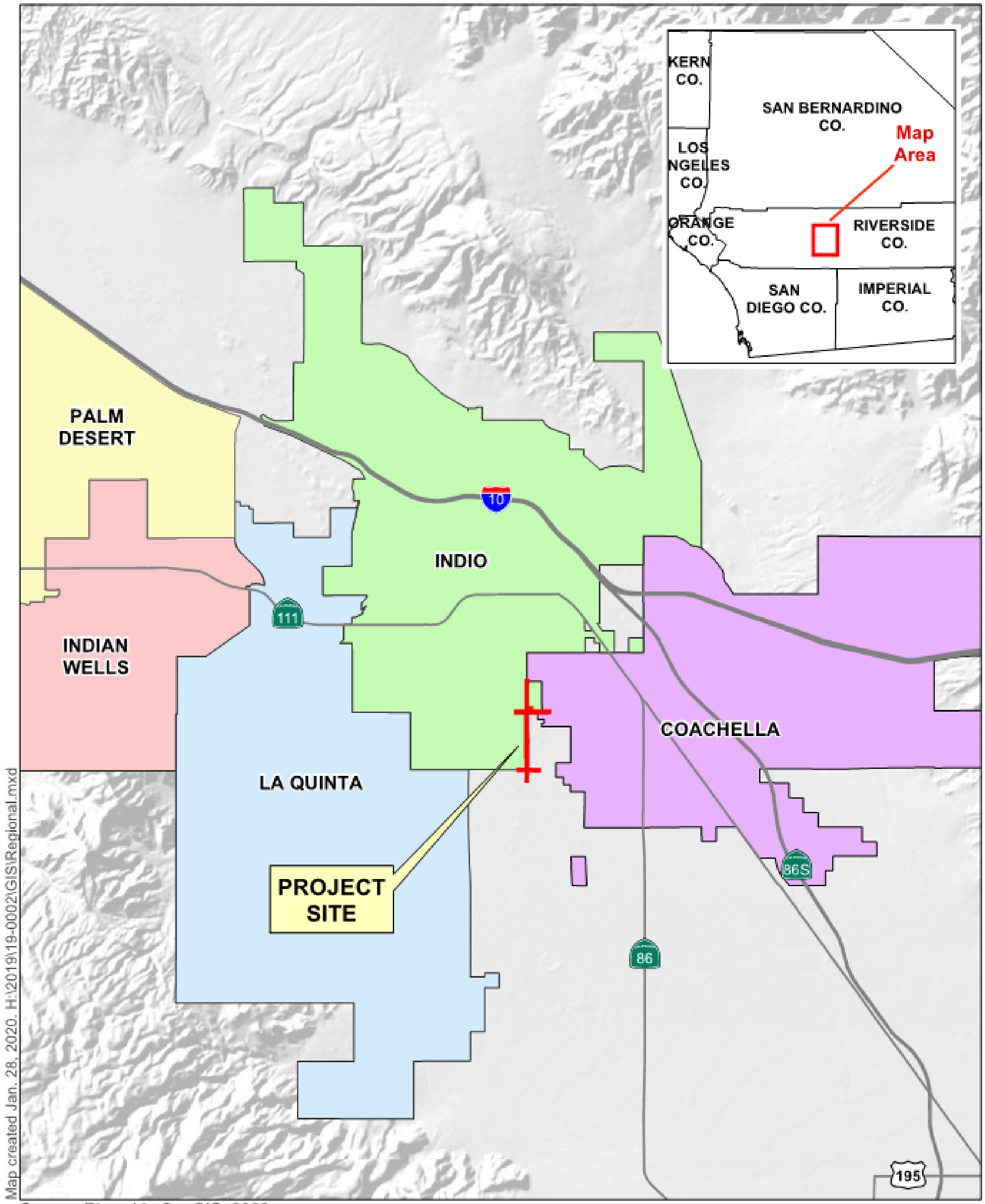
CONTECH Design Your Own Detention System worksheet is also utilized to calculate 48", 60" pipe storage volume and porous stone storage volume.

Conclusion

Based upon the results of this report, it is concluded that the proposed facilities will adequately provide drainage conveyance, storage, and infiltration for Jackson Street storm runoff. The proposed facilities, with adequate maintenance, will convey flows safely to the underground retention and ground infiltration with the additional benefit of groundwater recharging, in accordance with the requirements of the City of Indio and the County of Riverside.

SECTION 2 - UNIT HYDROGRAPHIC STUDIES

Regional Map



Source: Riverside Co. GIS, 2020

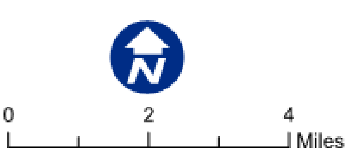
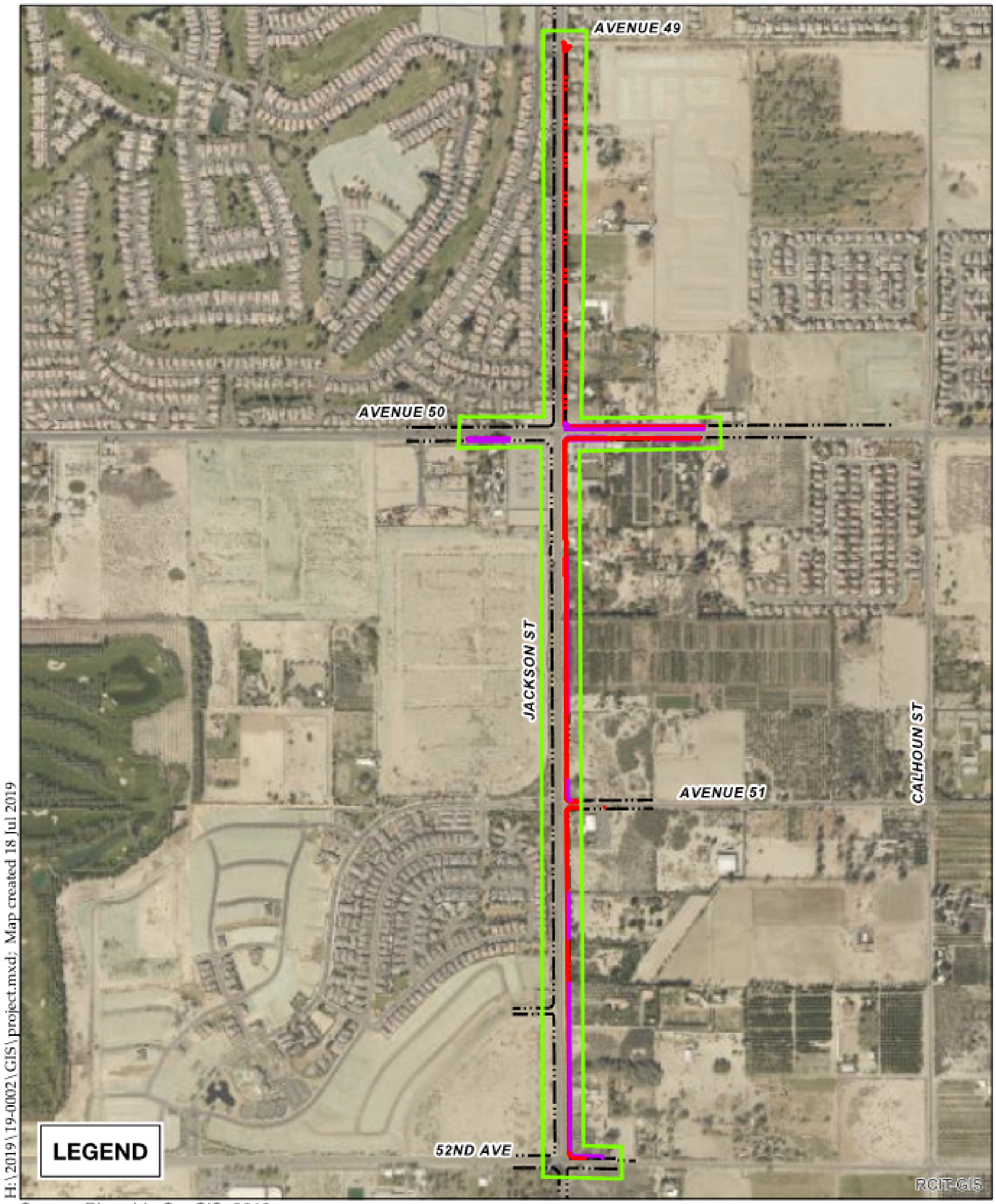


Figure 1 – Regional Location Map

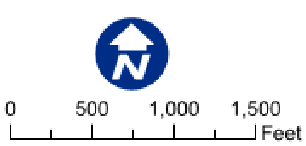
Jackson Street Widening

ALBERT A. WEBB ASSOCIATES

Location/ Aerial Map



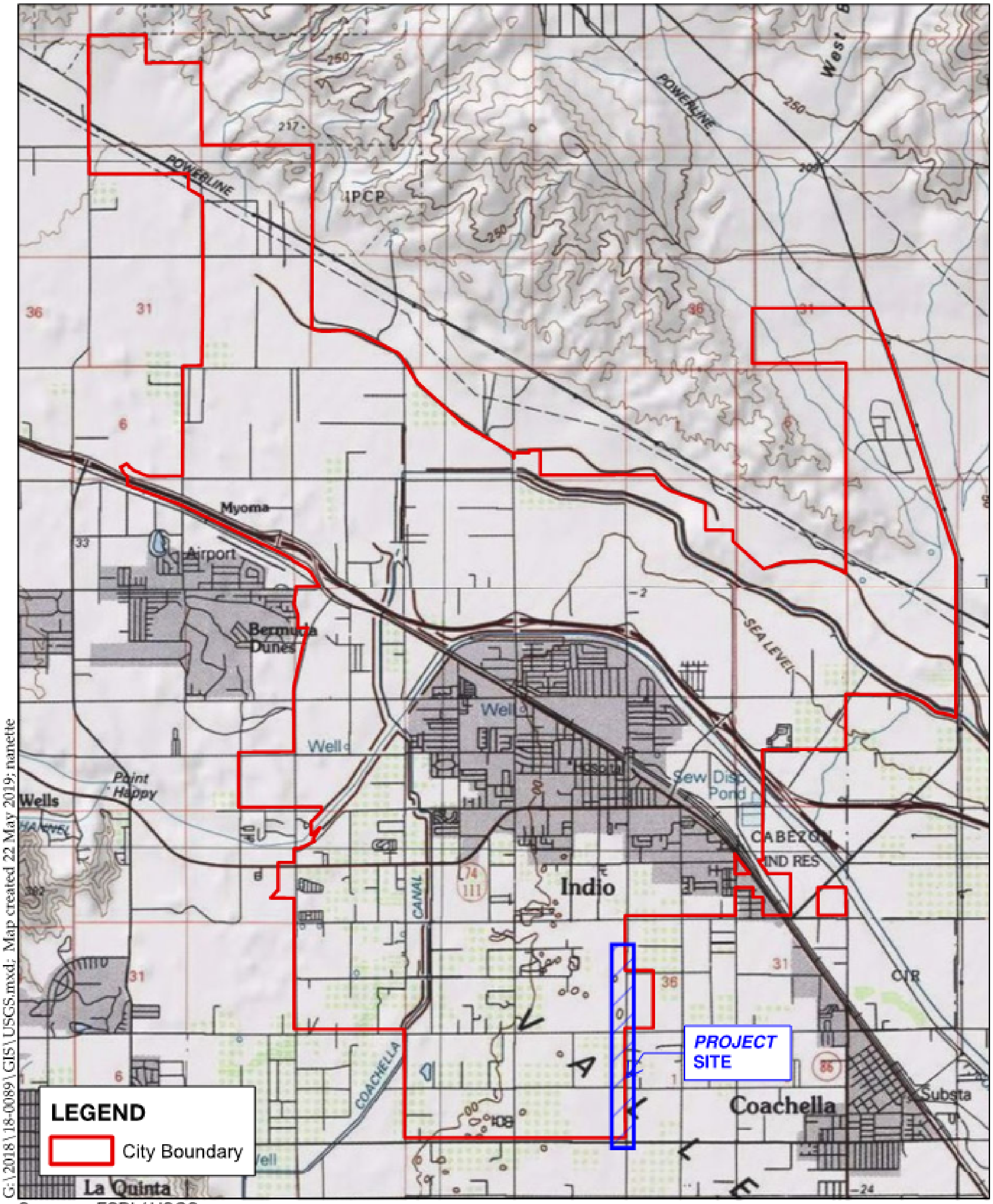
Source: Riverside Co. GIS, 2019



Ave. 50 and Jackson St. Improvements

ALBERT A. WEBB ASSOCIATES

USGS Map



G:\2018\18-0089\GIS\USGS.mxd; Map created 22 May 2019; nanette

Sources: ESRI / USGS

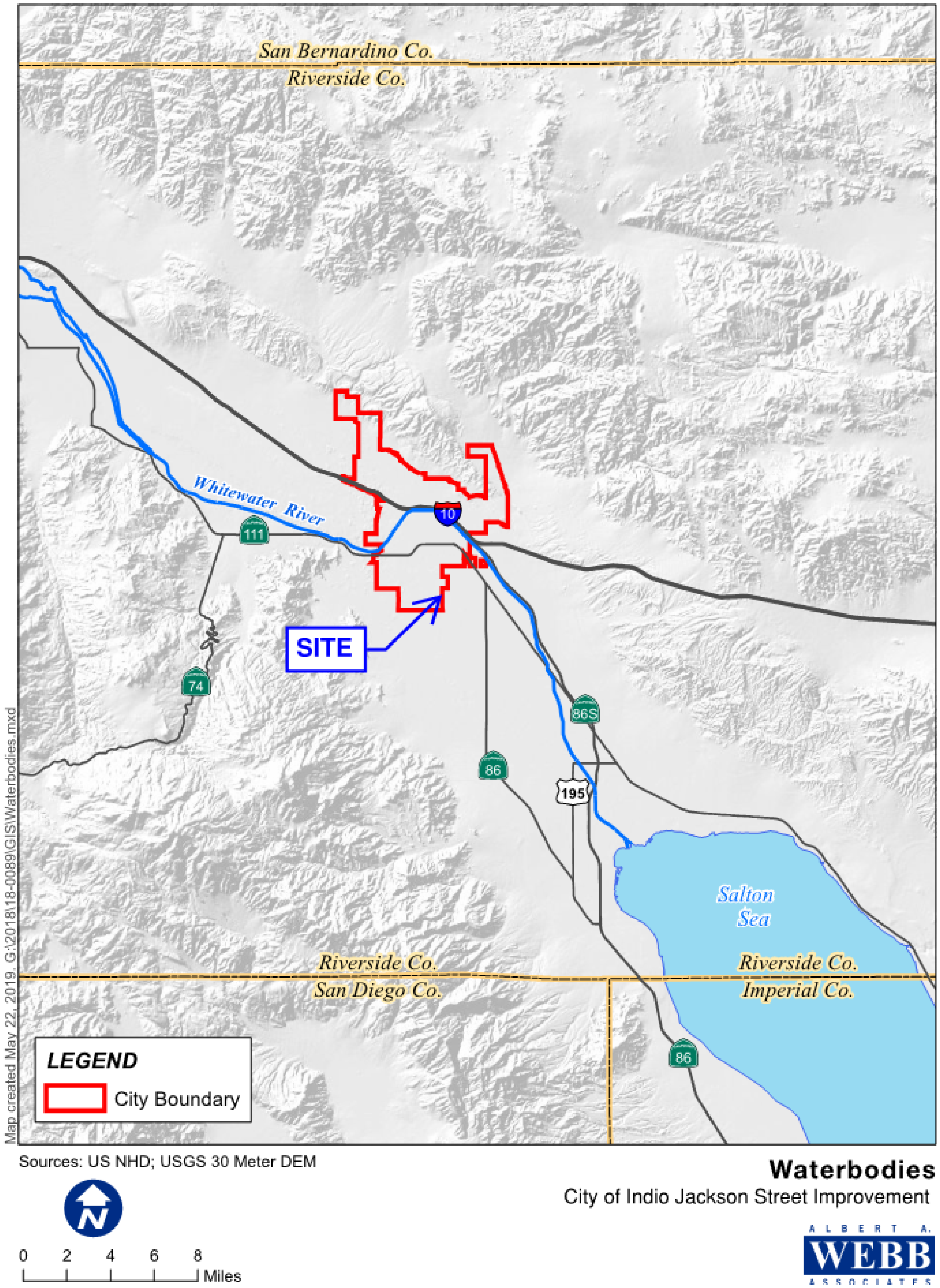
USGS Map

City of Indio Jackson Street Improvement

0 4,000 8,000 12,000 Feet

ALBERT A. WEBB ASSOCIATES

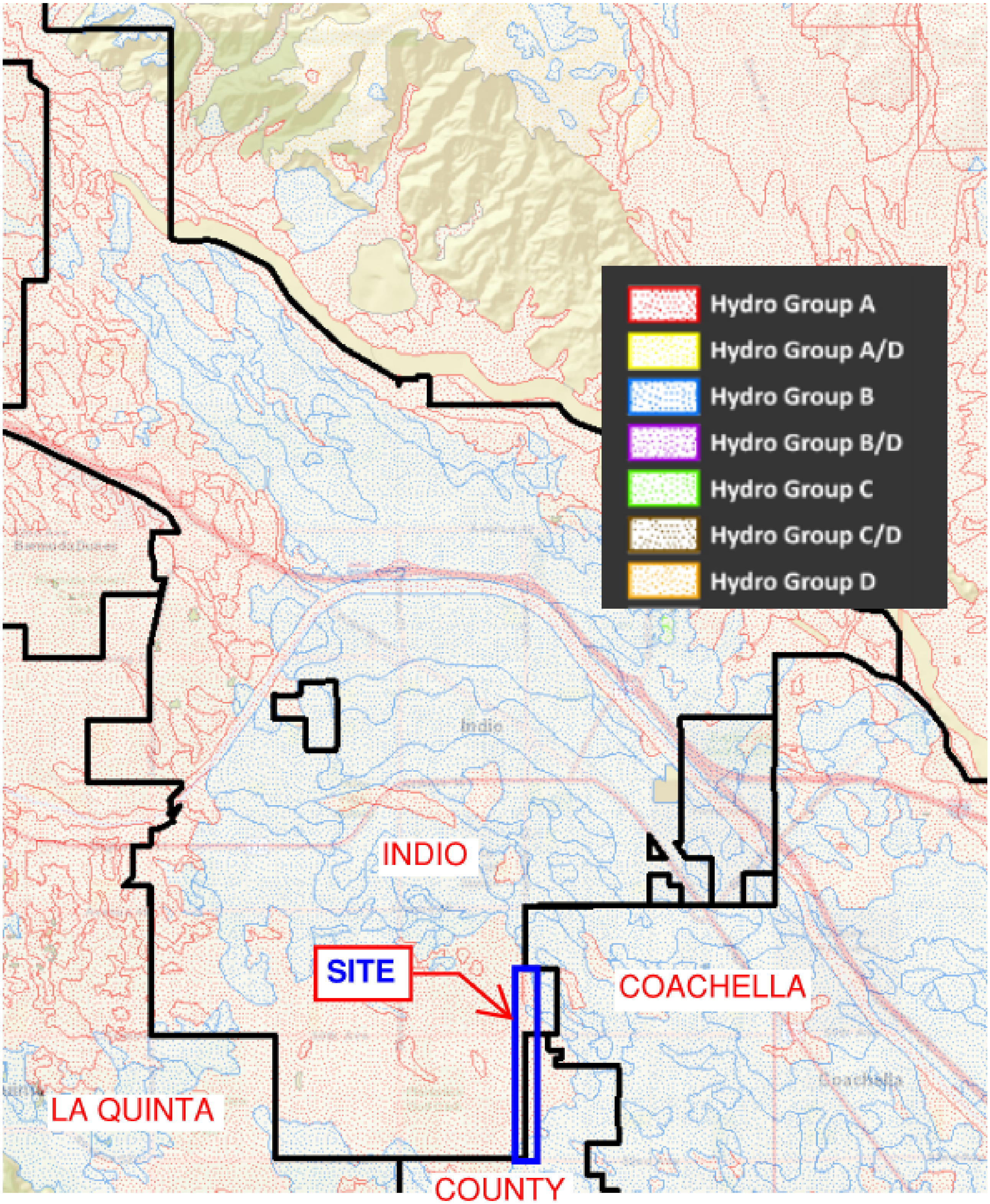
Receiving Waterbodies Map



Waterbodies

City of Indio Jackson Street Improvement

Hydrologic Soil Group



Precipitation Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Coachella, California, USA*
Latitude: 33.6849°, Longitude: -116.2162°
Elevation: -14.4 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.064 (0.053-0.077)	0.100 (0.083-0.121)	0.151 (0.126-0.184)	0.197 (0.162-0.242)	0.266 (0.212-0.337)	0.325 (0.253-0.421)	0.390 (0.296-0.518)	0.464 (0.343-0.634)	0.576 (0.408-0.822)	0.675 (0.462-0.998)
10-min	0.091 (0.076-0.110)	0.143 (0.119-0.173)	0.217 (0.180-0.263)	0.282 (0.233-0.346)	0.381 (0.304-0.483)	0.465 (0.363-0.603)	0.559 (0.425-0.742)	0.664 (0.491-0.908)	0.826 (0.585-1.18)	0.968 (0.662-1.43)
15-min	0.110 (0.092-0.134)	0.173 (0.144-0.209)	0.262 (0.218-0.318)	0.342 (0.282-0.419)	0.461 (0.367-0.585)	0.563 (0.439-0.729)	0.676 (0.514-0.898)	0.804 (0.594-1.10)	0.998 (0.707-1.42)	1.17 (0.800-1.73)
30-min	0.160 (0.133-0.193)	0.250 (0.208-0.303)	0.379 (0.315-0.461)	0.494 (0.407-0.606)	0.667 (0.531-0.846)	0.814 (0.635-1.06)	0.978 (0.744-1.30)	1.16 (0.859-1.59)	1.45 (1.02-2.06)	1.69 (1.16-2.50)
60-min	0.224 (0.187-0.271)	0.350 (0.292-0.424)	0.531 (0.442-0.646)	0.692 (0.571-0.849)	0.935 (0.744-1.19)	1.14 (0.889-1.48)	1.37 (1.04-1.82)	1.63 (1.20-2.23)	2.02 (1.43-2.89)	2.37 (1.62-3.51)
2-hr	0.310 (0.259-0.375)	0.460 (0.384-0.558)	0.683 (0.568-0.830)	0.887 (0.731-1.09)	1.20 (0.957-1.52)	1.47 (1.15-1.91)	1.78 (1.36-2.37)	2.14 (1.58-2.92)	2.68 (1.90-3.82)	3.16 (2.16-4.67)
3-hr	0.374 (0.312-0.452)	0.545 (0.454-0.660)	0.802 (0.667-0.975)	1.04 (0.857-1.27)	1.41 (1.12-1.79)	1.74 (1.36-2.25)	2.11 (1.61-2.81)	2.54 (1.88-3.48)	3.21 (2.28-4.58)	3.81 (2.61-5.63)
6-hr	0.493 (0.412-0.597)	0.712 (0.593-0.863)	1.04 (0.867-1.27)	1.35 (1.11-1.66)	1.84 (1.46-2.33)	2.27 (1.77-2.94)	2.76 (2.10-3.67)	3.34 (2.47-4.57)	4.25 (3.01-6.06)	5.06 (3.46-7.48)
12-hr	0.596 (0.497-0.721)	0.879 (0.733-1.07)	1.30 (1.08-1.58)	1.69 (1.40-2.08)	2.30 (1.83-2.92)	2.84 (2.21-3.67)	3.45 (2.62-4.58)	4.15 (3.07-5.67)	5.24 (3.71-7.48)	6.22 (4.25-9.18)
24-hr	0.748 (0.662-0.863)	1.14 (1.00-1.31)	1.71 (1.51-1.98)	2.22 (1.94-2.59)	3.01 (2.55-3.63)	3.69 (3.06-4.53)	4.45 (3.61-5.60)	5.32 (4.20-6.87)	6.64 (5.04-8.93)	7.79 (5.72-10.8)
2-day	0.867 (0.767-0.999)	1.33 (1.18-1.54)	2.01 (1.77-2.33)	2.61 (2.29-3.05)	3.52 (2.98-4.23)	4.28 (3.56-5.26)	5.13 (4.16-6.45)	6.07 (4.80-7.85)	7.49 (5.68-10.1)	8.69 (6.38-12.1)
3-day	0.928 (0.822-1.07)	1.44 (1.27-1.66)	2.17 (1.91-2.51)	2.81 (2.46-3.28)	3.77 (3.20-4.54)	4.58 (3.80-5.63)	5.47 (4.43-6.88)	6.45 (5.10-8.34)	7.92 (6.01-10.6)	9.16 (6.73-12.7)
4-day	0.979 (0.866-1.13)	1.52 (1.34-1.75)	2.28 (2.01-2.64)	2.96 (2.59-3.45)	3.96 (3.36-4.77)	4.80 (3.99-5.90)	5.72 (4.64-7.20)	6.75 (5.33-8.72)	8.26 (6.27-11.1)	9.54 (7.00-13.3)
7-day	1.04 (0.920-1.20)	1.60 (1.42-1.85)	2.40 (2.12-2.78)	3.11 (2.72-3.62)	4.14 (3.51-4.99)	5.01 (4.16-6.16)	5.96 (4.83-7.49)	7.00 (5.53-9.05)	8.54 (6.48-11.5)	9.83 (7.22-13.7)
10-day	1.08 (0.951-1.24)	1.65 (1.46-1.91)	2.47 (2.18-2.86)	3.20 (2.79-3.73)	4.26 (3.61-5.13)	5.14 (4.27-6.32)	6.11 (4.95-7.68)	7.17 (5.66-9.26)	8.73 (6.62-11.7)	10.0 (7.37-14.0)
20-day	1.14 (1.01-1.32)	1.78 (1.57-2.05)	2.67 (2.35-3.09)	3.45 (3.02-4.03)	4.60 (3.90-5.54)	5.55 (4.61-6.82)	6.58 (5.34-8.28)	7.71 (6.09-9.97)	9.36 (7.10-12.6)	10.7 (7.88-14.9)
30-day	1.19 (1.05-1.37)	1.87 (1.66-2.16)	2.85 (2.51-3.30)	3.71 (3.24-4.33)	4.96 (4.21-5.98)	6.00 (4.98-7.37)	7.11 (5.77-8.95)	8.33 (6.58-10.8)	10.1 (7.65-13.6)	11.5 (8.47-16.0)
45-day	1.29 (1.14-1.49)	2.07 (1.83-2.38)	3.17 (2.80-3.67)	4.14 (3.62-4.83)	5.56 (4.71-6.70)	6.74 (5.60-8.28)	8.00 (6.49-10.1)	9.37 (7.40-12.1)	11.3 (8.60-15.2)	12.9 (9.50-18.0)
60-day	1.36 (1.20-1.56)	2.20 (1.95-2.54)	3.41 (3.01-3.95)	4.47 (3.91-5.22)	6.03 (5.11-7.26)	7.31 (6.07-8.99)	8.69 (7.05-10.9)	10.2 (8.04-13.2)	12.3 (9.34-16.6)	14.1 (10.3-19.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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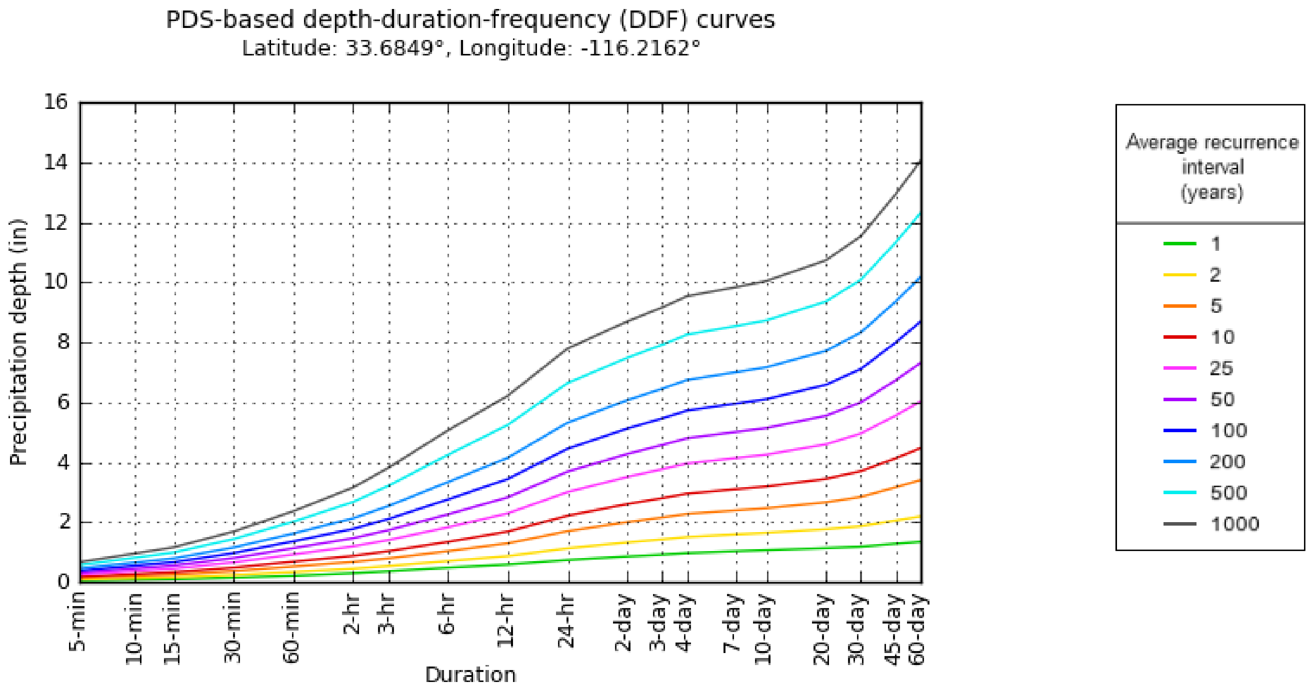
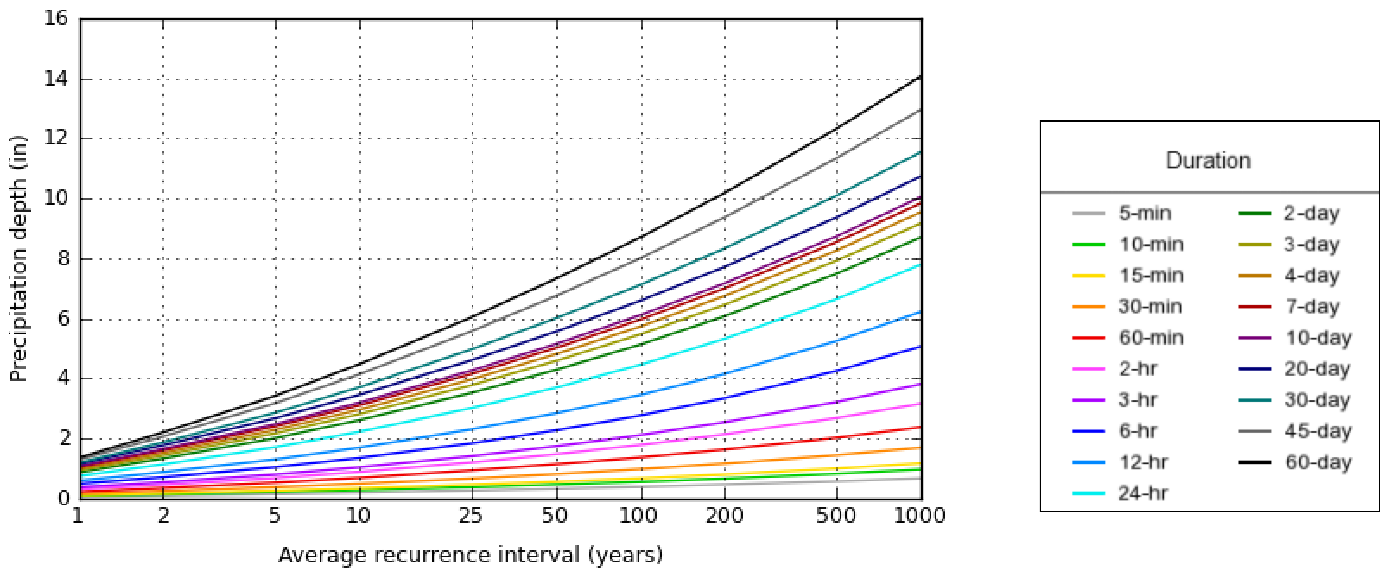
PF graphical





NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Fri Nov 22 19:40:53 2019

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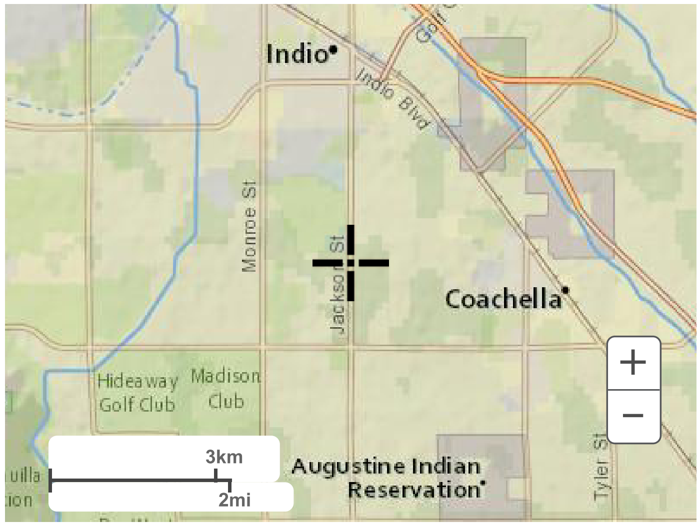
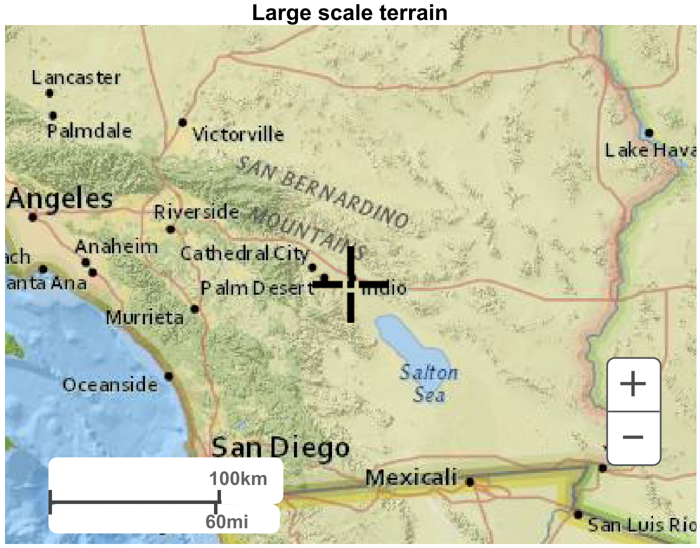
Maps & aerials

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

Infiltration Report by GeoCon (Pending)

Hydrographic Studies for Retention / Infiltration

100-Year 24 – Hour Event Storm Volume Summary

100-Year 24 – Hour Event for Each Sub-area

Jackson Sub-Watershed Unit Hydrograph Summary

ID	Jackson/ Ave 50 Street Station	Watershed Area (acre)	Roadway Length (ft)	100-Y 24-H Storm Volume (cf)
	JACKSON AVE.			
J1	10+76 to 36+36	3.23	2560	40700
J2	36+36 to 56+00	1.80	1964	23840
J3	56+00 to 64+75	0.82	875	10860
J4	64+75 to 90+00	2.37	2525	31390
	AVENUE 50			
A1	169+30 to 177+20	0.91	790	11470
A2	169+30 to 182+00	1.28	1270	16130
	Total	**10.41**	**9984**	**134390**

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       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  02/03/20 File: J124100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

----------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format

----------------------------------------------------------------------
JACKSON STREET IMPROVEMENT
100-YEAR 24 HOUR STORM
AREA J1, AVE 52 TO AVE 51
FILE: J1.UM1
---------------------------------------------------------------------
Drainage Area =       3.23(Ac.)  =      0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       3.23(Ac.)  =      0.005 Sq. Mi.
Length along longest watercourse =    2560.00(Ft.)
Length along longest watercourse measured to centroid =    1280.00(Ft.)
Length along longest watercourse =      0.485 Mi.
Length along longest watercourse measured to centroid =      0.242 Mi.
Difference in elevation =      20.10(Ft.)
Slope along watercourse =     41.4563 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.079 Hr.
Lag time =     4.72 Min.
25% of lag time =     1.18 Min.
40% of lag time =     1.89 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        3.23           1.14                  3.68

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        3.23           4.45                 14.37

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.140(In)
Area Averaged 100-Year Rainfall =    4.450(In)

Point rain (area averaged) =    4.450(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    4.450(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     3.230           32.00         0.850
 Total Area Entered =      3.23(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
32.0  32.0      0.742     0.850        0.174       1.000      0.174
```

Sum (F) = 0.174

Area averaged mean soil loss (F) (In/Hr) = 0.174
Minimum soil loss rate ((In/Hr)) = 0.087
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

U n i t   H y d r o g r a p h
DESERT S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	105.972	19.171	0.624
2	0.167	211.943	50.221	1.635
3	0.250	317.915	16.070	0.523
4	0.333	423.886	7.029	0.229
5	0.417	529.858	3.748	0.122
6	0.500	635.829	1.886	0.061
7	0.583	741.801	1.193	0.039
8	0.667	847.772	0.682	0.022
			Sum = 100.000	Sum= 3.255

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.309)	0.008	0.028
2	0.17	0.07	0.036	(0.308)	0.008	0.028
3	0.25	0.07	0.036	(0.307)	0.008	0.028
4	0.33	0.10	0.053	(0.306)	0.012	0.042
5	0.42	0.10	0.053	(0.304)	0.012	0.042
6	0.50	0.10	0.053	(0.303)	0.012	0.042
7	0.58	0.10	0.053	(0.302)	0.012	0.042
8	0.67	0.10	0.053	(0.301)	0.012	0.042
9	0.75	0.10	0.053	(0.300)	0.012	0.042
10	0.83	0.13	0.071	(0.298)	0.016	0.056
11	0.92	0.13	0.071	(0.297)	0.016	0.056
12	1.00	0.13	0.071	(0.296)	0.016	0.056
13	1.08	0.10	0.053	(0.295)	0.012	0.042
14	1.17	0.10	0.053	(0.294)	0.012	0.042
15	1.25	0.10	0.053	(0.293)	0.012	0.042
16	1.33	0.10	0.053	(0.291)	0.012	0.042
17	1.42	0.10	0.053	(0.290)	0.012	0.042
18	1.50	0.10	0.053	(0.289)	0.012	0.042
19	1.58	0.10	0.053	(0.288)	0.012	0.042
20	1.67	0.10	0.053	(0.287)	0.012	0.042
21	1.75	0.10	0.053	(0.286)	0.012	0.042
22	1.83	0.13	0.071	(0.284)	0.016	0.056
23	1.92	0.13	0.071	(0.283)	0.016	0.056
24	2.00	0.13	0.071	(0.282)	0.016	0.056
25	2.08	0.13	0.071	(0.281)	0.016	0.056
26	2.17	0.13	0.071	(0.280)	0.016	0.056
27	2.25	0.13	0.071	(0.279)	0.016	0.056
28	2.33	0.13	0.071	(0.278)	0.016	0.056
29	2.42	0.13	0.071	(0.277)	0.016	0.056
30	2.50	0.13	0.071	(0.275)	0.016	0.056
31	2.58	0.17	0.089	(0.274)	0.020	0.069
32	2.67	0.17	0.089	(0.273)	0.020	0.069
33	2.75	0.17	0.089	(0.272)	0.020	0.069
34	2.83	0.17	0.089	(0.271)	0.020	0.069
35	2.92	0.17	0.089	(0.270)	0.020	0.069
36	3.00	0.17	0.089	(0.269)	0.020	0.069
37	3.08	0.17	0.089	(0.268)	0.020	0.069
38	3.17	0.17	0.089	(0.266)	0.020	0.069
39	3.25	0.17	0.089	(0.265)	0.020	0.069

40	3.33	0.17	0.089	(0.264)	0.020	0.069
41	3.42	0.17	0.089	(0.263)	0.020	0.069
42	3.50	0.17	0.089	(0.262)	0.020	0.069
43	3.58	0.17	0.089	(0.261)	0.020	0.069
44	3.67	0.17	0.089	(0.260)	0.020	0.069
45	3.75	0.17	0.089	(0.259)	0.020	0.069
46	3.83	0.20	0.107	(0.258)	0.023	0.083
47	3.92	0.20	0.107	(0.257)	0.023	0.083
48	4.00	0.20	0.107	(0.255)	0.023	0.083
49	4.08	0.20	0.107	(0.254)	0.023	0.083
50	4.17	0.20	0.107	(0.253)	0.023	0.083
51	4.25	0.20	0.107	(0.252)	0.023	0.083
52	4.33	0.23	0.125	(0.251)	0.027	0.097
53	4.42	0.23	0.125	(0.250)	0.027	0.097
54	4.50	0.23	0.125	(0.249)	0.027	0.097
55	4.58	0.23	0.125	(0.248)	0.027	0.097
56	4.67	0.23	0.125	(0.247)	0.027	0.097
57	4.75	0.23	0.125	(0.246)	0.027	0.097
58	4.83	0.27	0.142	(0.245)	0.031	0.111
59	4.92	0.27	0.142	(0.244)	0.031	0.111
60	5.00	0.27	0.142	(0.243)	0.031	0.111
61	5.08	0.20	0.107	(0.242)	0.023	0.083
62	5.17	0.20	0.107	(0.241)	0.023	0.083
63	5.25	0.20	0.107	(0.239)	0.023	0.083
64	5.33	0.23	0.125	(0.238)	0.027	0.097
65	5.42	0.23	0.125	(0.237)	0.027	0.097
66	5.50	0.23	0.125	(0.236)	0.027	0.097
67	5.58	0.27	0.142	(0.235)	0.031	0.111
68	5.67	0.27	0.142	(0.234)	0.031	0.111
69	5.75	0.27	0.142	(0.233)	0.031	0.111
70	5.83	0.27	0.142	(0.232)	0.031	0.111
71	5.92	0.27	0.142	(0.231)	0.031	0.111
72	6.00	0.27	0.142	(0.230)	0.031	0.111
73	6.08	0.30	0.160	(0.229)	0.035	0.125
74	6.17	0.30	0.160	(0.228)	0.035	0.125
75	6.25	0.30	0.160	(0.227)	0.035	0.125
76	6.33	0.30	0.160	(0.226)	0.035	0.125
77	6.42	0.30	0.160	(0.225)	0.035	0.125
78	6.50	0.30	0.160	(0.224)	0.035	0.125
79	6.58	0.33	0.178	(0.223)	0.039	0.139
80	6.67	0.33	0.178	(0.222)	0.039	0.139
81	6.75	0.33	0.178	(0.221)	0.039	0.139
82	6.83	0.33	0.178	(0.220)	0.039	0.139
83	6.92	0.33	0.178	(0.219)	0.039	0.139
84	7.00	0.33	0.178	(0.218)	0.039	0.139
85	7.08	0.33	0.178	(0.217)	0.039	0.139
86	7.17	0.33	0.178	(0.216)	0.039	0.139
87	7.25	0.33	0.178	(0.215)	0.039	0.139
88	7.33	0.37	0.196	(0.214)	0.043	0.153
89	7.42	0.37	0.196	(0.213)	0.043	0.153
90	7.50	0.37	0.196	(0.212)	0.043	0.153
91	7.58	0.40	0.214	(0.211)	0.047	0.167
92	7.67	0.40	0.214	(0.210)	0.047	0.167
93	7.75	0.40	0.214	(0.209)	0.047	0.167
94	7.83	0.43	0.231	(0.208)	0.051	0.180
95	7.92	0.43	0.231	(0.207)	0.051	0.180
96	8.00	0.43	0.231	(0.206)	0.051	0.180
97	8.08	0.50	0.267	(0.205)	0.059	0.208
98	8.17	0.50	0.267	(0.204)	0.059	0.208
99	8.25	0.50	0.267	(0.203)	0.059	0.208
100	8.33	0.50	0.267	(0.203)	0.059	0.208
101	8.42	0.50	0.267	(0.202)	0.059	0.208
102	8.50	0.50	0.267	(0.201)	0.059	0.208
103	8.58	0.53	0.285	(0.200)	0.063	0.222
104	8.67	0.53	0.285	(0.199)	0.063	0.222
105	8.75	0.53	0.285	(0.198)	0.063	0.222
106	8.83	0.57	0.303	(0.197)	0.067	0.236
107	8.92	0.57	0.303	(0.196)	0.067	0.236
108	9.00	0.57	0.303	(0.195)	0.067	0.236
109	9.08	0.63	0.338	(0.194)	0.074	0.264
110	9.17	0.63	0.338	(0.193)	0.074	0.264

111	9.25	0.63	0.338	(0.192)	0.074	0.264
112	9.33	0.67	0.356	(0.191)	0.078	0.278
113	9.42	0.67	0.356	(0.190)	0.078	0.278
114	9.50	0.67	0.356	(0.190)	0.078	0.278
115	9.58	0.70	0.374	(0.189)	0.082	0.292
116	9.67	0.70	0.374	(0.188)	0.082	0.292
117	9.75	0.70	0.374	(0.187)	0.082	0.292
118	9.83	0.73	0.392	(0.186)	0.086	0.305
119	9.92	0.73	0.392	(0.185)	0.086	0.305
120	10.00	0.73	0.392	(0.184)	0.086	0.305
121	10.08	0.50	0.267	(0.183)	0.059	0.208
122	10.17	0.50	0.267	(0.182)	0.059	0.208
123	10.25	0.50	0.267	(0.181)	0.059	0.208
124	10.33	0.50	0.267	(0.181)	0.059	0.208
125	10.42	0.50	0.267	(0.180)	0.059	0.208
126	10.50	0.50	0.267	(0.179)	0.059	0.208
127	10.58	0.67	0.356	(0.178)	0.078	0.278
128	10.67	0.67	0.356	(0.177)	0.078	0.278
129	10.75	0.67	0.356	(0.176)	0.078	0.278
130	10.83	0.67	0.356	(0.175)	0.078	0.278
131	10.92	0.67	0.356	(0.175)	0.078	0.278
132	11.00	0.67	0.356	(0.174)	0.078	0.278
133	11.08	0.63	0.338	(0.173)	0.074	0.264
134	11.17	0.63	0.338	(0.172)	0.074	0.264
135	11.25	0.63	0.338	(0.171)	0.074	0.264
136	11.33	0.63	0.338	(0.170)	0.074	0.264
137	11.42	0.63	0.338	(0.169)	0.074	0.264
138	11.50	0.63	0.338	(0.169)	0.074	0.264
139	11.58	0.57	0.303	(0.168)	0.067	0.236
140	11.67	0.57	0.303	(0.167)	0.067	0.236
141	11.75	0.57	0.303	(0.166)	0.067	0.236
142	11.83	0.60	0.320	(0.165)	0.070	0.250
143	11.92	0.60	0.320	(0.164)	0.070	0.250
144	12.00	0.60	0.320	(0.164)	0.070	0.250
145	12.08	0.83	0.445	(0.163)	0.098	0.347
146	12.17	0.83	0.445	(0.162)	0.098	0.347
147	12.25	0.83	0.445	(0.161)	0.098	0.347
148	12.33	0.87	0.463	(0.160)	0.102	0.361
149	12.42	0.87	0.463	(0.160)	0.102	0.361
150	12.50	0.87	0.463	(0.159)	0.102	0.361
151	12.58	0.93	0.498	(0.158)	0.110	0.389
152	12.67	0.93	0.498	(0.157)	0.110	0.389
153	12.75	0.93	0.498	(0.156)	0.110	0.389
154	12.83	0.97	0.516	(0.156)	0.114	0.403
155	12.92	0.97	0.516	(0.155)	0.114	0.403
156	13.00	0.97	0.516	(0.154)	0.114	0.403
157	13.08	1.13	0.605	(0.153)	0.133	0.472
158	13.17	1.13	0.605	(0.152)	0.133	0.472
159	13.25	1.13	0.605	(0.152)	0.133	0.472
160	13.33	1.13	0.605	(0.151)	0.133	0.472
161	13.42	1.13	0.605	(0.150)	0.133	0.472
162	13.50	1.13	0.605	(0.149)	0.133	0.472
163	13.58	0.77	0.409	(0.149)	0.090	0.319
164	13.67	0.77	0.409	(0.148)	0.090	0.319
165	13.75	0.77	0.409	(0.147)	0.090	0.319
166	13.83	0.77	0.409	(0.146)	0.090	0.319
167	13.92	0.77	0.409	(0.146)	0.090	0.319
168	14.00	0.77	0.409	(0.145)	0.090	0.319
169	14.08	0.90	0.481	(0.144)	0.106	0.375
170	14.17	0.90	0.481	(0.143)	0.106	0.375
171	14.25	0.90	0.481	(0.143)	0.106	0.375
172	14.33	0.87	0.463	(0.142)	0.102	0.361
173	14.42	0.87	0.463	(0.141)	0.102	0.361
174	14.50	0.87	0.463	(0.140)	0.102	0.361
175	14.58	0.87	0.463	(0.140)	0.102	0.361
176	14.67	0.87	0.463	(0.139)	0.102	0.361
177	14.75	0.87	0.463	(0.138)	0.102	0.361
178	14.83	0.83	0.445	(0.138)	0.098	0.347
179	14.92	0.83	0.445	(0.137)	0.098	0.347
180	15.00	0.83	0.445	(0.136)	0.098	0.347
181	15.08	0.80	0.427	(0.135)	0.094	0.333

182	15.17	0.80	0.427	(0.135)	0.094	0.333
183	15.25	0.80	0.427	(0.134)	0.094	0.333
184	15.33	0.77	0.409	(0.133)	0.090	0.319
185	15.42	0.77	0.409	(0.133)	0.090	0.319
186	15.50	0.77	0.409	(0.132)	0.090	0.319
187	15.58	0.63	0.338	(0.131)	0.074	0.264
188	15.67	0.63	0.338	(0.131)	0.074	0.264
189	15.75	0.63	0.338	(0.130)	0.074	0.264
190	15.83	0.63	0.338	(0.129)	0.074	0.264
191	15.92	0.63	0.338	(0.129)	0.074	0.264
192	16.00	0.63	0.338	(0.128)	0.074	0.264
193	16.08	0.13	0.071	(0.127)	0.016	0.056
194	16.17	0.13	0.071	(0.127)	0.016	0.056
195	16.25	0.13	0.071	(0.126)	0.016	0.056
196	16.33	0.13	0.071	(0.125)	0.016	0.056
197	16.42	0.13	0.071	(0.125)	0.016	0.056
198	16.50	0.13	0.071	(0.124)	0.016	0.056
199	16.58	0.10	0.053	(0.124)	0.012	0.042
200	16.67	0.10	0.053	(0.123)	0.012	0.042
201	16.75	0.10	0.053	(0.122)	0.012	0.042
202	16.83	0.10	0.053	(0.122)	0.012	0.042
203	16.92	0.10	0.053	(0.121)	0.012	0.042
204	17.00	0.10	0.053	(0.120)	0.012	0.042
205	17.08	0.17	0.089	(0.120)	0.020	0.069
206	17.17	0.17	0.089	(0.119)	0.020	0.069
207	17.25	0.17	0.089	(0.119)	0.020	0.069
208	17.33	0.17	0.089	(0.118)	0.020	0.069
209	17.42	0.17	0.089	(0.117)	0.020	0.069
210	17.50	0.17	0.089	(0.117)	0.020	0.069
211	17.58	0.17	0.089	(0.116)	0.020	0.069
212	17.67	0.17	0.089	(0.116)	0.020	0.069
213	17.75	0.17	0.089	(0.115)	0.020	0.069
214	17.83	0.13	0.071	(0.115)	0.016	0.056
215	17.92	0.13	0.071	(0.114)	0.016	0.056
216	18.00	0.13	0.071	(0.113)	0.016	0.056
217	18.08	0.13	0.071	(0.113)	0.016	0.056
218	18.17	0.13	0.071	(0.112)	0.016	0.056
219	18.25	0.13	0.071	(0.112)	0.016	0.056
220	18.33	0.13	0.071	(0.111)	0.016	0.056
221	18.42	0.13	0.071	(0.111)	0.016	0.056
222	18.50	0.13	0.071	(0.110)	0.016	0.056
223	18.58	0.10	0.053	(0.110)	0.012	0.042
224	18.67	0.10	0.053	(0.109)	0.012	0.042
225	18.75	0.10	0.053	(0.109)	0.012	0.042
226	18.83	0.07	0.036	(0.108)	0.008	0.028
227	18.92	0.07	0.036	(0.108)	0.008	0.028
228	19.00	0.07	0.036	(0.107)	0.008	0.028
229	19.08	0.10	0.053	(0.106)	0.012	0.042
230	19.17	0.10	0.053	(0.106)	0.012	0.042
231	19.25	0.10	0.053	(0.105)	0.012	0.042
232	19.33	0.13	0.071	(0.105)	0.016	0.056
233	19.42	0.13	0.071	(0.105)	0.016	0.056
234	19.50	0.13	0.071	(0.104)	0.016	0.056
235	19.58	0.10	0.053	(0.104)	0.012	0.042
236	19.67	0.10	0.053	(0.103)	0.012	0.042
237	19.75	0.10	0.053	(0.103)	0.012	0.042
238	19.83	0.07	0.036	(0.102)	0.008	0.028
239	19.92	0.07	0.036	(0.102)	0.008	0.028
240	20.00	0.07	0.036	(0.101)	0.008	0.028
241	20.08	0.10	0.053	(0.101)	0.012	0.042
242	20.17	0.10	0.053	(0.100)	0.012	0.042
243	20.25	0.10	0.053	(0.100)	0.012	0.042
244	20.33	0.10	0.053	(0.099)	0.012	0.042
245	20.42	0.10	0.053	(0.099)	0.012	0.042
246	20.50	0.10	0.053	(0.099)	0.012	0.042
247	20.58	0.10	0.053	(0.098)	0.012	0.042
248	20.67	0.10	0.053	(0.098)	0.012	0.042
249	20.75	0.10	0.053	(0.097)	0.012	0.042
250	20.83	0.07	0.036	(0.097)	0.008	0.028
251	20.92	0.07	0.036	(0.097)	0.008	0.028
252	21.00	0.07	0.036	(0.096)	0.008	0.028

253	21.08	0.10	0.053	(0.096)	0.012	0.042
254	21.17	0.10	0.053	(0.095)	0.012	0.042
255	21.25	0.10	0.053	(0.095)	0.012	0.042
256	21.33	0.07	0.036	(0.095)	0.008	0.028
257	21.42	0.07	0.036	(0.094)	0.008	0.028
258	21.50	0.07	0.036	(0.094)	0.008	0.028
259	21.58	0.10	0.053	(0.094)	0.012	0.042
260	21.67	0.10	0.053	(0.093)	0.012	0.042
261	21.75	0.10	0.053	(0.093)	0.012	0.042
262	21.83	0.07	0.036	(0.093)	0.008	0.028
263	21.92	0.07	0.036	(0.092)	0.008	0.028
264	22.00	0.07	0.036	(0.092)	0.008	0.028
265	22.08	0.10	0.053	(0.092)	0.012	0.042
266	22.17	0.10	0.053	(0.091)	0.012	0.042
267	22.25	0.10	0.053	(0.091)	0.012	0.042
268	22.33	0.07	0.036	(0.091)	0.008	0.028
269	22.42	0.07	0.036	(0.091)	0.008	0.028
270	22.50	0.07	0.036	(0.090)	0.008	0.028
271	22.58	0.07	0.036	(0.090)	0.008	0.028
272	22.67	0.07	0.036	(0.090)	0.008	0.028
273	22.75	0.07	0.036	(0.090)	0.008	0.028
274	22.83	0.07	0.036	(0.089)	0.008	0.028
275	22.92	0.07	0.036	(0.089)	0.008	0.028
276	23.00	0.07	0.036	(0.089)	0.008	0.028
277	23.08	0.07	0.036	(0.089)	0.008	0.028
278	23.17	0.07	0.036	(0.088)	0.008	0.028
279	23.25	0.07	0.036	(0.088)	0.008	0.028
280	23.33	0.07	0.036	(0.088)	0.008	0.028
281	23.42	0.07	0.036	(0.088)	0.008	0.028
282	23.50	0.07	0.036	(0.088)	0.008	0.028
283	23.58	0.07	0.036	(0.088)	0.008	0.028
284	23.67	0.07	0.036	(0.088)	0.008	0.028
285	23.75	0.07	0.036	(0.087)	0.008	0.028
286	23.83	0.07	0.036	(0.087)	0.008	0.028
287	23.92	0.07	0.036	(0.087)	0.008	0.028
288	24.00	0.07	0.036	(0.087)	0.008	0.028

```
             (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    41.7
      Flood volume = Effective rainfall      3.47(In)
       times area       3.2(Ac.)/[(In)/(Ft.)] =       0.9(Ac.Ft)
      Total soil loss =      0.98(In)
      Total soil loss =     0.264(Ac.Ft)
      Total rainfall =      4.45(In)
      Flood volume =       40696.9 Cubic Feet
      Total soil loss =       11478.6 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.533(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0001      0.02  Q         |         |         |         |
   0+10       0.0006      0.06  Q         |         |         |         |
   0+15       0.0011      0.08  Q         |         |         |         |
   0+20       0.0017      0.09  Q         |         |         |         |
   0+25       0.0025      0.12  Q         |         |         |         |
   0+30       0.0034      0.13  Q         |         |         |         |
   0+35       0.0043      0.13  Q         |         |         |         |
   0+40       0.0052      0.13  Q         |         |         |         |
   0+45       0.0062      0.13  Q         |         |         |         |
   0+50       0.0072      0.14  Q         |         |         |         |
   0+55       0.0083      0.17  Q         |         |         |         |
   1+ 0       0.0095      0.17  Q         |         |         |         |
   1+ 5       0.0107      0.17  Q         |         |         |         |
   1+10       0.0117      0.15  Q         |         |         |         |
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1+15       0.0127      0.14  Q         |         |         |         |
1+20       0.0136      0.14  Q         |         |         |         |
1+25       0.0146      0.14  Q         |         |         |         |
1+30       0.0155      0.14  Q         |         |         |         |
1+35       0.0164      0.14  Q         |         |         |         |
1+40       0.0174      0.14  Q         |         |         |         |
1+45       0.0183      0.14  Q         |         |         |         |
1+50       0.0193      0.14  Q         |         |         |         |
1+55       0.0205      0.17  Q         |         |         |         |
2+ 0       0.0217      0.17  Q         |         |         |         |
2+ 5       0.0229      0.18  Q         |         |         |         |
2+10       0.0241      0.18  QV        |         |         |         |
2+15       0.0254      0.18  QV        |         |         |         |
2+20       0.0266      0.18  QV        |         |         |         |
2+25       0.0278      0.18  QV        |         |         |         |
2+30       0.0291      0.18  QV        |         |         |         |
2+35       0.0304      0.19  QV        |         |         |         |
2+40       0.0319      0.21  QV        |         |         |         |
2+45       0.0334      0.22  QV        |         |         |         |
2+50       0.0349      0.22  QV        |         |         |         |
2+55       0.0364      0.22  QV        |         |         |         |
3+ 0       0.0380      0.23  QV        |         |         |         |
3+ 5       0.0396      0.23  QV        |         |         |         |
3+10       0.0411      0.23  QV        |         |         |         |
3+15       0.0427      0.23  QV        |         |         |         |
3+20       0.0442      0.23  QV        |         |         |         |
3+25       0.0458      0.23  QV        |         |         |         |
3+30       0.0473      0.23  Q V       |         |         |         |
3+35       0.0489      0.23  Q V       |         |         |         |
3+40       0.0505      0.23  Q V       |         |         |         |
3+45       0.0520      0.23  Q V       |         |         |         |
3+50       0.0536      0.23  Q V       |         |         |         |
3+55       0.0554      0.26  |QV       |         |         |         |
4+ 0       0.0572      0.26  |QV       |         |         |         |
4+ 5       0.0591      0.27  |QV       |         |         |         |
4+10       0.0609      0.27  |QV       |         |         |         |
4+15       0.0628      0.27  |QV       |         |         |         |
4+20       0.0647      0.28  |QV       |         |         |         |
4+25       0.0668      0.30  |QV       |         |         |         |
4+30       0.0689      0.31  |QV       |         |         |         |
4+35       0.0711      0.31  |Q V      |         |         |         |
4+40       0.0733      0.31  |Q V      |         |         |         |
4+45       0.0754      0.32  |Q V      |         |         |         |
4+50       0.0777      0.32  |Q V      |         |         |         |
4+55       0.0801      0.35  |Q V      |         |         |         |
5+ 0       0.0825      0.36  |Q V      |         |         |         |
5+ 5       0.0849      0.34  |Q V      |         |         |         |
5+10       0.0869      0.30  |Q V      |         |         |         |
5+15       0.0889      0.28  |Q V      |         |         |         |
5+20       0.0908      0.29  |Q V      |         |         |         |
5+25       0.0929      0.31  |Q V      |         |         |         |
5+30       0.0951      0.31  |Q  V     |         |         |         |
5+35       0.0973      0.32  |Q  V     |         |         |         |
5+40       0.0997      0.35  |Q  V     |         |         |         |
5+45       0.1021      0.35  |Q  V     |         |         |         |
5+50       0.1046      0.36  |Q  V     |         |         |         |
5+55       0.1071      0.36  |Q  V     |         |         |         |
6+ 0       0.1096      0.36  |Q  V     |         |         |         |
6+ 5       0.1121      0.37  |Q  V     |         |         |         |
6+10       0.1148      0.39  |Q  V     |         |         |         |
6+15       0.1176      0.40  |Q   V    |         |         |         |
6+20       0.1204      0.40  |Q   V    |         |         |         |
6+25       0.1232      0.41  |Q   V    |         |         |         |
6+30       0.1259      0.41  |Q   V    |         |         |         |
6+35       0.1288      0.42  |Q   V    |         |         |         |
6+40       0.1318      0.44  |Q   V    |         |         |         |
6+45       0.1349      0.45  |Q   V    |         |         |         |
6+50       0.1380      0.45  |Q   V    |         |         |         |
6+55       0.1411      0.45  |Q    V   |         |         |         |
7+ 0       0.1442      0.45  |Q    V   |         |         |         |
7+ 5       0.1473      0.45  |Q    V   |         |         |         |
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  7+10      0.1504      0.45  |Q    V   |         |         |         |
  7+15      0.1535      0.45  |Q    V   |         |         |         |
  7+20      0.1567      0.46  |Q    V   |         |         |         |
  7+25      0.1600      0.48  |Q    V   |         |         |         |
  7+30      0.1634      0.49  |Q    V   |         |         |         |
  7+35      0.1669      0.50  | Q    V  |         |         |         |
  7+40      0.1705      0.53  | Q    V  |         |         |         |
  7+45      0.1742      0.54  | Q    V  |         |         |         |
  7+50      0.1780      0.55  | Q    V  |         |         |         |
  7+55      0.1819      0.57  | Q    V  |         |         |         |
  8+ 0      0.1859      0.58  | Q    V  |         |         |         |
  8+ 5      0.1901      0.60  | Q     V |         |         |         |
  8+10      0.1945      0.65  | Q     V |         |         |         |
  8+15      0.1991      0.66  | Q     V |         |         |         |
  8+20      0.2037      0.67  | Q     V |         |         |         |
  8+25      0.2084      0.67  | Q     V |         |         |         |
  8+30      0.2130      0.68  | Q      V|         |         |         |
  8+35      0.2178      0.69  | Q      V|         |         |         |
  8+40      0.2226      0.71  | Q      V|         |         |         |
  8+45      0.2276      0.72  | Q      V|         |         |         |
  8+50      0.2326      0.73  | Q      V|         |         |         |
  8+55      0.2378      0.75  |  Q      V         |         |         |
  9+ 0      0.2430      0.76  |  Q      V         |         |         |
  9+ 5      0.2484      0.78  |  Q      V         |         |         |
  9+10      0.2541      0.83  |  Q      V         |         |         |
  9+15      0.2600      0.85  |  Q      |V        |         |         |
  9+20      0.2659      0.86  |  Q      |V        |         |         |
  9+25      0.2720      0.89  |  Q      |V        |         |         |
  9+30      0.2782      0.90  |  Q      |V        |         |         |
  9+35      0.2844      0.91  |  Q      | V       |         |         |
  9+40      0.2909      0.93  |  Q      | V       |         |         |
  9+45      0.2973      0.94  |  Q      | V       |         |         |
  9+50      0.3039      0.95  |  Q      |  V      |         |         |
  9+55      0.3107      0.98  |  Q      |  V      |         |         |
 10+ 0      0.3175      0.99  |  Q      |  V      |         |         |
 10+ 5      0.3239      0.93  |  Q      |  V      |         |         |
 10+10      0.3292      0.77  |  Q      |   V     |         |         |
 10+15      0.3342      0.72  | Q       |   V     |         |         |
 10+20      0.3390      0.70  | Q       |   V     |         |         |
 10+25      0.3438      0.69  | Q       |   V     |         |         |
 10+30      0.3485      0.68  | Q       |   V     |         |         |
 10+35      0.3535      0.72  | Q       |    V    |         |         |
 10+40      0.3592      0.84  |  Q      |    V    |         |         |
 10+45      0.3652      0.87  |  Q      |    V    |         |         |
 10+50      0.3713      0.89  |  Q      |    V    |         |         |
 10+55      0.3775      0.90  |  Q      |     V   |         |         |
 11+ 0      0.3837      0.90  |  Q      |     V   |         |         |
 11+ 5      0.3899      0.89  |  Q      |     V   |         |         |
 11+10      0.3959      0.87  |  Q      |     V   |         |         |
 11+15      0.4018      0.87  |  Q      |      V  |         |         |
 11+20      0.4078      0.86  |  Q      |      V  |         |         |
 11+25      0.4137      0.86  |  Q      |      V  |         |         |
 11+30      0.4196      0.86  |  Q      |      V  |         |         |
 11+35      0.4254      0.84  |  Q      |       V |         |         |
 11+40      0.4309      0.80  |  Q      |       V |         |         |
 11+45      0.4363      0.78  |  Q      |       V |         |         |
 11+50      0.4417      0.78  |  Q      |       V |         |         |
 11+55      0.4472      0.80  |  Q      |        V|         |         |
 12+ 0      0.4528      0.81  |  Q      |        V|         |         |
 12+ 5      0.4588      0.87  |  Q      |        V|         |         |
 12+10      0.4659      1.03  |   Q     |        V|         |         |
 12+15      0.4734      1.08  |   Q     |         V         |         |
 12+20      0.4811      1.12  |   Q     |         V         |         |
 12+25      0.4890      1.15  |   Q     |         V         |         |
 12+30      0.4970      1.16  |   Q     |         |V        |         |
 12+35      0.5052      1.19  |   Q     |         |V        |         |
 12+40      0.5137      1.24  |   Q     |         |V        |         |
 12+45      0.5223      1.25  |    Q    |         | V       |         |
 12+50      0.5310      1.27  |    Q    |         | V       |         |
 12+55      0.5399      1.29  |    Q    |         |  V      |         |
 13+ 0      0.5489      1.30  |    Q    |         |  V      |         |
```

13+ 5	0.5582	1.35	Q	V
13+10	0.5683	1.47	Q	V
13+15	0.5787	1.50	Q	V
13+20	0.5891	1.52	Q	V
13+25	0.5997	1.53	Q	V
13+30	0.6102	1.53	Q	V
13+35	0.6202	1.44	Q	V
13+40	0.6284	1.19	Q	V
13+45	0.6360	1.11	Q	V
13+50	0.6434	1.08	Q	V
13+55	0.6507	1.06	Q	V
14+ 0	0.6580	1.05	Q	V
14+ 5	0.6654	1.08	Q	V
14+10	0.6734	1.17	Q	V
14+15	0.6816	1.19	Q	V
14+20	0.6899	1.20	Q	V
14+25	0.6980	1.18	Q	V
14+30	0.7062	1.18	Q	V
14+35	0.7143	1.18	Q	V
14+40	0.7224	1.18	Q	V
14+45	0.7305	1.18	Q	V
14+50	0.7385	1.17	Q	V
14+55	0.7464	1.14	Q	V
15+ 0	0.7542	1.14	Q	V
15+ 5	0.7620	1.13	Q	V
15+10	0.7696	1.10	Q	V
15+15	0.7771	1.09	Q	V
15+20	0.7845	1.08	Q	V
15+25	0.7918	1.06	Q	V
15+30	0.7990	1.05	Q	V
15+35	0.8060	1.01	Q	V
15+40	0.8123	0.92	Q	V
15+45	0.8184	0.89	Q	V
15+50	0.8244	0.87	Q	V
15+55	0.8304	0.87	Q	V
16+ 0	0.8363	0.86	Q	V
16+ 5	0.8413	0.73	Q	V
16+10	0.8440	0.39	Q	V
16+15	0.8459	0.28	Q	V
16+20	0.8475	0.23	Q	V
16+25	0.8489	0.21	Q	V
16+30	0.8503	0.19	Q	V
16+35	0.8515	0.18	Q	V
16+40	0.8525	0.15	Q	V
16+45	0.8535	0.14	Q	V
16+50	0.8545	0.14	Q	V
16+55	0.8554	0.14	Q	V
17+ 0	0.8564	0.14	Q	V
17+ 5	0.8574	0.15	Q	V
17+10	0.8588	0.20	Q	V
17+15	0.8602	0.21	Q	V
17+20	0.8618	0.22	Q	V
17+25	0.8633	0.22	Q	V
17+30	0.8648	0.22	Q	V
17+35	0.8664	0.23	Q	V
17+40	0.8679	0.23	Q	V
17+45	0.8695	0.23	Q	V
17+50	0.8710	0.22	Q	V
17+55	0.8723	0.19	Q	V
18+ 0	0.8736	0.19	Q	V
18+ 5	0.8749	0.18	Q	V
18+10	0.8762	0.18	Q	V
18+15	0.8774	0.18	Q	V
18+20	0.8787	0.18	Q	V
18+25	0.8799	0.18	Q	V
18+30	0.8811	0.18	Q	V
18+35	0.8823	0.17	Q	V
18+40	0.8834	0.15	Q	V
18+45	0.8843	0.14	Q	V
18+50	0.8852	0.13	Q	V
18+55	0.8860	0.11	Q	V

19+ 0	0.8866	0.10	Q				V
19+ 5	0.8874	0.10	Q				V
19+10	0.8882	0.12	Q				V
19+15	0.8891	0.13	Q				V
19+20	0.8901	0.14	Q				V
19+25	0.8912	0.17	Q				V
19+30	0.8924	0.17	Q				V
19+35	0.8936	0.17	Q				V
19+40	0.8946	0.15	Q				V
19+45	0.8956	0.14	Q				V
19+50	0.8964	0.13	Q				V
19+55	0.8972	0.11	Q				V
20+ 0	0.8979	0.10	Q				V
20+ 5	0.8986	0.10	Q				V
20+10	0.8994	0.12	Q				V
20+15	0.9003	0.13	Q				V
20+20	0.9012	0.13	Q				V
20+25	0.9021	0.13	Q				V
20+30	0.9031	0.13	Q				V
20+35	0.9040	0.14	Q				V
20+40	0.9049	0.14	Q				V
20+45	0.9059	0.14	Q				V
20+50	0.9067	0.13	Q				V
20+55	0.9075	0.10	Q				V
21+ 0	0.9081	0.10	Q				V
21+ 5	0.9088	0.10	Q				V
21+10	0.9097	0.12	Q				V
21+15	0.9106	0.13	Q				V
21+20	0.9114	0.12	Q				V
21+25	0.9121	0.10	Q				V
21+30	0.9128	0.10	Q				V
21+35	0.9135	0.10	Q				V
21+40	0.9144	0.12	Q				V
21+45	0.9153	0.13	Q				V
21+50	0.9161	0.12	Q				V
21+55	0.9168	0.10	Q				V
22+ 0	0.9175	0.10	Q				V
22+ 5	0.9182	0.10	Q				V
22+10	0.9190	0.12	Q				V
22+15	0.9199	0.13	Q				V
22+20	0.9208	0.12	Q				V
22+25	0.9215	0.10	Q				V
22+30	0.9221	0.10	Q				V
22+35	0.9228	0.09	Q				V
22+40	0.9234	0.09	Q				V
22+45	0.9241	0.09	Q				V
22+50	0.9247	0.09	Q				V
22+55	0.9253	0.09	Q				V
23+ 0	0.9259	0.09	Q				V
23+ 5	0.9265	0.09	Q				V
23+10	0.9272	0.09	Q				V
23+15	0.9278	0.09	Q				V
23+20	0.9284	0.09	Q				V
23+25	0.9290	0.09	Q				V
23+30	0.9297	0.09	Q				V
23+35	0.9303	0.09	Q				V
23+40	0.9309	0.09	Q				V
23+45	0.9315	0.09	Q				V
23+50	0.9322	0.09	Q				V
23+55	0.9328	0.09	Q				V
24+ 0	0.9334	0.09	Q				V
24+ 5	0.9339	0.07	Q				V
24+10	0.9341	0.03	Q				V
24+15	0.9342	0.01	Q				V
24+20	0.9342	0.01	Q				V
24+25	0.9343	0.00	Q				V
24+30	0.9343	0.00	Q				V
24+35	0.9343	0.00	Q				V

```
       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  02/03/20 File: J224100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format

---------------------------------------------------------------------
JACKSON STREET IMPROVEMENT
100-YEAR 24 HOUR STORM
AREA J2, AVE 51 HP TO AVE 50
FILE: J2.UM1
--------------------------------------------------------------------
Drainage Area =       1.80(Ac.)  =      0.003 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       1.80(Ac.)  =      0.003 Sq. Mi.
Length along longest watercourse =    1964.00(Ft.)
Length along longest watercourse measured to centroid =     982.00(Ft.)
Length along longest watercourse =      0.372 Mi.
Length along longest watercourse measured to centroid =      0.186 Mi.
Difference in elevation =       5.20(Ft.)
Slope along watercourse =     13.9796 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.079 Hr.
Lag time =     4.74 Min.
25% of lag time =     1.19 Min.
40% of lag time =     1.90 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      1.80           1.14                   2.05

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      1.80           4.45                   8.01

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.140(In)
Area Averaged 100-Year Rainfall =    4.450(In)

Point rain (area averaged) =    4.450(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    4.450(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     1.800           32.00         0.900
 Total Area Entered =      1.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
```

32.0	32.0	0.742	0.900	0.141	1.000	0.141
					Sum (F) =	0.141

Area averaged mean soil loss (F) (In/Hr) = 0.141
Minimum soil loss rate ((In/Hr)) = 0.070
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
DESERT S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	105.430	18.998	0.345
2	0.167	210.861	50.203	0.911
3	0.250	316.291	16.138	0.293
4	0.333	421.722	7.065	0.128
5	0.417	527.152	3.773	0.068
6	0.500	632.583	1.912	0.035
7	0.583	738.013	1.195	0.022
8	0.667	843.444	0.716	0.013
			Sum = 100.000	Sum= 1.814

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.250)	0.006	0.029
2	0.17	0.07	0.036	(0.249)	0.006	0.029
3	0.25	0.07	0.036	(0.248)	0.006	0.029
4	0.33	0.10	0.053	(0.247)	0.010	0.044
5	0.42	0.10	0.053	(0.246)	0.010	0.044
6	0.50	0.10	0.053	(0.245)	0.010	0.044
7	0.58	0.10	0.053	(0.244)	0.010	0.044
8	0.67	0.10	0.053	(0.243)	0.010	0.044
9	0.75	0.10	0.053	(0.242)	0.010	0.044
10	0.83	0.13	0.071	(0.241)	0.013	0.058
11	0.92	0.13	0.071	(0.240)	0.013	0.058
12	1.00	0.13	0.071	(0.239)	0.013	0.058
13	1.08	0.10	0.053	(0.238)	0.010	0.044
14	1.17	0.10	0.053	(0.238)	0.010	0.044
15	1.25	0.10	0.053	(0.237)	0.010	0.044
16	1.33	0.10	0.053	(0.236)	0.010	0.044
17	1.42	0.10	0.053	(0.235)	0.010	0.044
18	1.50	0.10	0.053	(0.234)	0.010	0.044
19	1.58	0.10	0.053	(0.233)	0.010	0.044
20	1.67	0.10	0.053	(0.232)	0.010	0.044
21	1.75	0.10	0.053	(0.231)	0.010	0.044
22	1.83	0.13	0.071	(0.230)	0.013	0.058
23	1.92	0.13	0.071	(0.229)	0.013	0.058
24	2.00	0.13	0.071	(0.228)	0.013	0.058
25	2.08	0.13	0.071	(0.227)	0.013	0.058
26	2.17	0.13	0.071	(0.226)	0.013	0.058
27	2.25	0.13	0.071	(0.225)	0.013	0.058
28	2.33	0.13	0.071	(0.224)	0.013	0.058
29	2.42	0.13	0.071	(0.224)	0.013	0.058
30	2.50	0.13	0.071	(0.223)	0.013	0.058
31	2.58	0.17	0.089	(0.222)	0.016	0.073
32	2.67	0.17	0.089	(0.221)	0.016	0.073
33	2.75	0.17	0.089	(0.220)	0.016	0.073
34	2.83	0.17	0.089	(0.219)	0.016	0.073
35	2.92	0.17	0.089	(0.218)	0.016	0.073
36	3.00	0.17	0.089	(0.217)	0.016	0.073
37	3.08	0.17	0.089	(0.216)	0.016	0.073
38	3.17	0.17	0.089	(0.215)	0.016	0.073

39	3.25	0.17	0.089	(0.215)	0.016	0.073
40	3.33	0.17	0.089	(0.214)	0.016	0.073
41	3.42	0.17	0.089	(0.213)	0.016	0.073
42	3.50	0.17	0.089	(0.212)	0.016	0.073
43	3.58	0.17	0.089	(0.211)	0.016	0.073
44	3.67	0.17	0.089	(0.210)	0.016	0.073
45	3.75	0.17	0.089	(0.209)	0.016	0.073
46	3.83	0.20	0.107	(0.208)	0.019	0.088
47	3.92	0.20	0.107	(0.207)	0.019	0.088
48	4.00	0.20	0.107	(0.207)	0.019	0.088
49	4.08	0.20	0.107	(0.206)	0.019	0.088
50	4.17	0.20	0.107	(0.205)	0.019	0.088
51	4.25	0.20	0.107	(0.204)	0.019	0.088
52	4.33	0.23	0.125	(0.203)	0.022	0.102
53	4.42	0.23	0.125	(0.202)	0.022	0.102
54	4.50	0.23	0.125	(0.201)	0.022	0.102
55	4.58	0.23	0.125	(0.200)	0.022	0.102
56	4.67	0.23	0.125	(0.200)	0.022	0.102
57	4.75	0.23	0.125	(0.199)	0.022	0.102
58	4.83	0.27	0.142	(0.198)	0.026	0.117
59	4.92	0.27	0.142	(0.197)	0.026	0.117
60	5.00	0.27	0.142	(0.196)	0.026	0.117
61	5.08	0.20	0.107	(0.195)	0.019	0.088
62	5.17	0.20	0.107	(0.194)	0.019	0.088
63	5.25	0.20	0.107	(0.194)	0.019	0.088
64	5.33	0.23	0.125	(0.193)	0.022	0.102
65	5.42	0.23	0.125	(0.192)	0.022	0.102
66	5.50	0.23	0.125	(0.191)	0.022	0.102
67	5.58	0.27	0.142	(0.190)	0.026	0.117
68	5.67	0.27	0.142	(0.189)	0.026	0.117
69	5.75	0.27	0.142	(0.189)	0.026	0.117
70	5.83	0.27	0.142	(0.188)	0.026	0.117
71	5.92	0.27	0.142	(0.187)	0.026	0.117
72	6.00	0.27	0.142	(0.186)	0.026	0.117
73	6.08	0.30	0.160	(0.185)	0.029	0.131
74	6.17	0.30	0.160	(0.184)	0.029	0.131
75	6.25	0.30	0.160	(0.184)	0.029	0.131
76	6.33	0.30	0.160	(0.183)	0.029	0.131
77	6.42	0.30	0.160	(0.182)	0.029	0.131
78	6.50	0.30	0.160	(0.181)	0.029	0.131
79	6.58	0.33	0.178	(0.180)	0.032	0.146
80	6.67	0.33	0.178	(0.180)	0.032	0.146
81	6.75	0.33	0.178	(0.179)	0.032	0.146
82	6.83	0.33	0.178	(0.178)	0.032	0.146
83	6.92	0.33	0.178	(0.177)	0.032	0.146
84	7.00	0.33	0.178	(0.176)	0.032	0.146
85	7.08	0.33	0.178	(0.176)	0.032	0.146
86	7.17	0.33	0.178	(0.175)	0.032	0.146
87	7.25	0.33	0.178	(0.174)	0.032	0.146
88	7.33	0.37	0.196	(0.173)	0.035	0.161
89	7.42	0.37	0.196	(0.172)	0.035	0.161
90	7.50	0.37	0.196	(0.172)	0.035	0.161
91	7.58	0.40	0.214	(0.171)	0.038	0.175
92	7.67	0.40	0.214	(0.170)	0.038	0.175
93	7.75	0.40	0.214	(0.169)	0.038	0.175
94	7.83	0.43	0.231	(0.168)	0.042	0.190
95	7.92	0.43	0.231	(0.168)	0.042	0.190
96	8.00	0.43	0.231	(0.167)	0.042	0.190
97	8.08	0.50	0.267	(0.166)	0.048	0.219
98	8.17	0.50	0.267	(0.165)	0.048	0.219
99	8.25	0.50	0.267	(0.165)	0.048	0.219
100	8.33	0.50	0.267	(0.164)	0.048	0.219
101	8.42	0.50	0.267	(0.163)	0.048	0.219
102	8.50	0.50	0.267	(0.162)	0.048	0.219
103	8.58	0.53	0.285	(0.161)	0.051	0.234
104	8.67	0.53	0.285	(0.161)	0.051	0.234
105	8.75	0.53	0.285	(0.160)	0.051	0.234
106	8.83	0.57	0.303	(0.159)	0.054	0.248
107	8.92	0.57	0.303	(0.158)	0.054	0.248
108	9.00	0.57	0.303	(0.158)	0.054	0.248
109	9.08	0.63	0.338	(0.157)	0.061	0.277

110	9.17	0.63	0.338	(0.156)	0.061	0.277
111	9.25	0.63	0.338	(0.155)	0.061	0.277
112	9.33	0.67	0.356	(0.155)	0.064	0.292
113	9.42	0.67	0.356	(0.154)	0.064	0.292
114	9.50	0.67	0.356	(0.153)	0.064	0.292
115	9.58	0.70	0.374	(0.153)	0.067	0.307
116	9.67	0.70	0.374	(0.152)	0.067	0.307
117	9.75	0.70	0.374	(0.151)	0.067	0.307
118	9.83	0.73	0.392	(0.150)	0.070	0.321
119	9.92	0.73	0.392	(0.150)	0.070	0.321
120	10.00	0.73	0.392	(0.149)	0.070	0.321
121	10.08	0.50	0.267	(0.148)	0.048	0.219
122	10.17	0.50	0.267	(0.147)	0.048	0.219
123	10.25	0.50	0.267	(0.147)	0.048	0.219
124	10.33	0.50	0.267	(0.146)	0.048	0.219
125	10.42	0.50	0.267	(0.145)	0.048	0.219
126	10.50	0.50	0.267	(0.145)	0.048	0.219
127	10.58	0.67	0.356	(0.144)	0.064	0.292
128	10.67	0.67	0.356	(0.143)	0.064	0.292
129	10.75	0.67	0.356	(0.142)	0.064	0.292
130	10.83	0.67	0.356	(0.142)	0.064	0.292
131	10.92	0.67	0.356	(0.141)	0.064	0.292
132	11.00	0.67	0.356	(0.140)	0.064	0.292
133	11.08	0.63	0.338	(0.140)	0.061	0.277
134	11.17	0.63	0.338	(0.139)	0.061	0.277
135	11.25	0.63	0.338	(0.138)	0.061	0.277
136	11.33	0.63	0.338	(0.138)	0.061	0.277
137	11.42	0.63	0.338	(0.137)	0.061	0.277
138	11.50	0.63	0.338	(0.136)	0.061	0.277
139	11.58	0.57	0.303	(0.136)	0.054	0.248
140	11.67	0.57	0.303	(0.135)	0.054	0.248
141	11.75	0.57	0.303	(0.134)	0.054	0.248
142	11.83	0.60	0.320	(0.134)	0.058	0.263
143	11.92	0.60	0.320	(0.133)	0.058	0.263
144	12.00	0.60	0.320	(0.132)	0.058	0.263
145	12.08	0.83	0.445	(0.132)	0.080	0.365
146	12.17	0.83	0.445	(0.131)	0.080	0.365
147	12.25	0.83	0.445	(0.130)	0.080	0.365
148	12.33	0.87	0.463	(0.130)	0.083	0.379
149	12.42	0.87	0.463	(0.129)	0.083	0.379
150	12.50	0.87	0.463	(0.128)	0.083	0.379
151	12.58	0.93	0.498	(0.128)	0.090	0.409
152	12.67	0.93	0.498	(0.127)	0.090	0.409
153	12.75	0.93	0.498	(0.126)	0.090	0.409
154	12.83	0.97	0.516	(0.126)	0.093	0.423
155	12.92	0.97	0.516	(0.125)	0.093	0.423
156	13.00	0.97	0.516	(0.124)	0.093	0.423
157	13.08	1.13	0.605	(0.124)	0.109	0.496
158	13.17	1.13	0.605	(0.123)	0.109	0.496
159	13.25	1.13	0.605	(0.123)	0.109	0.496
160	13.33	1.13	0.605	(0.122)	0.109	0.496
161	13.42	1.13	0.605	(0.121)	0.109	0.496
162	13.50	1.13	0.605	(0.121)	0.109	0.496
163	13.58	0.77	0.409	(0.120)	0.074	0.336
164	13.67	0.77	0.409	(0.120)	0.074	0.336
165	13.75	0.77	0.409	(0.119)	0.074	0.336
166	13.83	0.77	0.409	(0.118)	0.074	0.336
167	13.92	0.77	0.409	(0.118)	0.074	0.336
168	14.00	0.77	0.409	(0.117)	0.074	0.336
169	14.08	0.90	0.481	(0.117)	0.087	0.394
170	14.17	0.90	0.481	(0.116)	0.087	0.394
171	14.25	0.90	0.481	(0.115)	0.087	0.394
172	14.33	0.87	0.463	(0.115)	0.083	0.379
173	14.42	0.87	0.463	(0.114)	0.083	0.379
174	14.50	0.87	0.463	(0.114)	0.083	0.379
175	14.58	0.87	0.463	(0.113)	0.083	0.379
176	14.67	0.87	0.463	(0.112)	0.083	0.379
177	14.75	0.87	0.463	(0.112)	0.083	0.379
178	14.83	0.83	0.445	(0.111)	0.080	0.365
179	14.92	0.83	0.445	(0.111)	0.080	0.365
180	15.00	0.83	0.445	(0.110)	0.080	0.365

181	15.08	0.80	0.427	(0.110)	0.077	0.350
182	15.17	0.80	0.427	(0.109)	0.077	0.350
183	15.25	0.80	0.427	(0.108)	0.077	0.350
184	15.33	0.77	0.409	(0.108)	0.074	0.336
185	15.42	0.77	0.409	(0.107)	0.074	0.336
186	15.50	0.77	0.409	(0.107)	0.074	0.336
187	15.58	0.63	0.338	(0.106)	0.061	0.277
188	15.67	0.63	0.338	(0.106)	0.061	0.277
189	15.75	0.63	0.338	(0.105)	0.061	0.277
190	15.83	0.63	0.338	(0.105)	0.061	0.277
191	15.92	0.63	0.338	(0.104)	0.061	0.277
192	16.00	0.63	0.338	(0.104)	0.061	0.277
193	16.08	0.13	0.071	(0.103)	0.013	0.058
194	16.17	0.13	0.071	(0.102)	0.013	0.058
195	16.25	0.13	0.071	(0.102)	0.013	0.058
196	16.33	0.13	0.071	(0.101)	0.013	0.058
197	16.42	0.13	0.071	(0.101)	0.013	0.058
198	16.50	0.13	0.071	(0.100)	0.013	0.058
199	16.58	0.10	0.053	(0.100)	0.010	0.044
200	16.67	0.10	0.053	(0.099)	0.010	0.044
201	16.75	0.10	0.053	(0.099)	0.010	0.044
202	16.83	0.10	0.053	(0.098)	0.010	0.044
203	16.92	0.10	0.053	(0.098)	0.010	0.044
204	17.00	0.10	0.053	(0.097)	0.010	0.044
205	17.08	0.17	0.089	(0.097)	0.016	0.073
206	17.17	0.17	0.089	(0.096)	0.016	0.073
207	17.25	0.17	0.089	(0.096)	0.016	0.073
208	17.33	0.17	0.089	(0.095)	0.016	0.073
209	17.42	0.17	0.089	(0.095)	0.016	0.073
210	17.50	0.17	0.089	(0.094)	0.016	0.073
211	17.58	0.17	0.089	(0.094)	0.016	0.073
212	17.67	0.17	0.089	(0.094)	0.016	0.073
213	17.75	0.17	0.089	(0.093)	0.016	0.073
214	17.83	0.13	0.071	(0.093)	0.013	0.058
215	17.92	0.13	0.071	(0.092)	0.013	0.058
216	18.00	0.13	0.071	(0.092)	0.013	0.058
217	18.08	0.13	0.071	(0.091)	0.013	0.058
218	18.17	0.13	0.071	(0.091)	0.013	0.058
219	18.25	0.13	0.071	(0.090)	0.013	0.058
220	18.33	0.13	0.071	(0.090)	0.013	0.058
221	18.42	0.13	0.071	(0.089)	0.013	0.058
222	18.50	0.13	0.071	(0.089)	0.013	0.058
223	18.58	0.10	0.053	(0.089)	0.010	0.044
224	18.67	0.10	0.053	(0.088)	0.010	0.044
225	18.75	0.10	0.053	(0.088)	0.010	0.044
226	18.83	0.07	0.036	(0.087)	0.006	0.029
227	18.92	0.07	0.036	(0.087)	0.006	0.029
228	19.00	0.07	0.036	(0.087)	0.006	0.029
229	19.08	0.10	0.053	(0.086)	0.010	0.044
230	19.17	0.10	0.053	(0.086)	0.010	0.044
231	19.25	0.10	0.053	(0.085)	0.010	0.044
232	19.33	0.13	0.071	(0.085)	0.013	0.058
233	19.42	0.13	0.071	(0.085)	0.013	0.058
234	19.50	0.13	0.071	(0.084)	0.013	0.058
235	19.58	0.10	0.053	(0.084)	0.010	0.044
236	19.67	0.10	0.053	(0.083)	0.010	0.044
237	19.75	0.10	0.053	(0.083)	0.010	0.044
238	19.83	0.07	0.036	(0.083)	0.006	0.029
239	19.92	0.07	0.036	(0.082)	0.006	0.029
240	20.00	0.07	0.036	(0.082)	0.006	0.029
241	20.08	0.10	0.053	(0.082)	0.010	0.044
242	20.17	0.10	0.053	(0.081)	0.010	0.044
243	20.25	0.10	0.053	(0.081)	0.010	0.044
244	20.33	0.10	0.053	(0.080)	0.010	0.044
245	20.42	0.10	0.053	(0.080)	0.010	0.044
246	20.50	0.10	0.053	(0.080)	0.010	0.044
247	20.58	0.10	0.053	(0.079)	0.010	0.044
248	20.67	0.10	0.053	(0.079)	0.010	0.044
249	20.75	0.10	0.053	(0.079)	0.010	0.044
250	20.83	0.07	0.036	(0.078)	0.006	0.029
251	20.92	0.07	0.036	(0.078)	0.006	0.029

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252  21.00     0.07      0.036        (  0.078)       0.006        0.029
253  21.08     0.10      0.053        (  0.078)       0.010        0.044
254  21.17     0.10      0.053        (  0.077)       0.010        0.044
255  21.25     0.10      0.053        (  0.077)       0.010        0.044
256  21.33     0.07      0.036        (  0.077)       0.006        0.029
257  21.42     0.07      0.036        (  0.076)       0.006        0.029
258  21.50     0.07      0.036        (  0.076)       0.006        0.029
259  21.58     0.10      0.053        (  0.076)       0.010        0.044
260  21.67     0.10      0.053        (  0.075)       0.010        0.044
261  21.75     0.10      0.053        (  0.075)       0.010        0.044
262  21.83     0.07      0.036        (  0.075)       0.006        0.029
263  21.92     0.07      0.036        (  0.075)       0.006        0.029
264  22.00     0.07      0.036        (  0.074)       0.006        0.029
265  22.08     0.10      0.053        (  0.074)       0.010        0.044
266  22.17     0.10      0.053        (  0.074)       0.010        0.044
267  22.25     0.10      0.053        (  0.074)       0.010        0.044
268  22.33     0.07      0.036        (  0.073)       0.006        0.029
269  22.42     0.07      0.036        (  0.073)       0.006        0.029
270  22.50     0.07      0.036        (  0.073)       0.006        0.029
271  22.58     0.07      0.036        (  0.073)       0.006        0.029
272  22.67     0.07      0.036        (  0.073)       0.006        0.029
273  22.75     0.07      0.036        (  0.072)       0.006        0.029
274  22.83     0.07      0.036        (  0.072)       0.006        0.029
275  22.92     0.07      0.036        (  0.072)       0.006        0.029
276  23.00     0.07      0.036        (  0.072)       0.006        0.029
277  23.08     0.07      0.036        (  0.072)       0.006        0.029
278  23.17     0.07      0.036        (  0.072)       0.006        0.029
279  23.25     0.07      0.036        (  0.071)       0.006        0.029
280  23.33     0.07      0.036        (  0.071)       0.006        0.029
281  23.42     0.07      0.036        (  0.071)       0.006        0.029
282  23.50     0.07      0.036        (  0.071)       0.006        0.029
283  23.58     0.07      0.036        (  0.071)       0.006        0.029
284  23.67     0.07      0.036        (  0.071)       0.006        0.029
285  23.75     0.07      0.036        (  0.071)       0.006        0.029
286  23.83     0.07      0.036        (  0.071)       0.006        0.029
287  23.92     0.07      0.036        (  0.071)       0.006        0.029
288  24.00     0.07      0.036        (  0.070)       0.006        0.029
               (Loss Rate Not Used)
    Sum =     100.0                                 Sum =    43.8
      Flood volume = Effective rainfall      3.65(In)
       times area       1.8(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      0.80(In)
      Total soil loss =     0.120(Ac.Ft)
      Total rainfall =      4.45(In)
      Flood volume =       23842.5 Cubic Feet
      Total soil loss =        5233.7 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.898(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0003      0.04  Q         |         |         |         |
   0+15       0.0006      0.05  Q         |         |         |         |
   0+20       0.0010      0.05  Q         |         |         |         |
   0+25       0.0015      0.07  Q         |         |         |         |
   0+30       0.0020      0.07  Q         |         |         |         |
   0+35       0.0025      0.08  Q         |         |         |         |
   0+40       0.0031      0.08  Q         |         |         |         |
   0+45       0.0036      0.08  Q         |         |         |         |
   0+50       0.0042      0.08  Q         |         |         |         |
   0+55       0.0049      0.10  Q         |         |         |         |
   1+ 0       0.0056      0.10  Q         |         |         |         |
   1+ 5       0.0062      0.10  Q         |         |         |         |
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1+10       0.0068      0.09  Q          |         |         |         |
1+15       0.0074      0.08  Q          |         |         |         |
1+20       0.0080      0.08  Q          |         |         |         |
1+25       0.0085      0.08  Q          |         |         |         |
1+30       0.0091      0.08  Q          |         |         |         |
1+35       0.0096      0.08  Q          |         |         |         |
1+40       0.0102      0.08  Q          |         |         |         |
1+45       0.0107      0.08  Q          |         |         |         |
1+50       0.0113      0.08  Q          |         |         |         |
1+55       0.0120      0.10  Q          |         |         |         |
2+ 0       0.0127      0.10  Q          |         |         |         |
2+ 5       0.0134      0.10  Q          |         |         |         |
2+10       0.0141      0.10  QV         |         |         |         |
2+15       0.0148      0.11  QV         |         |         |         |
2+20       0.0156      0.11  QV         |         |         |         |
2+25       0.0163      0.11  QV         |         |         |         |
2+30       0.0170      0.11  QV         |         |         |         |
2+35       0.0178      0.11  QV         |         |         |         |
2+40       0.0187      0.12  QV         |         |         |         |
2+45       0.0195      0.13  QV         |         |         |         |
2+50       0.0204      0.13  QV         |         |         |         |
2+55       0.0213      0.13  QV         |         |         |         |
3+ 0       0.0223      0.13  QV         |         |         |         |
3+ 5       0.0232      0.13  QV         |         |         |         |
3+10       0.0241      0.13  QV         |         |         |         |
3+15       0.0250      0.13  QV         |         |         |         |
3+20       0.0259      0.13  QV         |         |         |         |
3+25       0.0268      0.13  QV         |         |         |         |
3+30       0.0277      0.13  Q V        |         |         |         |
3+35       0.0286      0.13  Q V        |         |         |         |
3+40       0.0296      0.13  Q V        |         |         |         |
3+45       0.0305      0.13  Q V        |         |         |         |
3+50       0.0314      0.14  Q V        |         |         |         |
3+55       0.0324      0.15  Q V        |         |         |         |
4+ 0       0.0335      0.16  Q V        |         |         |         |
4+ 5       0.0346      0.16  Q V        |         |         |         |
4+10       0.0357      0.16  Q V        |         |         |         |
4+15       0.0368      0.16  Q V        |         |         |         |
4+20       0.0379      0.16  Q V        |         |         |         |
4+25       0.0391      0.18  Q V        |         |         |         |
4+30       0.0404      0.18  Q V        |         |         |         |
4+35       0.0416      0.18  Q  V       |         |         |         |
4+40       0.0429      0.18  Q  V       |         |         |         |
4+45       0.0442      0.18  Q  V       |         |         |         |
4+50       0.0455      0.19  Q  V       |         |         |         |
4+55       0.0469      0.20  Q  V       |         |         |         |
5+ 0       0.0483      0.21  Q  V       |         |         |         |
5+ 5       0.0497      0.20  Q  V       |         |         |         |
5+10       0.0509      0.17  Q  V       |         |         |         |
5+15       0.0521      0.17  Q  V       |         |         |         |
5+20       0.0532      0.17  Q  V       |         |         |         |
5+25       0.0544      0.18  Q  V       |         |         |         |
5+30       0.0557      0.18  Q   V      |         |         |         |
5+35       0.0570      0.19  Q   V      |         |         |         |
5+40       0.0584      0.20  Q   V      |         |         |         |
5+45       0.0598      0.21  Q   V      |         |         |         |
5+50       0.0613      0.21  Q   V      |         |         |         |
5+55       0.0627      0.21  Q   V      |         |         |         |
6+ 0       0.0642      0.21  Q   V      |         |         |         |
6+ 5       0.0657      0.22  Q   V      |         |         |         |
6+10       0.0673      0.23  Q   V      |         |         |         |
6+15       0.0689      0.23  Q    V     |         |         |         |
6+20       0.0705      0.24  Q    V     |         |         |         |
6+25       0.0721      0.24  Q    V     |         |         |         |
6+30       0.0738      0.24  Q    V     |         |         |         |
6+35       0.0755      0.24  Q    V     |         |         |         |
6+40       0.0772      0.26  |Q   V     |         |         |         |
6+45       0.0790      0.26  |Q   V     |         |         |         |
6+50       0.0808      0.26  |Q   V     |         |         |         |
6+55       0.0826      0.26  |Q    V    |         |         |         |
7+ 0       0.0845      0.26  |Q    V    |         |         |         |
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 7+ 5      0.0863      0.26  |Q    V   |         |         |         |
 7+10      0.0881      0.26  |Q    V   |         |         |         |
 7+15      0.0899      0.26  |Q    V   |         |         |         |
 7+20      0.0918      0.27  |Q    V   |         |         |         |
 7+25      0.0937      0.28  |Q    V   |         |         |         |
 7+30      0.0957      0.29  |Q    V   |         |         |         |
 7+35      0.0978      0.29  |Q     V  |         |         |         |
 7+40      0.0999      0.31  |Q     V  |         |         |         |
 7+45      0.1020      0.31  |Q     V  |         |         |         |
 7+50      0.1043      0.32  |Q     V  |         |         |         |
 7+55      0.1066      0.34  |Q     V  |         |         |         |
 8+ 0      0.1089      0.34  |Q     V  |         |         |         |
 8+ 5      0.1113      0.35  |Q      V |         |         |         |
 8+10      0.1139      0.38  |Q      V |         |         |         |
 8+15      0.1166      0.39  |Q      V |         |         |         |
 8+20      0.1193      0.39  |Q      V |         |         |         |
 8+25      0.1221      0.40  |Q      V |         |         |         |
 8+30      0.1248      0.40  |Q       V|         |         |         |
 8+35      0.1276      0.40  |Q       V|         |         |         |
 8+40      0.1304      0.42  |Q       V|         |         |         |
 8+45      0.1333      0.42  |Q       V|         |         |         |
 8+50      0.1362      0.43  |Q       V|         |         |         |
 8+55      0.1393      0.44  |Q        V         |         |         |
 9+ 0      0.1424      0.45  |Q        V         |         |         |
 9+ 5      0.1455      0.46  |Q        V         |         |         |
 9+10      0.1489      0.49  |Q        V         |         |         |
 9+15      0.1523      0.50  |Q        |V        |         |         |
 9+20      0.1557      0.50  | Q       |V        |         |         |
 9+25      0.1593      0.52  | Q       |V        |         |         |
 9+30      0.1629      0.52  | Q       |V        |         |         |
 9+35      0.1666      0.53  | Q       | V       |         |         |
 9+40      0.1704      0.55  | Q       | V       |         |         |
 9+45      0.1742      0.55  | Q       | V       |         |         |
 9+50      0.1780      0.56  | Q       |  V      |         |         |
 9+55      0.1820      0.57  | Q       |  V      |         |         |
10+ 0      0.1860      0.58  | Q       |  V      |         |         |
10+ 5      0.1897      0.55  | Q       |  V      |         |         |
10+10      0.1928      0.45  |Q        |   V     |         |         |
10+15      0.1958      0.42  |Q        |   V     |         |         |
10+20      0.1986      0.41  |Q        |   V     |         |         |
10+25      0.2014      0.40  |Q        |   V     |         |         |
10+30      0.2041      0.40  |Q        |   V     |         |         |
10+35      0.2071      0.42  |Q        |    V    |         |         |
10+40      0.2104      0.49  |Q        |    V    |         |         |
10+45      0.2139      0.51  | Q       |    V    |         |         |
10+50      0.2175      0.52  | Q       |    V    |         |         |
10+55      0.2211      0.52  | Q       |     V   |         |         |
11+ 0      0.2248      0.53  | Q       |     V   |         |         |
11+ 5      0.2284      0.52  | Q       |     V   |         |         |
11+10      0.2319      0.51  | Q       |     V   |         |         |
11+15      0.2354      0.51  | Q       |      V  |         |         |
11+20      0.2389      0.51  | Q       |      V  |         |         |
11+25      0.2423      0.50  | Q       |      V  |         |         |
11+30      0.2458      0.50  | Q       |      V  |         |         |
11+35      0.2492      0.49  |Q        |       V |         |         |
11+40      0.2524      0.47  |Q        |       V |         |         |
11+45      0.2556      0.46  |Q        |       V |         |         |
11+50      0.2587      0.46  |Q        |       V |         |         |
11+55      0.2620      0.47  |Q        |        V|         |         |
12+ 0      0.2653      0.47  |Q        |        V|         |         |
12+ 5      0.2688      0.51  | Q       |        V|         |         |
12+10      0.2729      0.60  | Q       |        V|         |         |
12+15      0.2773      0.63  | Q       |         V         |         |
12+20      0.2818      0.65  | Q       |         V         |         |
12+25      0.2864      0.67  | Q       |         V         |         |
12+30      0.2911      0.68  | Q       |         |V        |         |
12+35      0.2959      0.70  | Q       |         |V        |         |
12+40      0.3009      0.72  | Q       |         |V        |         |
12+45      0.3060      0.73  | Q       |         | V       |         |
12+50      0.3111      0.74  | Q       |         | V       |         |
12+55      0.3163      0.76  |  Q      |         |  V      |         |
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13+ 0       0.3216      0.76  |  Q      |         |  V      |         |
13+ 5       0.3270      0.79  |  Q      |         |  V      |         |
13+10       0.3329      0.86  |  Q      |         |   V     |         |
13+15       0.3390      0.88  |  Q      |         |   V     |         |
13+20       0.3451      0.89  |  Q      |         |    V    |         |
13+25       0.3513      0.90  |  Q      |         |    V    |         |
13+30       0.3575      0.90  |  Q      |         |     V   |         |
13+35       0.3633      0.84  |  Q      |         |     V   |         |
13+40       0.3681      0.70  | Q       |         |     V   |         |
13+45       0.3726      0.65  | Q       |         |      V  |         |
13+50       0.3769      0.63  | Q       |         |      V  |         |
13+55       0.3812      0.62  | Q       |         |      V  |         |
14+ 0       0.3854      0.61  | Q       |         |       V |         |
14+ 5       0.3898      0.63  | Q       |         |       V |         |
14+10       0.3945      0.68  | Q       |         |       V |         |
14+15       0.3993      0.70  | Q       |         |        V|         |
14+20       0.4041      0.70  | Q       |         |        V|         |
14+25       0.4089      0.69  | Q       |         |        V|         |
14+30       0.4137      0.69  | Q       |         |         V         |
14+35       0.4184      0.69  | Q       |         |         V         |
14+40       0.4232      0.69  | Q       |         |         V         |
14+45       0.4279      0.69  | Q       |         |         |V        |
14+50       0.4326      0.68  | Q       |         |         |V        |
14+55       0.4373      0.67  | Q       |         |         |V        |
15+ 0       0.4418      0.67  | Q       |         |         | V       |
15+ 5       0.4464      0.66  | Q       |         |         | V       |
15+10       0.4508      0.64  | Q       |         |         | V       |
15+15       0.4552      0.64  | Q       |         |         |  V      |
15+20       0.4596      0.63  | Q       |         |         |  V      |
15+25       0.4639      0.62  | Q       |         |         |  V      |
15+30       0.4681      0.61  | Q       |         |         |   V     |
15+35       0.4722      0.59  | Q       |         |         |   V     |
15+40       0.4759      0.54  | Q       |         |         |   V     |
15+45       0.4794      0.52  | Q       |         |         |    V    |
15+50       0.4830      0.51  | Q       |         |         |    V    |
15+55       0.4864      0.51  | Q       |         |         |    V    |
16+ 0       0.4899      0.51  | Q       |         |         |    V    |
16+ 5       0.4929      0.43  |Q        |         |         |     V   |
16+10       0.4945      0.23  Q         |         |         |     V   |
16+15       0.4956      0.16  Q         |         |         |     V   |
16+20       0.4965      0.14  Q         |         |         |     V   |
16+25       0.4974      0.12  Q         |         |         |     V   |
16+30       0.4981      0.11  Q         |         |         |     V   |
16+35       0.4989      0.10  Q         |         |         |     V   |
16+40       0.4995      0.09  Q         |         |         |     V   |
16+45       0.5000      0.08  Q         |         |         |     V   |
16+50       0.5006      0.08  Q         |         |         |     V   |
16+55       0.5011      0.08  Q         |         |         |     V   |
17+ 0       0.5017      0.08  Q         |         |         |     V   |
17+ 5       0.5023      0.09  Q         |         |         |     V   |
17+10       0.5031      0.12  Q         |         |         |     V   |
17+15       0.5040      0.12  Q         |         |         |     V   |
17+20       0.5049      0.13  Q         |         |         |     V   |
17+25       0.5058      0.13  Q         |         |         |     V   |
17+30       0.5067      0.13  Q         |         |         |      V  |
17+35       0.5076      0.13  Q         |         |         |      V  |
17+40       0.5085      0.13  Q         |         |         |      V  |
17+45       0.5094      0.13  Q         |         |         |      V  |
17+50       0.5103      0.13  Q         |         |         |      V  |
17+55       0.5111      0.11  Q         |         |         |      V  |
18+ 0       0.5118      0.11  Q         |         |         |      V  |
18+ 5       0.5126      0.11  Q         |         |         |      V  |
18+10       0.5133      0.11  Q         |         |         |      V  |
18+15       0.5140      0.11  Q         |         |         |      V  |
18+20       0.5148      0.11  Q         |         |         |      V  |
18+25       0.5155      0.11  Q         |         |         |      V  |
18+30       0.5162      0.11  Q         |         |         |      V  |
18+35       0.5169      0.10  Q         |         |         |      V  |
18+40       0.5175      0.09  Q         |         |         |      V  |
18+45       0.5181      0.08  Q         |         |         |      V  |
18+50       0.5186      0.08  Q         |         |         |      V  |
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   18+55       0.5190       0.06  Q         |         |         |        V  |
   19+ 0       0.5194       0.06  Q         |         |         |        V  |
   19+ 5       0.5199       0.06  Q         |         |         |        V  |
   19+10       0.5204       0.07  Q         |         |         |         V |
   19+15       0.5209       0.08  Q         |         |         |         V |
   19+20       0.5214       0.08  Q         |         |         |         V |
   19+25       0.5221       0.10  Q         |         |         |         V |
   19+30       0.5228       0.10  Q         |         |         |         V |
   19+35       0.5235       0.10  Q         |         |         |         V |
   19+40       0.5241       0.09  Q         |         |         |         V |
   19+45       0.5247       0.08  Q         |         |         |         V |
   19+50       0.5252       0.08  Q         |         |         |         V |
   19+55       0.5256       0.06  Q         |         |         |         V |
   20+ 0       0.5260       0.06  Q         |         |         |         V |
   20+ 5       0.5264       0.06  Q         |         |         |         V |
   20+10       0.5269       0.07  Q         |         |         |         V |
   20+15       0.5274       0.08  Q         |         |         |         V |
   20+20       0.5280       0.08  Q         |         |         |         V |
   20+25       0.5285       0.08  Q         |         |         |         V |
   20+30       0.5291       0.08  Q         |         |         |         V |
   20+35       0.5296       0.08  Q         |         |         |         V |
   20+40       0.5302       0.08  Q         |         |         |         V |
   20+45       0.5307       0.08  Q         |         |         |         V |
   20+50       0.5312       0.07  Q         |         |         |         V |
   20+55       0.5316       0.06  Q         |         |         |         V |
   21+ 0       0.5320       0.06  Q         |         |         |         V |
   21+ 5       0.5324       0.06  Q         |         |         |         V |
   21+10       0.5329       0.07  Q         |         |         |         V |
   21+15       0.5335       0.08  Q         |         |         |         V |
   21+20       0.5340       0.07  Q         |         |         |          V|
   21+25       0.5344       0.06  Q         |         |         |          V|
   21+30       0.5348       0.06  Q         |         |         |          V|
   21+35       0.5352       0.06  Q         |         |         |          V|
   21+40       0.5357       0.07  Q         |         |         |          V|
   21+45       0.5362       0.08  Q         |         |         |          V|
   21+50       0.5367       0.07  Q         |         |         |          V|
   21+55       0.5371       0.06  Q         |         |         |          V|
   22+ 0       0.5375       0.06  Q         |         |         |          V|
   22+ 5       0.5379       0.06  Q         |         |         |          V|
   22+10       0.5384       0.07  Q         |         |         |          V|
   22+15       0.5389       0.08  Q         |         |         |          V|
   22+20       0.5394       0.07  Q         |         |         |          V|
   22+25       0.5399       0.06  Q         |         |         |          V|
   22+30       0.5402       0.06  Q         |         |         |          V|
   22+35       0.5406       0.05  Q         |         |         |          V|
   22+40       0.5410       0.05  Q         |         |         |          V|
   22+45       0.5414       0.05  Q         |         |         |          V|
   22+50       0.5417       0.05  Q         |         |         |          V|
   22+55       0.5421       0.05  Q         |         |         |          V|
   23+ 0       0.5425       0.05  Q         |         |         |          V|
   23+ 5       0.5428       0.05  Q         |         |         |          V|
   23+10       0.5432       0.05  Q         |         |         |          V|
   23+15       0.5436       0.05  Q         |         |         |          V|
   23+20       0.5439       0.05  Q         |         |         |          V|
   23+25       0.5443       0.05  Q         |         |         |          V|
   23+30       0.5446       0.05  Q         |         |         |          V|
   23+35       0.5450       0.05  Q         |         |         |          V|
   23+40       0.5454       0.05  Q         |         |         |          V|
   23+45       0.5457       0.05  Q         |         |         |          V|
   23+50       0.5461       0.05  Q         |         |         |          V|
   23+55       0.5465       0.05  Q         |         |         |          V|
   24+ 0       0.5468       0.05  Q         |         |         |          V|
   24+ 5       0.5471       0.04  Q         |         |         |          V|
   24+10       0.5472       0.02  Q         |         |         |          V|
   24+15       0.5473       0.01  Q         |         |         |          V|
   24+20       0.5473       0.00  Q         |         |         |          V|
   24+25       0.5473       0.00  Q         |         |         |          V|
   24+30       0.5473       0.00  Q         |         |         |          V|
   24+35       0.5473       0.00  Q         |         |         |          V|
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       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  02/03/20 File: J324100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format

---------------------------------------------------------------------
JACKSON STREET IMPROVEMENT
100-YEAR 24 HOUR STORM
AREA J3, AVE 50 TO AVE 50 HP
FILE: J3.UM1
--------------------------------------------------------------------
Drainage Area =       0.82(Ac.)  =      0.001 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       0.82(Ac.)  =      0.001 Sq. Mi.
Length along longest watercourse =     875.00(Ft.)
Length along longest watercourse measured to centroid =     430.00(Ft.)
Length along longest watercourse =      0.166 Mi.
Length along longest watercourse measured to centroid =      0.081 Mi.
Difference in elevation =       1.50(Ft.)
Slope along watercourse =      9.0514 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.046 Hr.
Lag time =     2.77 Min.
25% of lag time =     0.69 Min.
40% of lag time =     1.11 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.82           1.14                  0.93

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.82           4.45                  3.65

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.140(In)
Area Averaged 100-Year Rainfall =    4.450(In)

Point rain (area averaged) =    4.450(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    4.450(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     0.820           32.00         0.900
 Total Area Entered =      0.82(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
32.0  32.0      0.742     0.900        0.141       1.000      0.141
```

Sum (F) = 0.141

Area averaged mean soil loss (F) (In/Hr) = 0.141
Minimum soil loss rate ((In/Hr)) = 0.070
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
DESERT S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	180.640	38.510	0.318
2	0.167	361.279	46.919	0.388
3	0.250	541.919	9.957	0.082
4	0.333	722.559	3.311	0.027
5	0.417	903.199	1.304	0.011
			Sum = 100.000	Sum= 0.826

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.250)	0.006	0.029
2	0.17	0.07	0.036	(0.249)	0.006	0.029
3	0.25	0.07	0.036	(0.248)	0.006	0.029
4	0.33	0.10	0.053	(0.247)	0.010	0.044
5	0.42	0.10	0.053	(0.246)	0.010	0.044
6	0.50	0.10	0.053	(0.245)	0.010	0.044
7	0.58	0.10	0.053	(0.244)	0.010	0.044
8	0.67	0.10	0.053	(0.243)	0.010	0.044
9	0.75	0.10	0.053	(0.242)	0.010	0.044
10	0.83	0.13	0.071	(0.241)	0.013	0.058
11	0.92	0.13	0.071	(0.240)	0.013	0.058
12	1.00	0.13	0.071	(0.239)	0.013	0.058
13	1.08	0.10	0.053	(0.238)	0.010	0.044
14	1.17	0.10	0.053	(0.238)	0.010	0.044
15	1.25	0.10	0.053	(0.237)	0.010	0.044
16	1.33	0.10	0.053	(0.236)	0.010	0.044
17	1.42	0.10	0.053	(0.235)	0.010	0.044
18	1.50	0.10	0.053	(0.234)	0.010	0.044
19	1.58	0.10	0.053	(0.233)	0.010	0.044
20	1.67	0.10	0.053	(0.232)	0.010	0.044
21	1.75	0.10	0.053	(0.231)	0.010	0.044
22	1.83	0.13	0.071	(0.230)	0.013	0.058
23	1.92	0.13	0.071	(0.229)	0.013	0.058
24	2.00	0.13	0.071	(0.228)	0.013	0.058
25	2.08	0.13	0.071	(0.227)	0.013	0.058
26	2.17	0.13	0.071	(0.226)	0.013	0.058
27	2.25	0.13	0.071	(0.225)	0.013	0.058
28	2.33	0.13	0.071	(0.224)	0.013	0.058
29	2.42	0.13	0.071	(0.224)	0.013	0.058
30	2.50	0.13	0.071	(0.223)	0.013	0.058
31	2.58	0.17	0.089	(0.222)	0.016	0.073
32	2.67	0.17	0.089	(0.221)	0.016	0.073
33	2.75	0.17	0.089	(0.220)	0.016	0.073
34	2.83	0.17	0.089	(0.219)	0.016	0.073
35	2.92	0.17	0.089	(0.218)	0.016	0.073
36	3.00	0.17	0.089	(0.217)	0.016	0.073
37	3.08	0.17	0.089	(0.216)	0.016	0.073
38	3.17	0.17	0.089	(0.215)	0.016	0.073
39	3.25	0.17	0.089	(0.215)	0.016	0.073
40	3.33	0.17	0.089	(0.214)	0.016	0.073
41	3.42	0.17	0.089	(0.213)	0.016	0.073
42	3.50	0.17	0.089	(0.212)	0.016	0.073

43	3.58	0.17	0.089	(0.211)	0.016	0.073
44	3.67	0.17	0.089	(0.210)	0.016	0.073
45	3.75	0.17	0.089	(0.209)	0.016	0.073
46	3.83	0.20	0.107	(0.208)	0.019	0.088
47	3.92	0.20	0.107	(0.207)	0.019	0.088
48	4.00	0.20	0.107	(0.207)	0.019	0.088
49	4.08	0.20	0.107	(0.206)	0.019	0.088
50	4.17	0.20	0.107	(0.205)	0.019	0.088
51	4.25	0.20	0.107	(0.204)	0.019	0.088
52	4.33	0.23	0.125	(0.203)	0.022	0.102
53	4.42	0.23	0.125	(0.202)	0.022	0.102
54	4.50	0.23	0.125	(0.201)	0.022	0.102
55	4.58	0.23	0.125	(0.200)	0.022	0.102
56	4.67	0.23	0.125	(0.200)	0.022	0.102
57	4.75	0.23	0.125	(0.199)	0.022	0.102
58	4.83	0.27	0.142	(0.198)	0.026	0.117
59	4.92	0.27	0.142	(0.197)	0.026	0.117
60	5.00	0.27	0.142	(0.196)	0.026	0.117
61	5.08	0.20	0.107	(0.195)	0.019	0.088
62	5.17	0.20	0.107	(0.194)	0.019	0.088
63	5.25	0.20	0.107	(0.194)	0.019	0.088
64	5.33	0.23	0.125	(0.193)	0.022	0.102
65	5.42	0.23	0.125	(0.192)	0.022	0.102
66	5.50	0.23	0.125	(0.191)	0.022	0.102
67	5.58	0.27	0.142	(0.190)	0.026	0.117
68	5.67	0.27	0.142	(0.189)	0.026	0.117
69	5.75	0.27	0.142	(0.189)	0.026	0.117
70	5.83	0.27	0.142	(0.188)	0.026	0.117
71	5.92	0.27	0.142	(0.187)	0.026	0.117
72	6.00	0.27	0.142	(0.186)	0.026	0.117
73	6.08	0.30	0.160	(0.185)	0.029	0.131
74	6.17	0.30	0.160	(0.184)	0.029	0.131
75	6.25	0.30	0.160	(0.184)	0.029	0.131
76	6.33	0.30	0.160	(0.183)	0.029	0.131
77	6.42	0.30	0.160	(0.182)	0.029	0.131
78	6.50	0.30	0.160	(0.181)	0.029	0.131
79	6.58	0.33	0.178	(0.180)	0.032	0.146
80	6.67	0.33	0.178	(0.180)	0.032	0.146
81	6.75	0.33	0.178	(0.179)	0.032	0.146
82	6.83	0.33	0.178	(0.178)	0.032	0.146
83	6.92	0.33	0.178	(0.177)	0.032	0.146
84	7.00	0.33	0.178	(0.176)	0.032	0.146
85	7.08	0.33	0.178	(0.176)	0.032	0.146
86	7.17	0.33	0.178	(0.175)	0.032	0.146
87	7.25	0.33	0.178	(0.174)	0.032	0.146
88	7.33	0.37	0.196	(0.173)	0.035	0.161
89	7.42	0.37	0.196	(0.172)	0.035	0.161
90	7.50	0.37	0.196	(0.172)	0.035	0.161
91	7.58	0.40	0.214	(0.171)	0.038	0.175
92	7.67	0.40	0.214	(0.170)	0.038	0.175
93	7.75	0.40	0.214	(0.169)	0.038	0.175
94	7.83	0.43	0.231	(0.168)	0.042	0.190
95	7.92	0.43	0.231	(0.168)	0.042	0.190
96	8.00	0.43	0.231	(0.167)	0.042	0.190
97	8.08	0.50	0.267	(0.166)	0.048	0.219
98	8.17	0.50	0.267	(0.165)	0.048	0.219
99	8.25	0.50	0.267	(0.165)	0.048	0.219
100	8.33	0.50	0.267	(0.164)	0.048	0.219
101	8.42	0.50	0.267	(0.163)	0.048	0.219
102	8.50	0.50	0.267	(0.162)	0.048	0.219
103	8.58	0.53	0.285	(0.161)	0.051	0.234
104	8.67	0.53	0.285	(0.161)	0.051	0.234
105	8.75	0.53	0.285	(0.160)	0.051	0.234
106	8.83	0.57	0.303	(0.159)	0.054	0.248
107	8.92	0.57	0.303	(0.158)	0.054	0.248
108	9.00	0.57	0.303	(0.158)	0.054	0.248
109	9.08	0.63	0.338	(0.157)	0.061	0.277
110	9.17	0.63	0.338	(0.156)	0.061	0.277
111	9.25	0.63	0.338	(0.155)	0.061	0.277
112	9.33	0.67	0.356	(0.155)	0.064	0.292
113	9.42	0.67	0.356	(0.154)	0.064	0.292

114	9.50	0.67	0.356	(0.153)	0.064	0.292
115	9.58	0.70	0.374	(0.153)	0.067	0.307
116	9.67	0.70	0.374	(0.152)	0.067	0.307
117	9.75	0.70	0.374	(0.151)	0.067	0.307
118	9.83	0.73	0.392	(0.150)	0.070	0.321
119	9.92	0.73	0.392	(0.150)	0.070	0.321
120	10.00	0.73	0.392	(0.149)	0.070	0.321
121	10.08	0.50	0.267	(0.148)	0.048	0.219
122	10.17	0.50	0.267	(0.147)	0.048	0.219
123	10.25	0.50	0.267	(0.147)	0.048	0.219
124	10.33	0.50	0.267	(0.146)	0.048	0.219
125	10.42	0.50	0.267	(0.145)	0.048	0.219
126	10.50	0.50	0.267	(0.145)	0.048	0.219
127	10.58	0.67	0.356	(0.144)	0.064	0.292
128	10.67	0.67	0.356	(0.143)	0.064	0.292
129	10.75	0.67	0.356	(0.142)	0.064	0.292
130	10.83	0.67	0.356	(0.142)	0.064	0.292
131	10.92	0.67	0.356	(0.141)	0.064	0.292
132	11.00	0.67	0.356	(0.140)	0.064	0.292
133	11.08	0.63	0.338	(0.140)	0.061	0.277
134	11.17	0.63	0.338	(0.139)	0.061	0.277
135	11.25	0.63	0.338	(0.138)	0.061	0.277
136	11.33	0.63	0.338	(0.138)	0.061	0.277
137	11.42	0.63	0.338	(0.137)	0.061	0.277
138	11.50	0.63	0.338	(0.136)	0.061	0.277
139	11.58	0.57	0.303	(0.136)	0.054	0.248
140	11.67	0.57	0.303	(0.135)	0.054	0.248
141	11.75	0.57	0.303	(0.134)	0.054	0.248
142	11.83	0.60	0.320	(0.134)	0.058	0.263
143	11.92	0.60	0.320	(0.133)	0.058	0.263
144	12.00	0.60	0.320	(0.132)	0.058	0.263
145	12.08	0.83	0.445	(0.132)	0.080	0.365
146	12.17	0.83	0.445	(0.131)	0.080	0.365
147	12.25	0.83	0.445	(0.130)	0.080	0.365
148	12.33	0.87	0.463	(0.130)	0.083	0.379
149	12.42	0.87	0.463	(0.129)	0.083	0.379
150	12.50	0.87	0.463	(0.128)	0.083	0.379
151	12.58	0.93	0.498	(0.128)	0.090	0.409
152	12.67	0.93	0.498	(0.127)	0.090	0.409
153	12.75	0.93	0.498	(0.126)	0.090	0.409
154	12.83	0.97	0.516	(0.126)	0.093	0.423
155	12.92	0.97	0.516	(0.125)	0.093	0.423
156	13.00	0.97	0.516	(0.124)	0.093	0.423
157	13.08	1.13	0.605	(0.124)	0.109	0.496
158	13.17	1.13	0.605	(0.123)	0.109	0.496
159	13.25	1.13	0.605	(0.123)	0.109	0.496
160	13.33	1.13	0.605	(0.122)	0.109	0.496
161	13.42	1.13	0.605	(0.121)	0.109	0.496
162	13.50	1.13	0.605	(0.121)	0.109	0.496
163	13.58	0.77	0.409	(0.120)	0.074	0.336
164	13.67	0.77	0.409	(0.120)	0.074	0.336
165	13.75	0.77	0.409	(0.119)	0.074	0.336
166	13.83	0.77	0.409	(0.118)	0.074	0.336
167	13.92	0.77	0.409	(0.118)	0.074	0.336
168	14.00	0.77	0.409	(0.117)	0.074	0.336
169	14.08	0.90	0.481	(0.117)	0.087	0.394
170	14.17	0.90	0.481	(0.116)	0.087	0.394
171	14.25	0.90	0.481	(0.115)	0.087	0.394
172	14.33	0.87	0.463	(0.115)	0.083	0.379
173	14.42	0.87	0.463	(0.114)	0.083	0.379
174	14.50	0.87	0.463	(0.114)	0.083	0.379
175	14.58	0.87	0.463	(0.113)	0.083	0.379
176	14.67	0.87	0.463	(0.112)	0.083	0.379
177	14.75	0.87	0.463	(0.112)	0.083	0.379
178	14.83	0.83	0.445	(0.111)	0.080	0.365
179	14.92	0.83	0.445	(0.111)	0.080	0.365
180	15.00	0.83	0.445	(0.110)	0.080	0.365
181	15.08	0.80	0.427	(0.110)	0.077	0.350
182	15.17	0.80	0.427	(0.109)	0.077	0.350
183	15.25	0.80	0.427	(0.108)	0.077	0.350
184	15.33	0.77	0.409	(0.108)	0.074	0.336

185	15.42	0.77	0.409	(0.107)	0.074	0.336
186	15.50	0.77	0.409	(0.107)	0.074	0.336
187	15.58	0.63	0.338	(0.106)	0.061	0.277
188	15.67	0.63	0.338	(0.106)	0.061	0.277
189	15.75	0.63	0.338	(0.105)	0.061	0.277
190	15.83	0.63	0.338	(0.105)	0.061	0.277
191	15.92	0.63	0.338	(0.104)	0.061	0.277
192	16.00	0.63	0.338	(0.104)	0.061	0.277
193	16.08	0.13	0.071	(0.103)	0.013	0.058
194	16.17	0.13	0.071	(0.102)	0.013	0.058
195	16.25	0.13	0.071	(0.102)	0.013	0.058
196	16.33	0.13	0.071	(0.101)	0.013	0.058
197	16.42	0.13	0.071	(0.101)	0.013	0.058
198	16.50	0.13	0.071	(0.100)	0.013	0.058
199	16.58	0.10	0.053	(0.100)	0.010	0.044
200	16.67	0.10	0.053	(0.099)	0.010	0.044
201	16.75	0.10	0.053	(0.099)	0.010	0.044
202	16.83	0.10	0.053	(0.098)	0.010	0.044
203	16.92	0.10	0.053	(0.098)	0.010	0.044
204	17.00	0.10	0.053	(0.097)	0.010	0.044
205	17.08	0.17	0.089	(0.097)	0.016	0.073
206	17.17	0.17	0.089	(0.096)	0.016	0.073
207	17.25	0.17	0.089	(0.096)	0.016	0.073
208	17.33	0.17	0.089	(0.095)	0.016	0.073
209	17.42	0.17	0.089	(0.095)	0.016	0.073
210	17.50	0.17	0.089	(0.094)	0.016	0.073
211	17.58	0.17	0.089	(0.094)	0.016	0.073
212	17.67	0.17	0.089	(0.094)	0.016	0.073
213	17.75	0.17	0.089	(0.093)	0.016	0.073
214	17.83	0.13	0.071	(0.093)	0.013	0.058
215	17.92	0.13	0.071	(0.092)	0.013	0.058
216	18.00	0.13	0.071	(0.092)	0.013	0.058
217	18.08	0.13	0.071	(0.091)	0.013	0.058
218	18.17	0.13	0.071	(0.091)	0.013	0.058
219	18.25	0.13	0.071	(0.090)	0.013	0.058
220	18.33	0.13	0.071	(0.090)	0.013	0.058
221	18.42	0.13	0.071	(0.089)	0.013	0.058
222	18.50	0.13	0.071	(0.089)	0.013	0.058
223	18.58	0.10	0.053	(0.089)	0.010	0.044
224	18.67	0.10	0.053	(0.088)	0.010	0.044
225	18.75	0.10	0.053	(0.088)	0.010	0.044
226	18.83	0.07	0.036	(0.087)	0.006	0.029
227	18.92	0.07	0.036	(0.087)	0.006	0.029
228	19.00	0.07	0.036	(0.087)	0.006	0.029
229	19.08	0.10	0.053	(0.086)	0.010	0.044
230	19.17	0.10	0.053	(0.086)	0.010	0.044
231	19.25	0.10	0.053	(0.085)	0.010	0.044
232	19.33	0.13	0.071	(0.085)	0.013	0.058
233	19.42	0.13	0.071	(0.085)	0.013	0.058
234	19.50	0.13	0.071	(0.084)	0.013	0.058
235	19.58	0.10	0.053	(0.084)	0.010	0.044
236	19.67	0.10	0.053	(0.083)	0.010	0.044
237	19.75	0.10	0.053	(0.083)	0.010	0.044
238	19.83	0.07	0.036	(0.083)	0.006	0.029
239	19.92	0.07	0.036	(0.082)	0.006	0.029
240	20.00	0.07	0.036	(0.082)	0.006	0.029
241	20.08	0.10	0.053	(0.082)	0.010	0.044
242	20.17	0.10	0.053	(0.081)	0.010	0.044
243	20.25	0.10	0.053	(0.081)	0.010	0.044
244	20.33	0.10	0.053	(0.080)	0.010	0.044
245	20.42	0.10	0.053	(0.080)	0.010	0.044
246	20.50	0.10	0.053	(0.080)	0.010	0.044
247	20.58	0.10	0.053	(0.079)	0.010	0.044
248	20.67	0.10	0.053	(0.079)	0.010	0.044
249	20.75	0.10	0.053	(0.079)	0.010	0.044
250	20.83	0.07	0.036	(0.078)	0.006	0.029
251	20.92	0.07	0.036	(0.078)	0.006	0.029
252	21.00	0.07	0.036	(0.078)	0.006	0.029
253	21.08	0.10	0.053	(0.078)	0.010	0.044
254	21.17	0.10	0.053	(0.077)	0.010	0.044
255	21.25	0.10	0.053	(0.077)	0.010	0.044

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256  21.33     0.07      0.036       (  0.077)       0.006        0.029
257  21.42     0.07      0.036       (  0.076)       0.006        0.029
258  21.50     0.07      0.036       (  0.076)       0.006        0.029
259  21.58     0.10      0.053       (  0.076)       0.010        0.044
260  21.67     0.10      0.053       (  0.075)       0.010        0.044
261  21.75     0.10      0.053       (  0.075)       0.010        0.044
262  21.83     0.07      0.036       (  0.075)       0.006        0.029
263  21.92     0.07      0.036       (  0.075)       0.006        0.029
264  22.00     0.07      0.036       (  0.074)       0.006        0.029
265  22.08     0.10      0.053       (  0.074)       0.010        0.044
266  22.17     0.10      0.053       (  0.074)       0.010        0.044
267  22.25     0.10      0.053       (  0.074)       0.010        0.044
268  22.33     0.07      0.036       (  0.073)       0.006        0.029
269  22.42     0.07      0.036       (  0.073)       0.006        0.029
270  22.50     0.07      0.036       (  0.073)       0.006        0.029
271  22.58     0.07      0.036       (  0.073)       0.006        0.029
272  22.67     0.07      0.036       (  0.073)       0.006        0.029
273  22.75     0.07      0.036       (  0.072)       0.006        0.029
274  22.83     0.07      0.036       (  0.072)       0.006        0.029
275  22.92     0.07      0.036       (  0.072)       0.006        0.029
276  23.00     0.07      0.036       (  0.072)       0.006        0.029
277  23.08     0.07      0.036       (  0.072)       0.006        0.029
278  23.17     0.07      0.036       (  0.072)       0.006        0.029
279  23.25     0.07      0.036       (  0.071)       0.006        0.029
280  23.33     0.07      0.036       (  0.071)       0.006        0.029
281  23.42     0.07      0.036       (  0.071)       0.006        0.029
282  23.50     0.07      0.036       (  0.071)       0.006        0.029
283  23.58     0.07      0.036       (  0.071)       0.006        0.029
284  23.67     0.07      0.036       (  0.071)       0.006        0.029
285  23.75     0.07      0.036       (  0.071)       0.006        0.029
286  23.83     0.07      0.036       (  0.071)       0.006        0.029
287  23.92     0.07      0.036       (  0.071)       0.006        0.029
288  24.00     0.07      0.036       (  0.070)       0.006        0.029
              (Loss Rate Not Used)
    Sum =     100.0                                   Sum =    43.8
      Flood volume = Effective rainfall      3.65(In)
       times area       0.8(Ac.)/[(In)/(Ft.)] =       0.2(Ac.Ft)
      Total soil loss =      0.80(In)
      Total soil loss =     0.055(Ac.Ft)
      Total rainfall =      4.45(In)
      Flood volume =       10861.6 Cubic Feet
      Total soil loss =        2384.3 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.410(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q          |         |         |         |
   0+10       0.0002      0.02  Q          |         |         |         |
   0+15       0.0004      0.02  Q          |         |         |         |
   0+20       0.0006      0.03  Q          |         |         |         |
   0+25       0.0008      0.03  Q          |         |         |         |
   0+30       0.0010      0.04  Q          |         |         |         |
   0+35       0.0013      0.04  Q          |         |         |         |
   0+40       0.0015      0.04  Q          |         |         |         |
   0+45       0.0018      0.04  Q          |         |         |         |
   0+50       0.0021      0.04  Q          |         |         |         |
   0+55       0.0024      0.05  Q          |         |         |         |
   1+ 0       0.0027      0.05  Q          |         |         |         |
   1+ 5       0.0030      0.04  Q          |         |         |         |
   1+10       0.0033      0.04  Q          |         |         |         |
   1+15       0.0035      0.04  Q          |         |         |         |
   1+20       0.0038      0.04  Q          |         |         |         |
   1+25       0.0040      0.04  Q          |         |         |         |
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1+30        0.0043      0.04  Q         |         |         |         |
1+35        0.0045      0.04  Q         |         |         |         |
1+40        0.0048      0.04  Q         |         |         |         |
1+45        0.0050      0.04  Q         |         |         |         |
1+50        0.0053      0.04  Q         |         |         |         |
1+55        0.0056      0.05  Q         |         |         |         |
2+ 0        0.0060      0.05  Q         |         |         |         |
2+ 5        0.0063      0.05  QV        |         |         |         |
2+10        0.0066      0.05  QV        |         |         |         |
2+15        0.0070      0.05  QV        |         |         |         |
2+20        0.0073      0.05  QV        |         |         |         |
2+25        0.0076      0.05  QV        |         |         |         |
2+30        0.0080      0.05  QV        |         |         |         |
2+35        0.0083      0.05  QV        |         |         |         |
2+40        0.0087      0.06  QV        |         |         |         |
2+45        0.0091      0.06  QV        |         |         |         |
2+50        0.0096      0.06  QV        |         |         |         |
2+55        0.0100      0.06  QV        |         |         |         |
3+ 0        0.0104      0.06  QV        |         |         |         |
3+ 5        0.0108      0.06  QV        |         |         |         |
3+10        0.0112      0.06  QV        |         |         |         |
3+15        0.0116      0.06  QV        |         |         |         |
3+20        0.0120      0.06  QV        |         |         |         |
3+25        0.0125      0.06  QV        |         |         |         |
3+30        0.0129      0.06  Q V       |         |         |         |
3+35        0.0133      0.06  Q V       |         |         |         |
3+40        0.0137      0.06  Q V       |         |         |         |
3+45        0.0141      0.06  Q V       |         |         |         |
3+50        0.0146      0.06  Q V       |         |         |         |
3+55        0.0151      0.07  Q V       |         |         |         |
4+ 0        0.0156      0.07  Q V       |         |         |         |
4+ 5        0.0160      0.07  Q V       |         |         |         |
4+10        0.0165      0.07  Q V       |         |         |         |
4+15        0.0170      0.07  Q V       |         |         |         |
4+20        0.0176      0.08  Q V       |         |         |         |
4+25        0.0181      0.08  Q V       |         |         |         |
4+30        0.0187      0.08  Q  V      |         |         |         |
4+35        0.0193      0.08  Q  V      |         |         |         |
4+40        0.0199      0.08  Q  V      |         |         |         |
4+45        0.0205      0.08  Q  V      |         |         |         |
4+50        0.0211      0.09  Q  V      |         |         |         |
4+55        0.0217      0.09  Q  V      |         |         |         |
5+ 0        0.0224      0.10  Q  V      |         |         |         |
5+ 5        0.0230      0.09  Q  V      |         |         |         |
5+10        0.0235      0.08  Q  V      |         |         |         |
5+15        0.0240      0.07  Q  V      |         |         |         |
5+20        0.0246      0.08  Q  V      |         |         |         |
5+25        0.0251      0.08  Q   V     |         |         |         |
5+30        0.0257      0.08  Q   V     |         |         |         |
5+35        0.0263      0.09  Q   V     |         |         |         |
5+40        0.0270      0.09  Q   V     |         |         |         |
5+45        0.0276      0.10  Q   V     |         |         |         |
5+50        0.0283      0.10  Q   V     |         |         |         |
5+55        0.0290      0.10  Q   V     |         |         |         |
6+ 0        0.0296      0.10  Q   V     |         |         |         |
6+ 5        0.0303      0.10  Q   V     |         |         |         |
6+10        0.0311      0.11  Q   V     |         |         |         |
6+15        0.0318      0.11  Q    V    |         |         |         |
6+20        0.0326      0.11  Q    V    |         |         |         |
6+25        0.0333      0.11  Q    V    |         |         |         |
6+30        0.0340      0.11  Q    V    |         |         |         |
6+35        0.0348      0.11  Q    V    |         |         |         |
6+40        0.0356      0.12  Q    V    |         |         |         |
6+45        0.0365      0.12  Q    V    |         |         |         |
6+50        0.0373      0.12  Q    V    |         |         |         |
6+55        0.0381      0.12  Q     V   |         |         |         |
7+ 0        0.0390      0.12  Q     V   |         |         |         |
7+ 5        0.0398      0.12  Q     V   |         |         |         |
7+10        0.0406      0.12  Q     V   |         |         |         |
7+15        0.0415      0.12  Q     V   |         |         |         |
7+20        0.0423      0.13  Q     V   |         |         |         |
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 7+25       0.0432      0.13  Q     V   |         |         |         |
 7+30       0.0441      0.13  Q      V  |         |         |         |
 7+35       0.0451      0.14  Q      V  |         |         |         |
 7+40       0.0461      0.14  Q      V  |         |         |         |
 7+45       0.0471      0.14  Q      V  |         |         |         |
 7+50       0.0481      0.15  Q      V  |         |         |         |
 7+55       0.0492      0.16  Q      V  |         |         |         |
 8+ 0       0.0502      0.16  Q       V |         |         |         |
 8+ 5       0.0514      0.17  Q       V |         |         |         |
 8+10       0.0526      0.18  Q       V |         |         |         |
 8+15       0.0538      0.18  Q       V |         |         |         |
 8+20       0.0551      0.18  Q       V |         |         |         |
 8+25       0.0563      0.18  Q        V|         |         |         |
 8+30       0.0576      0.18  Q        V|         |         |         |
 8+35       0.0589      0.19  Q        V|         |         |         |
 8+40       0.0602      0.19  Q        V|         |         |         |
 8+45       0.0615      0.19  Q        V|         |         |         |
 8+50       0.0629      0.20  Q         V         |         |         |
 8+55       0.0643      0.20  Q         V         |         |         |
 9+ 0       0.0657      0.20  Q         V         |         |         |
 9+ 5       0.0671      0.21  Q         V         |         |         |
 9+10       0.0687      0.23  Q         |V        |         |         |
 9+15       0.0703      0.23  Q         |V        |         |         |
 9+20       0.0719      0.23  Q         |V        |         |         |
 9+25       0.0735      0.24  Q         |V        |         |         |
 9+30       0.0752      0.24  Q         | V       |         |         |
 9+35       0.0769      0.25  Q         | V       |         |         |
 9+40       0.0786      0.25  |Q        | V       |         |         |
 9+45       0.0804      0.25  |Q        | V       |         |         |
 9+50       0.0821      0.26  |Q        |  V      |         |         |
 9+55       0.0839      0.26  |Q        |  V      |         |         |
10+ 0       0.0858      0.26  |Q        |  V      |         |         |
10+ 5       0.0874      0.23  Q         |   V     |         |         |
10+10       0.0887      0.19  Q         |   V     |         |         |
10+15       0.0900      0.18  Q         |   V     |         |         |
10+20       0.0912      0.18  Q         |   V     |         |         |
10+25       0.0925      0.18  Q         |   V     |         |         |
10+30       0.0937      0.18  Q         |    V    |         |         |
10+35       0.0951      0.20  Q         |    V    |         |         |
10+40       0.0967      0.23  Q         |    V    |         |         |
10+45       0.0984      0.24  Q         |    V    |         |         |
10+50       0.1000      0.24  Q         |     V   |         |         |
10+55       0.1017      0.24  Q         |     V   |         |         |
11+ 0       0.1034      0.24  Q         |     V   |         |         |
11+ 5       0.1050      0.24  Q         |     V   |         |         |
11+10       0.1066      0.23  Q         |      V  |         |         |
11+15       0.1082      0.23  Q         |      V  |         |         |
11+20       0.1097      0.23  Q         |      V  |         |         |
11+25       0.1113      0.23  Q         |      V  |         |         |
11+30       0.1129      0.23  Q         |       V |         |         |
11+35       0.1144      0.22  Q         |       V |         |         |
11+40       0.1159      0.21  Q         |       V |         |         |
11+45       0.1173      0.21  Q         |       V |         |         |
11+50       0.1187      0.21  Q         |        V|         |         |
11+55       0.1202      0.22  Q         |        V|         |         |
12+ 0       0.1217      0.22  Q         |        V|         |         |
12+ 5       0.1234      0.25  Q         |        V|         |         |
12+10       0.1254      0.29  |Q        |         V         |         |
12+15       0.1275      0.30  |Q        |         V         |         |
12+20       0.1296      0.31  |Q        |         V         |         |
12+25       0.1317      0.31  |Q        |         |V        |         |
12+30       0.1339      0.31  |Q        |         |V        |         |
12+35       0.1361      0.32  |Q        |         |V        |         |
12+40       0.1384      0.33  |Q        |         | V       |         |
12+45       0.1407      0.34  |Q        |         | V       |         |
12+50       0.1431      0.34  |Q        |         | V       |         |
12+55       0.1455      0.35  |Q        |         |  V      |         |
13+ 0       0.1479      0.35  |Q        |         |  V      |         |
13+ 5       0.1505      0.37  |Q        |         |   V     |         |
13+10       0.1532      0.40  |Q        |         |   V     |         |
13+15       0.1560      0.41  |Q        |         |    V    |         |
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13+20       0.1588      0.41  |Q        |         |    V    |         |
13+25       0.1617      0.41  |Q        |         |    V    |         |
13+30       0.1645      0.41  |Q        |         |     V   |         |
13+35       0.1670      0.36  |Q        |         |     V   |         |
13+40       0.1690      0.30  |Q        |         |      V  |         |
13+45       0.1710      0.28  |Q        |         |      V  |         |
13+50       0.1729      0.28  |Q        |         |      V  |         |
13+55       0.1748      0.28  |Q        |         |       V |         |
14+ 0       0.1767      0.28  |Q        |         |       V |         |
14+ 5       0.1788      0.30  |Q        |         |       V |         |
14+10       0.1810      0.32  |Q        |         |        V|         |
14+15       0.1832      0.32  |Q        |         |        V|         |
14+20       0.1854      0.32  |Q        |         |        V|         |
14+25       0.1876      0.32  |Q        |         |         V         |
14+30       0.1897      0.31  |Q        |         |         V         |
14+35       0.1919      0.31  |Q        |         |         V         |
14+40       0.1940      0.31  |Q        |         |         |V        |
14+45       0.1962      0.31  |Q        |         |         |V        |
14+50       0.1983      0.31  |Q        |         |         |V        |
14+55       0.2004      0.30  |Q        |         |         | V       |
15+ 0       0.2025      0.30  |Q        |         |         | V       |
15+ 5       0.2046      0.30  |Q        |         |         | V       |
15+10       0.2066      0.29  |Q        |         |         |  V      |
15+15       0.2086      0.29  |Q        |         |         |  V      |
15+20       0.2105      0.29  |Q        |         |         |  V      |
15+25       0.2125      0.28  |Q        |         |         |   V     |
15+30       0.2144      0.28  |Q        |         |         |   V     |
15+35       0.2162      0.26  |Q        |         |         |   V     |
15+40       0.2178      0.24  Q         |         |         |   V     |
15+45       0.2194      0.23  Q         |         |         |    V    |
15+50       0.2210      0.23  Q         |         |         |    V    |
15+55       0.2225      0.23  Q         |         |         |    V    |
16+ 0       0.2241      0.23  Q         |         |         |    V    |
16+ 5       0.2252      0.16  Q         |         |         |     V   |
16+10       0.2257      0.07  Q         |         |         |     V   |
16+15       0.2261      0.06  Q         |         |         |     V   |
16+20       0.2265      0.05  Q         |         |         |     V   |
16+25       0.2268      0.05  Q         |         |         |     V   |
16+30       0.2271      0.05  Q         |         |         |     V   |
16+35       0.2274      0.04  Q         |         |         |     V   |
16+40       0.2277      0.04  Q         |         |         |     V   |
16+45       0.2279      0.04  Q         |         |         |     V   |
16+50       0.2282      0.04  Q         |         |         |     V   |
16+55       0.2284      0.04  Q         |         |         |     V   |
17+ 0       0.2287      0.04  Q         |         |         |     V   |
17+ 5       0.2290      0.05  Q         |         |         |     V   |
17+10       0.2294      0.06  Q         |         |         |     V   |
17+15       0.2298      0.06  Q         |         |         |     V   |
17+20       0.2302      0.06  Q         |         |         |     V   |
17+25       0.2306      0.06  Q         |         |         |     V   |
17+30       0.2311      0.06  Q         |         |         |      V  |
17+35       0.2315      0.06  Q         |         |         |      V  |
17+40       0.2319      0.06  Q         |         |         |      V  |
17+45       0.2323      0.06  Q         |         |         |      V  |
17+50       0.2327      0.06  Q         |         |         |      V  |
17+55       0.2330      0.05  Q         |         |         |      V  |
18+ 0       0.2334      0.05  Q         |         |         |      V  |
18+ 5       0.2337      0.05  Q         |         |         |      V  |
18+10       0.2340      0.05  Q         |         |         |      V  |
18+15       0.2344      0.05  Q         |         |         |      V  |
18+20       0.2347      0.05  Q         |         |         |      V  |
18+25       0.2350      0.05  Q         |         |         |      V  |
18+30       0.2354      0.05  Q         |         |         |      V  |
18+35       0.2357      0.04  Q         |         |         |      V  |
18+40       0.2359      0.04  Q         |         |         |      V  |
18+45       0.2362      0.04  Q         |         |         |      V  |
18+50       0.2364      0.03  Q         |         |         |      V  |
18+55       0.2366      0.03  Q         |         |         |      V  |
19+ 0       0.2367      0.02  Q         |         |         |      V  |
19+ 5       0.2369      0.03  Q         |         |         |       V |
19+10       0.2372      0.03  Q         |         |         |       V |
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19+15	0.2374	0.04	Q				V
19+20	0.2377	0.04	Q				V
19+25	0.2380	0.05	Q				V
19+30	0.2384	0.05	Q				V
19+35	0.2387	0.04	Q				V
19+40	0.2389	0.04	Q				V
19+45	0.2392	0.04	Q				V
19+50	0.2394	0.03	Q				V
19+55	0.2396	0.03	Q				V
20+ 0	0.2397	0.02	Q				V
20+ 5	0.2399	0.03	Q				V
20+10	0.2402	0.03	Q				V
20+15	0.2404	0.04	Q				V
20+20	0.2407	0.04	Q				V
20+25	0.2409	0.04	Q				V
20+30	0.2412	0.04	Q				V
20+35	0.2414	0.04	Q				V
20+40	0.2417	0.04	Q				V
20+45	0.2419	0.04	Q				V
20+50	0.2421	0.03	Q				V
20+55	0.2423	0.03	Q				V
21+ 0	0.2425	0.02	Q				V
21+ 5	0.2427	0.03	Q				V
21+10	0.2429	0.03	Q				V
21+15	0.2432	0.04	Q				V
21+20	0.2434	0.03	Q				V
21+25	0.2436	0.03	Q				V
21+30	0.2437	0.02	Q				V
21+35	0.2439	0.03	Q				V
21+40	0.2442	0.03	Q				V
21+45	0.2444	0.04	Q				V
21+50	0.2446	0.03	Q				V
21+55	0.2448	0.03	Q				V
22+ 0	0.2450	0.02	Q				V
22+ 5	0.2452	0.03	Q				V
22+10	0.2454	0.03	Q				V
22+15	0.2457	0.04	Q				V
22+20	0.2459	0.03	Q				V
22+25	0.2460	0.03	Q				V
22+30	0.2462	0.02	Q				V
22+35	0.2464	0.02	Q				V
22+40	0.2466	0.02	Q				V
22+45	0.2467	0.02	Q				V
22+50	0.2469	0.02	Q				V
22+55	0.2471	0.02	Q				V
23+ 0	0.2472	0.02	Q				V
23+ 5	0.2474	0.02	Q				V
23+10	0.2475	0.02	Q				V
23+15	0.2477	0.02	Q				V
23+20	0.2479	0.02	Q				V
23+25	0.2480	0.02	Q				V
23+30	0.2482	0.02	Q				V
23+35	0.2484	0.02	Q				V
23+40	0.2485	0.02	Q				V
23+45	0.2487	0.02	Q				V
23+50	0.2489	0.02	Q				V
23+55	0.2490	0.02	Q				V
24+ 0	0.2492	0.02	Q				V
24+ 5	0.2493	0.01	Q				V
24+10	0.2493	0.00	Q				V
24+15	0.2493	0.00	Q				V
24+20	0.2493	0.00	Q				V

```
       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  02/03/20 File: J424100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978
Program License Serial Number 4010

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format

---------------------------------------------------------------------
JACKSON STREET IMPROVEMENT
100-YEAR 24 HOUR STORM
AREA J4, AVE 50 TO AVE 49
FILE: J4.UM1
--------------------------------------------------------------------
Drainage Area =       2.37(Ac.)  =      0.004 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       2.37(Ac.)  =      0.004 Sq. Mi.
Length along longest watercourse =    2525.00(Ft.)
Length along longest watercourse measured to centroid =    1100.00(Ft.)
Length along longest watercourse =      0.478 Mi.
Length along longest watercourse measured to centroid =      0.208 Mi.
Difference in elevation =       7.20(Ft.)
Slope along watercourse =     15.0558 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.090 Hr.
Lag time =     5.37 Min.
25% of lag time =     1.34 Min.
40% of lag time =     2.15 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        2.37           1.14                  2.70

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        2.37           4.45                 10.55

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.140(In)
Area Averaged 100-Year Rainfall =    4.450(In)

Point rain (area averaged) =    4.450(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    4.450(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     2.370           32.00         0.900
 Total Area Entered =      2.37(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
32.0  32.0      0.742     0.900        0.141       1.000      0.141
```

Sum (F) = 0.141

Area averaged mean soil loss (F) (In/Hr) = 0.141
Minimum soil loss rate ((In/Hr)) = 0.070
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
DESERT S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	93.088	14.969	0.358
2	0.167	186.176	49.280	1.177
3	0.250	279.264	17.896	0.427
4	0.333	372.352	7.987	0.191
5	0.417	465.440	4.358	0.104
6	0.500	558.528	2.570	0.061
7	0.583	651.616	1.318	0.031
8	0.667	744.704	1.037	0.025
9	0.750	837.792	0.584	0.014
			Sum = 100.000	Sum= 2.389

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.250)	0.006	0.029
2	0.17	0.07	0.036	(0.249)	0.006	0.029
3	0.25	0.07	0.036	(0.248)	0.006	0.029
4	0.33	0.10	0.053	(0.247)	0.010	0.044
5	0.42	0.10	0.053	(0.246)	0.010	0.044
6	0.50	0.10	0.053	(0.245)	0.010	0.044
7	0.58	0.10	0.053	(0.244)	0.010	0.044
8	0.67	0.10	0.053	(0.243)	0.010	0.044
9	0.75	0.10	0.053	(0.242)	0.010	0.044
10	0.83	0.13	0.071	(0.241)	0.013	0.058
11	0.92	0.13	0.071	(0.240)	0.013	0.058
12	1.00	0.13	0.071	(0.239)	0.013	0.058
13	1.08	0.10	0.053	(0.238)	0.010	0.044
14	1.17	0.10	0.053	(0.238)	0.010	0.044
15	1.25	0.10	0.053	(0.237)	0.010	0.044
16	1.33	0.10	0.053	(0.236)	0.010	0.044
17	1.42	0.10	0.053	(0.235)	0.010	0.044
18	1.50	0.10	0.053	(0.234)	0.010	0.044
19	1.58	0.10	0.053	(0.233)	0.010	0.044
20	1.67	0.10	0.053	(0.232)	0.010	0.044
21	1.75	0.10	0.053	(0.231)	0.010	0.044
22	1.83	0.13	0.071	(0.230)	0.013	0.058
23	1.92	0.13	0.071	(0.229)	0.013	0.058
24	2.00	0.13	0.071	(0.228)	0.013	0.058
25	2.08	0.13	0.071	(0.227)	0.013	0.058
26	2.17	0.13	0.071	(0.226)	0.013	0.058
27	2.25	0.13	0.071	(0.225)	0.013	0.058
28	2.33	0.13	0.071	(0.224)	0.013	0.058
29	2.42	0.13	0.071	(0.224)	0.013	0.058
30	2.50	0.13	0.071	(0.223)	0.013	0.058
31	2.58	0.17	0.089	(0.222)	0.016	0.073
32	2.67	0.17	0.089	(0.221)	0.016	0.073
33	2.75	0.17	0.089	(0.220)	0.016	0.073
34	2.83	0.17	0.089	(0.219)	0.016	0.073
35	2.92	0.17	0.089	(0.218)	0.016	0.073
36	3.00	0.17	0.089	(0.217)	0.016	0.073
37	3.08	0.17	0.089	(0.216)	0.016	0.073
38	3.17	0.17	0.089	(0.215)	0.016	0.073

39	3.25	0.17	0.089	(0.215)	0.016	0.073
40	3.33	0.17	0.089	(0.214)	0.016	0.073
41	3.42	0.17	0.089	(0.213)	0.016	0.073
42	3.50	0.17	0.089	(0.212)	0.016	0.073
43	3.58	0.17	0.089	(0.211)	0.016	0.073
44	3.67	0.17	0.089	(0.210)	0.016	0.073
45	3.75	0.17	0.089	(0.209)	0.016	0.073
46	3.83	0.20	0.107	(0.208)	0.019	0.088
47	3.92	0.20	0.107	(0.207)	0.019	0.088
48	4.00	0.20	0.107	(0.207)	0.019	0.088
49	4.08	0.20	0.107	(0.206)	0.019	0.088
50	4.17	0.20	0.107	(0.205)	0.019	0.088
51	4.25	0.20	0.107	(0.204)	0.019	0.088
52	4.33	0.23	0.125	(0.203)	0.022	0.102
53	4.42	0.23	0.125	(0.202)	0.022	0.102
54	4.50	0.23	0.125	(0.201)	0.022	0.102
55	4.58	0.23	0.125	(0.200)	0.022	0.102
56	4.67	0.23	0.125	(0.200)	0.022	0.102
57	4.75	0.23	0.125	(0.199)	0.022	0.102
58	4.83	0.27	0.142	(0.198)	0.026	0.117
59	4.92	0.27	0.142	(0.197)	0.026	0.117
60	5.00	0.27	0.142	(0.196)	0.026	0.117
61	5.08	0.20	0.107	(0.195)	0.019	0.088
62	5.17	0.20	0.107	(0.194)	0.019	0.088
63	5.25	0.20	0.107	(0.194)	0.019	0.088
64	5.33	0.23	0.125	(0.193)	0.022	0.102
65	5.42	0.23	0.125	(0.192)	0.022	0.102
66	5.50	0.23	0.125	(0.191)	0.022	0.102
67	5.58	0.27	0.142	(0.190)	0.026	0.117
68	5.67	0.27	0.142	(0.189)	0.026	0.117
69	5.75	0.27	0.142	(0.189)	0.026	0.117
70	5.83	0.27	0.142	(0.188)	0.026	0.117
71	5.92	0.27	0.142	(0.187)	0.026	0.117
72	6.00	0.27	0.142	(0.186)	0.026	0.117
73	6.08	0.30	0.160	(0.185)	0.029	0.131
74	6.17	0.30	0.160	(0.184)	0.029	0.131
75	6.25	0.30	0.160	(0.184)	0.029	0.131
76	6.33	0.30	0.160	(0.183)	0.029	0.131
77	6.42	0.30	0.160	(0.182)	0.029	0.131
78	6.50	0.30	0.160	(0.181)	0.029	0.131
79	6.58	0.33	0.178	(0.180)	0.032	0.146
80	6.67	0.33	0.178	(0.180)	0.032	0.146
81	6.75	0.33	0.178	(0.179)	0.032	0.146
82	6.83	0.33	0.178	(0.178)	0.032	0.146
83	6.92	0.33	0.178	(0.177)	0.032	0.146
84	7.00	0.33	0.178	(0.176)	0.032	0.146
85	7.08	0.33	0.178	(0.176)	0.032	0.146
86	7.17	0.33	0.178	(0.175)	0.032	0.146
87	7.25	0.33	0.178	(0.174)	0.032	0.146
88	7.33	0.37	0.196	(0.173)	0.035	0.161
89	7.42	0.37	0.196	(0.172)	0.035	0.161
90	7.50	0.37	0.196	(0.172)	0.035	0.161
91	7.58	0.40	0.214	(0.171)	0.038	0.175
92	7.67	0.40	0.214	(0.170)	0.038	0.175
93	7.75	0.40	0.214	(0.169)	0.038	0.175
94	7.83	0.43	0.231	(0.168)	0.042	0.190
95	7.92	0.43	0.231	(0.168)	0.042	0.190
96	8.00	0.43	0.231	(0.167)	0.042	0.190
97	8.08	0.50	0.267	(0.166)	0.048	0.219
98	8.17	0.50	0.267	(0.165)	0.048	0.219
99	8.25	0.50	0.267	(0.165)	0.048	0.219
100	8.33	0.50	0.267	(0.164)	0.048	0.219
101	8.42	0.50	0.267	(0.163)	0.048	0.219
102	8.50	0.50	0.267	(0.162)	0.048	0.219
103	8.58	0.53	0.285	(0.161)	0.051	0.234
104	8.67	0.53	0.285	(0.161)	0.051	0.234
105	8.75	0.53	0.285	(0.160)	0.051	0.234
106	8.83	0.57	0.303	(0.159)	0.054	0.248
107	8.92	0.57	0.303	(0.158)	0.054	0.248
108	9.00	0.57	0.303	(0.158)	0.054	0.248
109	9.08	0.63	0.338	(0.157)	0.061	0.277

110	9.17	0.63	0.338	(0.156)	0.061	0.277
111	9.25	0.63	0.338	(0.155)	0.061	0.277
112	9.33	0.67	0.356	(0.155)	0.064	0.292
113	9.42	0.67	0.356	(0.154)	0.064	0.292
114	9.50	0.67	0.356	(0.153)	0.064	0.292
115	9.58	0.70	0.374	(0.153)	0.067	0.307
116	9.67	0.70	0.374	(0.152)	0.067	0.307
117	9.75	0.70	0.374	(0.151)	0.067	0.307
118	9.83	0.73	0.392	(0.150)	0.070	0.321
119	9.92	0.73	0.392	(0.150)	0.070	0.321
120	10.00	0.73	0.392	(0.149)	0.070	0.321
121	10.08	0.50	0.267	(0.148)	0.048	0.219
122	10.17	0.50	0.267	(0.147)	0.048	0.219
123	10.25	0.50	0.267	(0.147)	0.048	0.219
124	10.33	0.50	0.267	(0.146)	0.048	0.219
125	10.42	0.50	0.267	(0.145)	0.048	0.219
126	10.50	0.50	0.267	(0.145)	0.048	0.219
127	10.58	0.67	0.356	(0.144)	0.064	0.292
128	10.67	0.67	0.356	(0.143)	0.064	0.292
129	10.75	0.67	0.356	(0.142)	0.064	0.292
130	10.83	0.67	0.356	(0.142)	0.064	0.292
131	10.92	0.67	0.356	(0.141)	0.064	0.292
132	11.00	0.67	0.356	(0.140)	0.064	0.292
133	11.08	0.63	0.338	(0.140)	0.061	0.277
134	11.17	0.63	0.338	(0.139)	0.061	0.277
135	11.25	0.63	0.338	(0.138)	0.061	0.277
136	11.33	0.63	0.338	(0.138)	0.061	0.277
137	11.42	0.63	0.338	(0.137)	0.061	0.277
138	11.50	0.63	0.338	(0.136)	0.061	0.277
139	11.58	0.57	0.303	(0.136)	0.054	0.248
140	11.67	0.57	0.303	(0.135)	0.054	0.248
141	11.75	0.57	0.303	(0.134)	0.054	0.248
142	11.83	0.60	0.320	(0.134)	0.058	0.263
143	11.92	0.60	0.320	(0.133)	0.058	0.263
144	12.00	0.60	0.320	(0.132)	0.058	0.263
145	12.08	0.83	0.445	(0.132)	0.080	0.365
146	12.17	0.83	0.445	(0.131)	0.080	0.365
147	12.25	0.83	0.445	(0.130)	0.080	0.365
148	12.33	0.87	0.463	(0.130)	0.083	0.379
149	12.42	0.87	0.463	(0.129)	0.083	0.379
150	12.50	0.87	0.463	(0.128)	0.083	0.379
151	12.58	0.93	0.498	(0.128)	0.090	0.409
152	12.67	0.93	0.498	(0.127)	0.090	0.409
153	12.75	0.93	0.498	(0.126)	0.090	0.409
154	12.83	0.97	0.516	(0.126)	0.093	0.423
155	12.92	0.97	0.516	(0.125)	0.093	0.423
156	13.00	0.97	0.516	(0.124)	0.093	0.423
157	13.08	1.13	0.605	(0.124)	0.109	0.496
158	13.17	1.13	0.605	(0.123)	0.109	0.496
159	13.25	1.13	0.605	(0.123)	0.109	0.496
160	13.33	1.13	0.605	(0.122)	0.109	0.496
161	13.42	1.13	0.605	(0.121)	0.109	0.496
162	13.50	1.13	0.605	(0.121)	0.109	0.496
163	13.58	0.77	0.409	(0.120)	0.074	0.336
164	13.67	0.77	0.409	(0.120)	0.074	0.336
165	13.75	0.77	0.409	(0.119)	0.074	0.336
166	13.83	0.77	0.409	(0.118)	0.074	0.336
167	13.92	0.77	0.409	(0.118)	0.074	0.336
168	14.00	0.77	0.409	(0.117)	0.074	0.336
169	14.08	0.90	0.481	(0.117)	0.087	0.394
170	14.17	0.90	0.481	(0.116)	0.087	0.394
171	14.25	0.90	0.481	(0.115)	0.087	0.394
172	14.33	0.87	0.463	(0.115)	0.083	0.379
173	14.42	0.87	0.463	(0.114)	0.083	0.379
174	14.50	0.87	0.463	(0.114)	0.083	0.379
175	14.58	0.87	0.463	(0.113)	0.083	0.379
176	14.67	0.87	0.463	(0.112)	0.083	0.379
177	14.75	0.87	0.463	(0.112)	0.083	0.379
178	14.83	0.83	0.445	(0.111)	0.080	0.365
179	14.92	0.83	0.445	(0.111)	0.080	0.365
180	15.00	0.83	0.445	(0.110)	0.080	0.365

181	15.08	0.80	0.427	(0.110)	0.077	0.350
182	15.17	0.80	0.427	(0.109)	0.077	0.350
183	15.25	0.80	0.427	(0.108)	0.077	0.350
184	15.33	0.77	0.409	(0.108)	0.074	0.336
185	15.42	0.77	0.409	(0.107)	0.074	0.336
186	15.50	0.77	0.409	(0.107)	0.074	0.336
187	15.58	0.63	0.338	(0.106)	0.061	0.277
188	15.67	0.63	0.338	(0.106)	0.061	0.277
189	15.75	0.63	0.338	(0.105)	0.061	0.277
190	15.83	0.63	0.338	(0.105)	0.061	0.277
191	15.92	0.63	0.338	(0.104)	0.061	0.277
192	16.00	0.63	0.338	(0.104)	0.061	0.277
193	16.08	0.13	0.071	(0.103)	0.013	0.058
194	16.17	0.13	0.071	(0.102)	0.013	0.058
195	16.25	0.13	0.071	(0.102)	0.013	0.058
196	16.33	0.13	0.071	(0.101)	0.013	0.058
197	16.42	0.13	0.071	(0.101)	0.013	0.058
198	16.50	0.13	0.071	(0.100)	0.013	0.058
199	16.58	0.10	0.053	(0.100)	0.010	0.044
200	16.67	0.10	0.053	(0.099)	0.010	0.044
201	16.75	0.10	0.053	(0.099)	0.010	0.044
202	16.83	0.10	0.053	(0.098)	0.010	0.044
203	16.92	0.10	0.053	(0.098)	0.010	0.044
204	17.00	0.10	0.053	(0.097)	0.010	0.044
205	17.08	0.17	0.089	(0.097)	0.016	0.073
206	17.17	0.17	0.089	(0.096)	0.016	0.073
207	17.25	0.17	0.089	(0.096)	0.016	0.073
208	17.33	0.17	0.089	(0.095)	0.016	0.073
209	17.42	0.17	0.089	(0.095)	0.016	0.073
210	17.50	0.17	0.089	(0.094)	0.016	0.073
211	17.58	0.17	0.089	(0.094)	0.016	0.073
212	17.67	0.17	0.089	(0.094)	0.016	0.073
213	17.75	0.17	0.089	(0.093)	0.016	0.073
214	17.83	0.13	0.071	(0.093)	0.013	0.058
215	17.92	0.13	0.071	(0.092)	0.013	0.058
216	18.00	0.13	0.071	(0.092)	0.013	0.058
217	18.08	0.13	0.071	(0.091)	0.013	0.058
218	18.17	0.13	0.071	(0.091)	0.013	0.058
219	18.25	0.13	0.071	(0.090)	0.013	0.058
220	18.33	0.13	0.071	(0.090)	0.013	0.058
221	18.42	0.13	0.071	(0.089)	0.013	0.058
222	18.50	0.13	0.071	(0.089)	0.013	0.058
223	18.58	0.10	0.053	(0.089)	0.010	0.044
224	18.67	0.10	0.053	(0.088)	0.010	0.044
225	18.75	0.10	0.053	(0.088)	0.010	0.044
226	18.83	0.07	0.036	(0.087)	0.006	0.029
227	18.92	0.07	0.036	(0.087)	0.006	0.029
228	19.00	0.07	0.036	(0.087)	0.006	0.029
229	19.08	0.10	0.053	(0.086)	0.010	0.044
230	19.17	0.10	0.053	(0.086)	0.010	0.044
231	19.25	0.10	0.053	(0.085)	0.010	0.044
232	19.33	0.13	0.071	(0.085)	0.013	0.058
233	19.42	0.13	0.071	(0.085)	0.013	0.058
234	19.50	0.13	0.071	(0.084)	0.013	0.058
235	19.58	0.10	0.053	(0.084)	0.010	0.044
236	19.67	0.10	0.053	(0.083)	0.010	0.044
237	19.75	0.10	0.053	(0.083)	0.010	0.044
238	19.83	0.07	0.036	(0.083)	0.006	0.029
239	19.92	0.07	0.036	(0.082)	0.006	0.029
240	20.00	0.07	0.036	(0.082)	0.006	0.029
241	20.08	0.10	0.053	(0.082)	0.010	0.044
242	20.17	0.10	0.053	(0.081)	0.010	0.044
243	20.25	0.10	0.053	(0.081)	0.010	0.044
244	20.33	0.10	0.053	(0.080)	0.010	0.044
245	20.42	0.10	0.053	(0.080)	0.010	0.044
246	20.50	0.10	0.053	(0.080)	0.010	0.044
247	20.58	0.10	0.053	(0.079)	0.010	0.044
248	20.67	0.10	0.053	(0.079)	0.010	0.044
249	20.75	0.10	0.053	(0.079)	0.010	0.044
250	20.83	0.07	0.036	(0.078)	0.006	0.029
251	20.92	0.07	0.036	(0.078)	0.006	0.029

252	21.00	0.07	0.036	(0.078)	0.006	0.029
253	21.08	0.10	0.053	(0.078)	0.010	0.044
254	21.17	0.10	0.053	(0.077)	0.010	0.044
255	21.25	0.10	0.053	(0.077)	0.010	0.044
256	21.33	0.07	0.036	(0.077)	0.006	0.029
257	21.42	0.07	0.036	(0.076)	0.006	0.029
258	21.50	0.07	0.036	(0.076)	0.006	0.029
259	21.58	0.10	0.053	(0.076)	0.010	0.044
260	21.67	0.10	0.053	(0.075)	0.010	0.044
261	21.75	0.10	0.053	(0.075)	0.010	0.044
262	21.83	0.07	0.036	(0.075)	0.006	0.029
263	21.92	0.07	0.036	(0.075)	0.006	0.029
264	22.00	0.07	0.036	(0.074)	0.006	0.029
265	22.08	0.10	0.053	(0.074)	0.010	0.044
266	22.17	0.10	0.053	(0.074)	0.010	0.044
267	22.25	0.10	0.053	(0.074)	0.010	0.044
268	22.33	0.07	0.036	(0.073)	0.006	0.029
269	22.42	0.07	0.036	(0.073)	0.006	0.029
270	22.50	0.07	0.036	(0.073)	0.006	0.029
271	22.58	0.07	0.036	(0.073)	0.006	0.029
272	22.67	0.07	0.036	(0.073)	0.006	0.029
273	22.75	0.07	0.036	(0.072)	0.006	0.029
274	22.83	0.07	0.036	(0.072)	0.006	0.029
275	22.92	0.07	0.036	(0.072)	0.006	0.029
276	23.00	0.07	0.036	(0.072)	0.006	0.029
277	23.08	0.07	0.036	(0.072)	0.006	0.029
278	23.17	0.07	0.036	(0.072)	0.006	0.029
279	23.25	0.07	0.036	(0.071)	0.006	0.029
280	23.33	0.07	0.036	(0.071)	0.006	0.029
281	23.42	0.07	0.036	(0.071)	0.006	0.029
282	23.50	0.07	0.036	(0.071)	0.006	0.029
283	23.58	0.07	0.036	(0.071)	0.006	0.029
284	23.67	0.07	0.036	(0.071)	0.006	0.029
285	23.75	0.07	0.036	(0.071)	0.006	0.029
286	23.83	0.07	0.036	(0.071)	0.006	0.029
287	23.92	0.07	0.036	(0.071)	0.006	0.029
288	24.00	0.07	0.036	(0.070)	0.006	0.029

(Loss Rate Not Used)

Sum = 100.0 Sum = 43.8

Flood volume = Effective rainfall 3.65(In)
times area 2.4(Ac.)/[(In)/(Ft.)] = 0.7(Ac.Ft)
Total soil loss = 0.80(In)
Total soil loss = 0.158(Ac.Ft)
Total rainfall = 4.45(In)
Flood volume = 31392.6 Cubic Feet
Total soil loss = 6891.1 Cubic Feet

Peak flow rate of this hydrograph = 1.181(CFS)

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24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0004	0.04	Q				
0+15	0.0008	0.06	Q				
0+20	0.0012	0.07	Q				
0+25	0.0019	0.09	Q				
0+30	0.0025	0.10	Q				
0+35	0.0032	0.10	Q				
0+40	0.0039	0.10	Q				
0+45	0.0046	0.10	Q				
0+50	0.0054	0.11	Q				
0+55	0.0063	0.13	Q				
1+ 0	0.0072	0.13	Q				
1+ 5	0.0081	0.13	Q				

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 1+10      0.0089      0.12  Q         |         |         |         |
 1+15      0.0096      0.11  Q         |         |         |         |
 1+20      0.0104      0.11  Q         |         |         |         |
 1+25      0.0111      0.11  Q         |         |         |         |
 1+30      0.0118      0.11  Q         |         |         |         |
 1+35      0.0125      0.11  Q         |         |         |         |
 1+40      0.0133      0.10  Q         |         |         |         |
 1+45      0.0140      0.10  Q         |         |         |         |
 1+50      0.0147      0.11  Q         |         |         |         |
 1+55      0.0156      0.13  Q         |         |         |         |
 2+ 0      0.0165      0.13  Q         |         |         |         |
 2+ 5      0.0175      0.14  Q         |         |         |         |
 2+10      0.0184      0.14  QV        |         |         |         |
 2+15      0.0194      0.14  QV        |         |         |         |
 2+20      0.0203      0.14  QV        |         |         |         |
 2+25      0.0213      0.14  QV        |         |         |         |
 2+30      0.0223      0.14  QV        |         |         |         |
 2+35      0.0232      0.14  QV        |         |         |         |
 2+40      0.0244      0.16  QV        |         |         |         |
 2+45      0.0255      0.17  QV        |         |         |         |
 2+50      0.0267      0.17  QV        |         |         |         |
 2+55      0.0279      0.17  QV        |         |         |         |
 3+ 0      0.0291      0.17  QV        |         |         |         |
 3+ 5      0.0303      0.17  QV        |         |         |         |
 3+10      0.0315      0.17  QV        |         |         |         |
 3+15      0.0327      0.17  QV        |         |         |         |
 3+20      0.0339      0.17  QV        |         |         |         |
 3+25      0.0351      0.17  QV        |         |         |         |
 3+30      0.0363      0.17  Q V       |         |         |         |
 3+35      0.0375      0.17  Q V       |         |         |         |
 3+40      0.0387      0.17  Q V       |         |         |         |
 3+45      0.0399      0.17  Q V       |         |         |         |
 3+50      0.0411      0.18  Q V       |         |         |         |
 3+55      0.0425      0.20  Q V       |         |         |         |
 4+ 0      0.0439      0.20  Q V       |         |         |         |
 4+ 5      0.0453      0.21  Q V       |         |         |         |
 4+10      0.0467      0.21  Q V       |         |         |         |
 4+15      0.0482      0.21  Q V       |         |         |         |
 4+20      0.0496      0.21  Q V       |         |         |         |
 4+25      0.0512      0.23  Q V       |         |         |         |
 4+30      0.0529      0.24  Q V       |         |         |         |
 4+35      0.0545      0.24  Q  V      |         |         |         |
 4+40      0.0562      0.24  Q  V      |         |         |         |
 4+45      0.0579      0.24  Q  V      |         |         |         |
 4+50      0.0596      0.25  Q  V      |         |         |         |
 4+55      0.0614      0.27  |Q V      |         |         |         |
 5+ 0      0.0633      0.27  |Q V      |         |         |         |
 5+ 5      0.0651      0.27  |Q V      |         |         |         |
 5+10      0.0667      0.23  Q  V      |         |         |         |
 5+15      0.0682      0.22  Q  V      |         |         |         |
 5+20      0.0698      0.22  Q  V      |         |         |         |
 5+25      0.0714      0.24  Q  V      |         |         |         |
 5+30      0.0730      0.24  Q   V     |         |         |         |
 5+35      0.0747      0.25  Q   V     |         |         |         |
 5+40      0.0766      0.27  |Q  V     |         |         |         |
 5+45      0.0784      0.27  |Q  V     |         |         |         |
 5+50      0.0803      0.28  |Q  V     |         |         |         |
 5+55      0.0822      0.28  |Q  V     |         |         |         |
 6+ 0      0.0841      0.28  |Q  V     |         |         |         |
 6+ 5      0.0861      0.28  |Q  V     |         |         |         |
 6+10      0.0882      0.30  |Q  V     |         |         |         |
 6+15      0.0903      0.31  |Q   V    |         |         |         |
 6+20      0.0924      0.31  |Q   V    |         |         |         |
 6+25      0.0946      0.31  |Q   V    |         |         |         |
 6+30      0.0967      0.31  |Q   V    |         |         |         |
 6+35      0.0989      0.32  |Q   V    |         |         |         |
 6+40      0.1012      0.34  |Q   V    |         |         |         |
 6+45      0.1036      0.34  |Q   V    |         |         |         |
 6+50      0.1060      0.35  |Q   V    |         |         |         |
 6+55      0.1084      0.35  |Q    V   |         |         |         |
 7+ 0      0.1108      0.35  |Q    V   |         |         |         |
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  7+ 5      0.1132      0.35  |Q    V   |         |         |         |
  7+10      0.1156      0.35  |Q    V   |         |         |         |
  7+15      0.1180      0.35  |Q    V   |         |         |         |
  7+20      0.1204      0.35  |Q    V   |         |         |         |
  7+25      0.1230      0.37  |Q    V   |         |         |         |
  7+30      0.1256      0.38  |Q    V   |         |         |         |
  7+35      0.1282      0.39  |Q     V  |         |         |         |
  7+40      0.1310      0.40  |Q     V  |         |         |         |
  7+45      0.1338      0.41  |Q     V  |         |         |         |
  7+50      0.1367      0.42  |Q     V  |         |         |         |
  7+55      0.1397      0.44  |Q     V  |         |         |         |
  8+ 0      0.1428      0.45  |Q     V  |         |         |         |
  8+ 5      0.1460      0.46  |Q      V |         |         |         |
  8+10      0.1494      0.50  |Q      V |         |         |         |
  8+15      0.1529      0.51  | Q     V |         |         |         |
  8+20      0.1565      0.52  | Q     V |         |         |         |
  8+25      0.1600      0.52  | Q     V |         |         |         |
  8+30      0.1636      0.52  | Q      V|         |         |         |
  8+35      0.1673      0.53  | Q      V|         |         |         |
  8+40      0.1710      0.55  | Q      V|         |         |         |
  8+45      0.1748      0.55  | Q      V|         |         |         |
  8+50      0.1787      0.56  | Q      V|         |         |         |
  8+55      0.1827      0.58  | Q       V         |         |         |
  9+ 0      0.1867      0.59  | Q       V         |         |         |
  9+ 5      0.1908      0.60  | Q       V         |         |         |
  9+10      0.1952      0.64  | Q       V         |         |         |
  9+15      0.1997      0.65  | Q       |V        |         |         |
  9+20      0.2042      0.66  | Q       |V        |         |         |
  9+25      0.2089      0.68  | Q       |V        |         |         |
  9+30      0.2137      0.69  | Q       |V        |         |         |
  9+35      0.2185      0.70  | Q       | V       |         |         |
  9+40      0.2234      0.72  | Q       | V       |         |         |
  9+45      0.2284      0.73  | Q       | V       |         |         |
  9+50      0.2335      0.73  | Q       | V       |         |         |
  9+55      0.2386      0.75  |  Q      |  V      |         |         |
 10+ 0      0.2439      0.76  |  Q      |  V      |         |         |
 10+ 5      0.2489      0.73  | Q       |  V      |         |         |
 10+10      0.2531      0.61  | Q       |   V     |         |         |
 10+15      0.2570      0.57  | Q       |   V     |         |         |
 10+20      0.2607      0.55  | Q       |   V     |         |         |
 10+25      0.2644      0.54  | Q       |   V     |         |         |
 10+30      0.2681      0.53  | Q       |   V     |         |         |
 10+35      0.2719      0.55  | Q       |    V    |         |         |
 10+40      0.2763      0.64  | Q       |    V    |         |         |
 10+45      0.2809      0.67  | Q       |    V    |         |         |
 10+50      0.2856      0.68  | Q       |    V    |         |         |
 10+55      0.2903      0.69  | Q       |     V   |         |         |
 11+ 0      0.2951      0.69  | Q       |     V   |         |         |
 11+ 5      0.2998      0.69  | Q       |     V   |         |         |
 11+10      0.3045      0.67  | Q       |     V   |         |         |
 11+15      0.3091      0.67  | Q       |      V  |         |         |
 11+20      0.3137      0.67  | Q       |      V  |         |         |
 11+25      0.3182      0.66  | Q       |      V  |         |         |
 11+30      0.3228      0.66  | Q       |      V  |         |         |
 11+35      0.3273      0.65  | Q       |       V |         |         |
 11+40      0.3316      0.62  | Q       |       V |         |         |
 11+45      0.3357      0.61  | Q       |       V |         |         |
 11+50      0.3399      0.61  | Q       |       V |         |         |
 11+55      0.3442      0.62  | Q       |        V|         |         |
 12+ 0      0.3484      0.62  | Q       |        V|         |         |
 12+ 5      0.3530      0.66  | Q       |        V|         |         |
 12+10      0.3584      0.78  |  Q      |        V|         |         |
 12+15      0.3641      0.83  |  Q      |         V         |         |
 12+20      0.3700      0.85  |  Q      |         V         |         |
 12+25      0.3760      0.88  |  Q      |         V         |         |
 12+30      0.3822      0.89  |  Q      |         |V        |         |
 12+35      0.3885      0.91  |  Q      |         |V        |         |
 12+40      0.3950      0.95  |  Q      |         |V        |         |
 12+45      0.4016      0.96  |  Q      |         | V       |         |
 12+50      0.4083      0.97  |  Q      |         | V       |         |
 12+55      0.4152      1.00  |  Q      |         |  V      |         |
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13+ 0       0.4221      1.00  |   Q     |         |  V      |         |
13+ 5       0.4292      1.03  |   Q     |         |  V      |         |
13+10       0.4369      1.12  |   Q     |         |   V     |         |
13+15       0.4449      1.15  |   Q     |         |   V     |         |
13+20       0.4529      1.17  |   Q     |         |    V    |         |
13+25       0.4610      1.18  |   Q     |         |    V    |         |
13+30       0.4692      1.18  |   Q     |         |     V   |         |
13+35       0.4769      1.13  |   Q     |         |     V   |         |
13+40       0.4834      0.94  |  Q      |         |     V   |         |
13+45       0.4894      0.87  |  Q      |         |      V  |         |
13+50       0.4952      0.84  |  Q      |         |      V  |         |
13+55       0.5008      0.82  |  Q      |         |      V  |         |
14+ 0       0.5064      0.81  |  Q      |         |       V |         |
14+ 5       0.5121      0.83  |  Q      |         |       V |         |
14+10       0.5183      0.89  |  Q      |         |       V |         |
14+15       0.5246      0.92  |  Q      |         |        V|         |
14+20       0.5310      0.92  |  Q      |         |        V|         |
14+25       0.5372      0.91  |  Q      |         |        V|         |
14+30       0.5435      0.91  |  Q      |         |         V         |
14+35       0.5498      0.91  |  Q      |         |         V         |
14+40       0.5560      0.91  |  Q      |         |         V         |
14+45       0.5623      0.91  |  Q      |         |         |V        |
14+50       0.5685      0.90  |  Q      |         |         |V        |
14+55       0.5746      0.88  |  Q      |         |         |V        |
15+ 0       0.5806      0.88  |  Q      |         |         | V       |
15+ 5       0.5866      0.87  |  Q      |         |         | V       |
15+10       0.5925      0.85  |  Q      |         |         | V       |
15+15       0.5983      0.84  |  Q      |         |         |  V      |
15+20       0.6041      0.84  |  Q      |         |         |  V      |
15+25       0.6097      0.82  |  Q      |         |         |  V      |
15+30       0.6153      0.81  |  Q      |         |         |   V     |
15+35       0.6207      0.79  |  Q      |         |         |   V     |
15+40       0.6256      0.71  | Q       |         |         |   V     |
15+45       0.6303      0.69  | Q       |         |         |   V     |
15+50       0.6350      0.68  | Q       |         |         |    V    |
15+55       0.6396      0.67  | Q       |         |         |    V    |
16+ 0       0.6442      0.67  | Q       |         |         |    V    |
16+ 5       0.6482      0.59  | Q       |         |         |    V    |
16+10       0.6505      0.33  |Q        |         |         |     V   |
16+15       0.6521      0.23  Q         |         |         |     V   |
16+20       0.6534      0.19  Q         |         |         |     V   |
16+25       0.6546      0.17  Q         |         |         |     V   |
16+30       0.6556      0.15  Q         |         |         |     V   |
16+35       0.6566      0.14  Q         |         |         |     V   |
16+40       0.6575      0.12  Q         |         |         |     V   |
16+45       0.6582      0.11  Q         |         |         |     V   |
16+50       0.6590      0.11  Q         |         |         |     V   |
16+55       0.6597      0.11  Q         |         |         |     V   |
17+ 0       0.6604      0.11  Q         |         |         |     V   |
17+ 5       0.6612      0.12  Q         |         |         |     V   |
17+10       0.6623      0.15  Q         |         |         |     V   |
17+15       0.6634      0.16  Q         |         |         |     V   |
17+20       0.6645      0.17  Q         |         |         |     V   |
17+25       0.6657      0.17  Q         |         |         |     V   |
17+30       0.6669      0.17  Q         |         |         |      V  |
17+35       0.6681      0.17  Q         |         |         |      V  |
17+40       0.6693      0.17  Q         |         |         |      V  |
17+45       0.6705      0.17  Q         |         |         |      V  |
17+50       0.6716      0.17  Q         |         |         |      V  |
17+55       0.6727      0.15  Q         |         |         |      V  |
18+ 0       0.6737      0.15  Q         |         |         |      V  |
18+ 5       0.6747      0.14  Q         |         |         |      V  |
18+10       0.6757      0.14  Q         |         |         |      V  |
18+15       0.6766      0.14  Q         |         |         |      V  |
18+20       0.6776      0.14  Q         |         |         |      V  |
18+25       0.6785      0.14  Q         |         |         |      V  |
18+30       0.6795      0.14  Q         |         |         |      V  |
18+35       0.6804      0.13  Q         |         |         |      V  |
18+40       0.6812      0.12  Q         |         |         |      V  |
18+45       0.6820      0.11  Q         |         |         |      V  |
18+50       0.6827      0.10  Q         |         |         |      V  |
```

18+55	0.6833	0.08	Q				V
19+ 0	0.6838	0.08	Q				V
19+ 5	0.6844	0.08	Q				V
19+10	0.6850	0.09	Q				V
19+15	0.6857	0.10	Q				V
19+20	0.6864	0.11	Q				V
19+25	0.6873	0.13	Q				V
19+30	0.6882	0.13	Q				V
19+35	0.6891	0.13	Q				V
19+40	0.6899	0.11	Q				V
19+45	0.6907	0.11	Q				V
19+50	0.6914	0.10	Q				V
19+55	0.6919	0.08	Q				V
20+ 0	0.6925	0.08	Q				V
20+ 5	0.6930	0.08	Q				V
20+10	0.6937	0.09	Q				V
20+15	0.6943	0.10	Q				V
20+20	0.6950	0.10	Q				V
20+25	0.6958	0.10	Q				V
20+30	0.6965	0.10	Q				V
20+35	0.6972	0.10	Q				V
20+40	0.6979	0.10	Q				V
20+45	0.6986	0.10	Q				V
20+50	0.6993	0.10	Q				V
20+55	0.6999	0.08	Q				V
21+ 0	0.7004	0.08	Q				V
21+ 5	0.7009	0.08	Q				V
21+10	0.7016	0.09	Q				V
21+15	0.7023	0.10	Q				V
21+20	0.7029	0.10	Q				V
21+25	0.7035	0.08	Q				V
21+30	0.7040	0.07	Q				V
21+35	0.7045	0.08	Q				V
21+40	0.7052	0.09	Q				V
21+45	0.7059	0.10	Q				V
21+50	0.7065	0.10	Q				V
21+55	0.7071	0.08	Q				V
22+ 0	0.7076	0.07	Q				V
22+ 5	0.7082	0.08	Q				V
22+10	0.7088	0.09	Q				V
22+15	0.7095	0.10	Q				V
22+20	0.7101	0.10	Q				V
22+25	0.7107	0.08	Q				V
22+30	0.7112	0.07	Q				V
22+35	0.7117	0.07	Q				V
22+40	0.7122	0.07	Q				V
22+45	0.7127	0.07	Q				V
22+50	0.7132	0.07	Q				V
22+55	0.7137	0.07	Q				V
23+ 0	0.7141	0.07	Q				V
23+ 5	0.7146	0.07	Q				V
23+10	0.7151	0.07	Q				V
23+15	0.7156	0.07	Q				V
23+20	0.7161	0.07	Q				V
23+25	0.7165	0.07	Q				V
23+30	0.7170	0.07	Q				V
23+35	0.7175	0.07	Q				V
23+40	0.7180	0.07	Q				V
23+45	0.7185	0.07	Q				V
23+50	0.7189	0.07	Q				V
23+55	0.7194	0.07	Q				V
24+ 0	0.7199	0.07	Q				V
24+ 5	0.7203	0.06	Q				V
24+10	0.7205	0.02	Q				V
24+15	0.7206	0.01	Q				V
24+20	0.7206	0.01	Q				V
24+25	0.7206	0.00	Q				V
24+30	0.7207	0.00	Q				V
24+35	0.7207	0.00	Q				V
24+40	0.7207	0.00	Q				V

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       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  02/03/20 File: A124100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format

---------------------------------------------------------------------
JACKSON STREET IMPROVEMENT
100-YEAR 24 HOUR STORM
AREA A1, AVE 50 NORTH
FILE: A1.UM1
--------------------------------------------------------------------
Drainage Area =       0.91(Ac.)  =      0.001 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       0.91(Ac.)  =      0.001 Sq. Mi.
Length along longest watercourse =     790.00(Ft.)
Length along longest watercourse measured to centroid =     400.00(Ft.)
Length along longest watercourse =      0.150 Mi.
Length along longest watercourse measured to centroid =      0.076 Mi.
Difference in elevation =       4.30(Ft.)
Slope along watercourse =     28.7392 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.035 Hr.
Lag time =     2.08 Min.
25% of lag time =     0.52 Min.
40% of lag time =     0.83 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.91           1.14                  1.04

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.91           4.45                  4.05

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.140(In)
Area Averaged 100-Year Rainfall =    4.450(In)

Point rain (area averaged) =    4.450(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    4.450(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     0.910           32.00         0.850
 Total Area Entered =      0.91(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
```

32.0	32.0	0.742	0.850	0.174	1.000	0.174
					Sum (F) =	0.174

Area averaged mean soil loss (F) (In/Hr) = 0.174
Minimum soil loss rate ((In/Hr)) = 0.087
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

U n i t   H y d r o g r a p h
DESERT S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	240.407	48.707	0.447
2	0.167	480.814	42.709	0.392
3	0.250	721.221	6.865	0.063
4	0.333	961.628	1.720	0.016
			Sum = 100.000	Sum= 0.917

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.309)	0.008	0.028
2	0.17	0.07	0.036	(0.308)	0.008	0.028
3	0.25	0.07	0.036	(0.307)	0.008	0.028
4	0.33	0.10	0.053	(0.306)	0.012	0.042
5	0.42	0.10	0.053	(0.304)	0.012	0.042
6	0.50	0.10	0.053	(0.303)	0.012	0.042
7	0.58	0.10	0.053	(0.302)	0.012	0.042
8	0.67	0.10	0.053	(0.301)	0.012	0.042
9	0.75	0.10	0.053	(0.300)	0.012	0.042
10	0.83	0.13	0.071	(0.298)	0.016	0.056
11	0.92	0.13	0.071	(0.297)	0.016	0.056
12	1.00	0.13	0.071	(0.296)	0.016	0.056
13	1.08	0.10	0.053	(0.295)	0.012	0.042
14	1.17	0.10	0.053	(0.294)	0.012	0.042
15	1.25	0.10	0.053	(0.293)	0.012	0.042
16	1.33	0.10	0.053	(0.291)	0.012	0.042
17	1.42	0.10	0.053	(0.290)	0.012	0.042
18	1.50	0.10	0.053	(0.289)	0.012	0.042
19	1.58	0.10	0.053	(0.288)	0.012	0.042
20	1.67	0.10	0.053	(0.287)	0.012	0.042
21	1.75	0.10	0.053	(0.286)	0.012	0.042
22	1.83	0.13	0.071	(0.284)	0.016	0.056
23	1.92	0.13	0.071	(0.283)	0.016	0.056
24	2.00	0.13	0.071	(0.282)	0.016	0.056
25	2.08	0.13	0.071	(0.281)	0.016	0.056
26	2.17	0.13	0.071	(0.280)	0.016	0.056
27	2.25	0.13	0.071	(0.279)	0.016	0.056
28	2.33	0.13	0.071	(0.278)	0.016	0.056
29	2.42	0.13	0.071	(0.277)	0.016	0.056
30	2.50	0.13	0.071	(0.275)	0.016	0.056
31	2.58	0.17	0.089	(0.274)	0.020	0.069
32	2.67	0.17	0.089	(0.273)	0.020	0.069
33	2.75	0.17	0.089	(0.272)	0.020	0.069
34	2.83	0.17	0.089	(0.271)	0.020	0.069
35	2.92	0.17	0.089	(0.270)	0.020	0.069
36	3.00	0.17	0.089	(0.269)	0.020	0.069
37	3.08	0.17	0.089	(0.268)	0.020	0.069
38	3.17	0.17	0.089	(0.266)	0.020	0.069
39	3.25	0.17	0.089	(0.265)	0.020	0.069
40	3.33	0.17	0.089	(0.264)	0.020	0.069
41	3.42	0.17	0.089	(0.263)	0.020	0.069
42	3.50	0.17	0.089	(0.262)	0.020	0.069

43	3.58	0.17	0.089	(0.261)	0.020	0.069
44	3.67	0.17	0.089	(0.260)	0.020	0.069
45	3.75	0.17	0.089	(0.259)	0.020	0.069
46	3.83	0.20	0.107	(0.258)	0.023	0.083
47	3.92	0.20	0.107	(0.257)	0.023	0.083
48	4.00	0.20	0.107	(0.255)	0.023	0.083
49	4.08	0.20	0.107	(0.254)	0.023	0.083
50	4.17	0.20	0.107	(0.253)	0.023	0.083
51	4.25	0.20	0.107	(0.252)	0.023	0.083
52	4.33	0.23	0.125	(0.251)	0.027	0.097
53	4.42	0.23	0.125	(0.250)	0.027	0.097
54	4.50	0.23	0.125	(0.249)	0.027	0.097
55	4.58	0.23	0.125	(0.248)	0.027	0.097
56	4.67	0.23	0.125	(0.247)	0.027	0.097
57	4.75	0.23	0.125	(0.246)	0.027	0.097
58	4.83	0.27	0.142	(0.245)	0.031	0.111
59	4.92	0.27	0.142	(0.244)	0.031	0.111
60	5.00	0.27	0.142	(0.243)	0.031	0.111
61	5.08	0.20	0.107	(0.242)	0.023	0.083
62	5.17	0.20	0.107	(0.241)	0.023	0.083
63	5.25	0.20	0.107	(0.239)	0.023	0.083
64	5.33	0.23	0.125	(0.238)	0.027	0.097
65	5.42	0.23	0.125	(0.237)	0.027	0.097
66	5.50	0.23	0.125	(0.236)	0.027	0.097
67	5.58	0.27	0.142	(0.235)	0.031	0.111
68	5.67	0.27	0.142	(0.234)	0.031	0.111
69	5.75	0.27	0.142	(0.233)	0.031	0.111
70	5.83	0.27	0.142	(0.232)	0.031	0.111
71	5.92	0.27	0.142	(0.231)	0.031	0.111
72	6.00	0.27	0.142	(0.230)	0.031	0.111
73	6.08	0.30	0.160	(0.229)	0.035	0.125
74	6.17	0.30	0.160	(0.228)	0.035	0.125
75	6.25	0.30	0.160	(0.227)	0.035	0.125
76	6.33	0.30	0.160	(0.226)	0.035	0.125
77	6.42	0.30	0.160	(0.225)	0.035	0.125
78	6.50	0.30	0.160	(0.224)	0.035	0.125
79	6.58	0.33	0.178	(0.223)	0.039	0.139
80	6.67	0.33	0.178	(0.222)	0.039	0.139
81	6.75	0.33	0.178	(0.221)	0.039	0.139
82	6.83	0.33	0.178	(0.220)	0.039	0.139
83	6.92	0.33	0.178	(0.219)	0.039	0.139
84	7.00	0.33	0.178	(0.218)	0.039	0.139
85	7.08	0.33	0.178	(0.217)	0.039	0.139
86	7.17	0.33	0.178	(0.216)	0.039	0.139
87	7.25	0.33	0.178	(0.215)	0.039	0.139
88	7.33	0.37	0.196	(0.214)	0.043	0.153
89	7.42	0.37	0.196	(0.213)	0.043	0.153
90	7.50	0.37	0.196	(0.212)	0.043	0.153
91	7.58	0.40	0.214	(0.211)	0.047	0.167
92	7.67	0.40	0.214	(0.210)	0.047	0.167
93	7.75	0.40	0.214	(0.209)	0.047	0.167
94	7.83	0.43	0.231	(0.208)	0.051	0.180
95	7.92	0.43	0.231	(0.207)	0.051	0.180
96	8.00	0.43	0.231	(0.206)	0.051	0.180
97	8.08	0.50	0.267	(0.205)	0.059	0.208
98	8.17	0.50	0.267	(0.204)	0.059	0.208
99	8.25	0.50	0.267	(0.203)	0.059	0.208
100	8.33	0.50	0.267	(0.203)	0.059	0.208
101	8.42	0.50	0.267	(0.202)	0.059	0.208
102	8.50	0.50	0.267	(0.201)	0.059	0.208
103	8.58	0.53	0.285	(0.200)	0.063	0.222
104	8.67	0.53	0.285	(0.199)	0.063	0.222
105	8.75	0.53	0.285	(0.198)	0.063	0.222
106	8.83	0.57	0.303	(0.197)	0.067	0.236
107	8.92	0.57	0.303	(0.196)	0.067	0.236
108	9.00	0.57	0.303	(0.195)	0.067	0.236
109	9.08	0.63	0.338	(0.194)	0.074	0.264
110	9.17	0.63	0.338	(0.193)	0.074	0.264
111	9.25	0.63	0.338	(0.192)	0.074	0.264
112	9.33	0.67	0.356	(0.191)	0.078	0.278
113	9.42	0.67	0.356	(0.190)	0.078	0.278

114	9.50	0.67	0.356	(0.190)	0.078	0.278
115	9.58	0.70	0.374	(0.189)	0.082	0.292
116	9.67	0.70	0.374	(0.188)	0.082	0.292
117	9.75	0.70	0.374	(0.187)	0.082	0.292
118	9.83	0.73	0.392	(0.186)	0.086	0.305
119	9.92	0.73	0.392	(0.185)	0.086	0.305
120	10.00	0.73	0.392	(0.184)	0.086	0.305
121	10.08	0.50	0.267	(0.183)	0.059	0.208
122	10.17	0.50	0.267	(0.182)	0.059	0.208
123	10.25	0.50	0.267	(0.181)	0.059	0.208
124	10.33	0.50	0.267	(0.181)	0.059	0.208
125	10.42	0.50	0.267	(0.180)	0.059	0.208
126	10.50	0.50	0.267	(0.179)	0.059	0.208
127	10.58	0.67	0.356	(0.178)	0.078	0.278
128	10.67	0.67	0.356	(0.177)	0.078	0.278
129	10.75	0.67	0.356	(0.176)	0.078	0.278
130	10.83	0.67	0.356	(0.175)	0.078	0.278
131	10.92	0.67	0.356	(0.175)	0.078	0.278
132	11.00	0.67	0.356	(0.174)	0.078	0.278
133	11.08	0.63	0.338	(0.173)	0.074	0.264
134	11.17	0.63	0.338	(0.172)	0.074	0.264
135	11.25	0.63	0.338	(0.171)	0.074	0.264
136	11.33	0.63	0.338	(0.170)	0.074	0.264
137	11.42	0.63	0.338	(0.169)	0.074	0.264
138	11.50	0.63	0.338	(0.169)	0.074	0.264
139	11.58	0.57	0.303	(0.168)	0.067	0.236
140	11.67	0.57	0.303	(0.167)	0.067	0.236
141	11.75	0.57	0.303	(0.166)	0.067	0.236
142	11.83	0.60	0.320	(0.165)	0.070	0.250
143	11.92	0.60	0.320	(0.164)	0.070	0.250
144	12.00	0.60	0.320	(0.164)	0.070	0.250
145	12.08	0.83	0.445	(0.163)	0.098	0.347
146	12.17	0.83	0.445	(0.162)	0.098	0.347
147	12.25	0.83	0.445	(0.161)	0.098	0.347
148	12.33	0.87	0.463	(0.160)	0.102	0.361
149	12.42	0.87	0.463	(0.160)	0.102	0.361
150	12.50	0.87	0.463	(0.159)	0.102	0.361
151	12.58	0.93	0.498	(0.158)	0.110	0.389
152	12.67	0.93	0.498	(0.157)	0.110	0.389
153	12.75	0.93	0.498	(0.156)	0.110	0.389
154	12.83	0.97	0.516	(0.156)	0.114	0.403
155	12.92	0.97	0.516	(0.155)	0.114	0.403
156	13.00	0.97	0.516	(0.154)	0.114	0.403
157	13.08	1.13	0.605	(0.153)	0.133	0.472
158	13.17	1.13	0.605	(0.152)	0.133	0.472
159	13.25	1.13	0.605	(0.152)	0.133	0.472
160	13.33	1.13	0.605	(0.151)	0.133	0.472
161	13.42	1.13	0.605	(0.150)	0.133	0.472
162	13.50	1.13	0.605	(0.149)	0.133	0.472
163	13.58	0.77	0.409	(0.149)	0.090	0.319
164	13.67	0.77	0.409	(0.148)	0.090	0.319
165	13.75	0.77	0.409	(0.147)	0.090	0.319
166	13.83	0.77	0.409	(0.146)	0.090	0.319
167	13.92	0.77	0.409	(0.146)	0.090	0.319
168	14.00	0.77	0.409	(0.145)	0.090	0.319
169	14.08	0.90	0.481	(0.144)	0.106	0.375
170	14.17	0.90	0.481	(0.143)	0.106	0.375
171	14.25	0.90	0.481	(0.143)	0.106	0.375
172	14.33	0.87	0.463	(0.142)	0.102	0.361
173	14.42	0.87	0.463	(0.141)	0.102	0.361
174	14.50	0.87	0.463	(0.140)	0.102	0.361
175	14.58	0.87	0.463	(0.140)	0.102	0.361
176	14.67	0.87	0.463	(0.139)	0.102	0.361
177	14.75	0.87	0.463	(0.138)	0.102	0.361
178	14.83	0.83	0.445	(0.138)	0.098	0.347
179	14.92	0.83	0.445	(0.137)	0.098	0.347
180	15.00	0.83	0.445	(0.136)	0.098	0.347
181	15.08	0.80	0.427	(0.135)	0.094	0.333
182	15.17	0.80	0.427	(0.135)	0.094	0.333
183	15.25	0.80	0.427	(0.134)	0.094	0.333
184	15.33	0.77	0.409	(0.133)	0.090	0.319

185	15.42	0.77	0.409	(0.133)	0.090	0.319
186	15.50	0.77	0.409	(0.132)	0.090	0.319
187	15.58	0.63	0.338	(0.131)	0.074	0.264
188	15.67	0.63	0.338	(0.131)	0.074	0.264
189	15.75	0.63	0.338	(0.130)	0.074	0.264
190	15.83	0.63	0.338	(0.129)	0.074	0.264
191	15.92	0.63	0.338	(0.129)	0.074	0.264
192	16.00	0.63	0.338	(0.128)	0.074	0.264
193	16.08	0.13	0.071	(0.127)	0.016	0.056
194	16.17	0.13	0.071	(0.127)	0.016	0.056
195	16.25	0.13	0.071	(0.126)	0.016	0.056
196	16.33	0.13	0.071	(0.125)	0.016	0.056
197	16.42	0.13	0.071	(0.125)	0.016	0.056
198	16.50	0.13	0.071	(0.124)	0.016	0.056
199	16.58	0.10	0.053	(0.124)	0.012	0.042
200	16.67	0.10	0.053	(0.123)	0.012	0.042
201	16.75	0.10	0.053	(0.122)	0.012	0.042
202	16.83	0.10	0.053	(0.122)	0.012	0.042
203	16.92	0.10	0.053	(0.121)	0.012	0.042
204	17.00	0.10	0.053	(0.120)	0.012	0.042
205	17.08	0.17	0.089	(0.120)	0.020	0.069
206	17.17	0.17	0.089	(0.119)	0.020	0.069
207	17.25	0.17	0.089	(0.119)	0.020	0.069
208	17.33	0.17	0.089	(0.118)	0.020	0.069
209	17.42	0.17	0.089	(0.117)	0.020	0.069
210	17.50	0.17	0.089	(0.117)	0.020	0.069
211	17.58	0.17	0.089	(0.116)	0.020	0.069
212	17.67	0.17	0.089	(0.116)	0.020	0.069
213	17.75	0.17	0.089	(0.115)	0.020	0.069
214	17.83	0.13	0.071	(0.115)	0.016	0.056
215	17.92	0.13	0.071	(0.114)	0.016	0.056
216	18.00	0.13	0.071	(0.113)	0.016	0.056
217	18.08	0.13	0.071	(0.113)	0.016	0.056
218	18.17	0.13	0.071	(0.112)	0.016	0.056
219	18.25	0.13	0.071	(0.112)	0.016	0.056
220	18.33	0.13	0.071	(0.111)	0.016	0.056
221	18.42	0.13	0.071	(0.111)	0.016	0.056
222	18.50	0.13	0.071	(0.110)	0.016	0.056
223	18.58	0.10	0.053	(0.110)	0.012	0.042
224	18.67	0.10	0.053	(0.109)	0.012	0.042
225	18.75	0.10	0.053	(0.109)	0.012	0.042
226	18.83	0.07	0.036	(0.108)	0.008	0.028
227	18.92	0.07	0.036	(0.108)	0.008	0.028
228	19.00	0.07	0.036	(0.107)	0.008	0.028
229	19.08	0.10	0.053	(0.106)	0.012	0.042
230	19.17	0.10	0.053	(0.106)	0.012	0.042
231	19.25	0.10	0.053	(0.105)	0.012	0.042
232	19.33	0.13	0.071	(0.105)	0.016	0.056
233	19.42	0.13	0.071	(0.105)	0.016	0.056
234	19.50	0.13	0.071	(0.104)	0.016	0.056
235	19.58	0.10	0.053	(0.104)	0.012	0.042
236	19.67	0.10	0.053	(0.103)	0.012	0.042
237	19.75	0.10	0.053	(0.103)	0.012	0.042
238	19.83	0.07	0.036	(0.102)	0.008	0.028
239	19.92	0.07	0.036	(0.102)	0.008	0.028
240	20.00	0.07	0.036	(0.101)	0.008	0.028
241	20.08	0.10	0.053	(0.101)	0.012	0.042
242	20.17	0.10	0.053	(0.100)	0.012	0.042
243	20.25	0.10	0.053	(0.100)	0.012	0.042
244	20.33	0.10	0.053	(0.099)	0.012	0.042
245	20.42	0.10	0.053	(0.099)	0.012	0.042
246	20.50	0.10	0.053	(0.099)	0.012	0.042
247	20.58	0.10	0.053	(0.098)	0.012	0.042
248	20.67	0.10	0.053	(0.098)	0.012	0.042
249	20.75	0.10	0.053	(0.097)	0.012	0.042
250	20.83	0.07	0.036	(0.097)	0.008	0.028
251	20.92	0.07	0.036	(0.097)	0.008	0.028
252	21.00	0.07	0.036	(0.096)	0.008	0.028
253	21.08	0.10	0.053	(0.096)	0.012	0.042
254	21.17	0.10	0.053	(0.095)	0.012	0.042
255	21.25	0.10	0.053	(0.095)	0.012	0.042

256	21.33	0.07	0.036	(0.095)	0.008	0.028
257	21.42	0.07	0.036	(0.094)	0.008	0.028
258	21.50	0.07	0.036	(0.094)	0.008	0.028
259	21.58	0.10	0.053	(0.094)	0.012	0.042
260	21.67	0.10	0.053	(0.093)	0.012	0.042
261	21.75	0.10	0.053	(0.093)	0.012	0.042
262	21.83	0.07	0.036	(0.093)	0.008	0.028
263	21.92	0.07	0.036	(0.092)	0.008	0.028
264	22.00	0.07	0.036	(0.092)	0.008	0.028
265	22.08	0.10	0.053	(0.092)	0.012	0.042
266	22.17	0.10	0.053	(0.091)	0.012	0.042
267	22.25	0.10	0.053	(0.091)	0.012	0.042
268	22.33	0.07	0.036	(0.091)	0.008	0.028
269	22.42	0.07	0.036	(0.091)	0.008	0.028
270	22.50	0.07	0.036	(0.090)	0.008	0.028
271	22.58	0.07	0.036	(0.090)	0.008	0.028
272	22.67	0.07	0.036	(0.090)	0.008	0.028
273	22.75	0.07	0.036	(0.090)	0.008	0.028
274	22.83	0.07	0.036	(0.089)	0.008	0.028
275	22.92	0.07	0.036	(0.089)	0.008	0.028
276	23.00	0.07	0.036	(0.089)	0.008	0.028
277	23.08	0.07	0.036	(0.089)	0.008	0.028
278	23.17	0.07	0.036	(0.088)	0.008	0.028
279	23.25	0.07	0.036	(0.088)	0.008	0.028
280	23.33	0.07	0.036	(0.088)	0.008	0.028
281	23.42	0.07	0.036	(0.088)	0.008	0.028
282	23.50	0.07	0.036	(0.088)	0.008	0.028
283	23.58	0.07	0.036	(0.088)	0.008	0.028
284	23.67	0.07	0.036	(0.088)	0.008	0.028
285	23.75	0.07	0.036	(0.087)	0.008	0.028
286	23.83	0.07	0.036	(0.087)	0.008	0.028
287	23.92	0.07	0.036	(0.087)	0.008	0.028
288	24.00	0.07	0.036	(0.087)	0.008	0.028

(Loss Rate Not Used)

Sum = 100.0 Sum = 41.7

Flood volume = Effective rainfall 3.47(In)
times area 0.9(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.98(In)
Total soil loss = 0.074(Ac.Ft)
Total rainfall = 4.45(In)
Flood volume = 11465.7 Cubic Feet
Total soil loss = 3233.9 Cubic Feet

Peak flow rate of this hydrograph = 0.433(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0002	0.02	Q				
0+15	0.0004	0.03	Q				
0+20	0.0006	0.03	Q				
0+25	0.0009	0.04	Q				
0+30	0.0012	0.04	Q				
0+35	0.0014	0.04	Q				
0+40	0.0017	0.04	Q				
0+45	0.0019	0.04	Q				
0+50	0.0022	0.04	Q				
0+55	0.0026	0.05	Q				
1+ 0	0.0029	0.05	Q				
1+ 5	0.0033	0.04	Q				
1+10	0.0035	0.04	Q				
1+15	0.0038	0.04	Q				
1+20	0.0040	0.04	Q				
1+25	0.0043	0.04	Q				

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  1+30        0.0046      0.04  Q          |          |          |          |
  1+35        0.0048      0.04  Q          |          |          |          |
  1+40        0.0051      0.04  Q          |          |          |          |
  1+45        0.0054      0.04  Q          |          |          |          |
  1+50        0.0057      0.04  Q          |          |          |          |
  1+55        0.0060      0.05  Q          |          |          |          |
  2+ 0        0.0064      0.05  Q          |          |          |          |
  2+ 5        0.0067      0.05  QV         |          |          |          |
  2+10        0.0071      0.05  QV         |          |          |          |
  2+15        0.0074      0.05  QV         |          |          |          |
  2+20        0.0078      0.05  QV         |          |          |          |
  2+25        0.0081      0.05  QV         |          |          |          |
  2+30        0.0085      0.05  QV         |          |          |          |
  2+35        0.0089      0.06  QV         |          |          |          |
  2+40        0.0093      0.06  QV         |          |          |          |
  2+45        0.0097      0.06  QV         |          |          |          |
  2+50        0.0102      0.06  QV         |          |          |          |
  2+55        0.0106      0.06  QV         |          |          |          |
  3+ 0        0.0110      0.06  QV         |          |          |          |
  3+ 5        0.0115      0.06  QV         |          |          |          |
  3+10        0.0119      0.06  QV         |          |          |          |
  3+15        0.0124      0.06  QV         |          |          |          |
  3+20        0.0128      0.06  QV         |          |          |          |
  3+25        0.0132      0.06  Q V        |          |          |          |
  3+30        0.0137      0.06  Q V        |          |          |          |
  3+35        0.0141      0.06  Q V        |          |          |          |
  3+40        0.0146      0.06  Q V        |          |          |          |
  3+45        0.0150      0.06  Q V        |          |          |          |
  3+50        0.0155      0.07  Q V        |          |          |          |
  3+55        0.0160      0.08  Q V        |          |          |          |
  4+ 0        0.0165      0.08  Q V        |          |          |          |
  4+ 5        0.0170      0.08  Q V        |          |          |          |
  4+10        0.0176      0.08  Q V        |          |          |          |
  4+15        0.0181      0.08  Q V        |          |          |          |
  4+20        0.0187      0.08  Q V        |          |          |          |
  4+25        0.0193      0.09  Q V        |          |          |          |
  4+30        0.0199      0.09  Q  V       |          |          |          |
  4+35        0.0205      0.09  Q  V       |          |          |          |
  4+40        0.0211      0.09  Q  V       |          |          |          |
  4+45        0.0217      0.09  Q  V       |          |          |          |
  4+50        0.0224      0.10  Q  V       |          |          |          |
  4+55        0.0231      0.10  Q  V       |          |          |          |
  5+ 0        0.0238      0.10  Q  V       |          |          |          |
  5+ 5        0.0244      0.09  Q  V       |          |          |          |
  5+10        0.0249      0.08  Q  V       |          |          |          |
  5+15        0.0255      0.08  Q  V       |          |          |          |
  5+20        0.0260      0.08  Q  V       |          |          |          |
  5+25        0.0266      0.09  Q   V      |          |          |          |
  5+30        0.0273      0.09  Q   V      |          |          |          |
  5+35        0.0279      0.10  Q   V      |          |          |          |
  5+40        0.0286      0.10  Q   V      |          |          |          |
  5+45        0.0293      0.10  Q   V      |          |          |          |
  5+50        0.0300      0.10  Q   V      |          |          |          |
  5+55        0.0307      0.10  Q   V      |          |          |          |
  6+ 0        0.0314      0.10  Q   V      |          |          |          |
  6+ 5        0.0322      0.11  Q   V      |          |          |          |
  6+10        0.0329      0.11  Q    V     |          |          |          |
  6+15        0.0337      0.11  Q    V     |          |          |          |
  6+20        0.0345      0.11  Q    V     |          |          |          |
  6+25        0.0353      0.11  Q    V     |          |          |          |
  6+30        0.0361      0.11  Q    V     |          |          |          |
  6+35        0.0369      0.12  Q    V     |          |          |          |
  6+40        0.0378      0.13  Q    V     |          |          |          |
  6+45        0.0387      0.13  Q    V     |          |          |          |
  6+50        0.0396      0.13  Q     V    |          |          |          |
  6+55        0.0404      0.13  Q     V    |          |          |          |
  7+ 0        0.0413      0.13  Q     V    |          |          |          |
  7+ 5        0.0422      0.13  Q     V    |          |          |          |
  7+10        0.0431      0.13  Q     V    |          |          |          |
  7+15        0.0439      0.13  Q     V    |          |          |          |
  7+20        0.0449      0.13  Q     V    |          |          |          |
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 7+25       0.0458      0.14  Q     V   |         |         |         |
 7+30       0.0468      0.14  Q      V  |         |         |         |
 7+35       0.0478      0.15  Q      V  |         |         |         |
 7+40       0.0488      0.15  Q      V  |         |         |         |
 7+45       0.0499      0.15  Q      V  |         |         |         |
 7+50       0.0510      0.16  Q      V  |         |         |         |
 7+55       0.0521      0.16  Q      V  |         |         |         |
 8+ 0       0.0533      0.17  Q       V |         |         |         |
 8+ 5       0.0545      0.18  Q       V |         |         |         |
 8+10       0.0558      0.19  Q       V |         |         |         |
 8+15       0.0571      0.19  Q       V |         |         |         |
 8+20       0.0584      0.19  Q       V |         |         |         |
 8+25       0.0597      0.19  Q        V|         |         |         |
 8+30       0.0610      0.19  Q        V|         |         |         |
 8+35       0.0624      0.20  Q        V|         |         |         |
 8+40       0.0638      0.20  Q        V|         |         |         |
 8+45       0.0652      0.20  Q        V|         |         |         |
 8+50       0.0666      0.21  Q         V         |         |         |
 8+55       0.0681      0.22  Q         V         |         |         |
 9+ 0       0.0696      0.22  Q         V         |         |         |
 9+ 5       0.0712      0.23  Q         V         |         |         |
 9+10       0.0729      0.24  Q         |V        |         |         |
 9+15       0.0745      0.24  Q         |V        |         |         |
 9+20       0.0762      0.25  Q         |V        |         |         |
 9+25       0.0780      0.25  |Q        |V        |         |         |
 9+30       0.0797      0.25  |Q        | V       |         |         |
 9+35       0.0815      0.26  |Q        | V       |         |         |
 9+40       0.0834      0.27  |Q        | V       |         |         |
 9+45       0.0852      0.27  |Q        | V       |         |         |
 9+50       0.0871      0.27  |Q        |  V      |         |         |
 9+55       0.0890      0.28  |Q        |  V      |         |         |
10+ 0       0.0909      0.28  |Q        |  V      |         |         |
10+ 5       0.0926      0.24  Q         |   V     |         |         |
10+10       0.0939      0.20  Q         |   V     |         |         |
10+15       0.0953      0.19  Q         |   V     |         |         |
10+20       0.0966      0.19  Q         |   V     |         |         |
10+25       0.0979      0.19  Q         |   V     |         |         |
10+30       0.0992      0.19  Q         |    V    |         |         |
10+35       0.1007      0.22  Q         |    V    |         |         |
10+40       0.1025      0.25  Q         |    V    |         |         |
10+45       0.1042      0.25  |Q        |    V    |         |         |
10+50       0.1060      0.25  |Q        |     V   |         |         |
10+55       0.1077      0.25  |Q        |     V   |         |         |
11+ 0       0.1095      0.25  |Q        |     V   |         |         |
11+ 5       0.1112      0.25  Q         |     V   |         |         |
11+10       0.1129      0.24  Q         |      V  |         |         |
11+15       0.1145      0.24  Q         |      V  |         |         |
11+20       0.1162      0.24  Q         |      V  |         |         |
11+25       0.1179      0.24  Q         |      V  |         |         |
11+30       0.1195      0.24  Q         |       V |         |         |
11+35       0.1211      0.23  Q         |       V |         |         |
11+40       0.1226      0.22  Q         |       V |         |         |
11+45       0.1241      0.22  Q         |       V |         |         |
11+50       0.1256      0.22  Q         |        V|         |         |
11+55       0.1272      0.23  Q         |        V|         |         |
12+ 0       0.1288      0.23  Q         |        V|         |         |
12+ 5       0.1307      0.27  |Q        |        V|         |         |
12+10       0.1328      0.31  |Q        |         V         |         |
12+15       0.1350      0.32  |Q        |         V         |         |
12+20       0.1372      0.32  |Q        |         V         |         |
12+25       0.1395      0.33  |Q        |         |V        |         |
12+30       0.1418      0.33  |Q        |         |V        |         |
12+35       0.1442      0.34  |Q        |         |V        |         |
12+40       0.1466      0.35  |Q        |         | V       |         |
12+45       0.1490      0.36  |Q        |         | V       |         |
12+50       0.1515      0.36  |Q        |         |  V      |         |
12+55       0.1541      0.37  |Q        |         |  V      |         |
13+ 0       0.1566      0.37  |Q        |         |  V      |         |
13+ 5       0.1594      0.40  |Q        |         |   V     |         |
13+10       0.1623      0.43  |Q        |         |   V     |         |
13+15       0.1653      0.43  |Q        |         |    V    |         |
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13+20       0.1683      0.43  |Q        |         |    V    |         |
13+25       0.1713      0.43  |Q        |         |     V   |         |
13+30       0.1743      0.43  |Q        |         |     V   |         |
13+35       0.1768      0.36  |Q        |         |     V   |         |
13+40       0.1789      0.31  |Q        |         |      V  |         |
13+45       0.1809      0.30  |Q        |         |      V  |         |
13+50       0.1829      0.29  |Q        |         |      V  |         |
13+55       0.1849      0.29  |Q        |         |       V |         |
14+ 0       0.1870      0.29  |Q        |         |       V |         |
14+ 5       0.1891      0.32  |Q        |         |       V |         |
14+10       0.1915      0.34  |Q        |         |        V|         |
14+15       0.1938      0.34  |Q        |         |        V|         |
14+20       0.1962      0.34  |Q        |         |        V|         |
14+25       0.1985      0.33  |Q        |         |         V         |
14+30       0.2007      0.33  |Q        |         |         V         |
14+35       0.2030      0.33  |Q        |         |         V         |
14+40       0.2053      0.33  |Q        |         |         |V        |
14+45       0.2076      0.33  |Q        |         |         |V        |
14+50       0.2098      0.33  |Q        |         |         |V        |
14+55       0.2120      0.32  |Q        |         |         | V       |
15+ 0       0.2142      0.32  |Q        |         |         | V       |
15+ 5       0.2164      0.31  |Q        |         |         | V       |
15+10       0.2185      0.31  |Q        |         |         |  V      |
15+15       0.2206      0.31  |Q        |         |         |  V      |
15+20       0.2227      0.30  |Q        |         |         |  V      |
15+25       0.2247      0.29  |Q        |         |         |   V     |
15+30       0.2267      0.29  |Q        |         |         |   V     |
15+35       0.2285      0.27  |Q        |         |         |   V     |
15+40       0.2302      0.25  Q         |         |         |   V     |
15+45       0.2319      0.24  Q         |         |         |    V    |
15+50       0.2336      0.24  Q         |         |         |    V    |
15+55       0.2353      0.24  Q         |         |         |    V    |
16+ 0       0.2369      0.24  Q         |         |         |     V   |
16+ 5       0.2379      0.15  Q         |         |         |     V   |
16+10       0.2384      0.07  Q         |         |         |     V   |
16+15       0.2388      0.05  Q         |         |         |     V   |
16+20       0.2391      0.05  Q         |         |         |     V   |
16+25       0.2395      0.05  Q         |         |         |     V   |
16+30       0.2398      0.05  Q         |         |         |     V   |
16+35       0.2401      0.04  Q         |         |         |     V   |
16+40       0.2404      0.04  Q         |         |         |     V   |
16+45       0.2407      0.04  Q         |         |         |     V   |
16+50       0.2409      0.04  Q         |         |         |     V   |
16+55       0.2412      0.04  Q         |         |         |     V   |
17+ 0       0.2415      0.04  Q         |         |         |     V   |
17+ 5       0.2418      0.05  Q         |         |         |     V   |
17+10       0.2422      0.06  Q         |         |         |     V   |
17+15       0.2427      0.06  Q         |         |         |     V   |
17+20       0.2431      0.06  Q         |         |         |     V   |
17+25       0.2436      0.06  Q         |         |         |      V  |
17+30       0.2440      0.06  Q         |         |         |      V  |
17+35       0.2444      0.06  Q         |         |         |      V  |
17+40       0.2449      0.06  Q         |         |         |      V  |
17+45       0.2453      0.06  Q         |         |         |      V  |
17+50       0.2457      0.06  Q         |         |         |      V  |
17+55       0.2461      0.05  Q         |         |         |      V  |
18+ 0       0.2464      0.05  Q         |         |         |      V  |
18+ 5       0.2468      0.05  Q         |         |         |      V  |
18+10       0.2471      0.05  Q         |         |         |      V  |
18+15       0.2475      0.05  Q         |         |         |      V  |
18+20       0.2478      0.05  Q         |         |         |      V  |
18+25       0.2482      0.05  Q         |         |         |      V  |
18+30       0.2485      0.05  Q         |         |         |      V  |
18+35       0.2488      0.04  Q         |         |         |      V  |
18+40       0.2491      0.04  Q         |         |         |      V  |
18+45       0.2494      0.04  Q         |         |         |      V  |
18+50       0.2496      0.03  Q         |         |         |      V  |
18+55       0.2498      0.03  Q         |         |         |      V  |
19+ 0       0.2499      0.03  Q         |         |         |      V  |
19+ 5       0.2502      0.03  Q         |         |         |       V |
19+10       0.2504      0.04  Q         |         |         |       V |
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19+15	0.2507	0.04	Q				V
19+20	0.2510	0.04	Q				V
19+25	0.2513	0.05	Q				V
19+30	0.2517	0.05	Q				V
19+35	0.2520	0.04	Q				V
19+40	0.2523	0.04	Q				V
19+45	0.2525	0.04	Q				V
19+50	0.2527	0.03	Q				V
19+55	0.2529	0.03	Q				V
20+ 0	0.2531	0.03	Q				V
20+ 5	0.2533	0.03	Q				V
20+10	0.2536	0.04	Q				V
20+15	0.2538	0.04	Q				V
20+20	0.2541	0.04	Q				V
20+25	0.2544	0.04	Q				V
20+30	0.2546	0.04	Q				V
20+35	0.2549	0.04	Q				V
20+40	0.2552	0.04	Q				V
20+45	0.2554	0.04	Q				V
20+50	0.2556	0.03	Q				V
20+55	0.2558	0.03	Q				V
21+ 0	0.2560	0.03	Q				V
21+ 5	0.2562	0.03	Q				V
21+10	0.2565	0.04	Q				V
21+15	0.2567	0.04	Q				V
21+20	0.2570	0.03	Q				V
21+25	0.2571	0.03	Q				V
21+30	0.2573	0.03	Q				V
21+35	0.2575	0.03	Q				V
21+40	0.2578	0.04	Q				V
21+45	0.2581	0.04	Q				V
21+50	0.2583	0.03	Q				V
21+55	0.2585	0.03	Q				V
22+ 0	0.2586	0.03	Q				V
22+ 5	0.2589	0.03	Q				V
22+10	0.2591	0.04	Q				V
22+15	0.2594	0.04	Q				V
22+20	0.2596	0.03	Q				V
22+25	0.2598	0.03	Q				V
22+30	0.2600	0.03	Q				V
22+35	0.2601	0.03	Q				V
22+40	0.2603	0.03	Q				V
22+45	0.2605	0.03	Q				V
22+50	0.2607	0.03	Q				V
22+55	0.2608	0.03	Q				V
23+ 0	0.2610	0.03	Q				V
23+ 5	0.2612	0.03	Q				V
23+10	0.2614	0.03	Q				V
23+15	0.2615	0.03	Q				V
23+20	0.2617	0.03	Q				V
23+25	0.2619	0.03	Q				V
23+30	0.2621	0.03	Q				V
23+35	0.2622	0.03	Q				V
23+40	0.2624	0.03	Q				V
23+45	0.2626	0.03	Q				V
23+50	0.2628	0.03	Q				V
23+55	0.2629	0.03	Q				V
24+ 0	0.2631	0.03	Q				V
24+ 5	0.2632	0.01	Q				V
24+10	0.2632	0.00	Q				V
24+15	0.2632	0.00	Q				V

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 02/03/20 File: A224100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

JACKSON STREET IMPROVEMENT
100-YEAR 24 HOUR STORM
AREA A2, AVE 50 SOUTH
FILE: A2.UM1

Drainage Area = 1.28(Ac.) = 0.002 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 1.28(Ac.) = 0.002 Sq. Mi.
Length along longest watercourse = 1270.00(Ft.)
Length along longest watercourse measured to centroid = 630.00(Ft.)
Length along longest watercourse = 0.241 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 11.90(Ft.)
Slope along watercourse = 49.4740 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.045 Hr.
Lag time = 2.67 Min.
25% of lag time = 0.67 Min.
40% of lag time = 1.07 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
1.28	1.14	1.46

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
1.28	4.45	5.70

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.140(In)
Area Averaged 100-Year Rainfall = 4.450(In)

Point rain (area averaged) = 4.450(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 4.450(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
1.280	32.00	0.850

Total Area Entered = 1.28(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

32.0	32.0	0.742	0.850	0.174	1.000	0.174
					Sum (F) =	0.174

Area averaged mean soil loss (F) (In/Hr) = 0.174
Minimum soil loss rate ((In/Hr)) = 0.087
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

U n i t H y d r o g r a p h
DESERT S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	187.264	39.821	0.514
2	0.167	374.528	46.453	0.599
3	0.250	561.793	9.574	0.124
4	0.333	749.057	3.087	0.040
5	0.417	936.321	1.064	0.014
			Sum = 100.000	Sum= 1.290

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.309)	0.008	0.028
2	0.17	0.07	0.036	(0.308)	0.008	0.028
3	0.25	0.07	0.036	(0.307)	0.008	0.028
4	0.33	0.10	0.053	(0.306)	0.012	0.042
5	0.42	0.10	0.053	(0.304)	0.012	0.042
6	0.50	0.10	0.053	(0.303)	0.012	0.042
7	0.58	0.10	0.053	(0.302)	0.012	0.042
8	0.67	0.10	0.053	(0.301)	0.012	0.042
9	0.75	0.10	0.053	(0.300)	0.012	0.042
10	0.83	0.13	0.071	(0.298)	0.016	0.056
11	0.92	0.13	0.071	(0.297)	0.016	0.056
12	1.00	0.13	0.071	(0.296)	0.016	0.056
13	1.08	0.10	0.053	(0.295)	0.012	0.042
14	1.17	0.10	0.053	(0.294)	0.012	0.042
15	1.25	0.10	0.053	(0.293)	0.012	0.042
16	1.33	0.10	0.053	(0.291)	0.012	0.042
17	1.42	0.10	0.053	(0.290)	0.012	0.042
18	1.50	0.10	0.053	(0.289)	0.012	0.042
19	1.58	0.10	0.053	(0.288)	0.012	0.042
20	1.67	0.10	0.053	(0.287)	0.012	0.042
21	1.75	0.10	0.053	(0.286)	0.012	0.042
22	1.83	0.13	0.071	(0.284)	0.016	0.056
23	1.92	0.13	0.071	(0.283)	0.016	0.056
24	2.00	0.13	0.071	(0.282)	0.016	0.056
25	2.08	0.13	0.071	(0.281)	0.016	0.056
26	2.17	0.13	0.071	(0.280)	0.016	0.056
27	2.25	0.13	0.071	(0.279)	0.016	0.056
28	2.33	0.13	0.071	(0.278)	0.016	0.056
29	2.42	0.13	0.071	(0.277)	0.016	0.056
30	2.50	0.13	0.071	(0.275)	0.016	0.056
31	2.58	0.17	0.089	(0.274)	0.020	0.069
32	2.67	0.17	0.089	(0.273)	0.020	0.069
33	2.75	0.17	0.089	(0.272)	0.020	0.069
34	2.83	0.17	0.089	(0.271)	0.020	0.069
35	2.92	0.17	0.089	(0.270)	0.020	0.069
36	3.00	0.17	0.089	(0.269)	0.020	0.069
37	3.08	0.17	0.089	(0.268)	0.020	0.069
38	3.17	0.17	0.089	(0.266)	0.020	0.069
39	3.25	0.17	0.089	(0.265)	0.020	0.069
40	3.33	0.17	0.089	(0.264)	0.020	0.069
41	3.42	0.17	0.089	(0.263)	0.020	0.069

42	3.50	0.17	0.089	(0.262)	0.020	0.069
43	3.58	0.17	0.089	(0.261)	0.020	0.069
44	3.67	0.17	0.089	(0.260)	0.020	0.069
45	3.75	0.17	0.089	(0.259)	0.020	0.069
46	3.83	0.20	0.107	(0.258)	0.023	0.083
47	3.92	0.20	0.107	(0.257)	0.023	0.083
48	4.00	0.20	0.107	(0.255)	0.023	0.083
49	4.08	0.20	0.107	(0.254)	0.023	0.083
50	4.17	0.20	0.107	(0.253)	0.023	0.083
51	4.25	0.20	0.107	(0.252)	0.023	0.083
52	4.33	0.23	0.125	(0.251)	0.027	0.097
53	4.42	0.23	0.125	(0.250)	0.027	0.097
54	4.50	0.23	0.125	(0.249)	0.027	0.097
55	4.58	0.23	0.125	(0.248)	0.027	0.097
56	4.67	0.23	0.125	(0.247)	0.027	0.097
57	4.75	0.23	0.125	(0.246)	0.027	0.097
58	4.83	0.27	0.142	(0.245)	0.031	0.111
59	4.92	0.27	0.142	(0.244)	0.031	0.111
60	5.00	0.27	0.142	(0.243)	0.031	0.111
61	5.08	0.20	0.107	(0.242)	0.023	0.083
62	5.17	0.20	0.107	(0.241)	0.023	0.083
63	5.25	0.20	0.107	(0.239)	0.023	0.083
64	5.33	0.23	0.125	(0.238)	0.027	0.097
65	5.42	0.23	0.125	(0.237)	0.027	0.097
66	5.50	0.23	0.125	(0.236)	0.027	0.097
67	5.58	0.27	0.142	(0.235)	0.031	0.111
68	5.67	0.27	0.142	(0.234)	0.031	0.111
69	5.75	0.27	0.142	(0.233)	0.031	0.111
70	5.83	0.27	0.142	(0.232)	0.031	0.111
71	5.92	0.27	0.142	(0.231)	0.031	0.111
72	6.00	0.27	0.142	(0.230)	0.031	0.111
73	6.08	0.30	0.160	(0.229)	0.035	0.125
74	6.17	0.30	0.160	(0.228)	0.035	0.125
75	6.25	0.30	0.160	(0.227)	0.035	0.125
76	6.33	0.30	0.160	(0.226)	0.035	0.125
77	6.42	0.30	0.160	(0.225)	0.035	0.125
78	6.50	0.30	0.160	(0.224)	0.035	0.125
79	6.58	0.33	0.178	(0.223)	0.039	0.139
80	6.67	0.33	0.178	(0.222)	0.039	0.139
81	6.75	0.33	0.178	(0.221)	0.039	0.139
82	6.83	0.33	0.178	(0.220)	0.039	0.139
83	6.92	0.33	0.178	(0.219)	0.039	0.139
84	7.00	0.33	0.178	(0.218)	0.039	0.139
85	7.08	0.33	0.178	(0.217)	0.039	0.139
86	7.17	0.33	0.178	(0.216)	0.039	0.139
87	7.25	0.33	0.178	(0.215)	0.039	0.139
88	7.33	0.37	0.196	(0.214)	0.043	0.153
89	7.42	0.37	0.196	(0.213)	0.043	0.153
90	7.50	0.37	0.196	(0.212)	0.043	0.153
91	7.58	0.40	0.214	(0.211)	0.047	0.167
92	7.67	0.40	0.214	(0.210)	0.047	0.167
93	7.75	0.40	0.214	(0.209)	0.047	0.167
94	7.83	0.43	0.231	(0.208)	0.051	0.180
95	7.92	0.43	0.231	(0.207)	0.051	0.180
96	8.00	0.43	0.231	(0.206)	0.051	0.180
97	8.08	0.50	0.267	(0.205)	0.059	0.208
98	8.17	0.50	0.267	(0.204)	0.059	0.208
99	8.25	0.50	0.267	(0.203)	0.059	0.208
100	8.33	0.50	0.267	(0.203)	0.059	0.208
101	8.42	0.50	0.267	(0.202)	0.059	0.208
102	8.50	0.50	0.267	(0.201)	0.059	0.208
103	8.58	0.53	0.285	(0.200)	0.063	0.222
104	8.67	0.53	0.285	(0.199)	0.063	0.222
105	8.75	0.53	0.285	(0.198)	0.063	0.222
106	8.83	0.57	0.303	(0.197)	0.067	0.236
107	8.92	0.57	0.303	(0.196)	0.067	0.236
108	9.00	0.57	0.303	(0.195)	0.067	0.236
109	9.08	0.63	0.338	(0.194)	0.074	0.264
110	9.17	0.63	0.338	(0.193)	0.074	0.264
111	9.25	0.63	0.338	(0.192)	0.074	0.264
112	9.33	0.67	0.356	(0.191)	0.078	0.278

113	9.42	0.67	0.356	(0.190)	0.078	0.278
114	9.50	0.67	0.356	(0.190)	0.078	0.278
115	9.58	0.70	0.374	(0.189)	0.082	0.292
116	9.67	0.70	0.374	(0.188)	0.082	0.292
117	9.75	0.70	0.374	(0.187)	0.082	0.292
118	9.83	0.73	0.392	(0.186)	0.086	0.305
119	9.92	0.73	0.392	(0.185)	0.086	0.305
120	10.00	0.73	0.392	(0.184)	0.086	0.305
121	10.08	0.50	0.267	(0.183)	0.059	0.208
122	10.17	0.50	0.267	(0.182)	0.059	0.208
123	10.25	0.50	0.267	(0.181)	0.059	0.208
124	10.33	0.50	0.267	(0.181)	0.059	0.208
125	10.42	0.50	0.267	(0.180)	0.059	0.208
126	10.50	0.50	0.267	(0.179)	0.059	0.208
127	10.58	0.67	0.356	(0.178)	0.078	0.278
128	10.67	0.67	0.356	(0.177)	0.078	0.278
129	10.75	0.67	0.356	(0.176)	0.078	0.278
130	10.83	0.67	0.356	(0.175)	0.078	0.278
131	10.92	0.67	0.356	(0.175)	0.078	0.278
132	11.00	0.67	0.356	(0.174)	0.078	0.278
133	11.08	0.63	0.338	(0.173)	0.074	0.264
134	11.17	0.63	0.338	(0.172)	0.074	0.264
135	11.25	0.63	0.338	(0.171)	0.074	0.264
136	11.33	0.63	0.338	(0.170)	0.074	0.264
137	11.42	0.63	0.338	(0.169)	0.074	0.264
138	11.50	0.63	0.338	(0.169)	0.074	0.264
139	11.58	0.57	0.303	(0.168)	0.067	0.236
140	11.67	0.57	0.303	(0.167)	0.067	0.236
141	11.75	0.57	0.303	(0.166)	0.067	0.236
142	11.83	0.60	0.320	(0.165)	0.070	0.250
143	11.92	0.60	0.320	(0.164)	0.070	0.250
144	12.00	0.60	0.320	(0.164)	0.070	0.250
145	12.08	0.83	0.445	(0.163)	0.098	0.347
146	12.17	0.83	0.445	(0.162)	0.098	0.347
147	12.25	0.83	0.445	(0.161)	0.098	0.347
148	12.33	0.87	0.463	(0.160)	0.102	0.361
149	12.42	0.87	0.463	(0.160)	0.102	0.361
150	12.50	0.87	0.463	(0.159)	0.102	0.361
151	12.58	0.93	0.498	(0.158)	0.110	0.389
152	12.67	0.93	0.498	(0.157)	0.110	0.389
153	12.75	0.93	0.498	(0.156)	0.110	0.389
154	12.83	0.97	0.516	(0.156)	0.114	0.403
155	12.92	0.97	0.516	(0.155)	0.114	0.403
156	13.00	0.97	0.516	(0.154)	0.114	0.403
157	13.08	1.13	0.605	(0.153)	0.133	0.472
158	13.17	1.13	0.605	(0.152)	0.133	0.472
159	13.25	1.13	0.605	(0.152)	0.133	0.472
160	13.33	1.13	0.605	(0.151)	0.133	0.472
161	13.42	1.13	0.605	(0.150)	0.133	0.472
162	13.50	1.13	0.605	(0.149)	0.133	0.472
163	13.58	0.77	0.409	(0.149)	0.090	0.319
164	13.67	0.77	0.409	(0.148)	0.090	0.319
165	13.75	0.77	0.409	(0.147)	0.090	0.319
166	13.83	0.77	0.409	(0.146)	0.090	0.319
167	13.92	0.77	0.409	(0.146)	0.090	0.319
168	14.00	0.77	0.409	(0.145)	0.090	0.319
169	14.08	0.90	0.481	(0.144)	0.106	0.375
170	14.17	0.90	0.481	(0.143)	0.106	0.375
171	14.25	0.90	0.481	(0.143)	0.106	0.375
172	14.33	0.87	0.463	(0.142)	0.102	0.361
173	14.42	0.87	0.463	(0.141)	0.102	0.361
174	14.50	0.87	0.463	(0.140)	0.102	0.361
175	14.58	0.87	0.463	(0.140)	0.102	0.361
176	14.67	0.87	0.463	(0.139)	0.102	0.361
177	14.75	0.87	0.463	(0.138)	0.102	0.361
178	14.83	0.83	0.445	(0.138)	0.098	0.347
179	14.92	0.83	0.445	(0.137)	0.098	0.347
180	15.00	0.83	0.445	(0.136)	0.098	0.347
181	15.08	0.80	0.427	(0.135)	0.094	0.333
182	15.17	0.80	0.427	(0.135)	0.094	0.333
183	15.25	0.80	0.427	(0.134)	0.094	0.333

184	15.33	0.77	0.409	(0.133)	0.090	0.319
185	15.42	0.77	0.409	(0.133)	0.090	0.319
186	15.50	0.77	0.409	(0.132)	0.090	0.319
187	15.58	0.63	0.338	(0.131)	0.074	0.264
188	15.67	0.63	0.338	(0.131)	0.074	0.264
189	15.75	0.63	0.338	(0.130)	0.074	0.264
190	15.83	0.63	0.338	(0.129)	0.074	0.264
191	15.92	0.63	0.338	(0.129)	0.074	0.264
192	16.00	0.63	0.338	(0.128)	0.074	0.264
193	16.08	0.13	0.071	(0.127)	0.016	0.056
194	16.17	0.13	0.071	(0.127)	0.016	0.056
195	16.25	0.13	0.071	(0.126)	0.016	0.056
196	16.33	0.13	0.071	(0.125)	0.016	0.056
197	16.42	0.13	0.071	(0.125)	0.016	0.056
198	16.50	0.13	0.071	(0.124)	0.016	0.056
199	16.58	0.10	0.053	(0.124)	0.012	0.042
200	16.67	0.10	0.053	(0.123)	0.012	0.042
201	16.75	0.10	0.053	(0.122)	0.012	0.042
202	16.83	0.10	0.053	(0.122)	0.012	0.042
203	16.92	0.10	0.053	(0.121)	0.012	0.042
204	17.00	0.10	0.053	(0.120)	0.012	0.042
205	17.08	0.17	0.089	(0.120)	0.020	0.069
206	17.17	0.17	0.089	(0.119)	0.020	0.069
207	17.25	0.17	0.089	(0.119)	0.020	0.069
208	17.33	0.17	0.089	(0.118)	0.020	0.069
209	17.42	0.17	0.089	(0.117)	0.020	0.069
210	17.50	0.17	0.089	(0.117)	0.020	0.069
211	17.58	0.17	0.089	(0.116)	0.020	0.069
212	17.67	0.17	0.089	(0.116)	0.020	0.069
213	17.75	0.17	0.089	(0.115)	0.020	0.069
214	17.83	0.13	0.071	(0.115)	0.016	0.056
215	17.92	0.13	0.071	(0.114)	0.016	0.056
216	18.00	0.13	0.071	(0.113)	0.016	0.056
217	18.08	0.13	0.071	(0.113)	0.016	0.056
218	18.17	0.13	0.071	(0.112)	0.016	0.056
219	18.25	0.13	0.071	(0.112)	0.016	0.056
220	18.33	0.13	0.071	(0.111)	0.016	0.056
221	18.42	0.13	0.071	(0.111)	0.016	0.056
222	18.50	0.13	0.071	(0.110)	0.016	0.056
223	18.58	0.10	0.053	(0.110)	0.012	0.042
224	18.67	0.10	0.053	(0.109)	0.012	0.042
225	18.75	0.10	0.053	(0.109)	0.012	0.042
226	18.83	0.07	0.036	(0.108)	0.008	0.028
227	18.92	0.07	0.036	(0.108)	0.008	0.028
228	19.00	0.07	0.036	(0.107)	0.008	0.028
229	19.08	0.10	0.053	(0.106)	0.012	0.042
230	19.17	0.10	0.053	(0.106)	0.012	0.042
231	19.25	0.10	0.053	(0.105)	0.012	0.042
232	19.33	0.13	0.071	(0.105)	0.016	0.056
233	19.42	0.13	0.071	(0.105)	0.016	0.056
234	19.50	0.13	0.071	(0.104)	0.016	0.056
235	19.58	0.10	0.053	(0.104)	0.012	0.042
236	19.67	0.10	0.053	(0.103)	0.012	0.042
237	19.75	0.10	0.053	(0.103)	0.012	0.042
238	19.83	0.07	0.036	(0.102)	0.008	0.028
239	19.92	0.07	0.036	(0.102)	0.008	0.028
240	20.00	0.07	0.036	(0.101)	0.008	0.028
241	20.08	0.10	0.053	(0.101)	0.012	0.042
242	20.17	0.10	0.053	(0.100)	0.012	0.042
243	20.25	0.10	0.053	(0.100)	0.012	0.042
244	20.33	0.10	0.053	(0.099)	0.012	0.042
245	20.42	0.10	0.053	(0.099)	0.012	0.042
246	20.50	0.10	0.053	(0.099)	0.012	0.042
247	20.58	0.10	0.053	(0.098)	0.012	0.042
248	20.67	0.10	0.053	(0.098)	0.012	0.042
249	20.75	0.10	0.053	(0.097)	0.012	0.042
250	20.83	0.07	0.036	(0.097)	0.008	0.028
251	20.92	0.07	0.036	(0.097)	0.008	0.028
252	21.00	0.07	0.036	(0.096)	0.008	0.028
253	21.08	0.10	0.053	(0.096)	0.012	0.042
254	21.17	0.10	0.053	(0.095)	0.012	0.042

255	21.25	0.10	0.053	(0.095)	0.012	0.042
256	21.33	0.07	0.036	(0.095)	0.008	0.028
257	21.42	0.07	0.036	(0.094)	0.008	0.028
258	21.50	0.07	0.036	(0.094)	0.008	0.028
259	21.58	0.10	0.053	(0.094)	0.012	0.042
260	21.67	0.10	0.053	(0.093)	0.012	0.042
261	21.75	0.10	0.053	(0.093)	0.012	0.042
262	21.83	0.07	0.036	(0.093)	0.008	0.028
263	21.92	0.07	0.036	(0.092)	0.008	0.028
264	22.00	0.07	0.036	(0.092)	0.008	0.028
265	22.08	0.10	0.053	(0.092)	0.012	0.042
266	22.17	0.10	0.053	(0.091)	0.012	0.042
267	22.25	0.10	0.053	(0.091)	0.012	0.042
268	22.33	0.07	0.036	(0.091)	0.008	0.028
269	22.42	0.07	0.036	(0.091)	0.008	0.028
270	22.50	0.07	0.036	(0.090)	0.008	0.028
271	22.58	0.07	0.036	(0.090)	0.008	0.028
272	22.67	0.07	0.036	(0.090)	0.008	0.028
273	22.75	0.07	0.036	(0.090)	0.008	0.028
274	22.83	0.07	0.036	(0.089)	0.008	0.028
275	22.92	0.07	0.036	(0.089)	0.008	0.028
276	23.00	0.07	0.036	(0.089)	0.008	0.028
277	23.08	0.07	0.036	(0.089)	0.008	0.028
278	23.17	0.07	0.036	(0.088)	0.008	0.028
279	23.25	0.07	0.036	(0.088)	0.008	0.028
280	23.33	0.07	0.036	(0.088)	0.008	0.028
281	23.42	0.07	0.036	(0.088)	0.008	0.028
282	23.50	0.07	0.036	(0.088)	0.008	0.028
283	23.58	0.07	0.036	(0.088)	0.008	0.028
284	23.67	0.07	0.036	(0.088)	0.008	0.028
285	23.75	0.07	0.036	(0.087)	0.008	0.028
286	23.83	0.07	0.036	(0.087)	0.008	0.028
287	23.92	0.07	0.036	(0.087)	0.008	0.028
288	24.00	0.07	0.036	(0.087)	0.008	0.028
			(Loss Rate Not Used)			
	Sum =	100.0			Sum =	41.7

```
Flood volume = Effective rainfall      3.47(In)
 times area       1.3(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
Total soil loss =      0.98(In)
Total soil loss =     0.104(Ac.Ft)
Total rainfall =      4.45(In)
Flood volume =       16127.6 Cubic Feet
Total soil loss =        4548.8 Cubic Feet
--------------------------------------------------------------------
 Peak flow rate of this hydrograph =      0.609(CFS)
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R   S T O R M
               R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
           Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0003      0.03  Q         |         |         |         |
   0+15       0.0005      0.03  Q         |         |         |         |
   0+20       0.0008      0.04  Q         |         |         |         |
   0+25       0.0012      0.05  Q         |         |         |         |
   0+30       0.0016      0.05  Q         |         |         |         |
   0+35       0.0019      0.05  Q         |         |         |         |
   0+40       0.0023      0.05  Q         |         |         |         |
   0+45       0.0027      0.05  Q         |         |         |         |
   0+50       0.0031      0.06  Q         |         |         |         |
   0+55       0.0036      0.07  Q         |         |         |         |
   1+ 0       0.0041      0.07  Q         |         |         |         |
   1+ 5       0.0045      0.06  Q         |         |         |         |
   1+10       0.0049      0.06  Q         |         |         |         |
   1+15       0.0053      0.05  Q         |         |         |         |
   1+20       0.0056      0.05  Q         |         |         |         |
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1+25	0.0060	0.05	Q				
1+30	0.0064	0.05	Q				
1+35	0.0067	0.05	Q				
1+40	0.0071	0.05	Q				
1+45	0.0075	0.05	Q				
1+50	0.0079	0.06	Q				
1+55	0.0084	0.07	Q				
2+ 0	0.0089	0.07	Q				
2+ 5	0.0094	0.07	QV				
2+10	0.0099	0.07	QV				
2+15	0.0103	0.07	QV				
2+20	0.0108	0.07	QV				
2+25	0.0113	0.07	QV				
2+30	0.0118	0.07	QV				
2+35	0.0124	0.08	QV				
2+40	0.0130	0.09	QV				
2+45	0.0136	0.09	QV				
2+50	0.0142	0.09	QV				
2+55	0.0148	0.09	QV				
3+ 0	0.0154	0.09	QV				
3+ 5	0.0160	0.09	QV				
3+10	0.0167	0.09	QV				
3+15	0.0173	0.09	QV				
3+20	0.0179	0.09	QV				
3+25	0.0185	0.09	Q V				
3+30	0.0191	0.09	Q V				
3+35	0.0198	0.09	Q V				
3+40	0.0204	0.09	Q V				
3+45	0.0210	0.09	Q V				
3+50	0.0217	0.10	Q V				
3+55	0.0224	0.11	Q V				
4+ 0	0.0231	0.11	Q V				
4+ 5	0.0238	0.11	Q V				
4+10	0.0246	0.11	Q V				
4+15	0.0253	0.11	Q V				
4+20	0.0261	0.11	Q V				
4+25	0.0270	0.12	Q V				
4+30	0.0278	0.12	Q V				
4+35	0.0287	0.13	Q V				
4+40	0.0296	0.13	Q V				
4+45	0.0304	0.13	Q V				
4+50	0.0313	0.13	Q V				
4+55	0.0323	0.14	Q V				
5+ 0	0.0333	0.14	Q V				
5+ 5	0.0342	0.13	Q V				
5+10	0.0349	0.11	Q V				
5+15	0.0357	0.11	Q V				
5+20	0.0365	0.12	Q V				
5+25	0.0373	0.12	Q V				
5+30	0.0382	0.12	Q V				
5+35	0.0391	0.13	Q V				
5+40	0.0401	0.14	Q V				
5+45	0.0411	0.14	Q V				
5+50	0.0420	0.14	Q V				
5+55	0.0430	0.14	Q V				
6+ 0	0.0440	0.14	Q V				
6+ 5	0.0451	0.15	Q V				
6+10	0.0461	0.16	Q V				
6+15	0.0473	0.16	Q V				
6+20	0.0484	0.16	Q V				
6+25	0.0495	0.16	Q V				
6+30	0.0506	0.16	Q V				
6+35	0.0517	0.17	Q V				
6+40	0.0530	0.18	Q V				
6+45	0.0542	0.18	Q V				
6+50	0.0554	0.18	Q V				
6+55	0.0567	0.18	Q V				
7+ 0	0.0579	0.18	Q V				
7+ 5	0.0591	0.18	Q V				
7+10	0.0604	0.18	Q V				
7+15	0.0616	0.18	Q V				

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 7+20       0.0629      0.19  Q     V   |         |         |         |
 7+25       0.0642      0.19  Q     V   |         |         |         |
 7+30       0.0656      0.20  Q      V  |         |         |         |
 7+35       0.0670      0.20  Q      V  |         |         |         |
 7+40       0.0684      0.21  Q      V  |         |         |         |
 7+45       0.0699      0.21  Q      V  |         |         |         |
 7+50       0.0714      0.22  Q      V  |         |         |         |
 7+55       0.0730      0.23  Q      V  |         |         |         |
 8+ 0       0.0746      0.23  Q       V |         |         |         |
 8+ 5       0.0763      0.25  Q       V |         |         |         |
 8+10       0.0781      0.26  |Q      V |         |         |         |
 8+15       0.0800      0.27  |Q      V |         |         |         |
 8+20       0.0818      0.27  |Q      V |         |         |         |
 8+25       0.0837      0.27  |Q       V|         |         |         |
 8+30       0.0855      0.27  |Q       V|         |         |         |
 8+35       0.0874      0.28  |Q       V|         |         |         |
 8+40       0.0894      0.28  |Q       V|         |         |         |
 8+45       0.0914      0.29  |Q       V|         |         |         |
 8+50       0.0934      0.29  |Q        V         |         |         |
 8+55       0.0955      0.30  |Q        V         |         |         |
 9+ 0       0.0976      0.30  |Q        V         |         |         |
 9+ 5       0.0998      0.32  |Q        V         |         |         |
 9+10       0.1021      0.34  |Q        |V        |         |         |
 9+15       0.1044      0.34  |Q        |V        |         |         |
 9+20       0.1068      0.35  |Q        |V        |         |         |
 9+25       0.1092      0.36  |Q        |V        |         |         |
 9+30       0.1117      0.36  |Q        | V       |         |         |
 9+35       0.1142      0.37  |Q        | V       |         |         |
 9+40       0.1168      0.37  |Q        | V       |         |         |
 9+45       0.1194      0.38  |Q        | V       |         |         |
 9+50       0.1220      0.38  |Q        |  V      |         |         |
 9+55       0.1247      0.39  |Q        |  V      |         |         |
10+ 0       0.1274      0.39  |Q        |  V      |         |         |
10+ 5       0.1298      0.34  |Q        |   V     |         |         |
10+10       0.1318      0.29  |Q        |   V     |         |         |
10+15       0.1337      0.27  |Q        |   V     |         |         |
10+20       0.1355      0.27  |Q        |   V     |         |         |
10+25       0.1374      0.27  |Q        |   V     |         |         |
10+30       0.1392      0.27  |Q        |    V    |         |         |
10+35       0.1413      0.30  |Q        |    V    |         |         |
10+40       0.1437      0.35  |Q        |    V    |         |         |
10+45       0.1461      0.35  |Q        |    V    |         |         |
10+50       0.1486      0.36  |Q        |     V   |         |         |
10+55       0.1511      0.36  |Q        |     V   |         |         |
11+ 0       0.1535      0.36  |Q        |     V   |         |         |
11+ 5       0.1560      0.35  |Q        |     V   |         |         |
11+10       0.1583      0.34  |Q        |      V  |         |         |
11+15       0.1607      0.34  |Q        |      V  |         |         |
11+20       0.1630      0.34  |Q        |      V  |         |         |
11+25       0.1654      0.34  |Q        |      V  |         |         |
11+30       0.1677      0.34  |Q        |       V |         |         |
11+35       0.1700      0.33  |Q        |       V |         |         |
11+40       0.1721      0.31  |Q        |       V |         |         |
11+45       0.1742      0.31  |Q        |       V |         |         |
11+50       0.1764      0.31  |Q        |        V|         |         |
11+55       0.1786      0.32  |Q        |        V|         |         |
12+ 0       0.1808      0.32  |Q        |        V|         |         |
12+ 5       0.1833      0.37  |Q        |        V|         |         |
12+10       0.1863      0.43  |Q        |         V         |         |
12+15       0.1894      0.44  |Q        |         V         |         |
12+20       0.1925      0.45  |Q        |         V         |         |
12+25       0.1957      0.46  |Q        |         |V        |         |
12+30       0.1989      0.47  |Q        |         |V        |         |
12+35       0.2022      0.48  |Q        |         |V        |         |
12+40       0.2056      0.50  |Q        |         | V       |         |
12+45       0.2090      0.50  | Q       |         | V       |         |
12+50       0.2125      0.51  | Q       |         | V       |         |
12+55       0.2161      0.52  | Q       |         |  V      |         |
13+ 0       0.2197      0.52  | Q       |         |  V      |         |
13+ 5       0.2235      0.56  | Q       |         |   V     |         |
13+10       0.2276      0.60  | Q       |         |   V     |         |
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13+15       0.2318      0.61  | Q       |         |    V    |         |
13+20       0.2360      0.61  | Q       |         |    V    |         |
13+25       0.2402      0.61  | Q       |         |    V    |         |
13+30       0.2444      0.61  | Q       |         |     V   |         |
13+35       0.2480      0.53  | Q       |         |     V   |         |
13+40       0.2511      0.44  |Q        |         |      V  |         |
13+45       0.2539      0.42  |Q        |         |      V  |         |
13+50       0.2568      0.41  |Q        |         |      V  |         |
13+55       0.2596      0.41  |Q        |         |       V |         |
14+ 0       0.2625      0.41  |Q        |         |       V |         |
14+ 5       0.2655      0.44  |Q        |         |       V |         |
14+10       0.2688      0.47  |Q        |         |        V|         |
14+15       0.2721      0.48  |Q        |         |        V|         |
14+20       0.2754      0.48  |Q        |         |        V|         |
14+25       0.2786      0.47  |Q        |         |         V         |
14+30       0.2818      0.47  |Q        |         |         V         |
14+35       0.2850      0.47  |Q        |         |         V         |
14+40       0.2882      0.47  |Q        |         |         |V        |
14+45       0.2914      0.47  |Q        |         |         |V        |
14+50       0.2946      0.46  |Q        |         |         |V        |
14+55       0.2977      0.45  |Q        |         |         | V       |
15+ 0       0.3008      0.45  |Q        |         |         | V       |
15+ 5       0.3038      0.44  |Q        |         |         | V       |
15+10       0.3068      0.43  |Q        |         |         |  V      |
15+15       0.3098      0.43  |Q        |         |         |  V      |
15+20       0.3127      0.42  |Q        |         |         |  V      |
15+25       0.3155      0.41  |Q        |         |         |   V     |
15+30       0.3184      0.41  |Q        |         |         |   V     |
15+35       0.3210      0.38  |Q        |         |         |   V     |
15+40       0.3234      0.35  |Q        |         |         |   V     |
15+45       0.3258      0.34  |Q        |         |         |    V    |
15+50       0.3282      0.34  |Q        |         |         |    V    |
15+55       0.3305      0.34  |Q        |         |         |    V    |
16+ 0       0.3328      0.34  |Q        |         |         |    V    |
16+ 5       0.3344      0.23  Q         |         |         |     V   |
16+10       0.3352      0.11  Q         |         |         |     V   |
16+15       0.3358      0.08  Q         |         |         |     V   |
16+20       0.3363      0.07  Q         |         |         |     V   |
16+25       0.3368      0.07  Q         |         |         |     V   |
16+30       0.3373      0.07  Q         |         |         |     V   |
16+35       0.3377      0.06  Q         |         |         |     V   |
16+40       0.3381      0.06  Q         |         |         |     V   |
16+45       0.3385      0.05  Q         |         |         |     V   |
16+50       0.3388      0.05  Q         |         |         |     V   |
16+55       0.3392      0.05  Q         |         |         |     V   |
17+ 0       0.3396      0.05  Q         |         |         |     V   |
17+ 5       0.3401      0.07  Q         |         |         |     V   |
17+10       0.3406      0.08  Q         |         |         |     V   |
17+15       0.3412      0.09  Q         |         |         |     V   |
17+20       0.3419      0.09  Q         |         |         |     V   |
17+25       0.3425      0.09  Q         |         |         |      V  |
17+30       0.3431      0.09  Q         |         |         |      V  |
17+35       0.3437      0.09  Q         |         |         |      V  |
17+40       0.3443      0.09  Q         |         |         |      V  |
17+45       0.3449      0.09  Q         |         |         |      V  |
17+50       0.3455      0.08  Q         |         |         |      V  |
17+55       0.3460      0.07  Q         |         |         |      V  |
18+ 0       0.3465      0.07  Q         |         |         |      V  |
18+ 5       0.3470      0.07  Q         |         |         |      V  |
18+10       0.3475      0.07  Q         |         |         |      V  |
18+15       0.3480      0.07  Q         |         |         |      V  |
18+20       0.3485      0.07  Q         |         |         |      V  |
18+25       0.3490      0.07  Q         |         |         |      V  |
18+30       0.3495      0.07  Q         |         |         |      V  |
18+35       0.3499      0.06  Q         |         |         |      V  |
18+40       0.3503      0.06  Q         |         |         |      V  |
18+45       0.3507      0.05  Q         |         |         |      V  |
18+50       0.3510      0.05  Q         |         |         |      V  |
18+55       0.3513      0.04  Q         |         |         |      V  |
19+ 0       0.3515      0.04  Q         |         |         |      V  |
19+ 5       0.3518      0.04  Q         |         |         |       V |
```

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   19+10        0.3522       0.05  Q          |          |          |       V |
   19+15        0.3525       0.05  Q          |          |          |       V |
   19+20        0.3530       0.06  Q          |          |          |       V |
   19+25        0.3534       0.07  Q          |          |          |       V |
   19+30        0.3539       0.07  Q          |          |          |       V |
   19+35        0.3544       0.06  Q          |          |          |       V |
   19+40        0.3548       0.06  Q          |          |          |       V |
   19+45        0.3551       0.05  Q          |          |          |       V |
   19+50        0.3555       0.05  Q          |          |          |       V |
   19+55        0.3557       0.04  Q          |          |          |       V |
   20+ 0        0.3560       0.04  Q          |          |          |       V |
   20+ 5        0.3563       0.04  Q          |          |          |       V |
   20+10        0.3566       0.05  Q          |          |          |       V |
   20+15        0.3570       0.05  Q          |          |          |       V |
   20+20        0.3574       0.05  Q          |          |          |       V |
   20+25        0.3577       0.05  Q          |          |          |       V |
   20+30        0.3581       0.05  Q          |          |          |       V |
   20+35        0.3585       0.05  Q          |          |          |       V |
   20+40        0.3588       0.05  Q          |          |          |       V |
   20+45        0.3592       0.05  Q          |          |          |       V |
   20+50        0.3595       0.05  Q          |          |          |       V |
   20+55        0.3598       0.04  Q          |          |          |       V |
   21+ 0        0.3600       0.04  Q          |          |          |       V |
   21+ 5        0.3603       0.04  Q          |          |          |       V |
   21+10        0.3607       0.05  Q          |          |          |       V |
   21+15        0.3611       0.05  Q          |          |          |        V|
   21+20        0.3614       0.05  Q          |          |          |        V|
   21+25        0.3616       0.04  Q          |          |          |        V|
   21+30        0.3619       0.04  Q          |          |          |        V|
   21+35        0.3622       0.04  Q          |          |          |        V|
   21+40        0.3625       0.05  Q          |          |          |        V|
   21+45        0.3629       0.05  Q          |          |          |        V|
   21+50        0.3632       0.05  Q          |          |          |        V|
   21+55        0.3635       0.04  Q          |          |          |        V|
   22+ 0        0.3637       0.04  Q          |          |          |        V|
   22+ 5        0.3640       0.04  Q          |          |          |        V|
   22+10        0.3644       0.05  Q          |          |          |        V|
   22+15        0.3648       0.05  Q          |          |          |        V|
   22+20        0.3651       0.05  Q          |          |          |        V|
   22+25        0.3653       0.04  Q          |          |          |        V|
   22+30        0.3656       0.04  Q          |          |          |        V|
   22+35        0.3658       0.04  Q          |          |          |        V|
   22+40        0.3661       0.04  Q          |          |          |        V|
   22+45        0.3663       0.04  Q          |          |          |        V|
   22+50        0.3666       0.04  Q          |          |          |        V|
   22+55        0.3668       0.04  Q          |          |          |        V|
   23+ 0        0.3671       0.04  Q          |          |          |        V|
   23+ 5        0.3673       0.04  Q          |          |          |        V|
   23+10        0.3676       0.04  Q          |          |          |        V|
   23+15        0.3678       0.04  Q          |          |          |        V|
   23+20        0.3681       0.04  Q          |          |          |        V|
   23+25        0.3683       0.04  Q          |          |          |        V|
   23+30        0.3686       0.04  Q          |          |          |        V|
   23+35        0.3688       0.04  Q          |          |          |        V|
   23+40        0.3691       0.04  Q          |          |          |        V|
   23+45        0.3693       0.04  Q          |          |          |        V|
   23+50        0.3696       0.04  Q          |          |          |        V|
   23+55        0.3698       0.04  Q          |          |          |        V|
   24+ 0        0.3700       0.04  Q          |          |          |        V|
   24+ 5        0.3702       0.02  Q          |          |          |        V|
   24+10        0.3702       0.00  Q          |          |          |        V|
   24+15        0.3702       0.00  Q          |          |          |        V|
   24+20        0.3702       0.00  Q          |          |          |         V
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SECTION 3 - Hydraulic Studies

48” HDPE Pipe Sizing

60” HDPE Pipe Sizing

JACKSON STREET IMPROVEMENT   W.O. 2019-0002

Jackson Sub-Watershed Unit Hydrograph & 48" Infiltration Trench Summary

ID	Jackson/ Ave 50 Street Station	Watershed Area (acre)	Roadway Length (ft)	100-Y 24-H Storm Volume (cf)	HDPE Estimated Length (ft)	24-H Infiltration Volume * (cf)	Design Storage Volume (cf)	Req'd 48" HDPE Storage (lf)	48" HDPE Provided (lf)	Storm Drain
	JACKSON AVE.									
J1	10+76 to 36+36	3.23	2560	40700	1100	17248	23452	1088	**1100**	Option to use 60" or 48"
J2	36+36 to 56+00	1.80	1964	23840	640	10035	13805	640	**640**	Option to use 60" or 48"
J3	56+00 to 64+75	0.82	875	10860	300	4704	6156	285	**300**	
J4	64+75 to 90+00	2.37	2525	31390	850	13328	18062	838	**850**	
	AVENUE 50									
A1	169+30 to 177+20	0.91	790	11470	320	5018	6452	300	**320**	Option to use 60" or 48"
A2	169+30 to 182+00	1.28	1270	16130	440	6899	9231	428	**440**	Option to use 60" or 48"
	Total	**10.41**	**9984**	**134390**	**3650**	**57232**	**77158**	**3579**	**3650**	

*24-Hour Infiltration Volume = Estimated HDPE Length (80% Trench Width) [(Infiltration Rate 1.4 inches/Hour) /12] (24 Hour)

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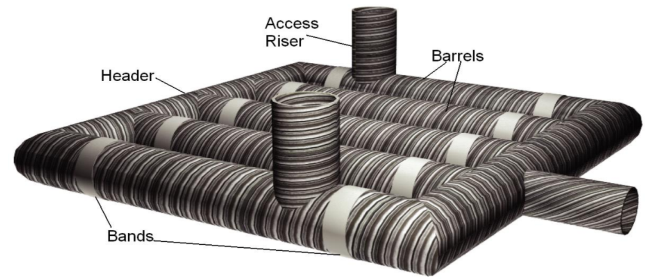
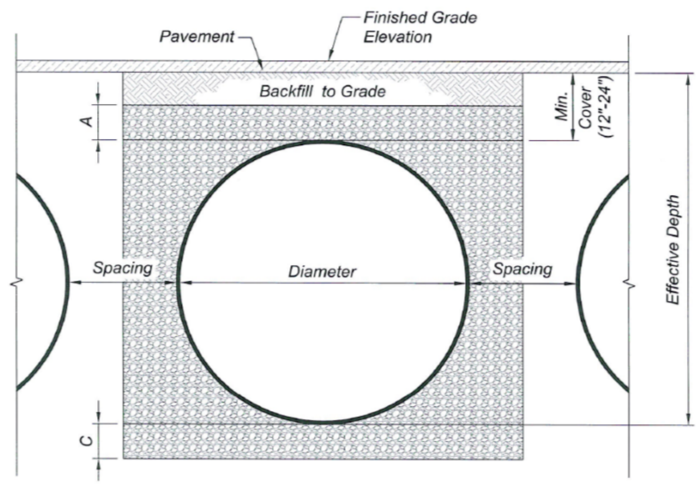




Project Summary

Date:	2/3/2020	
Project Name:	Jackson J1	
City / County:	Indio	
State:	CA	
Designed By:	LM	
Company:	Albert A. Webb Associates	**Enter Information in**
Telephone:	(951) 686-1070	**Blue Cells**

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	23,452	
Limiting Width (ft):	7.00	
Invert Depth Below Asphalt (ft):	7.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	48	12.57 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	13,672	cf	
Porous Stone Storage:	9,805	cf	
Total Storage Provided:	23,477	cf	100.1% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	1088.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	7. ft x 1091. ft		

CONTECH Materials

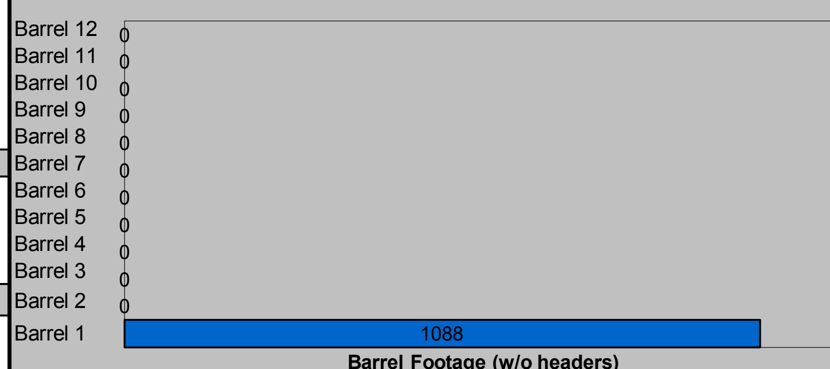
Total CMP Footage:	1,088	ft
Approximate Total Pieces:	46	pcs
Approximate Coupling Bands:	45	bands
Approximate Truckloads:	6	trucks

Construction Quantities**

Total Excavation:	1980	cy
Porous Stone Backfill For Storage:	908	cy stone
Backfill to Grade Excluding Stone:	566	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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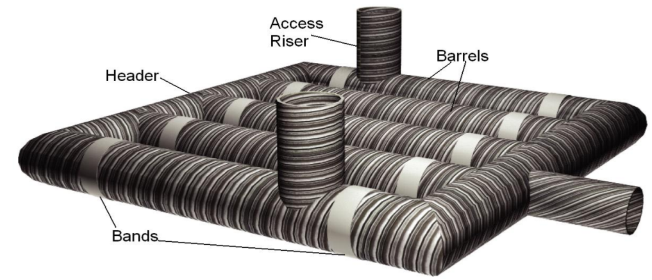
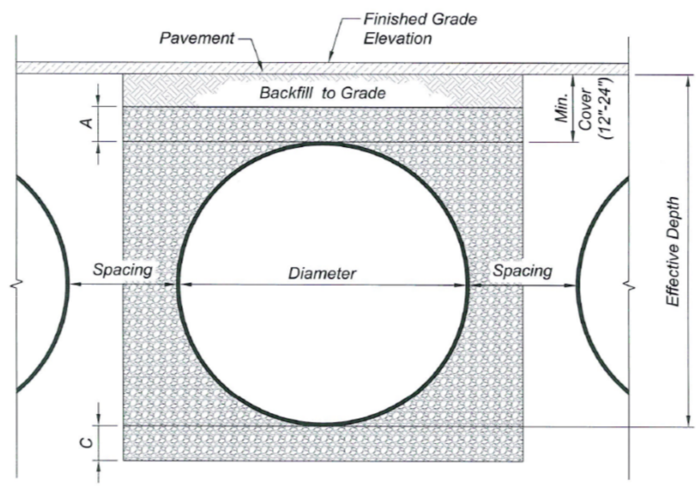




Project Summary

Date:	2/3/2020	
Project Name:	Jackson J2	
City / County:	Indio	
State:	CA	
Designed By:	LM	
Company:	Albert A. Webb Associates	**Enter Information in**
Telephone:	(951) 686-1070	**Blue Cells**

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	13,805	
Limiting Width (ft):	7.00	
Invert Depth Below Asphalt (ft):	7.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	48	12.57 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	8,042	cf	
Porous Stone Storage:	5,785	cf	
Total Storage Provided:	13,827	cf	100.2% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	640.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	7. ft x 643. ft		

CONTECH Materials

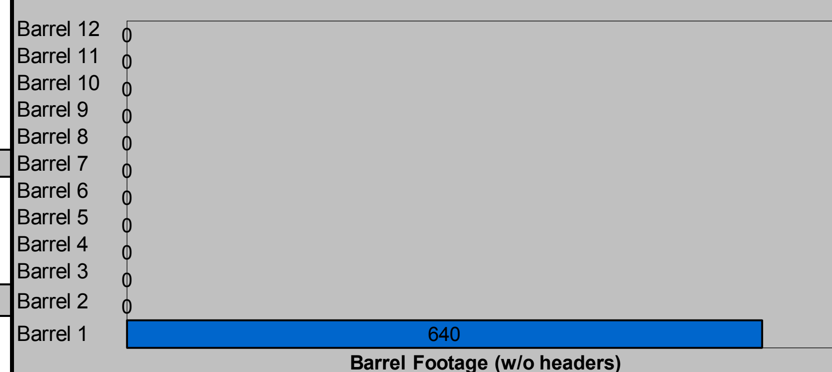
Total CMP Footage:	640	ft
Approximate Total Pieces:	27	pcs
Approximate Coupling Bands:	26	bands
Approximate Truckloads:	4	trucks

Construction Quantities**

Total Excavation:	1167	cy
Porous Stone Backfill For Storage:	536	cy stone
Backfill to Grade Excluding Stone:	333	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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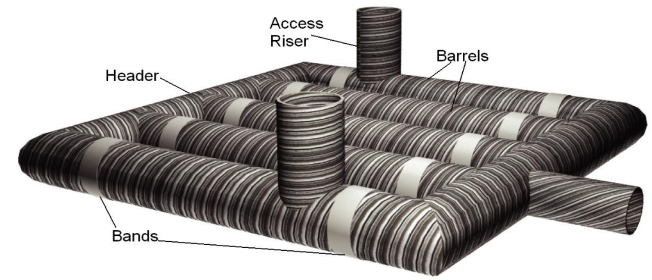
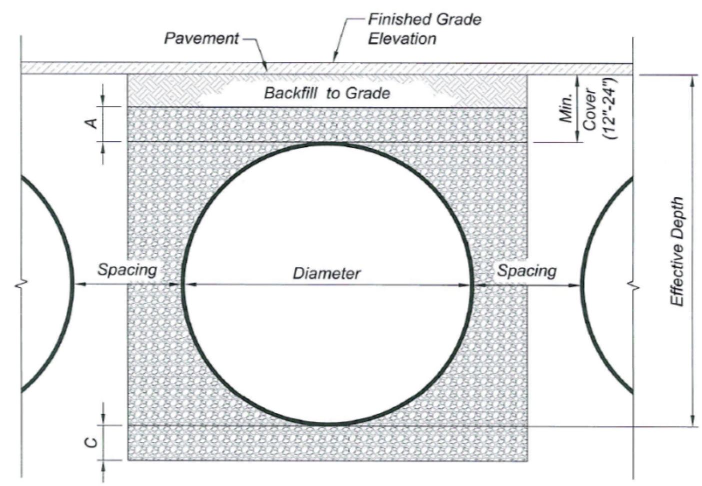




Project Summary

Date:	2/3/2020
Project Name:	Jackson J3
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	6,156	
Limiting Width (ft):	7.00	
Invert Depth Below Asphalt (ft):	7.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	48	12.57 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	3,581	cf	
Porous Stone Storage:	2,599	cf	
Total Storage Provided:	6,181	cf	100.4% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	285.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	7. ft x 288. ft		

CONTECH Materials

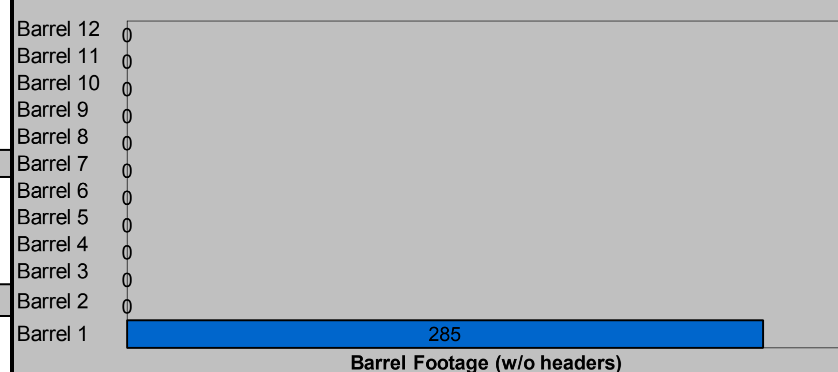
Total CMP Footage:	285	ft
Approximate Total Pieces:	12	pcs
Approximate Coupling Bands:	11	bands
Approximate Truckloads:	2	trucks

Construction Quantities**

Total Excavation:	523	cy
Porous Stone Backfill For Storage:	241	cy stone
Backfill to Grade Excluding Stone:	150	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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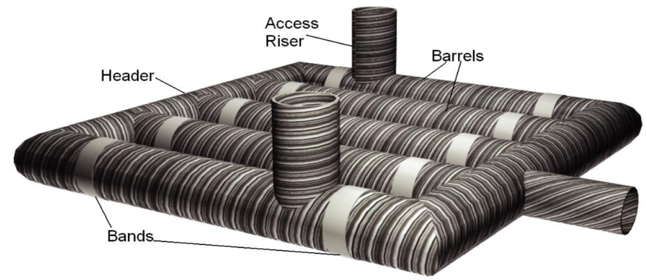
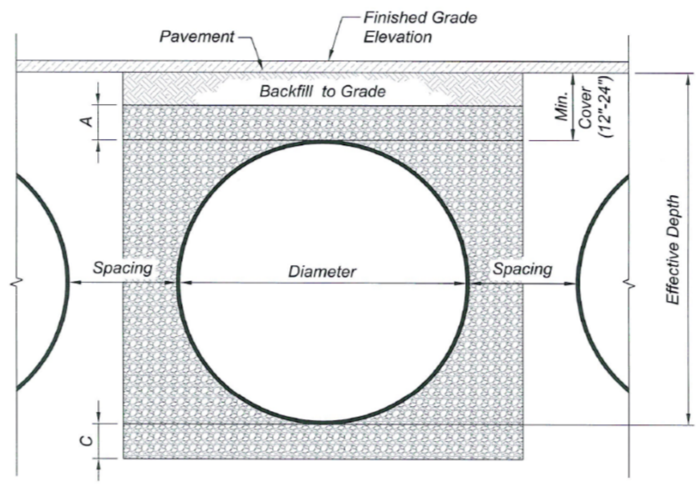


Project Summary

Date:	2/3/2020
Project Name:	Jackson J4
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells



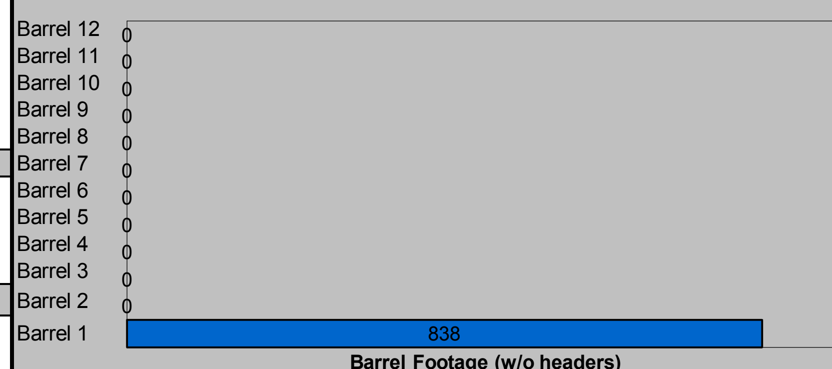
Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	18,062	
Limiting Width (ft):	7.00	
Invert Depth Below Asphalt (ft):	7.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	48	12.57 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	10,531	cf	
Porous Stone Storage:	7,562	cf	
Total Storage Provided:	18,092	cf	100.2% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	838.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	7. ft x 841. ft		

System Layout



CONTECH Materials

Total CMP Footage:	838	ft
Approximate Total Pieces:	35	pcs
Approximate Coupling Bands:	34	bands
Approximate Truckloads:	5	trucks

Construction Quantities**

Total Excavation:	1527	cy
Porous Stone Backfill For Storage:	700	cy stone
Backfill to Grade Excluding Stone:	437	cy fill

***Construction quantities are approximate and should be verified upon final design*

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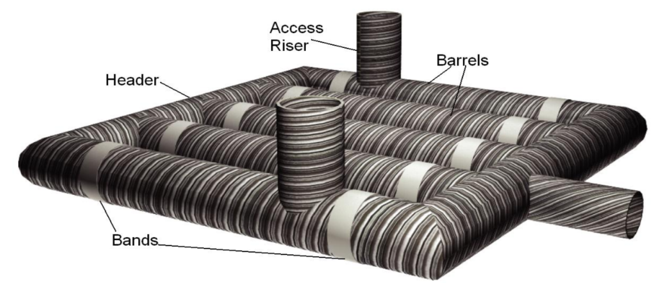
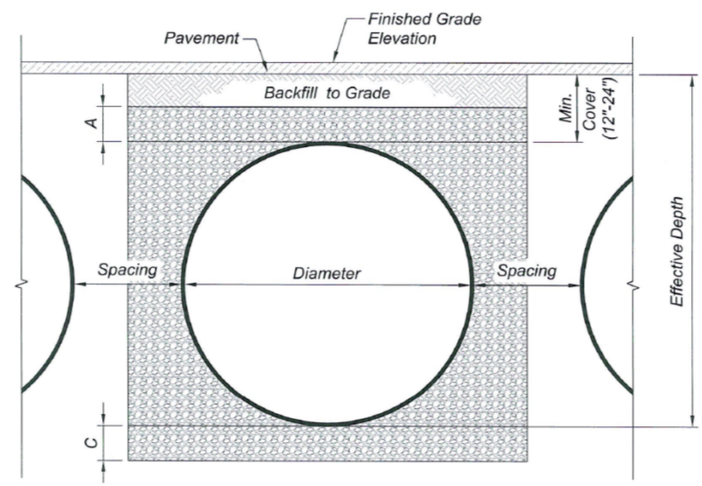




Project Summary

Date:	2/3/2020
Project Name:	Jackson A1
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	6,452	
Limiting Width (ft):	7.00	
Invert Depth Below Asphalt (ft):	7.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	48	12.57 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	3,757	cf	
Porous Stone Storage:	2,725	cf	
Total Storage Provided:	6,482	cf	100.5% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	299.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	7. ft x 302. ft		

CONTECH Materials

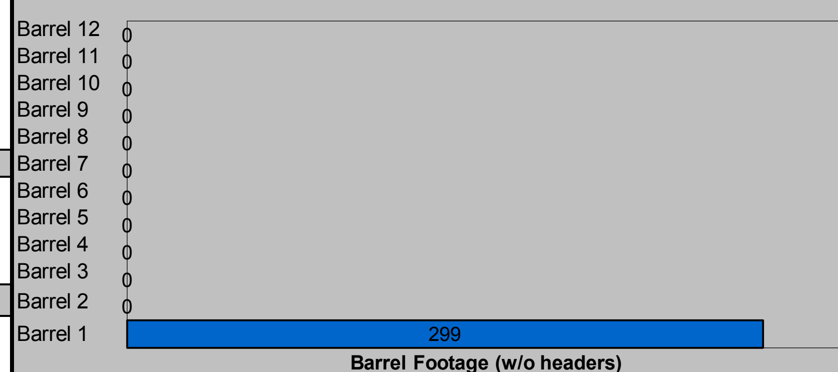
Total CMP Footage:	299	ft
Approximate Total Pieces:	13	pcs
Approximate Coupling Bands:	12	bands
Approximate Truckloads:	2	trucks

Construction Quantities**

Total Excavation:	549	cy
Porous Stone Backfill For Storage:	252	cy stone
Backfill to Grade Excluding Stone:	158	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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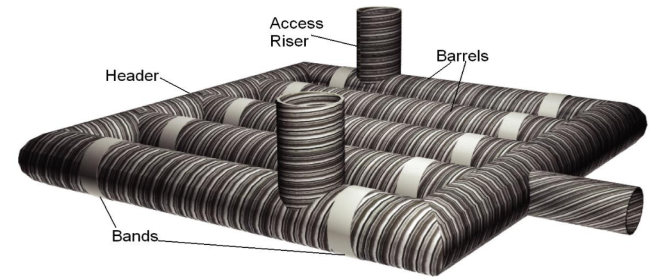
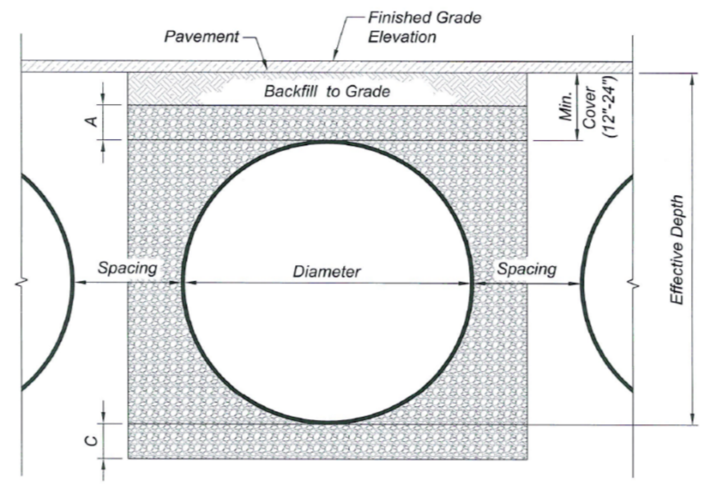




Project Summary

Date:	2/3/2020
Project Name:	Jackson A2
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	9,231	
Limiting Width (ft):	7.00	
Invert Depth Below Asphalt (ft):	7.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	48	12.57 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	5,378	cf	
Porous Stone Storage:	3,883	cf	
Total Storage Provided:	9,261	cf	100.3% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	428.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	7. ft x 431. ft		

CONTECH Materials

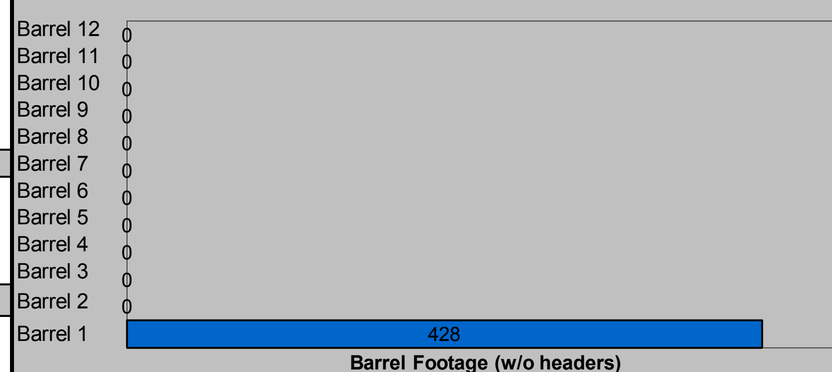
Total CMP Footage:	428	ft
Approximate Total Pieces:	18	pcs
Approximate Coupling Bands:	17	bands
Approximate Truckloads:	3	trucks

Construction Quantities**

Total Excavation:	783	cy
Porous Stone Backfill For Storage:	360	cy stone
Backfill to Grade Excluding Stone:	224	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



JACKSON STREET IMPROVEMENT   W.O. 2019-0002

Jackson Sub-Watershed Unit Hydrograph & 60" Infiltration Trench Summary

ID	Jackson/ Ave 50 Street Station	Watershed Area (acre)	Roadway Length (ft)	100-Y 24-H Storm Volume (cf)	HDPE Estimated Length (ft)	24-H Infiltration Volume * (cf)	Design Storage Volume (cf)	Req'd 60" HDPE Storage (lf)	60" HDPE Provided (lf)	Storm Drain
	JACKSON AVE.									
J1	10+76 to 36+36	3.23	2560	40700	840	15053	25647	827	**840**	Option to use 60" or 48"
J2	36+36 to 56+00	1.80	1964	23840	500	8960	14880	480	**500**	Option to use 60" or 48"
J3	56+00 to 64+75	0.82	875	10860	230	4122	6738	217	**230**	
J4	64+75 to 90+00	2.37	2525	31390	650	11648	19742	637	**650**	
	AVENUE 50									
A1	169+30 to 177+20	0.91	790	11470	240	4301	7169	231	**240**	Option to use 60" or 48"
A2	169+30 to 182+00	1.28	1270	16130	340	6093	10037	324	**340**	Option to use 60" or 48"
	Total	**10.41**	**9984**	**134390**	**2800**	**50176**	**84214**	**2716**	**2800**	

*24-Hour Infiltration Volume = Estimated HDPE Length (80% Trench Width) [(Infiltration Rate 1.4 inches/Hour) /12] (24 Hour)

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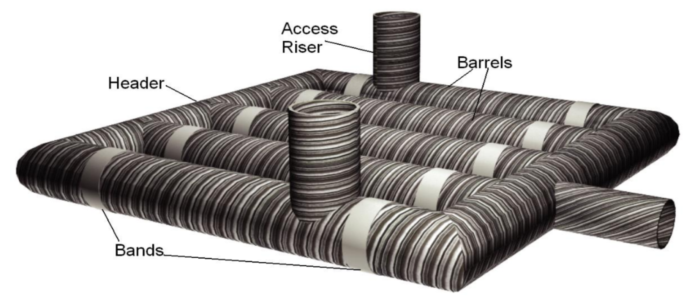


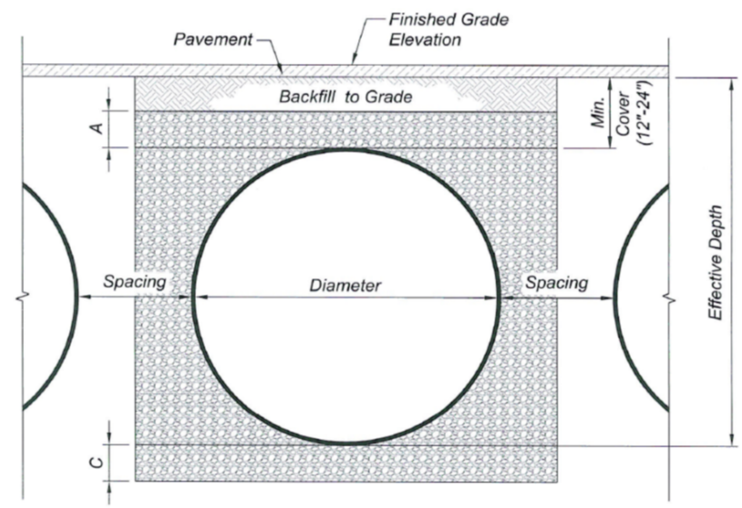
Project Summary

Date:	2/3/2020
Project Name:	Jackson J1
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	25,647	
Limiting Width (ft):	8.00	
Invert Depth Below Asphalt (ft):	8.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	60	19.63 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	



System Sizing

Pipe Storage:	16,238	cf	
Porous Stone Storage:	9,441	cf	
Total Storage Provided:	25,679	cf	100.1% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	827.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	8. ft x 830. ft		

CONTECH Materials

Total CMP Footage:	827	ft
Approximate Total Pieces:	35	pcs
Approximate Coupling Bands:	34	bands
Approximate Truckloads:	9	trucks

Construction Quantities**

Total Excavation:	1968	cy
Porous Stone Backfill For Storage:	874	cy stone
Backfill to Grade Excluding Stone:	492	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout

60" HDPE Pipe Sizing

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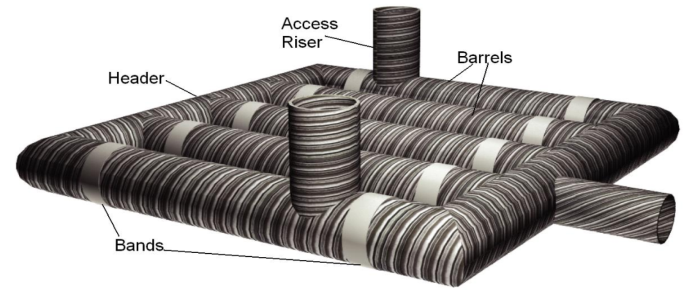


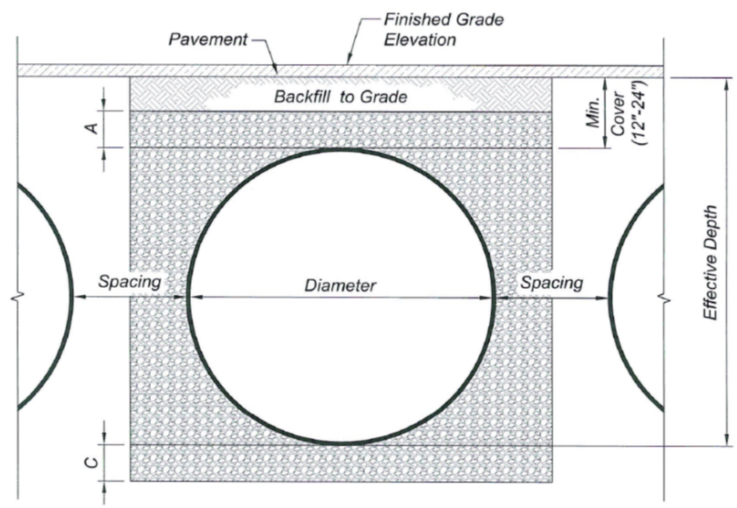
Project Summary

Date:	2/3/2020
Project Name:	Jackson J2
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	14,880	
Limiting Width (ft):	8.00	
Invert Depth Below Asphalt (ft):	8.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	60	19.63 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	



System Sizing

Pipe Storage:	9,425	cf	
Porous Stone Storage:	5,504	cf	
Total Storage Provided:	14,928	cf	100.3% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	480.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	8. ft x 483. ft		

CONTECH Materials

Total CMP Footage:	480	ft
Approximate Total Pieces:	20	pcs
Approximate Coupling Bands:	19	bands
Approximate Truckloads:	5	trucks

Construction Quantities**

Total Excavation:	1145	cy
Porous Stone Backfill For Storage:	510	cy stone
Backfill to Grade Excluding Stone:	286	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout

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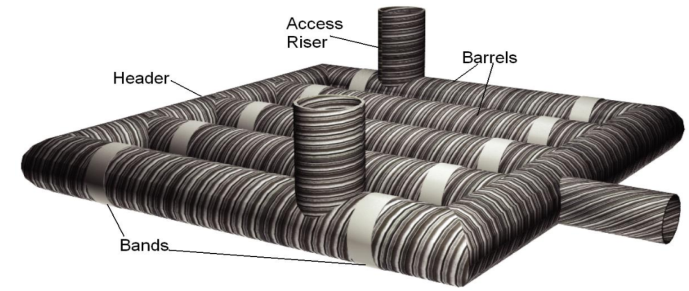

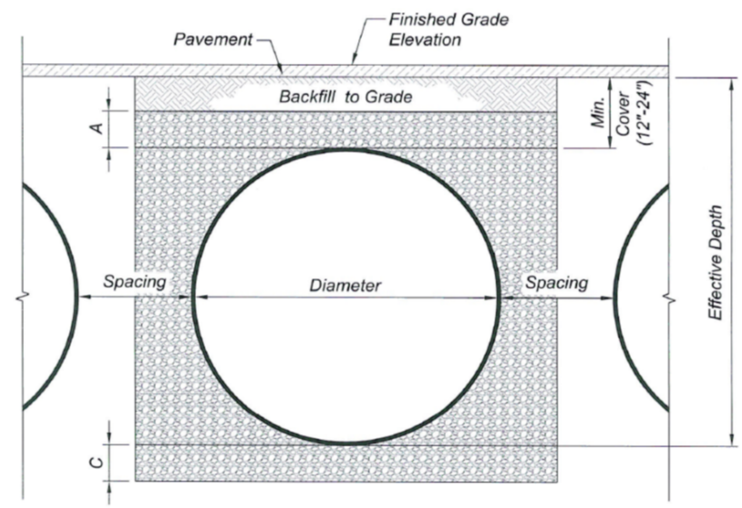

Project Summary

Date:	2/3/2020
Project Name:	Jackson J3
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	6,738	
Limiting Width (ft):	8.00	
Invert Depth Below Asphalt (ft):	8.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	60	19.63 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	4,261	cf	
Porous Stone Storage:	2,520	cf	
Total Storage Provided:	6,780	cf	100.6% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	217.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	8. ft x 220. ft		

CONTECH Materials

Total CMP Footage:	217	ft
Approximate Total Pieces:	10	pcs
Approximate Coupling Bands:	9	bands
Approximate Truckloads:	3	trucks

Construction Quantities**

Total Excavation:	522	cy
Porous Stone Backfill For Storage:	233	cy stone
Backfill to Grade Excluding Stone:	131	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout

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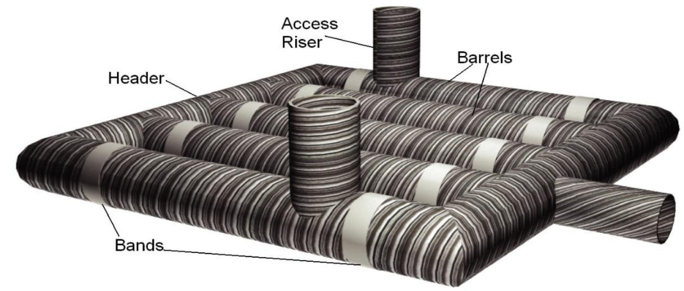
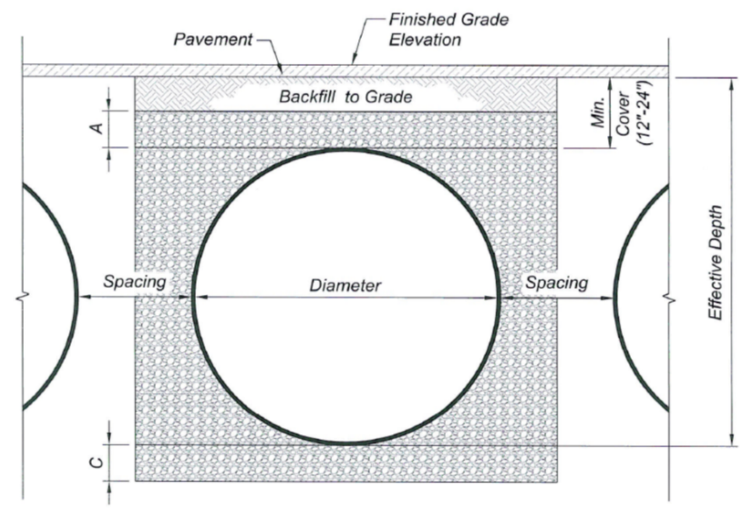


Project Summary

Date:	2/3/2020
Project Name:	Jackson Street J4
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells



Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	19,742	
Limiting Width (ft):	8.00	
Invert Depth Below Asphalt (ft):	8.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	60	19.63 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

System Sizing

Pipe Storage:	12,507	cf	
Porous Stone Storage:	7,285	cf	
Total Storage Provided:	19,792	cf	100.3% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	637.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	8. ft x 640. ft		

CONTECH Materials

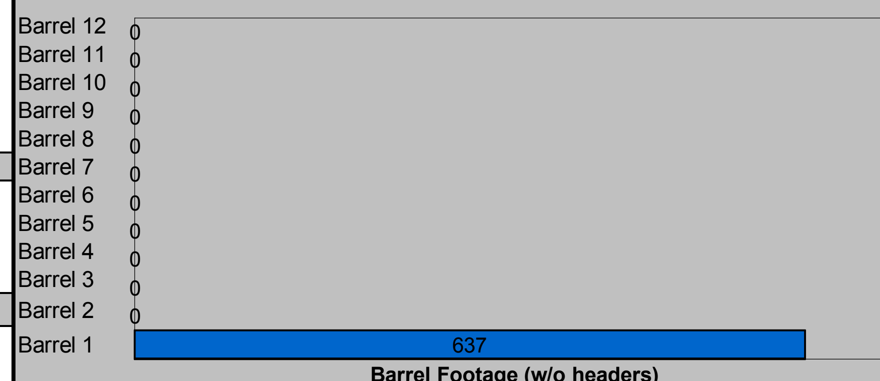
Total CMP Footage:	637	ft
Approximate Total Pieces:	27	pcs
Approximate Coupling Bands:	26	bands
Approximate Truckloads:	7	trucks

Construction Quantities**

Total Excavation:	1518	cy
Porous Stone Backfill For Storage:	675	cy stone
Backfill to Grade Excluding Stone:	380	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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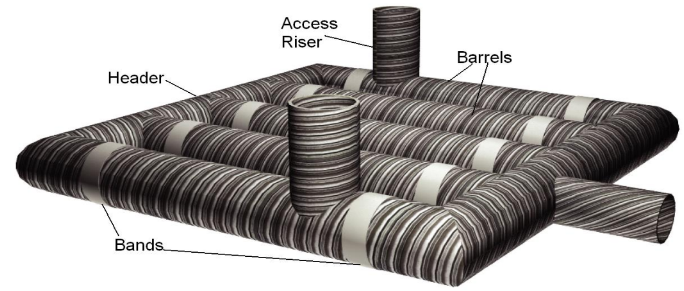


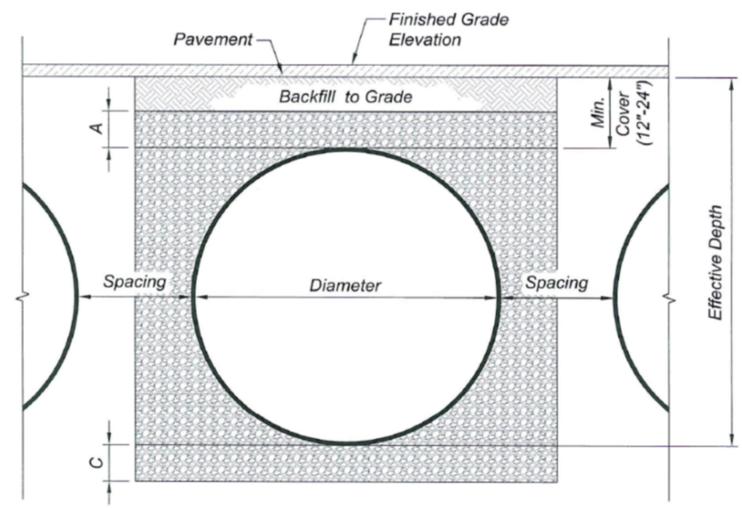
Project Summary

Date:	2/3/2020
Project Name:	Avenue 50 A1
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	7,169	
Limiting Width (ft):	8.00	
Invert Depth Below Asphalt (ft):	8.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	60	19.63 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	



System Sizing

Pipe Storage:	4,536	cf	
Porous Stone Storage:	2,679	cf	
Total Storage Provided:	7,214	cf	100.6% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	231.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	8. ft x 234. ft		

CONTECH Materials

Total CMP Footage:	231	ft
Approximate Total Pieces:	10	pcs
Approximate Coupling Bands:	9	bands
Approximate Truckloads:	3	trucks

Construction Quantities**

Total Excavation:	555	cy
Porous Stone Backfill For Storage:	248	cy stone
Backfill to Grade Excluding Stone:	139	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout

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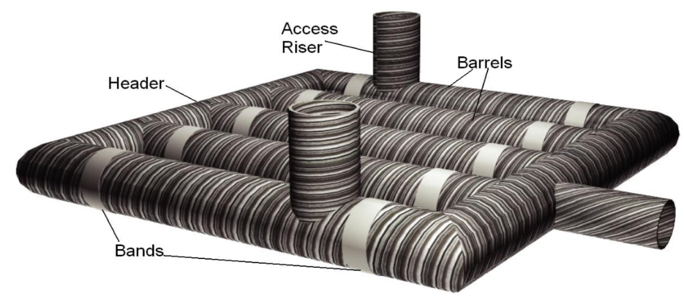


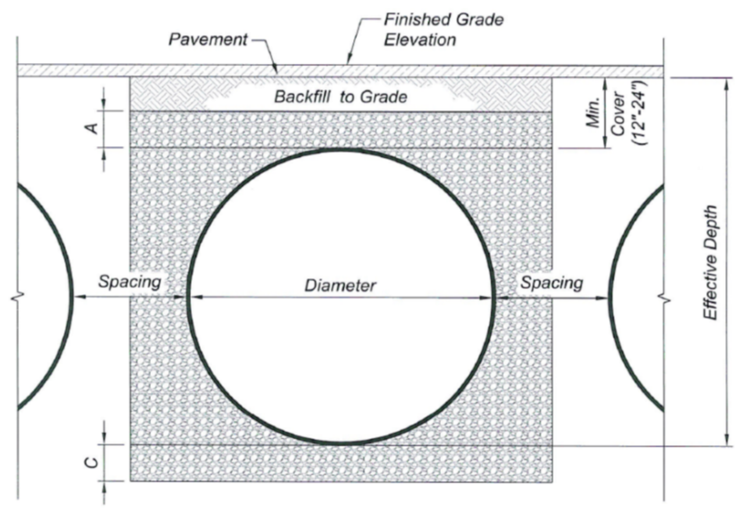
Project Summary

Date:	2/3/2020
Project Name:	Avenue 50 A2
City / County:	Indio
State:	CA
Designed By:	LM
Company:	Albert A. Webb Associates
Telephone:	(951) 686-1070

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	10,037	
Limiting Width (ft):	8.00	
Invert Depth Below Asphalt (ft):	8.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	60	19.63 ft^2 Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	2.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	



System Sizing

Pipe Storage:	6,362	cf	
Porous Stone Storage:	3,734	cf	
Total Storage Provided:	10,095	cf	100.6% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	324.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	8. ft x 327. ft		

CONTECH Materials

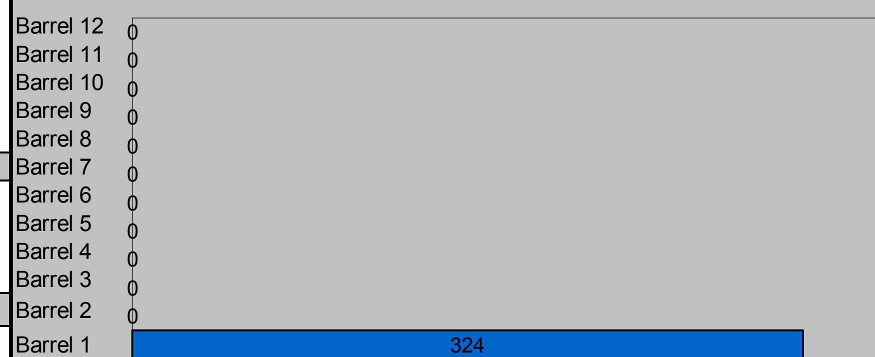
Total CMP Footage:	324	ft
Approximate Total Pieces:	14	pcs
Approximate Coupling Bands:	13	bands
Approximate Truckloads:	4	trucks

Construction Quantities**

Total Excavation:	776	cy
Porous Stone Backfill For Storage:	346	cy stone
Backfill to Grade Excluding Stone:	195	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



Barrel Footage (w/o headers)

Pre-Treatment and Debris and Sediment Removal

FLEXSTORM® INLET FILTERS CATCH-IT®

ADS®

FLEXSTORM® CATCH-IT® REUSABLE INLET PROTECTION

SPECIFY WITH CONFIDENCE

State DOTs and Municipalities across the country now have a universal structural BMP to address the issue of storm sewer inlet protection: FLEXSTORM CATCH-IT Inlet Filters—the temporary *and* reusable solution.

The FLEXSTORM CATCH-IT system is the preferred choice for temporary inlet protection and storm water runoff control. FLEXSTORM CATCH-IT Inlet Filters will fit any drainage structure and are equipped with high-efficiency filter bags. Whether you're the specifier or the user, it's clear to see how FLEXSTORM CATCH-IT Inlet Filters outperform the competition.

APPLICATIONS:

DOT	Road Construction
Commercial	Parking Lots
Industrial	Maintenance
Residential Developments	

FEATURES:

- **Configurable:** steel frames configured and guaranteed to fit ANY storm drainage structure
- **Adjustable:** although shipped to fit your inlet, rectangular framing may be field adjusted in 1/2" increments if necessary
- **Reusable:** galvanized framing will last year after year in harsh conditions, while geotextile filter bags are easily replaced after several years of use
- **Effective:** works below grade; overflow feature allows streets to drain with full bag; third party testing results of the FX filter bag show 82%
- **Affordable:** low per-unit cost; installs in seconds; easily maintained with Universal Removal Tool (no machinery required)

BENEFITS:

- Reduce jobsite flooding and keep projects running
- Minimize residential complaints with cleaner, dryer streets during all construction phases
- Prevent hazardous road icing conditions by eliminating ponding at curb inlets
- Significantly reduce cleanup costs
- Prevent siltation and pollution of rivers, lakes, and ponds
- Helps prevent fines; NPDES PHASE II Compliant
- Lowest cost alternative for the highest level of Inlet Protection
- Available through 5,000 ADS distributors nationwide
- Ships within 48 hours

ADS Service:
ADS representatives are committed to providing you with the answers to all your questions, including specifications, installation and more.

FLEXSTORM CATCH-IT INLET FILTERS SPECIFICATION

IDENTIFICATION

The installer shall inspect the plans and/or worksite to determine the quantity of each drainage structure casting type. The foundry casting number, exact grate size and clear opening size, or other information will be necessary to finalize the FLEXSTORM part number and dimensions. The units are shipped to the field configured precisely to fit the identified drainage structure.

MATERIAL AND PERFORMANCE

The FLEXSTORM Inlet Filter system is comprised of a corrosion resistant steel frame and a replaceable geotextile filter bag attached to the frame with a stainless steel locking band. The filter bag hangs suspended at a distance below the grate that shall allow full water flow into the drainage structure if the bag is completely filled with sediment. The standard Woven Polypropylene FX filter bags are rated for 200 gpm/sqft with a removal efficiency of 82% when filtering a USDA Sandy Loam sediment load. The Post Construction PC filter bags are rated for 137 gpm/sqft and have been 3rd party tested at 99% TSS removal to 110 micron and 97% TPH removal of used motor oil hydrocarbon mix.

INSTALLATION

Remove the grate from the casting or concrete drainage structure. Clean the ledge (lip) of the casting frame or drain- age structure to ensure it is free of stone and dirt. Drop in the FLEXSTORM Inlet Filter through the clear opening and be sure the suspension hangers rest firmly on the inside ledge (lip) of the casting. Replace the grate and confirm it is elevated no more than 1/8”, which is the thickness of the steel hangers. For wall mount units, follow instructions for attaching the stainless steel mounting brackets using the provided concrete fasteners.

INSPECTION FREQUENCY

Construction site inspection should occur following each 1⁄2” or more rain event. Post Construction inspections should occur three times per year (every four months) in areas with mild year round rainfall and four times per year (every three months Feb–Nov) in areas with summer rains before and after the winter snowfall season. Industrial application site inspections (loading ramps, wash racks, maintenance facilities) should occur on a regularly scheduled basis no less than three times per year.

MAINTENANCE GUIDELINES

Empty the filter bag if more than half filled with sediment and debris, or as directed by the Engineer. Remove the grate, engage the lifting bars or handles with the FLEXSTORM Removal Tool, and lift from the drainage structure. Dispose of the sediment or debris as directed by the Engineer or Maintenance Contract in accordance with EPA guidelines.

As an alternative, an industrial vacuum may be used to collect the accumulated sediment. Remove any caked on silt from the sediment bag and reverse flush the bag with medium spray for optimal filtration. Replace the bag if torn or punctured to 1⁄2” diameter or greater on the lower half of the bag.

FILTER BAG REPLACEMENT

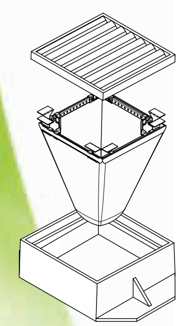
Remove the bag by loosening or cutting off the clamping band. Take the new filter bag, which is equipped with a stainless steel worm drive clamping band, and use a screw driver to tighten the bag around the frame channel. Ensure the bag is secure and that there is no slack around the perimeter of the band.

Lift Handles ease installation and maintenance

Replaceable Sediment Bag

1/8” thick steel hangers& channels; precision stampings **configured to fit each individual casting**

CAD drawings, work instructions and test reports on website: ***www.inletfilters.com***

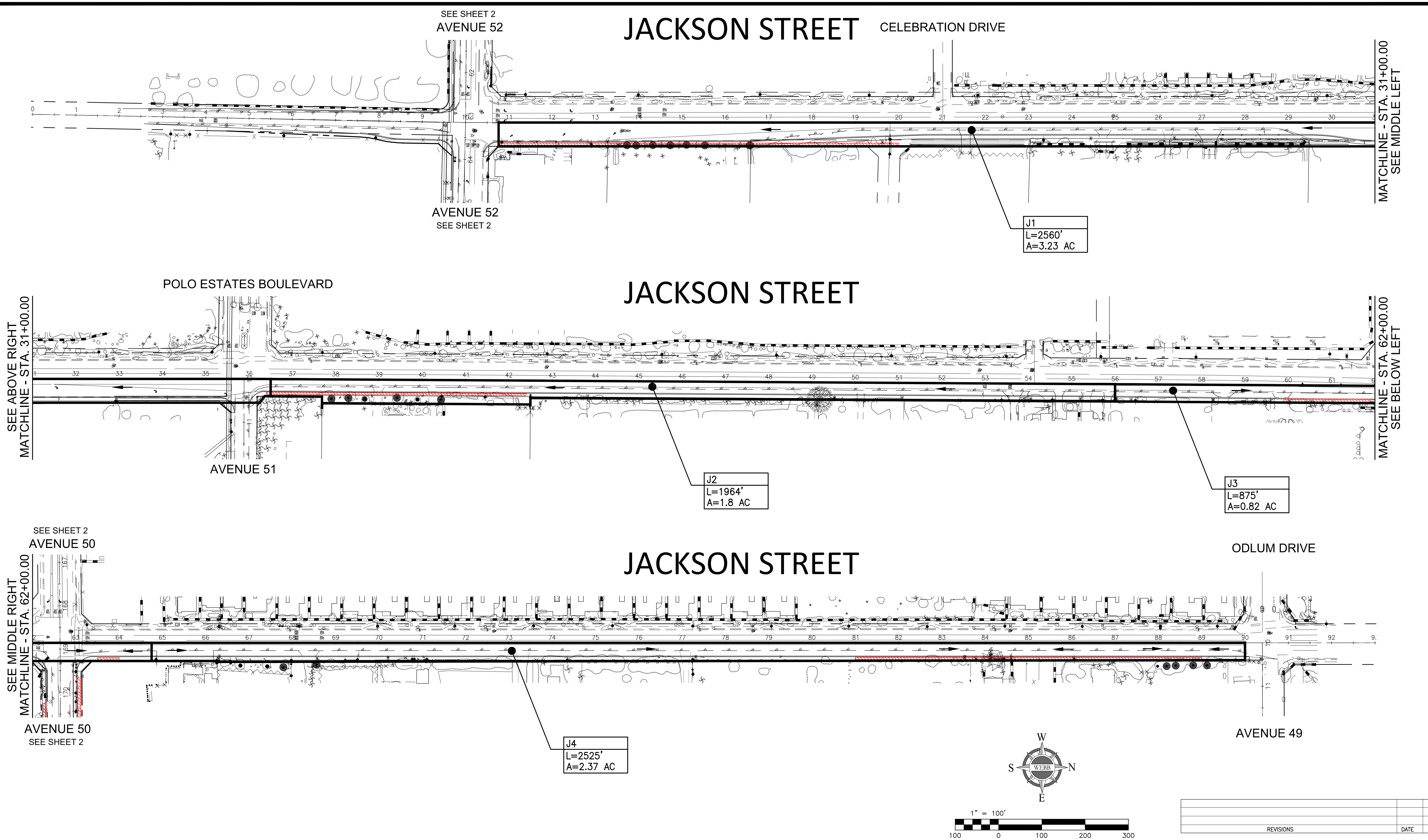


For more information on FLEXSTORM Inlet Filters and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

SECTION 4 - APPENDIX A

Hydrology Map for Unit Hydrographic Study



REVISIONS	DATE	BY

CITY OF INDIO
COUNTY OF RIVERSIDE

STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
JACKSON STREET
HYDROLOGY MAP

SCALE:	100'	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 2019-0002
DATE:	2-04-2020			SHEET 1
DESIGNED:	LM			OF 2 SHEETS
CHECKED:	LM			DWG. NO.
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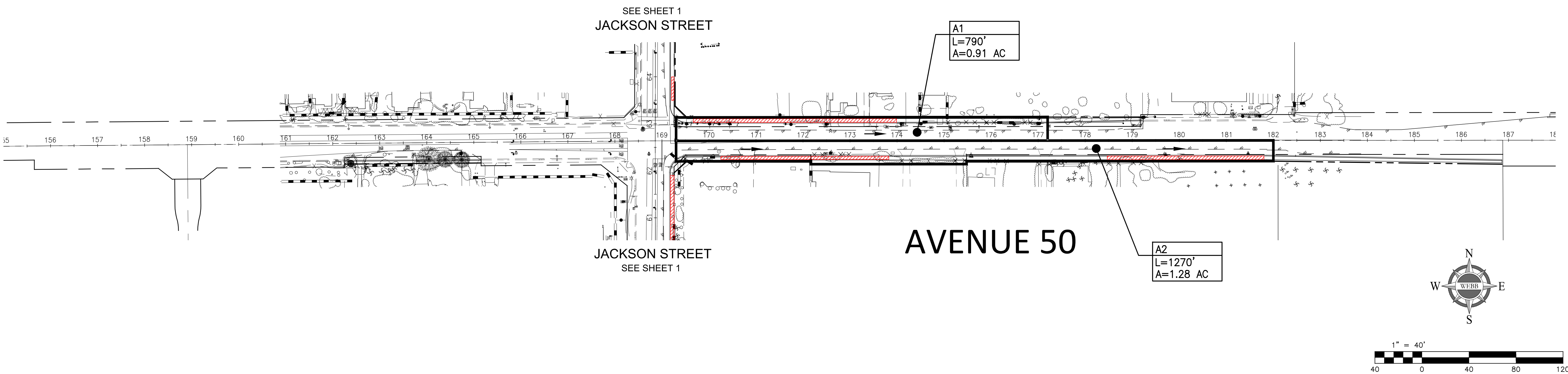

REVISIONS	DATE	BY

CITY OF INDIO
COUNTY OF RIVERSIDE

STREET IMPROVEMENT PLAN
JACKSON STREET IMPROVEMENT PROJECT
AVENUE 50
HYDROLOGY MAP

SCALE:	100'
DATE:	2-04-2020
DESIGNED:	LM
CHECKED:	LM
PLN CK REF:	REF
F.B.	F.B.

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W.O. 2019-0002
SHEET 2
OF 2 SHEETS
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APPENDIX G
NOISE STUDY REPORT

Noise Study Report

Avenue 50 & Jackson St Improvement Project

City of Indio

Prepared for:

City of Indio

Prepared by:

Entech Consulting Group
Planning • Environmental • Construction Management

43410 Business Park Drive
Temecula, CA 92590
(951) 506-0055

December 2020

Tables

Figures

1.0 INTRODUCTION

For CEQA purposes, the noise analysis centers around whether an increase in the future noise level would result in a significant effect. A comparison is made between existing noise levels to the predicted noise level with the project. Under CEQA, the assessment entails looking at the existing setting of the noise impact and then determining how large or perceptible any noise increase would be in the given area. Critical factors considered include the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected, and the absolute noise level. As the project is located within Riverside County in the City of Indio, CA, the CEQA analysis will also take into consideration the applicability of complying with the County of Riverside and the City of Indio Noise Ordinances, the City of Indio General Plan Noise Element, and other applicable city policies for protecting sensitive land use categories in the project area as well as complying with CEQA threshold requirements. Pursuant to Appendix G of the CEQA Guidelines, a noise analysis will be performed to determine whether the proposed project will result in:

- Substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance or other agencies' applicable standards?
- Excessive groundborne vibration or groundborne noise levels?
- Expose people residing or working in the project area to excessive noise levels for the project if it is located within the vicinity of a private airstrip or 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?

2.0 PROJECT DESCRIPTION

The study area is located in the City of Indio, along its southeastern border with the City of Coachella and a portion of unincorporated Riverside County, along Jackson Street between Avenue 50 and Avenue 52. Figure 1 shows an aerial of the study area.

The Jackson Street Improvement Project from Avenue 50 to Avenue 52 (hereinafter the Project) entails the improvement of Jackson Street from Odlum Drive, approximately 0.5 miles north of the intersection of Jackson Street and Avenue 50 to approximately 0.25 miles south of the intersection of Jackson Street and Avenue 52. Improvements are also proposed along Avenue 50 and Avenue 52, east and west of Jackson Street.

Jackson Street at Avenue 52

The proposed improvements include signalizing the existing 4-way stop. The existing Jackson Street south of Avenue 52 is a two-lane road with one lane of travel in each direction. The project proposes constructing a curb and gutter on the west side and providing a lane taper to accommodate through traffic. The east side will be widened approximately 24 feet with curb and gutter to accommodate a northbound right turn lane. Avenue 52, west of the intersection, will be widened approximately 12 feet and taper westerly back to existing pavement to also accommodate a right turn lane onto southbound Jackson Street. There are no improvements proposed along the north side of Avenue 52, west of Jackson Street. Avenue 52, east of Jackson Street, will be widened approximately 13 feet on the south side with a curb and gutter to accommodate a lane taper. The north side of Avenue 52, east of Jackson, will be widened approximately 12 feet without curb and gutter to accommodate a right turn pocket onto northbound Jackson street. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

Jackson Street (From Avenue 52 to Avenue 51)

The proposed improvements include widening the easterly side of Jackson Street approximately 12 feet and construct an 8' wide, curb-adjacent sidewalk. Existing power poles along this section will be protected in place. All private driveways will be reconstructed with standard residential driveway curb cuts. Approaching the Avenue 51 intersection, the existing right-turn pocket to head eastbound on Avenue 51 will be removed and replaced to meet turn pocket design standards. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate stormwater, 48" HDPE underground storage pipes are proposed underneath portions of the sidewalk.

Jackson Street at Avenue 51

The proposed improvements include signalizing the existing 2-way stop. ADA ramps are proposed at both northeast and southeast curb returns. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed

Jackson Street (From Avenue 51 to Avenue 50)

The proposed improvements include widening the easterly side of Jackson Street approximately 12 feet and construct an 8' wide, curb-adjacent sidewalk. All private driveways will be reconstructed with standard residential driveway curb cuts. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate stormwater, 48" HDPE underground storage pipes are proposed underneath portions of the sidewalk. Approximately 800 feet south of Avenue 50, there are four single-family residences located on the east side of Jackson. Removal and reconstruction of said driveways are proposed to accommodate the roadway widening and construction of an 8-foot-wide sidewalk.

Jackson Street at Avenue 50

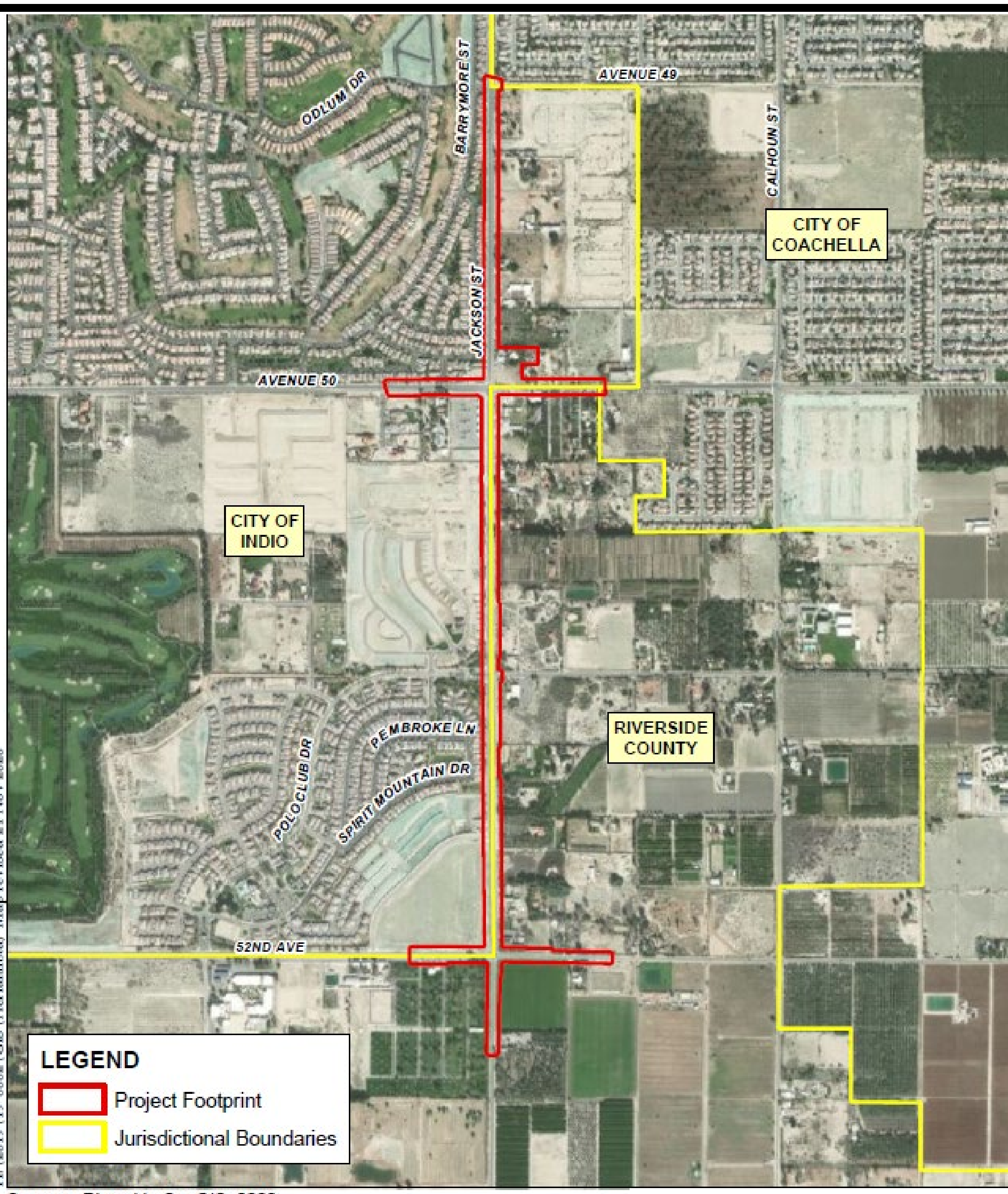
The proposed improvements include signalizing the existing 4-way stop. ADA ramps are proposed at both northeast and southeast curb returns. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed.

There is an existing local market store located at the northeast corner of the intersection. An adjacent 1-acre unpaved lot provided parking for the market customers. The proposed improvements will include paving and striping the existing lot and driveway cuts for lot access.

Along the south side of Avenue 50, west of Jackson Street, there is a 300-foot “gap” of unimproved frontage. The proposed improvements will construct this gap to ultimate width by widening the existing pavement approximately 22 feet, constructing curb & gutter, and sidewalk. A section of CVWD irrigation line facilities will be removed and replaced where surface improvements are proposed. The south side of Avenue 50, east of Jackson Street, will be widened approximately 14 feet and includes curb, gutter, and sidewalk construction. The proposed ultimate improvements will terminate at the City limit line and include a short pavement transition into the City of Coachella. The north side of Avenue 50, east of Jackson Street, will be widened approximately 16 feet and includes curb, gutter, and sidewalk construction. The proposed ultimate improvements will terminate approximately 320 feet short of the City limit line, where ultimate improvements have been constructed. Approximately 1,000 linear feet of Imperial Irrigation District (IID) is proposed to be undergrounded.

Jackson Street (From Avenue 50 to Avenue 49)

The proposed improvements include widening the easterly side of Jackson Street approximately 14 feet and construct an 8’ wide, curb-adjacent sidewalk. All private driveways will be reconstructed with standard residential driveway curb cuts. In addition to the east side roadway widening, a grind and overlay is proposed for the westerly portion of Jackson Street. To accommodate stormwater, 48” HDPE underground storage pipes are proposed underneath portions of the sidewalk.



Sources: Riverside Co. GIS, 2020;
ESRI/Digital Globe, 2018.

0 1,000 2,000 3,000 Feet

Figure 1. Regional Map

Jackson Street Improvement Project
from Avenue 50 to Avenue 52

ALBERT A. WEBB ASSOCIATES

3.0 FUNDAMENTALS OF NOISE

Table 3-1 presents a glossary of general acoustical terminology used in this analysis.

Table 3-1. Definition of Acoustical Terms

Term	Definition
Noise	Whether something is perceived as a noise event is influenced by the type of sound, the perceived importance of the sound, and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the listener.
Sound	For purposes of this analysis, sound is a physical phenomenon generated by vibrations that result in waves that travel through a medium, such as air, and result in auditory perception by the human brain.
Frequency	Sound frequency is measured in Hertz (Hz), a measure of how many times each second, the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates several times per second. When the drum skin vibrates 100 times per second, it generates a sound pressure wave oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the best human ear.
Amplitude or Level	It is measured in decibels (dB) using a logarithmic scale. A sound level of zero dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above approximately 110 dB begin to be felt inside the human ear as discomfort and eventually pain at 120 dB and higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about one to two dB. A three to five dB change is readily perceived. The average person usually perceives a change in the sound level of about 10 dB as a doubling (or decreasing by 10 dB, halving) of the sound's loudness.
Sound pressure	Sound level is usually expressed by reference to a known standard. This report refers to sound pressure level (SPL or Lp). In expressing sound pressure on a logarithmic scale, the sound pressure is compared to a reference value of 20 micropascals (µPa). Lp depends not only on the power of the source but also on the distance from the source and the acoustical characteristics of the space surrounding the source.
A-weighting	Sound from a tuning fork contains a single frequency (a pure tone), but most sounds one hears in the environment do not consist of a single frequency and

Table 3-1. Definition of Acoustical Terms

Term	Definition
	instead are composed of a broadband of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects the typical frequency-dependent sensitivity of average healthy human hearing. This is called "A-weighting," and the decibel level measured is referred to as dBA. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA "curve" of decibel adjustment per octave band center frequency (OBCF) from a "flat" or unweighted SPL.
Equivalent sound level	Although sound level value may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor, L_{eq}, may be used to describe sound that is changing in level. L_{eq} is the energy-average dBA during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given source to equal the acoustic energy contained in the fluctuating sound level measured.
L_{max} and L_{min}	Additionally, it is often desirable to know the range of amplitudes for the noise source(s) under study. This is typically accomplished by reporting the L_{max} and L_{min} indicators that represent the root mean square (RMS) maximum and minimum noise levels during a given monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the "noise floor."
Statistical sound values	The statistical noise descriptors L10, L50, and L90, are commonly used to describe environmental noise's time-varying character. These noise levels are exceeded during 10, 50, and 90 percent of a stated time interval. Sound levels associated with L10 typically describe transient or short-term events, while levels associated with L90 describe the "steady-state" (or most prevalent) background noise conditions.
Day-night sound level	Average sound exposure over 24 hours is often presented as a day-night average, or time-weighted, sound level (L_{dn}). L_{dn} values are calculated from hourly L_{eq} values, with the L_{eq} values for the nighttime period (10 p.m. to 7 a.m.) increased by 10 dB to reflect the greater disturbance potential from nighttime sounds.

In addition, sound is characterized by both its amplitude and frequency (or pitch). The human ear does not hear all frequencies equally. In particular, the ear deemphasizes low and very high frequencies. To approximate the sensitivity of human hearing, the A-weighted decibel scale (dBA) is used. On this scale, the human range of hearing extends from approximately 3- dBA to around 140 dBA. **Table 3-2** includes examples of A-weighted noise levels from common indoor and outdoor activities.

Table 3-2. Typical A-Weighted Noise Levels

Common Outdoor Noise	Noise Level (dBA)	Common Indoor Noise
	— 110 —	Rock band (noise to some, music to others)
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher in neighboring room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

SOURCE: Caltrans, 1998.

Using the decibel scale, sound levels from two or more sources cannot be directly added together to determine the overall sound level. Instead, the combination of two sounds at the same level yields an increase of 3 dBA. The smallest recognizable change in sound levels is approximately 1 dBA. A 3-dBA increase is generally considered perceptible, whereas a 5-dBA increase is readily perceptible. Most people judge a 10-dBA increase as an approximate doubling of the sound loudness.

Two of the primary factors that reduce environmental sounds are increasing the distance between the sound source to the receiver and having intervening obstacles such as walls, buildings, or terrain features between the sound source and the receiver. Factors that increase the loudness of environmental sounds include moving the sound source closer to the receiver, sound enhancements caused by reflections, and focusing caused by various meteorological conditions.

3.1 Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance)
- Interference effects (e.g., communication, sleep, and learning interference)

- Physiological effects (e.g., startle response)
- Physical effects (e.g., hearing loss)

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects refer to interruption of daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep. With regard to the subjective effects, the responses of individuals to similar noise events are diverse. They are influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity.

Overall, a wide variation of tolerance to noise exists, based on an individual's past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). The more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- A 3 dBA change in noise levels is considered a barely perceivable difference outside of the laboratory.
- A change in noise levels of 5 dBA is considered to be a readily perceivable difference.
- A change in noise levels of 10 dBA is subjectively heard as a doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a straightforward additive fashion but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

3.2 Noise Attenuation

Stationary point sources of noise, including stationary, mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for hard sites and 7.5 dBA for soft sites for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the noise from the source. Soft sites have an absorbent ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources (such as traffic noise from vehicles) attenuate at a rate between 3-dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement (Caltrans 2013).

Physical barriers between the noise source and the receiving property are also useful in reducing noise levels. Effective noise barriers can lower noise levels by 10 to 15dBA, which would substantially cut the loudness of traffic noise. A noise barrier is more effective when placed closest to the noise source or receiver, depending upon site geometry. However, there is a limitation on the effectiveness of a noise barrier. Noise barriers must block the line of sight between the receiving property and the noise source. When this occurs, a noise barrier can achieve a 5-dBA noise level reduction. This may require the noise barrier to be sufficiently long and high enough to block the view of a road to reduce traffic noise.

3.3 Fundamentals of Vibration

Vibration is energy transmitted in waves through the ground or human-made structures. These energy waves generally dissipate with distance from the vibration source. Familiar sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operation of heavy earth-moving equipment. As described in the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment (FTA 2006), ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most commonly used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to measure RMS. The relationship of PPV to RMS velocity is expressed in terms of the "crest factor," defined as the ratio of the PPV amplitude to the RMS amplitude. Peak particle velocity is typically a factor of 1.7 to 6 times greater than RMS vibration velocity (FTA 2006). The decibel notation acts to compress the range of numbers required to describe vibration. Typically, ground-borne vibration generated by human-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

The effects of ground-borne vibration include movement of the building floors, the rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration levels exceed the perception threshold by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 in/sec PPV (FTA 2006).

In residential areas, the background vibration velocity level is usually around 50 VdB (approximately 0.0013 in/sec PPV). This level is well below the vibration velocity level threshold of perception for humans, approximately 65 VdB. A vibration velocity level of 75 VdB is considered to be the approximate dividing line between barely perceptible and distinctly perceptible levels for many people (FTA 2006).

4.0 Regulatory Framework

The proposed project area's governing regulatory framework includes federal, state, and local agencies that enforce noise standards and specific regulations that govern project development, emitted pollutants, and ambient air quality status for the region.

4.1 Federal Regulations and Standards

There are no federal noise standards that directly regulate environmental noise related to the proposed project's construction or operation. With regard to noise exposure and workers, the Office of Safety and Health Administration (OSHA) regulations safeguard the hearing of workers exposed to occupational noise. Federal regulations also establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dB at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

Federal Transit Authority Vibration Standards

The FTA has adopted vibration standards to evaluate potential building damage impacts related to construction activities. The vibration damage criteria adopted by the FTA are shown in **Table 4-1**.

Table 4-1. Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12
SOURCE: FTA, 2006.	

The FTA has also adopted the following standards for groundborne vibration impacts related to human annoyance: Vibration Category 1 – High Sensitivity, Vibration Category 2 – Residential, and Vibration Category 3 – Institutional. The FTA defines Category 1 as buildings where vibration would interfere with operations, such as vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and research operations. Category 2 refers to all residential land uses and buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment but still have the potential for activity interference. The vibration thresholds associated with human annoyance for these three land-use categories are shown in **Table 4-2**. No thresholds have been adopted or recommended for commercial and office uses.

Table 4-2. Groundborne Vibration Impact Criteria for General Assessment

Land Use Category	Frequent Events [a]	Occasional Events [b]	Infrequent Events [c]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[d]	65 VdB[d]	65 VdB[d]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

[a] Frequent Events" is defined as more than 70 vibration events of the same source per day.
[b] Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
[c] Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.
[d] This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.
SOURCE: FTA, 2006

4.2. State Standards

Senate Bill 860

In the State of California, State Senate Bill 860, which became effective January 1, 1976, directed the California Office of Noise Control within the State Department of Health Services to prepare the *Guidelines for the Preparation and Content of Noise Elements of the General Plan*.[1] One purpose of these guidelines was to provide sufficient information concerning the community's noise environment so that noise could be considered in the land-use planning process. As part of this publication, Land Use Compatibility Standards were developed in four categories: Normally Acceptable, Conditionally Acceptable, Normally Unacceptable, and Clearly Unacceptable. These categories were based on earlier work done by the U.S. Department of Housing and Urban Development.

The interpretation of these four categories is as follows:

Normally Acceptable: Specified land use is satisfactory without special insulation.

Conditionally Acceptable: New development requires a detailed analysis of noise insulation requirements.

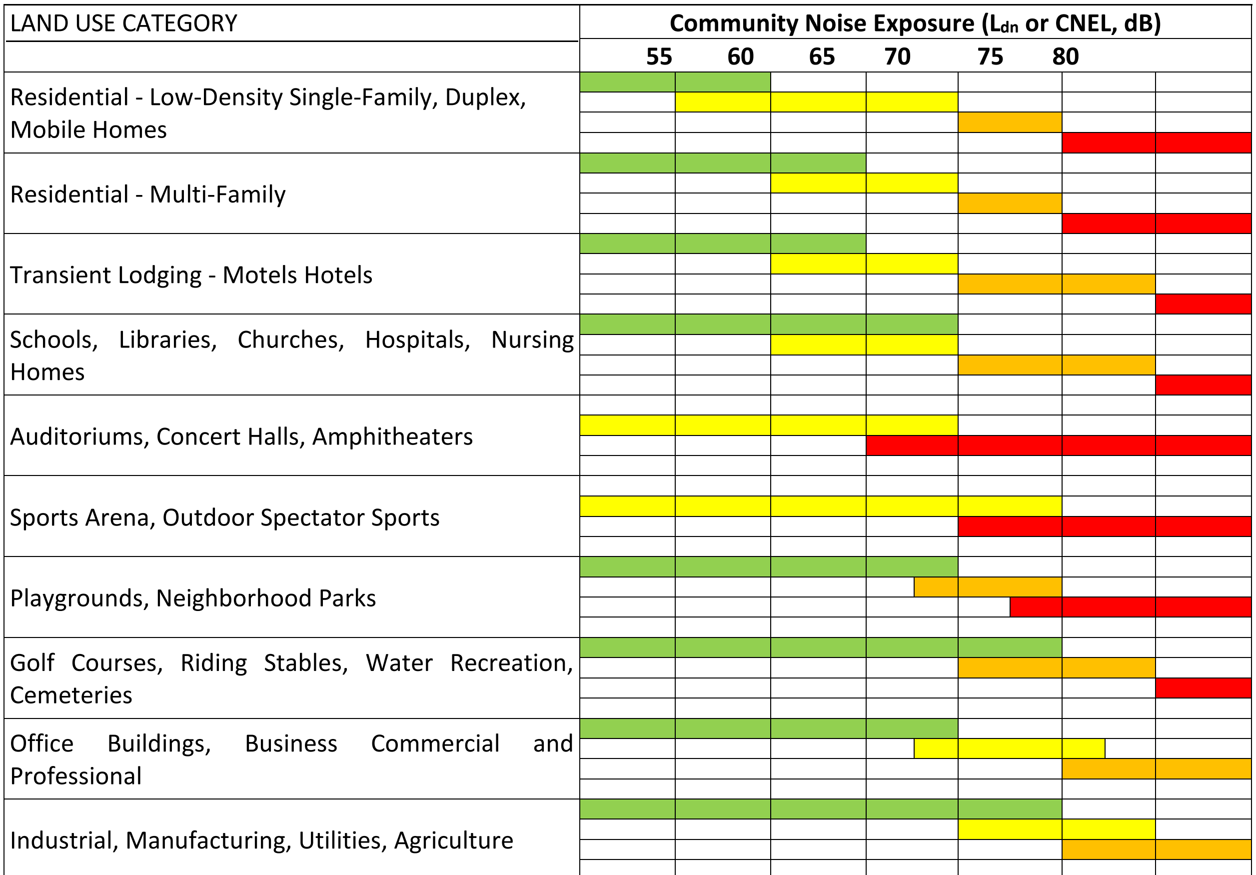
Normally Unacceptable: New development is discouraged and requires a detailed analysis of insulation features.

Clearly Unacceptable: New development should not be undertaken.

[1] State of California, General Plan Guidelines, Governor's Office of Planning and Research, October, 2003.

The state has developed a land-use compatibility matrix for community noise environments that further defines four categories of acceptance and assigns CNEL values to them. In addition, the State Building Code (Part 2, Title 24, California Code of Regulations) establishes uniform minimum noise insulation performance standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and residential units other than detached single-family residences from the effects of excessive noise, including, but not limited to, hearing loss or impairment and interference with speech and sleep. Residential structures to be located where the CNEL or L_{dn} is 60 dBA or greater are required to provide sound insulation to limit the interior CNEL to a maximum of 45 dBA. An acoustic or noise analysis report prepared by an experienced acoustic engineer is required to issuance a building permit for these structures. Conversely, land use changes that result in increased noise levels at residences of 60 dBA or greater must be considered in the evaluation of impacts to ambient noise levels. **Figure 2**, *Land Use Compatibility for Community Noise Environments*, graphically depicts the acceptability of noise levels for various uses.

Figure 2. Land Use Compatibility Matrix



Normally Acceptable - Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable - New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply system or air conditioning, will normally suffice.

Normally Unacceptable - New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable - New construction or development should generally not be undertaken.

SOURCE:
Adapted from: Governor's Office of Planning and Research. 2003. State of California General Plan Guidelines. Appendix C, Noise Element Guidelines, Figure 2. Sacramento, CA.

4.3 County and City Ordinances and Policies

4.3.1 County of Riverside Noise Ordinance 847

The County of Riverside regulates noise through Noise Ordinance 847 to protect Riverside County residents' health, safety, or general welfare. For this project, the capital improvements made along Jackson Street are exempt as outlined below under Section 2 of this Noise Ordinance.

Section 2. EXEMPTIONS.

Sound emanating from the following sources is exempt from the provisions of Riverside County Ordinance 847:

a. Facilities owned or operated by or for a governmental agency.
b. Capital improvement projects of a governmental agency.
c. The maintenance or repair of public properties.
d. Public safety personnel in the course of executing their official duties, including, but not limited to, sworn peace officers, emergency personnel, and public utility personnel. This exemption includes, without limitation, sound emanating from all equipment used by such personnel, whether stationary or mobile. e. Public or private schools and school-sponsored activities
f. Agricultural operations on land designated Agriculture in the Riverside County General Plan, or land zoned A-1 (Light Agriculture), A-P (Light Agriculture With Poultry), A-2 (Heavy Agriculture), A-D (Agriculture-Dairy) or C/V (Citrus/Vineyard), provided such operations are carried out in a manner consistent with accepted industry standards. This exemption includes, without limitation, sound emanating from all equipment used during such operations, whether stationary or mobile.
g. Wind Energy Conversion Systems (WECS) provided such systems comply with the WECS noise provisions of Riverside County Ordinance No. 348.
h. Private construction projects located one-quarter (1/4) of a mile or more from an inhabited dwelling.
i. Private construction projects located within one-quarter (1/4) of a mile from an inhabited dwelling, provided that:

1. Construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September; and
2. Construction does not occur between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May.

j. Property maintenance, including, but not limited to, the operation of lawnmowers, leaf blowers, etc., provided such maintenance occurs between the hours of 7 a.m. and 8 p.m.
k. Motor vehicles, other than off-highway vehicles. This exemption does not include sound emanating from motor vehicle sound systems
l. Heating and air conditioning equipment.
m. Safety, warning, and alarm devices, including, but not limited to, house and car alarms and other warning devices designed to protect the public health, safety, and welfare. n. The discharge of firearms consistent with all state laws.

4.3.2 City of Indio Noise Ordinance

Section 95C.08 of the City of Indio Noise Ordinance has established the following limits for noise occurrences that are particularly disturbing, excessive, or offensive to public welfare and quality of life.

§ 95C.08 DISTURBING, EXCESSIVE, OFFENSIVE NOISES OR VIBRATION CREATED BY VEHICLE(S), TOOLS, MACHINERY; DECLARATION OF CERTAIN ACTS CONSTITUTING.

The following activities, among others, are declared to cause disturbing, excessive, or offensive noises or vibration in violation of this section, but such enumeration shall not be deemed to be exclusive, namely:

(A) Standing motor vehicles. No person shall operate or permit the operation of any motor vehicle with a gross vehicle weight rating in excess of 10,000 pounds or any auxiliary equipment attached to such a vehicle, including but not limited to refrigerated truck compressors, for a period longer than 15 minutes in any hour while the vehicle is stationary and on a public right-of-way or public space, within 150 feet of a residential area between the hours of 7:00 p.m. and 7:00 a.m., except when movement of said vehicle is restricted by other traffic.

(B) Controlled hours of operation. Notwithstanding the provisions of Chapter 151 of this code, it shall be unlawful for any person to operate, permit, use, or cause to operate any of the following:

(1) Powered model vehicles/planes.

(2) Loading and unloading of vehicles, operating of forklifts or cranes within 1,000 feet of a residence [exempted if the distance from residential area exceeds 1,000 feet or as it may be reduced by the Planning Commission subject to design review or conditional use permit]; and

(3) Construction tools and machinery. Other than between the hours of:
- (1) Pacific Standard Time.
  - (a) Monday through Friday, 7:00 a.m. through 6:00 p.m.
  - (b) Saturday, 8:00 a.m. through 6:00 p.m.
  - (c) Sunday, 9:00 a.m. through 5:00 p.m.
  - (d) Government Holidays, 9:00 a.m. through 5:00 p.m.
- (2) Pacific Daylight Time.
  - (a) Monday through Friday, 6:00 a.m. through 6:00 p.m.
  - (b) Saturday, 7:00 a.m. through 6:00 p.m.
  - (c) Sunday, 9:00 a.m. through 5:00 p.m.
  - (d) Government Holidays, 9:00 a.m. through 5:00 p.m.

Public Works Construction that will occur along Jackson Street for this project is not precluded as outline below in Section 95C.09 (l). However, the City of Indio will make reasonable efforts to limit construction hours as outlined in 95C.08 B (3) to protect the health, safety, or general welfare of Indio residents.

§ 95C.09 SPECIAL PROVISIONS; EXEMPTIONS.

The following activities shall be exempted from the provisions of this chapter:

(A) Those noise events in the community (e.g., arterial traffic noise, railroad noise) that are more accurately measured by application of the general plan noise element policy, utilizing the community noise equivalent level (CNEL) method.

(B) School bands, school athletic, and school entertainment events.

(C) Outdoor gatherings, public dances, shows, and sporting and entertainment events provided said the City authorizes events via permit or previously approved development agreement.

(D) Activities conducted in public parks and public playgrounds with a valid city permit.

(E) Any mechanical device, apparatus, or equipment used, related to or connected with emergency machinery, vehicle, or work.

(F) All mechanical devices, apparatus, or equipment utilized for the protection or salvage of crops during periods of potential or actual frost damage or other adverse weather conditions. (G) Mobile noise sounds associated with agricultural operations provided such operations do not occur between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

(H) Mobile noise sources associated with agricultural pest control through pesticide application.

(I) The provisions of this chapter shall not preclude the construction, operation, maintenance, and repairs of equipment, apparatus or facilities of park and recreation departments, public work projects, or essential public services and facilities, including trash collection and those activities of public utilities subject to the regulatory jurisdiction of the California Public Utilities Commission.

(J) The provisions of this chapter shall not apply to noise sources associated with minor maintenance or improvement of property used either in part or whole for residential purposes provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except Sunday or between the hours of 10:00 a.m. and 8:00 p.m. on Sunday.

(K) This chapter's provisions shall not apply to any activity to the extent regulation thereof has been preempted by state or federal law or which is necessary or appropriate means of complying with health or safety requirements imposed by state or federal law.

(L) If at the time the enforcement officer investigates a noisy animal(s) complaint and determines that the cause of the noise is the result of a person, other than the animal's owner or caretaker, committing or attempting to commit an illegal act, such as trespass or theft, no violation of § 95C.04 shall have taken place.

4.3.3 City of Indio General Plan Policy

The City of Indio has developed policies within the Noise Element of its General Plan to prevent and/or minimize adverse or undesirable noise impacts. The following guidelines apply to the project.

Noise Compatibility

Goal NE-1: Land Use Compatibility. A City where noise exposure is minimized for those living, working, and visiting the community.

NE-1 Policies

NE-1.1 Sensitive receptors. Protect noise-sensitive uses, such as residences, schools, health care facilities, hotels, libraries, and churches, from excessive noise levels through land use capability/adjacency, building design, and noise ordinance enforcement.

Noise Sources

The City will implement noise reduction measures, such as appropriate setbacks and/or noise barriers, to minimize impacts on adjacent land uses from mobile and stationary sources.

Goal NE-2: Mobile Noise Sources. A City with minimal mobile source-generated noise levels.

NE-2 Policies

NE-2.4 Roadway noise. Implement the policies listed under Goal 1 to reduce roadway noise impacts on noise-sensitive receptors where roadway noise exceeds the normally compatible range shown in the City's Noise Compatibility Matrix shown in Table 11-1.

NE-2.5 Traffic calming. Require the use of traffic calming measures such as reduced speed limits or roadway design features to reduce noise levels where roadway noise exceeds the normally compatible range shown in the City's Noise Compatibility Matrix shown in Table 11-1.

NE-2.6 Noise-reducing paving. Encourage the use of noise-reducing paving materials, such as open-grade or rubberized asphalt, for public and private road surfacing projects in proximity to existing and proposed residential land uses.

4.4 Community Noise Assessment Criteria

In community noise assessment, changes in noise levels greater than 3 dBA are often identified as "barely perceptible" while changes of 5 dBA are "ready perceptible." In the range of 1 dBA to 3 dBA, people who are very sensitive to noise may perceive a slight change in noise level.

In laboratory testing situations, humans can detect noise level changes of slightly less than 1 dBA. However, in a community situation, noise exposure is extended over a long-time period, and changes in noise levels occur over the years rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely to be some value greater than 1 dBA, and 3 dBA appears to be appropriate for most people. For this study's purposes, noise impacts are considered significant if the project increases noise levels by 3 dBA or if the predicted exterior noise levels exceed the City of Indio Noise Element criteria.

Off-Site Impact Criteria

Transportation-related noise impacts associated with the development of the project were evaluated. Noise level increases and impacts attributable to the development of the proposed project are estimated by comparing the "with project" traffic volume to the "without project" traffic volume. For purposes of this study, roadway noise impacts would be considered significant if the project increases noise levels for noise-sensitive land use by 3 dBA and if: (1) the existing noise levels already exceed the 65 dBA residential standard, or (2) the projected increase noise levels from below the 65 dBA standard to above 65 dBA.

5.0 THRESHOLDS OF SIGNIFICANCE

Appendix G of the California Environmental Quality Act (CEQA) Guidelines states that a project could have a significant adverse effect related to noise if any of the following would occur:

- Substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance or other agencies' applicable standards?

- Excessive groundborne vibration or groundborne noise levels?

- Expose people residing or working in the project area to excessive noise levels for the project if it is located within the vicinity of a private airstrip or 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?

6.0 EXISTING NOISE

The existing noise environment was characterized by collecting field noise measurements at sensitive residential properties within the project area. Five (5) short-term measurements were taken at residential locations within the project area. The noise measurements were performed on November 19, 2020. Appendix A includes the field monitoring forms, and Figure 4 shows the monitoring locations.

6.1 Measurement Procedure and Criteria

Short-term and long-term noise measurements were taken using a Larson Davis Type 1 precision sound level meter. All noise meters were programmed in "slow" mode to record noise levels in the "A" weighted form.

The sound level meters and microphones were mounted on a tripod, five feet above the ground, and equipped with a windscreen during all measurements. The sound level meter was calibrated before the monitoring using a CAL200 calibrator. All noise level measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

6.2 Noise Measurement Locations

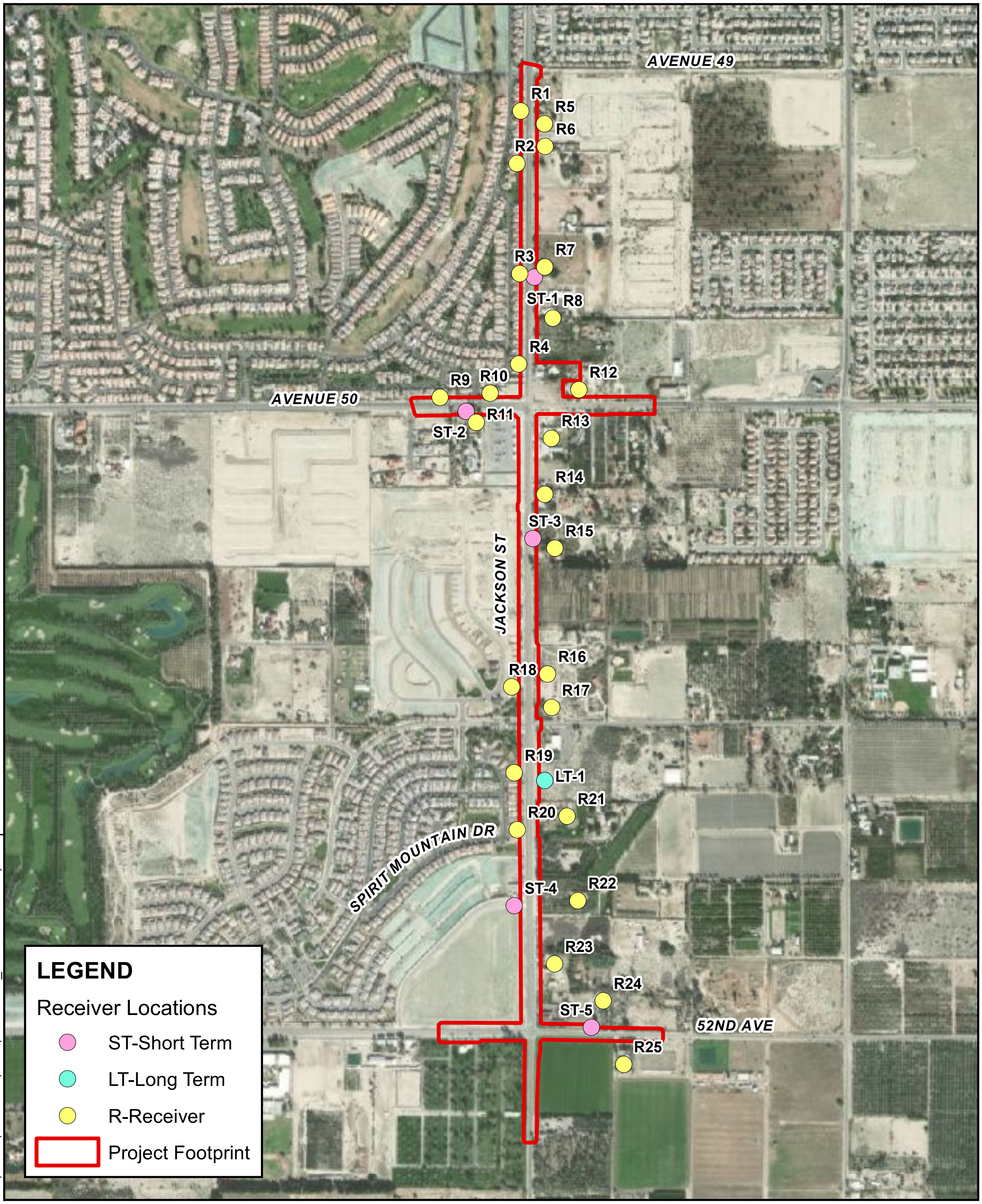
Noise monitoring locations were selected near the project site, as shown in Figure 4. Short-term noise measurement locations ST-1 through ST-5 were monitored for 20 minutes. Table 6-1 presents the results of the short-term monitoring.

Table 6-1. Existing (Ambient) Short-Term Noise Level Measurements[1,3]

Noise Monitoring Location ID[2]	Description	Time of Measurement[3]	Primary Noise Source	Noise Levels (L_{eq} dBA)
ST-1	Near 49604 Jackson St.	4:09 pm	Traffic	71.0
ST-2	82955 Avenue 50	3:43 pm	Traffic	69.4
ST-3	Near 50300 Jackson St.	5:06 pm	Traffic	70.3
ST-4	Near 51577 Jackson St.	2:16 pm	Traffic	62.3
ST-5	Near 83089 Avenue 52	4:36 pm	Traffic	66.5

1 Noise measurements were taken on November 19, 2020
2 See Figure 4 for the location of the monitoring sites and Appendix A for Field Monitoring Forms.
3 Taken with Larson Davis Type 1 noise meter

In addition, one long term measurement, LT-1, was conducted near 5150 Jackson St. The overall 24-hour exterior noise level in the project vicinity is 63.4 dBA CNEL.

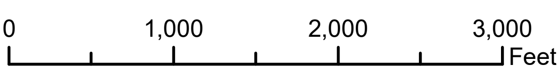


H:\2019\19-0002\GIS\Receiver_Locations.mxd; Map revised 07 Dec 2020

Sources: ENTECH, 2020; Riverside Co. GIS, 2020; ESRI/Digital Globe, 2018.

Figure 3. Measurement and Receiver Locations

Jackson Street Improvement Project
from Avenue 50 to Avenue 52



ALBERT A. WEBB ASSOCIATES

7.0 METHODOLOGY

The following section outlines the analysis methods utilized to predict future noise and vibration levels from the proposed project's construction and operation.

7.1 Construction

7.1.1 Noise Analysis Methods

The assessment of the construction noise impacts must be relatively general at this phase of the project because many of the decisions affecting noise will be at the contractor's discretion. However, an assessment based on the type of equipment expected to be used by the contractor can provide a reasonable estimate of potential noise impacts and the need for noise mitigation. A worst-case construction noise scenario was developed to estimate the loudest activities occurring at the project site. Pile driving and blasting activities are not anticipated; therefore, the loudest construction activities are centered around the movement of heavy construction equipment during excavation and grading operations. Noise levels were estimated based on a worst-case scenario, which assumed all pieces of equipment would be operating simultaneously during each construction phase. The calculated noise level was then compared to the respective local noise regulation to determine if construction would cause a short-term noise impact at nearby residential land uses and schools. Receiver distance to the construction activity along with the construction equipment operating at the maximum load will have the greatest influence on construction noise levels experienced at residential land and schools uses.

7.1.2 Vibration Analysis Methods

Groundborne vibration levels resulting from construction activities within the project area were estimated using the data published by the FTA in its Transit Noise and Vibration Impact Assessment Manual (FTA, 2006). Potential vibration levels resulting from the proposed project's construction activities are identified at the nearest off-site sensitive receptor location and compared to the FTA damage criteria, as shown previously in Table -4-1.

7.2 Operational Noise & Vibration Analysis

7.2.1 Operational Traffic Noise Analysis Methods

The project roadway noise impacts from vehicular traffic were predicted using the FHWA-TNM 2.5 Model. The FHWA TNM 2.5 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 account for: the roadway classification (e.g., collector, secondary, major, or arterial), the active roadway width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), traffic volumes on nearby roadways, the travel speed, the percentages of automobiles, medium trucks, and heavy trucks, and the site conditions (“hard” or “soft” relates to the adsorption of the ground, pavement, or landscaping).

7.2.2 Operational Traffic Vibration Analysis

As a conservative measure, the vibration vs. distance curve obtained from the Caltrans Transportation and Construction Vibration Guidance Manual will be used to represent worst-case vibration levels from traffic noise. These vibration levels will be compared to the Caltrans and FTA vibration annoyance criteria, as shown previously in Tables 2-6 and 2-7 for Continuous Sources. These criteria will be utilized to evaluate the level of significance associated with vibration effects from traffic.

7.3 Predicted Noise and Vibration Impacts

This section discusses the noise and vibration impacts compared to the applicable noise significance thresholds. When a significant impact has been set forth, mitigation measures to address that potential impact are presented, along with determining whether the impact will continue to be significant after implementing the mitigation measure.

7.3.1 Cause a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance or other agencies' applicable standards.

Noise sensitive receiver locations were identified near the project site, as shown in Figure 4. The Traffic Noise Model 2.5 (TNM) and the project's traffic report (Albert Webb & Associates, 2020) were utilized to predict Existing, Future 2023, and 2035 project noise levels at these locations. **Table 7-1** presents the existing and future noise levels. Changes in noise levels between existing and 2023 are negligible (less than 1 dBA increase). Noise levels continue to increase under 2035 future over existing conditions with project conditions. Many of the 2035 project noise increases are above 3 dBA. Therefore, 2035 operational noise impacts are significant. Table 4.12-6, Potentially Significant Traffic Noise Level Increases, as contained in the City of Indio's 2040 General Plan Update (GPU) Final EIR, identifies Jackson Street along with other segments within the City, as one of the roadway segments adjacent to existing noise-sensitive land uses that would experience significant increases associated with growth. For consistency with GPU Policy NE-2.6, the City of Indio's GPU Final EIR provides mitigation measures (MM-NOS-1), which recommends implementing noise-reducing paving materials on the roadway, such as open grade asphalt. Implementation of noise-reducing paving materials would reduce noise levels by 4 to 5 dBA. This noise reduction level would reduce the noise level to less than significant, bringing the resultant noise level within the acceptable noise compatibility levels near residential land uses.

TABLE 7.1. EXISTING AND FUTURE TRAFFIC NOISE LEVELS

Location	Existing Noise Levels L_{eq} (dBA)	2023 Project Noise Levels L_{eq} (dBA)	2023 Project Increase over Existing	2035 Project Noise Levels L_{eq} (dBA)	2035 Project Increase over Existing
R1	63	63.3	0.3	65.7	2.7
R2	60.3	60.5	0.2	62.9	2.6
R3	61.5	61.8	0.3	64.3	2.8
R4	62.6	62.8	0.2	65.2	2.6
R5	64.2	64.5	0.3	66.9	2.7
R6	62.8	63.1	0.3	65.5	2.7
R7	64.7	65.1	0.4	67.4	2.7
R8	62.7	63.1	0.4	65.4	2.7
R9	62.5	62.7	0.2	66.3	3.8
R10	61.4	61.6	0.2	64.7	3.3
R11	62.4	62.6	0.2	66.1	3.7
R12	64	63.4	-0.6	66.3	2.3
R13	64	64.2	0.2	66.8	2.8
R14	64	64.3	0.3	66.7	2.7
R15	61.4	61.8	0.4	64.2	2.8
R16	56.6	57.4	0.8	59.6	3.0
R17	62.9	63.7	0.8	65.7	2.8
R18	57.3	58.1	0.8	60.7	3.4
R19	59.5	60.3	0.8	62.7	3.2
R20	65.8	66.1	0.3	68.8	3.0
R21	57.6	58.2	0.6	60.6	3.0
R22	56.8	57.3	0.5	59.8	3.0
R23	61.9	62.5	0.6	65	3.1
R24	60	59.9	-0.1	62.9	2.9
R25	58	57.9	-0.1	60.9	2.9

The operation of heavy-duty equipment would produce noise. Construction noise levels were estimated using FTA guidance (FTA, 2006), which provides a method for calculating noise levels for the two noisiest pieces of equipment operating in each construction phase using reference noise levels for individual pieces of equipment. Full power operation for a time period of one hour was assumed because more construction equipment operates continuously for periods of one hour or more at some point in the construction period. No ground effects were considered. The noise levels associated with equipment used during the various construction phases are shown in **Table 7-2**. As shown in **Table 7-2**, during each phase of construction, the noise level would have the potential to exceed existing background noise levels. The City of Indio Noise Ordinance limits construction noise to the hours of 7:00 am to 6:00 pm. This control measure would be implemented to reduce the temporary increase in noise levels from the construction of the proposed project to less than significant levels.

TABLE 7.2. CONSTRUCTION EQUIPMENT BY PHASE WITH ASSOCIATED MAXIMUM 1-hr L_{eq}

Equipment Type	Number of equipment	Lmax at 50 feet	Predicted Noise Levels (dBA) 1-hr L_{eq} at Nearest Residential Property
Grading			
Excavators	1	85	85.9
Graders	1	85	
Rubber Tired Dozer	1	85	
Tractors/Loaders/Backhoes	1	84	
Roller	1	85	
Scraper	1	85	
Concrete/Industrial Saw	1	85	
Air Compressor	1	80	
Paving			
Pavers	1	85	84.6
Tractor/Loaders/Backhoe	2	89	
Paving Equipment	1	89	
Rollers	2	74	
Tractor/Loader/Backhoe	1	85	

7.3.2 Expose persons to or generate excessive groundborne vibration or groundborne noise levels.

As a result of the proposed project's construction, groundborne vibration may occur from heavy equipment during demolition, grading, and paving. Based on the FTA's reference vibration levels, a large bulldozer represents the peak source of vibration with a reference level of 0.089 (in/sec) at a distance of 25 feet. At the nearest residential receptor, the vibration level would be 0.004 in/sec. Using the construction vibration assessment annoyance criteria provided by the FTA for infrequent events, as shown in **Tables 4-1** and **4-2**, the proposed project site will not include nor require equipment, facilities, or activities that would result in causing building damage or perceptible human response (annoyance). Further, impacts at the site of the closest sensitive receptor are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating near the project site perimeter. Moreover, construction at the project site will be restricted to daytime hours consistent with City and County requirements, thereby eliminating potential vibration impact during the sensitive nighttime hours. On this basis, the potential for the proposed project to result in persons' exposure to or generation of excessive ground-borne vibration is determined to be less than significant.

Groundborne vibration from vehicular traffic rarely causes a disturbance within buildings located in urban environments unless the pavement surface is uneven or the receptor is highly sensitive (e.g., a scientific research establishment) to groundborne vibration. Therefore, groundborne vibration levels within the project area are not expected to increase as a result of the implementation of the proposed project.

7.3.3 For a project located within the vicinity of a private airstrip or 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?

The nearest airport is the Bermuda Dunes Airport. The project site is 3.9 miles from the airport and is within the noise contour. The proposed project will not generate operational noise levels that would increase the noise above the existing noise contour levels. Therefore, the proposed project area would not exposure people working in the project area to excessive noise levels associated with aircraft.

8.0 MITIGATION MEASURES

8.1 Operational Mitigation Measures

For consistency with City of Indio GPU Policy NE-2.6, the Final EIR for the GPU states that the City of Indio shall incorporate Mitigation Measure (MM-NOS-1), which requires implementing noise-reducing paving materials, such as open-grade asphalt, for all road surfacing projects along the roadways, including Jackson Street, as identified in Table 4.12-6. Identification of financing for noise-reducing paving materials shall be incorporated in the annual update of the City's Operating and Capital Improvement Budget following the GPU's adoption.

8.2 Construction Mitigation Measures

Although the County of Riverside and the City of Indio Noise Ordinances exempt this project from compliance, the City of Indio is electing to be consistent with the noise control requirements ordinances where feasible for protecting the health, safety, or general welfare of Indio residents.

Adherence to local noise ordinances and implementation of construction Best Management Practices, such as limiting construction operating hours as outlined below, would reduce impacts from construction at sensitive receptors to less than significant.

(1) Pacific Standard Time.
- (a) Monday through Friday, 7:00 a.m. through 6:00 p.m.
- (b) Saturday, 8:00 a.m. through 6:00 p.m.
- (c) Sunday, 9:00 a.m. through 5:00 p.m.
- (d) Government Holidays, 9:00 a.m. through 5:00 p.m.

(2) Pacific Daylight Time.
- (a) Monday through Friday, 6:00 a.m. through 6:00 p.m.
- (b) Saturday, 7:00 a.m. through 6:00 p.m.
- (c) Sunday, 9:00 a.m. through 5:00 p.m.
- (d) Government Holidays, 9:00 a.m. through 5:00 p.m.

9.0 REFERENCES

Caltrans. (2013) Caltrans Transportation and Construction Vibration Guidance Manual

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City of Indio (2019). General Plan 2040 Update

City of Indio (2019). Final Environmental Impact Report for the City of Indio General Plan Update Indio, California SCH# 2015081021

Albert Webb & Associates (2020). Traffic Impact Study for Jackson Street Improvement Project

Federal Transit Administration. (2006, May). Chapter 7 (Vibration) and Chapter 12 (Construction Noise). Transit Noise and Vibration Impact Assessment.

US Department of Housing and Urban Development (HUD). (1991). Chapter 5. The Noise Guidebook.

US Department of Transportation, Federal Highway Administration (FHWA). (2006). Highway Construction Handbook.

Appendix A Noise Measurement Data & Forms

Long Term Measurement Data (LT-1)

Hourly			Leq	Ldn	CNEL
14:00	3	62	59.0	59.0	59.0
15:00	63	122	59.8	59.8	59.8
16:00	123	182	61.1	61.1	61.1
17:00	183	242	59.6	59.6	59.6
18:00	243	302	58.0	58.0	58.0
19:00	303	362	57.1	57.1	57.1
20:00	363	422	56.5	56.5	61.5
21:00	423	482	55.4	55.4	60.4
22:00	483	542	55.7	65.7	60.7
23:00	543	602	51.7	61.7	61.7
0:00	603	662	49.5	59.5	59.5
1:00	663	722	47.6	57.6	57.6
2:00	723	782	47.3	57.3	57.3
3:00	783	842	48.9	58.9	58.9
4:00	843	902	52.9	62.9	62.9
5:00	903	962	57.2	67.2	67.2
6:00	963	1022	60.4	70.4	70.4
7:00	1023	1082	62.0	62.0	72.0
8:00	1083	1142	60.2	60.2	60.2
9:00	1143	1202	58.7	58.7	58.7
10:00	1203	1262	60.0	60.0	60.0
11:00	1263	1322	58.4	58.4	58.4
12:00	1323	1382	59.1	59.1	59.1
13:00	1383	1442	59.8	59.8	59.8
		24hr	58.1		
			Ldn	62.1	63.4
			Night	56.3	

APPENDIX H
VMT SCREENING ANALYSIS

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solutions@translutions.com

July 19, 2021

Mr. Nicholas R. Lowe, MS, PE, Senior Engineer
Albert A. Webb Associates
3788 McCray Street,
Riverside, CA 92506

Subject: Jackson Street Widening, City of Indio, California – VMT Screening Analysis

Dear Nick:

Translutions, Inc. (Translutions) is pleased to provide this letter discussing the Vehicle Miles Traveled (VMT) for the proposed widening of Jackson Street in the City of Indio.

PROJECT DESCRIPTION

The Jackson Street Improvement Project is proposing roadway and traffic signal improvements on Jackson Street from Odlum Drive (approximately 0.5 miles north of Avenue 50) to approximately 0.25 miles south of Avenue 52. The project also includes improvements on Avenue 50, Avenue 51, and Avenue 52 near Jackson Street. The project would install three new traffic signals at the existing stop-controlled intersections of Jackson Street at Avenue 50, Avenue 51/Polo Club Drive, and Avenue 52. Some roadway widening is also included to provide a second northbound through lane on Jackson Street, as well as dedicated left- and right-turn lanes at the intersections. The project is approximately 1.5 miles long and also adds a bike lane and sidewalk along the roadway.

VMT DISCUSSION

Background and Guidance.

Senate Bill 743 (SB-743), which was codified in Public Resources Code section 21099, was signed by the Governor in 2013 and directed the Governor's Office of Planning and Research (OPR) to identify alternative metrics for evaluating transportation impacts under CEQA. Pursuant to Section 21099, the criteria for determining the significance of transportation impacts must "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." Recently adopted changes to the CEQA Guidelines in response to Section 21099 include a new section (15064.3) that specifies that Vehicle Miles Traveled (VMT) is the most appropriate measure of transportation impacts. A separate Technical Advisory issued by OPR provides additional technical details on calculating VMT and assessing transportation impacts for various types of projects. The City of Indio has not adopted guidelines or thresholds under VMT. Therefore, this memorandum uses the thresholds and analysis parameters based on the County of Riverside *Transportation Analysis Guidelines for Level of Service Vehicle Miles Traveled*, December 2020. The recommended threshold identified in the Riverside County Guidelines is based on increase in VMT, and an impact occurs if the project results in a net increase in jurisdiction VMT.

Model VMT.

The Riverside Transportation Analysis Model (RIVTAM) was run to evaluate the change in VMT for the project. The model was run for the base and future conditions and for the without and with project conditions. The model runs and data extraction process followed are consistent with the recommendations in the County guidelines. Table A shows the VMT outputs from the model:

Table A – Model VMT City or Indio and Sphere of Influence

Year	With Project	Without Project	Difference
2012	1,286,831	1,286,725	106
2040	2,124,915	2,123,249	1,666

As seen on Table A, the project results in an increase in VMT under both the base and future year conditions. The model outputs show an increase of 106 miles under base year and 1,666 miles under future year conditions.

translutions
the transportation solutions company...

VMT Reductions.

It should be noted that the model does not account for active transportation improvements, improved multimodal access to schools, and increased accessibility and availability of alternative modes. Therefore, these calculations were conducted separately and are discussed below. The County's mitigation measures for VMT reductions are generally development oriented. The County allows up to 2% reduction in VMT for pedestrian network improvements. Since the project will provide pedestrian network improvements as well as bicycle network improvements in the area, the total VMT associated with the traffic analysis zones along the project would result in reduced VMT due to pedestrian and bicycle improvements. Attachment A shows the TAZs adjacent to the project area. This neighborhood enhancement strategy implements pedestrian network improvements throughout and around the project site that encourages people to walk. The County maximum VMT reduction with implementation of this strategy is a 2 percent reduction in VMT. The range of effectiveness of this TDM strategy is found in the CAPCOA *Quantifying Greenhouse Gas Mitigation Measures (SDT-1 Neighborhood/Site Enhancement, August 2010).* This TDM strategy has a range of effectiveness of 0 to 2 percent reduction in VMT based on the context of the project being located in an urban, suburban, or rural area. If the project is located in an urban/suburban area, a reduction of 2 percent in VMT can be estimated if the extent of pedestrian accommodations is within the project site and connect off-site. The project is located in a suburban area and will provide a pedestrian access network that can internally link all future uses contiguous with the project site. The guidance from the CAPCOA document is included in Attachment B.

Table B shows the existing and 2040 VMT and associated VMT reductions from the pedestrian improvements portion of the proposed project. As seen on Table B, the project will result in a VMT reduction of 3,176 miles under 2012 and 5,907 miles under 2040 conditions.

Table B: VMT of Adjacent TAZs

	2012			2040		
TAZ	**ODCARO_VMT**	**ODCARD_VMT**	**TOT_VMT**	**ODCARO_VMT**	**ODCARD_VMT**	**TOT_VMT**
4769	3,949	4,038	7,988	5,838	6,339	12,177
4771	28,684	29,522	58,206	45,409	48,134	93,542
4773	2,212	2,314	4,525	4,988	5,174	10,162
4783	5,923	6,137	12,060	11,623	12,369	23,992
4786	1,265	1,317	2,581	4,068	4,301	8,369
4787	35,748	37,707	73,455	71,248	75,844	147,092
Total VMT	**77,780**	**81,035**	**158,816**	**143,172**	**152,162**	**295,334**
2% Reduction			**3,176**			**5,907**

Source: RIVTAM

Table C shows the resulting impact of the project on citywide VMT. As seen on Table C, the project will result in a reduction in VMT due to the provision of bike lanes and sidewalks in the area.

Table C – VMT Reductions and Net VMT

	2012	**2040**
Model VMT (With Project)	1,286,831	2,124,915
Model VMT (Without Project)	1,286,725	2,123,249
Increase in Model VMT	106	1,666
Pedestrian Network Improvements	(3,176)	(5,907)
Net Change (With Project - Without Project)	(3,071)	(4,241)

It should be noted that while the CAPCOA document allows a 2% reduction in VMT from developments that have access to pedestrian connections on and off-site, the project's impacts are reduced to less than significant if the VMT reduction is 0.067% in the base year conditions and 0.565% in the future year conditions.

VMT Due to Induced Demand. The Governor's Office of Planning and Research (OPR) states that *building new roadways, adding roadway capacity in congested areas, or adding roadway capacity to areas where congestion is expected in the future, typically induces additional vehicle travel. For the types of projects previously indicated as likely to lead to additional vehicle travel, an estimate should be made of the change in vehicle travel resulting from the project*. Induced travel, or induced vehicle travel, is the "*additional vehicle travel* *that occurs when the cost [for travel] is lower," after travel constraints, such as congestion, are reduced*. It is the increase in travel that occurs when auto travel is made more convenient by new roadway capacity. The extent that this occurs due to new roadway capacity versus other variables such as the economy (wage changes, gas prices, parking prices) and population growth varies across research, but in general, changes in travel times and costs affect demand and therefore VMT. For this reason, capacity-increasing projects generally need to be evaluated for their potential induced travel. The mechanisms by which induced travel occur include:

- Route changes (may increase or decrease overall VMT)
- Longer trips (increases overall VMT)
- Mode shift to automobile use (increases overall VMT)
- More trips (increases overall VMT)
- More disperse development (increases overall VMT)

The RIVTAM evaluates the effect of route changes and longer trips (associated with the route changes). The mode shift to automobile use is generally captured in the model if a robust transit network exists in the area. In this area, there is minimal transit, and as such, mode shift from transit is not applicable. The last two items, i.e. more trips and more disperse development cannot be calculated by tour based models. However, these occur if there are conditions that make it difficult to make more trips or disperse development due to congestion. The explanation for this is that if the transportation network is severely congested, automobile users will not make certain trips. Then, when capacity is added, and as a result, the roadway becomes uncongested, the trip would be made. However, if the roadway is uncongested to begin with, there is nothing preventing the original trips, and adding additional capacity would not result in additional VMT. Attachment C includes excerpts from the Traffic Impact Analysis for the project. As seen from Attachment C, the existing and future demand on Jackson Street are 10,675 and 16,269 respectively, and the capacity under no project conditions is 27,000, resulting in levels of service of C or better under both existing and future conditions. This shows that the roadway is not congested, except at isolated intersections during the peak hours. Therefore, the project is unlikely to induce latent demand.

The discussion from OPR regarding induced travel is focused on congested areas. Caltrans sponsored research states that areas with limited congestion and limited linkages to nearby urban districts can still experience induced travel resulting from new capacity, because the new capacity improves travel times or reduces costs and creates new patterns of accessibility and new location and land-use opportunities. It should be noted that the research and recommendations are limited to areas with limited linkages, wherein, addition of a new link to the transportation network makes destinations more accessible. This is not the case with the current project as many alternate routes are available.

SUMMARY & CONCLUSION

As seen from the above discussion, the project adds roadway capacity and increases automobile traffic due to added capacity in the area. However, because it also improves bicycle and pedestrian network in the area, it also reduces automobile travel and results in a net reduction of VMT in the City of Indio. Therefore, it is our professional opinion that the project will have a less than significant impact on VMT.

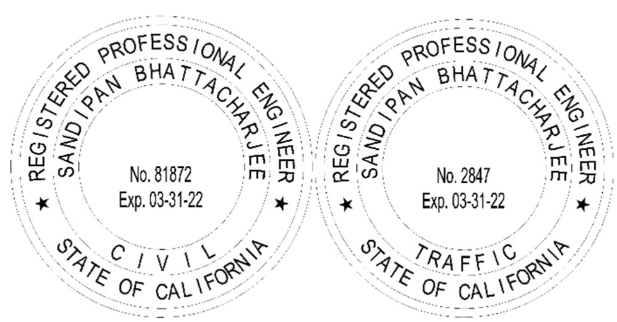
We hope you will find this information helpful. Should you have any questions, please don't hesitate to call me at (949) 656-3131.

Sincerely,

translutions, Inc.

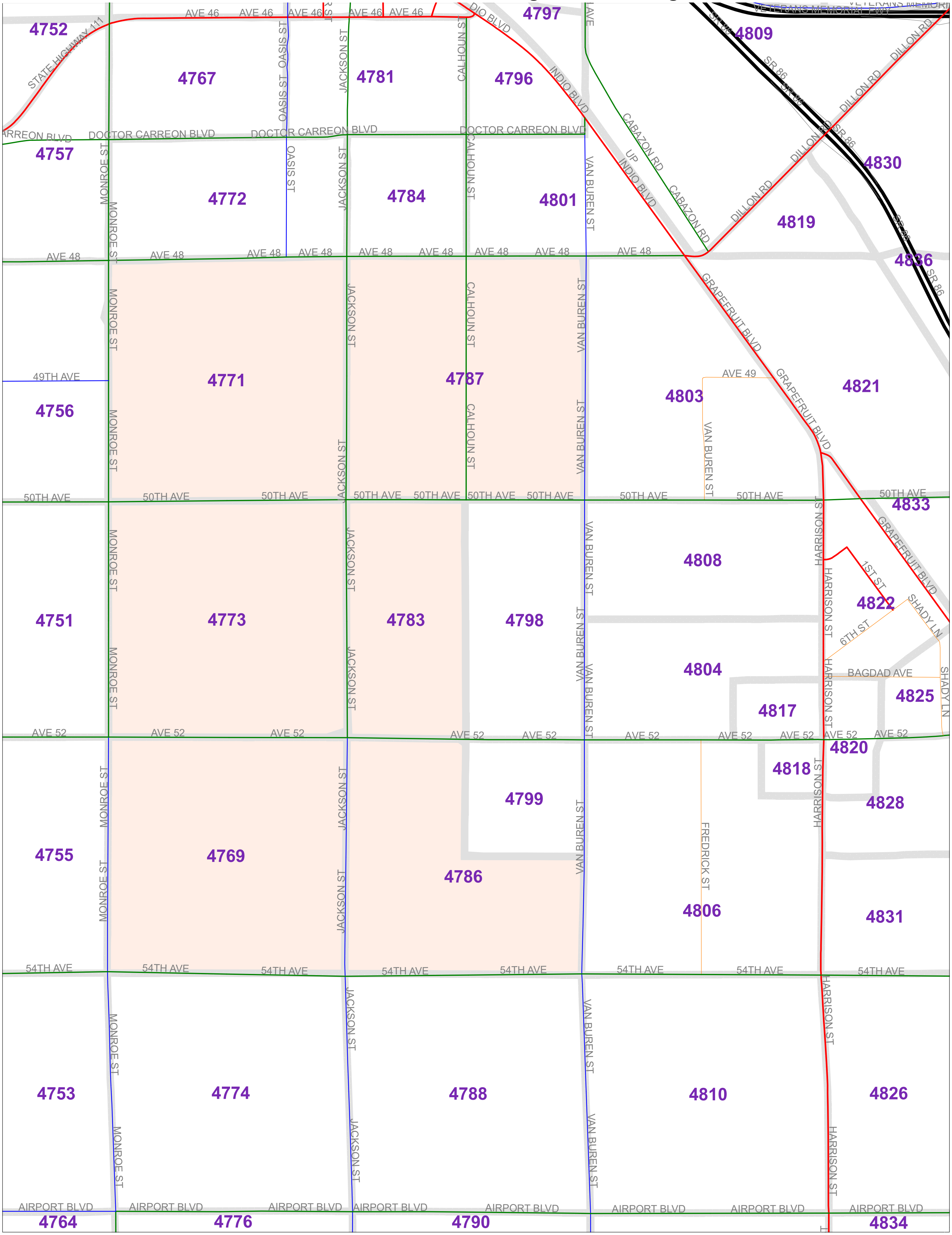
Sandipan Bhattacharjee

Sandipan Bhattacharjee, P.E., T.E., AICP, ENV SP
Principal



RIVTAM- Jackson Street Widening - Surrounding TAZs

Attachment A



3.2 Neighborhood/Site Enhancements

3.2.1 Provide Pedestrian Network Improvements

Range of Effectiveness: 0 - 2% vehicle miles traveled (VMT) reduction and therefore 0 - 2% reduction in GHG emissions.

Measure Description:

Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. This mode shift results in people driving less and thus a reduction in VMT. The project will provide a pedestrian access network that internally links all uses and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. The project will minimize barriers to pedestrian access and interconnectivity. Physical barriers such as walls, landscaping, and slopes that impede pedestrian circulation will be eliminated.

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for residential, retail, office, industrial and mixed-use projects
- Reduction benefit only occurs if the project has both pedestrian network improvements on site and connections to the larger off-site network.

Baseline Method:

See introduction to transportation section for a discussion of how to estimate trip rates and VMT. The CO_2 emissions are calculated from VMT as follows:

$$CO_2 = VMT \times EF_{running}$$

Where:

VMT = vehicle miles traveled

$EF_{running}$ = emission factor for running emissions

Inputs:

The project applicant must provide information regarding pedestrian access and connectivity within the project and to/from off-site destinations.

CEQA# **MM-T-6**
MP# **LU-4**

SDT-1

Neighborhood / Site Enhancement

Mitigation Method:

Estimated VMT Reduction	Extent of Pedestrian Accommodations	Context
2%	Within Project Site and Connecting Off-Site	Urban/Suburban
1%	Within Project Site	Urban/Suburban
< 1%	Within Project Site and Connecting Off-Site	Rural

Assumptions:

Data based upon the following references:

- Center for Clean Air Policy (CCAP) Transportation Emission Guidebook. http://www.ccap.org/safe/guidebook/guide_complete.html (accessed March 2010)
- 1000 Friends of Oregon (1997) "Making the Connections: A Summary of the LUTRAQ Project" (p. 16): http://www.onethousandfriendsoforegon.org/resources/lut_vol7.html

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[45]
CO_2e	0 - 2% of running
PM	0 - 2% of running
CO	0 - 2% of running
NOx	0 - 2% of running
SO_2	0 - 2% of running
ROG	0 – 1.2% of total

Discussion:

As detailed in the preferred literature section below, the lower range of 1 – 2% VMT reduction was pulled from the literature to provide a conservative estimate of reduction potential. The literature does not speak directly to a rural context, but an assumption was made that the benefits will likely be lower than a suburban/urban context.

Example:

N/A – calculations are not needed.

Preferred Literature:

[45] The percentage reduction reflects emission reductions from running emissions. The actual value will be less than this when starting and evaporative emissions are factored into the analysis. ROG emissions have been adjusted to reflect a ratio of 40% evaporative and 60% exhaust emissions based on a statewide EMFAC run of all vehicles.

Levels of Service – Roadway Segments

Based on the estimated ADT volumes and Riverside County LOS thresholds for roadways, both study roadway segments are expected to operate above LOS C in all study scenarios (**Table 5**)

Table 5: Roadway Capacity Analysis

Year*	Jackson St s/o Ave 50			Ave 50 e/o Jackson St		
	Volume	*Capacity*	*LOS*	*Volume*	*Capacity*	*LOS*
2017 [1]	10,675	27,000	**< C**	11,424	18,000	**< C**
2020 [2]	11,607	27,000	**< C**	12,422	18,000	**< C**
2023 [2]	12,540	35,900	**< C**	13,420	27,000	**< C**
2035 [2]	16,269	35,900	**< C**	17,411	27,000	**< C**

** 2017 base volumes from CVAG. Future volumes estimated per CVAG average annual growth rate.*