January 20, 2021

CITY OF BEAUMONT'S
2ND STREET IMPROVEMENT PROJECT

PRELIMINARY DESIGN REPORT

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BEAUMONT
California

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List of Abbreviations

BCVWD – Beaumont-Cherry Valley Water District

CDFW – California Department of Fish and Wildlife

CRWQCB – California Regional Water Quality Control Board

CWA – Clean Water Act

RCFC&WCD – Riverside County Flood Control and Water Conservation District

RCTD – Riverside County Transportation Department

SWQCB – State and Regional Water Quality Control Board

USACE – U.S. Army Corps of Engineers

WR-MSHCP – Western Riverside County Regional Conservation Authority

E – East

N – North

S – South

W – West

Ave – Avenue

St – Street

ROW or RW – Right-of-Way

LBV – Least Bell's Vireo

SWFL – Southwestern Willow Flycatcher

BUOW – Burrowing Owl

NEPS – Narrow Endemic Plants

Section 1: Executive Summary

1.1 Introduction

The City of Beaumont was settled originally in the mid-1800s and was incorporated on November 18, 1912. It offers both a small-town charm as well as a dynamic suburban environment. The city is in the western portion of Riverside County and is bounded on the west by Calimesa and unincorporated areas, on the north by the unincorporated County areas (Cherry Valley), on the south by unincorporated County areas and the City of San Jacinto, and on the east by the City of Banning. The land area within the city's boundaries is approximately 26 square miles. Over the past few years, Beaumont has seen a rapid increase in economic development attributed to the vision in the city's staff partnering with businesses to prepare it for a better future. The City of Beaumont lies strategically to offer exceptional development opportunities to new and existing businesses, both large (national retailers) and small (local merchants). In conjunction with past development, current, and future development, the city's streets have seen a significant impact to traffic flow particularly on 1st Street between Highland Springs and Pennsylvania Avenue.

1.2 Project Description

The City of Beaumont plans to alleviate traffic congestion on 1st Street between Highland Springs and Pennsylvania Avenue by extending 2nd Street, from the westerly boundary of the Home Depot shopping center to the proposed intersection at Pennsylvania Avenue. The improvements include extending 2nd Street approximately 1,700 feet from the current terminus at the westerly boundary of First Street Self and RV Storage, to Pennsylvania Avenue. Also, this project entails widening approximately 1,150 feet of 2nd Street from its current terminus to the westerly boundary of the Home Depot shopping center. The project will require construction of a new storm drain facility and may require improvements to existing drainage.

1.3 Existing Roads/ Existing Conditions

The project site is composed of an existing road, E. 2nd Street. Currently, there are both vehicular and pedestrian traffic travels on 1st Street to Commerce Way. Around the project location, there are existing commercial developments as well as undeveloped parcels of land. To the north of the proposed project location, lies a major highway, the I-10 Freeway. In the near north, of the proposed street improvement project lies the commercial development with a Home Depot and a Walmart Supercenter as the biggest establishments. To the south of the proposed project location lies a Kohl's as well as a storage facility. To the west of the undeveloped E. 2nd Street, there are large and vacant dirt parcels of land that lead up to Pennsylvania Avenue.

1.4 New Roads

The new road will be an extension of the existing E. 2nd Street on the westerly boundary of the Home Depot shopping center to the proposed intersection at Pennsylvania Avenue. The improvement will include a design of the extended road. The improvement will provide a safe and easy access to the commercial development for both pedestrians and vehicles from the west. Cozad & Fox, Inc. will design a road section over the existing culvert and design new

culverts for the water crossings on the west side of the project. The designed culverts will convey the proper water flow to the requirements set forth by the City of Beaumont and the Riverside County Flood Control and Water Conservation District. The roadway will be designed to be functional as well as compliant with the approved cross section.

Additionally, an effective signage and striping plan for the project will be completed for phasing as well as any detouring plans needed during the construction of the project to minimize the effects to the Beaumont driver or pedestrian.

Lastly, there was a proposed Pennsylvania Avenue Improvement Project that will widen the existing Pennsylvania Avenue from 1st Street to 6th Street. This improvement project will include new curb and gutter, a raised median, cross culvert extensions, and improvements at 6th Street intersection. Additionally, the project will expand the Pennsylvania Avenue interchange to include a new westbound on-ramp and eastbound off-ramp. This project lies to the west of the proposed E. 2nd Street Improvement Project.

1.5 Environmental Reporting Requirements

The subconsultant, Searl Biological Services, will identify potential environmental issues and reporting. It is anticipated that some of the biological services in Phase II, may not be required after the Habit Assessment is performed.

1.6 Potential Environmental Issues

The main identifiable environmental issues are those regarding potential animals, plants and animals of concerns in the near proximity of the project location.
The following are the specifics:

- Least Bell's Vireo − a type of endangered bird species. Near the project location, it is said to be a suitable habitat, though marginal, within 500 feet survey buffer area.
- Southwestern Willow Flycatcher − a federally endangered bird. This type of bird was detected 1.8 miles west of the right-of-way back in 2007. However, no suitable habitat was present in the 500 feet survey buffer area.
- Burrowing Owl − endangered animal species due to habitat loss and fragmentation. There was suitable habitat present and numerous California Ground Squirrel Burrows observed throughout the site.
- Narrow Endemic Plants − a type of endangered plant that can only be found in one particular region and nowhere else in the world. No suitable habitat was present for the two targeted narrow endemic plants.

No fairy shrimp habitat or vernal pools were present.

1.7 Jurisdictional Requirements

Jurisdiction for all three agencies (Section 404 Clean Water Act [Army Corps], Section 401 Clean Water Act/Porter-Cologne Act [State/Regional Water Quality Control Board], and 1600 streambeds [California Dept. Fish & Wildlife]) and the MSHCP (Riparian/Riverine habitat) was

present in the survey area in the three natural creek areas, and a man-made earthen/concrete, vegetated channel along the western boundary of the Home Depot/Walmart shopping center. All the reports and agency applications will be required.

The subconsultant, Searl Biological Services, will assist in identifying potential jurisdictional requirements and permits.

There are three jurisdictions in which this project lies under its authority. The first is that of U.S. Army Corps of Engineers (USACE). This jurisdiction regulates discharge of dredged or fill material into the US waters.

The second is that of California Regional Water Quality Control Board (CRWQCB). Potential CRWQCB reporting requirements include those from the Santa Ana Region 401 Water Quality Standards Certification.

Lastly, the California Department of Fish and Wildlife (CDFW) issues agreements for any alteration of a river, stream, or lake in which fish or wildlife resources might be affected. This is relevant to the project because the jurisdictional limits of streams and lakes where any riparian habitat is present. In the project location, there is riparian habitat present. This includes willows, mule fat, and other vegetation typically associated within the limits of riparian habitat. Potential CDFW reporting requirements include notification of Lake or Streambed Alteration, Fish and Game Code Section 1602 (Form DFW 2023 Application).

MSHCP Riparian/Riverine Areas were identified as well as LBVI Suitable Habitat within 500 feet of the RW; it is recommended to have protocol surveys for LBVI to be conducted during the 2021 season. Regarding the Riparian/Riverine Areas, the MSHCP requires a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis and report.

No vernal pools or fairy shrimp were detected on or within 500 feet of the right-of-way, thus no focused surveys for fairy shrimp will be required.

No suitable habitat (the area consists of sandy loam soils) was present for either ALMU or DUMU- 63 rare plant species that require clay soils for living, hence no focused surveys for ALMU or DUMU will be required.

Lastly, the area within 500 feet of the right-of-way is suitable for burrowing owls (BUOW) and focused surveys will be required.

1.8 Hydrology Requirements

The nearby existing drainage conditions and existing drainage facilities can be found in accordance with the “Pennsylvania Avenue Roadway Widening and Interchange Improvement Project” report (refer to Appendix B). This report was prepared for a project in the near proximity of the proposed project location. For Phase II- Final Engineering, a similar study will have to be conducted to evaluate the new drainage conditions and present stormwater management requirements.

This project area has little history of flooding problems and the only current flood protection is a storm drain channel found on the north, south and underneath of 2nd Street. Significant ponding occurs along Beaumont Channel at Pennsylvania Avenue due to the high freeway embankment

intersecting the channel. There are currently two (2) storm drain systems and six (6) existing cross culverts.

In accordance with the drainage design criteria from the County of Riverside Transportation Department (RCTD), the 10-year frequency storm is contained below the tops of curbs or dikes and the 100-year frequency storm will be contained within street right-of-way. The rational method was used to determine design discharges within the Caltrans right-of-way. Project improvements include widening the existing (4) lanes between 1st Street and 6th Street, new curb and gutter, and new sidewalk to improve the arterial service level. Additionally, a raised median will be constructed. Hydraulic grade line for the proposed storm drain systems along Pennsylvania Avenue were calculated using Civil Design Water Surface Pressure Gradient for Windows. It is anticipated that the proposed Pennsylvania Storm Drain (which will be designed by another consultant) will aid in capturing the increased flow in the project area.

Additionally, a proposed storm drain system in between Pennsylvania Avenue and Whitney Place and along 2nd Street will be designed and constructed to aid in the increase in flow capture. This proposed storm drain structure consists of (2)- headwalls and (2)- 24" Ø pipes for flows. A drainage study for this project will have to be conducted for the project area to determine the anticipated flow.

1.9 Right-of-Way Requirements

Right-of-way constraints were determined upon alignment reviewal as well as right-of-way records reviewal. Upon reviewal, it was determined that one right-of-way presented a potential constraint- the right-of-way associated with the westerly side of 2nd Street site. The westernmost section, to the north of E. 2nd Street, is dedicated to Loma Linda University. However, it is considered that this right-of-way dedication should not be an issue since the project will improve the current site and will benefit the existing commercial developments, the City, and the developers. Hence, it is highly probable that the Loma Linda University will undergo a process to give permission to the City of Beaumont to allow the 2nd Street Improvement Project.

1.10 Potential Utility Conflicts

Coordination with the local utility purveyors appoint to existing utility conflicts. Utilities include the following and are not limited to: water lines, sewer lines, gas lines, electric lines and/or poles, cable lines, etc. Existing parcels, right-of-way lines and centerlines and the received of requested plans from the various utility purveyors. No major utilities in place resulted after utility plotting. Through careful inspection, it can be noted that the only major utility in place is that of a sanitary sewer line that extends from American Avenue to Commerce Way along E. 2nd Street. Additionally, a storm drain system is in place in a segment at E. 2nd Street. All other existing utilities in place do not impose a potential utility conflict; this is especially true along E. 2nd Street where there is only dirt and no developments in place.

1.11 Preliminary Cost Estimate

A preliminary cost estimate for the street improvements can be seen in *Figure 1*. The predicted total costs came up to be $2,476,075. A 20% contingency factor, for any unforeseen expenses,

was considered for each of the improvement category total. The categories utilized in the cost estimate process are as follows:

- Mobilization
- Streets
- Erosion control
- Culvert
- Excavation
- Labor
- Plan Check
- Administrative

Refer to Appendix E for the total break down of each of the items utilized for cost estimating purposes.

PRELIMINARY CONSTRUCTION COST ESTIMATE

Street Improvements

PROJECT:	**City of Beaumont - 2nd Street Improvements**	**DATE:**	**1/19/21**

IMPROVEMENTS	Subtotal	20% Contigency	Total
Mobilization	not to exceed 10%		$224,443
Streets/Erosion Control	$1,253,928	$250,786	$1,504,714
Drainage/Excavation/Labor	$616,432	$123,286	$739,718
Plan Check	$3,500	$700	$4,200
Adminstrative	$2,500	$500	$3,000
Total	**$1,876,360**	**$375,272**	**$2,476,075**

Figure 1. Preliminary Cost Estimate Total Cost.

The total cost for the project is anticipated to be around $2.48 M. It is understood that the budget for this project is $2.5 M. Thus, this project is presumed to be satisfactory to be designed and constructed in accordance with the budget constraint.

1.12 Project Schedule

The project schedule is divided into (12) twelve different tasks. The tasks include:

- Kick-off Meeting
- Meetings
- Research and Review Records
- Compile Feasibility Study
- Potential Environmental Issues and Reporting
- Potential Jurisdictional Requirements and Permits
- Potential Hydrological and Hydraulic Issues
- Potential Utility Conflicts and Issues

- Potential Right-of-Way Issues
- Preliminary Design Plan
- Itemized Cost Estimate
- Geotechnical Report

Refer to *Figure 2* for the complete schedule with associated dates/tasks.

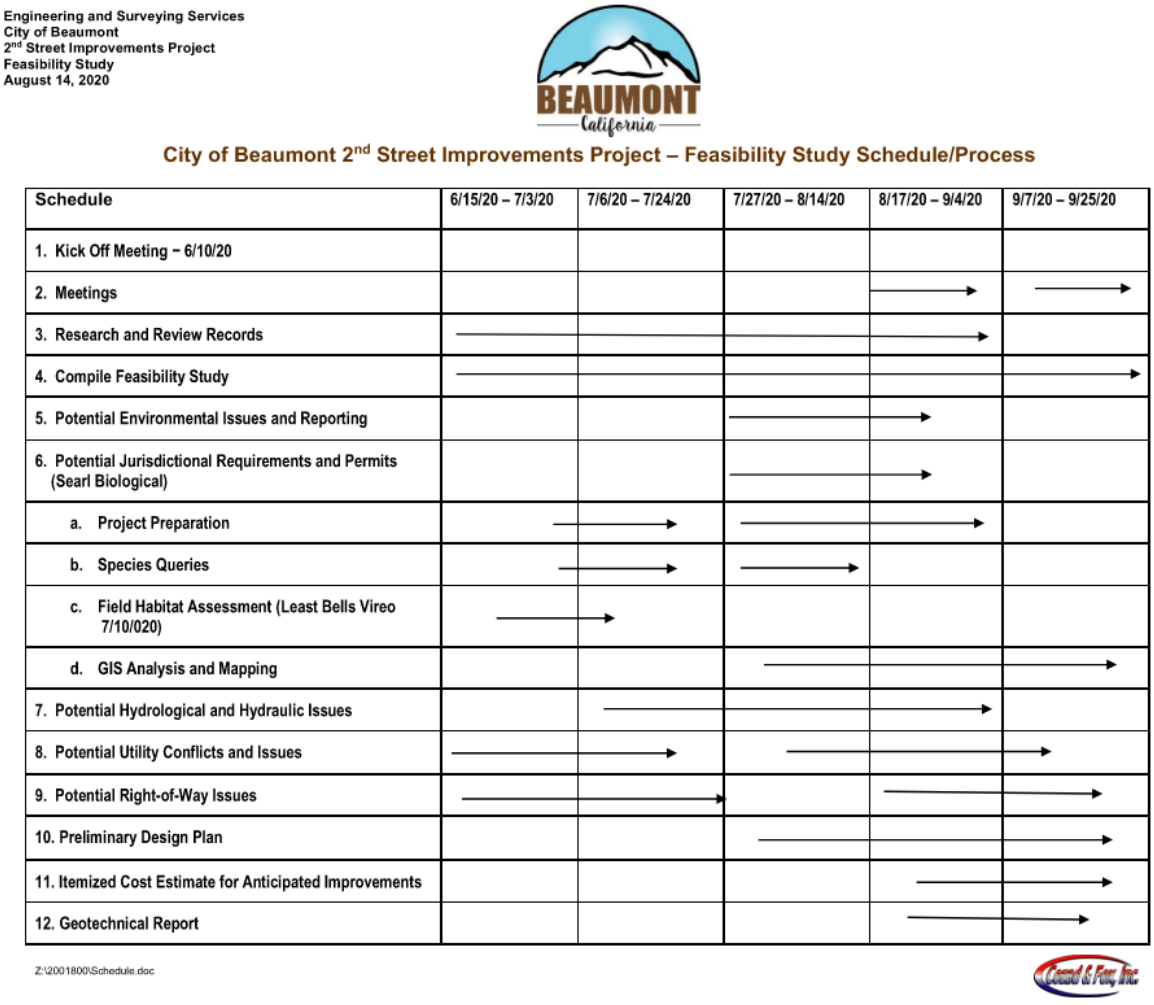


Figure 2. Schedule with Projected Dates and Tasks.

1.13 Geotechnical Report

Sladden Engineering performed the Geotechnical Report Investigation. Sladden Engineering is a highly regarded Geotechnical consulting firm with a vast project experience. The scope of work involved field exploration, laboratory testing, engineering analysis, and preparation of a report. The services provided information to be used in design of 2nd Street improvements. There was a total of 10 boreholes drilled, tested, and analyzed. In the existing areas where there is asphalt concrete, it is recommended that it does not have to be replaced. Additionally, there is a potential conflict because two boreholes were not drilled as concrete prohibited this; refer to the geotechnical portion of this report. The concrete is at least 6 inches thick. All the project location boreholes demonstrated to have SC (Clayey Sand). This type of soil is NOT

considered to be stable as this type of soil has the potential for moderate expansion. Clayey soils are a big issue in the City of Beaumont. For the 2nd Street Improvement Project to take place, the clayey soils must be removed and replaced with more adequate soil type layers. An R-Value of 30 was recommended to use for preliminary pavement design. From a geotechnical standpoint this project is feasible, but in areas where coarse grained soils are, additional work to take preventive measures of swelling and contraction of existing SC (Clayey Sand) will have to take place.

1.14 Preliminary Design

The design of 2nd Street is designated as a secondary street in accordance with City of Beaumont's General Plan. It is designated as such according to the standards because it has 4 travel lanes 2 in each direction) and has a pavement width of 64 feet which falls between the range of the range for this road type of between 56-64 feet. The approximate length of the designed road is 2,470 feet. There is a minor difference, however, in that the length of the right-of-way is 100 feet and, in the standards, a secondary street has a right-of-way width between 76-88 feet. This was agreed upon to be okay because it will reduce the construction costs. On the east, the asphalt concrete will be matched to the existing asphalt concrete. On the western portion, the drive approach will be designed and constructed per another design consultant. The cross section of the design shows that the asphalt concrete slopes away from the centerline at 2% for drainage purposes. On one side, water will be collected along the curb and gutter and on the other along the AC dike. A 6-foot sidewalk will be one side sloping at a 2% slope towards the curb and gutter. The existing terminus of 2nd Street is classified as a divider collector street. For the subgrade, the recommended values were given by the geotechnical consultant. An R value of 30 is recommended. For the recommended thicknesses of each material, reference Section 12 of this report.

Section 2: Introduction

2.1 Project Background

The City of Beaumont covers a land of approximately 30.33 square miles and has a population of 49,241. *Figure 3* depicts the outer boundary of the City of Beaumont shown in red. The city was settled in the mid-1800s and was incorporated on November 12, 1912. This city offers a small-town charm while at the same time a dynamic suburban environment.

It falls under the jurisdiction of Riverside County. This city is bounded to the southwest by a mountain range known as San Gorgonio Pass. To the northwest lies Calimesa as well as unincorporated areas. To the north of Beaumont lies Cherry Valley. Lastly, the City of Beaumont is bounded to the east by the City of Banning. In the recent years, the City of Beaumont has been seeing a rapid increase in economic development. This can be attributed to the city's vision and with its city's staff in its business strategy to prepare for a better future. The City of Beaumont's location is perfect in accordance with its vision and business strategy of continued economic development and growth.

Figure 3. City of Beaumont, CA Boundary Delineation.

The City of Beaumont is strategically placed to offer potential developers the allure to invest in the city. This is because it is an attractive option to both local merchants as well as national retailers. Hence, this project will alleviate current and future project traffic flows associated with current and future commercial developments.

2.2 Project Description

To alleviate traffic congestion on 1st Street between Highland Springs and Pennsylvania Avenue, the City of Beaumont wants to extend 2nd Street, see below for *Figure 4*, from the westerly boundary of the Home Depot shopping center to the projected project intersection at Pennsylvania Avenue. Specifically, the improvements are set forth to extend 2nd Street approximately 1,700 feet from its current terminus at the westerly boundary of 1st Street Self and RV Storage to Pennsylvania Avenue. In addition to the extension of the road, the city's intentions are to widen approximately 1,150 feet of 2nd Street from its current ending point to the western boundary of the Home Depot center. The project will require the construction of new storm drain facilities and thus might require improvements to existing drainage. A new storm drain system will also be designed as part of Final Engineering. Lastly, an effective signage and striping plan, phasing and any detouring plans needed during the construction of the project for minimization of Beaumont pedestrians and/or drivers will be prepared.

This project will be divided into two phases; the first phase will include a feasibility study. The second phase will be final engineering. Upon completion, this project shall provide a safe and easy access to the commercial development for pedestrians and vehicles from the west and thus an easier shopping experience.

Figure 4. 2nd Street Improvement Project Extension Site.

Section 3: Existing Project Conditions

Existing project location conditions include an asphalt concrete paved road, refer to *Figure 5*, E. 2nd Street terminating at the westernmost corner of 1st Street Self and RV Storage. The street extension is set forth to be approximately 1,700 feet from its current terminus at the westerly boundary of 1st Street Self Storage to Pennsylvania Avenue. Additionally, approximately 1,150 feet of 2nd Street is to be widened.

Figure 5. Existing Project Conditions.

3.1 Existing Street

The existing street refer to *Figure 6*, E. 2nd Street, is approximately 25 feet wide and is made from asphalt concrete material. Along the southern portion of this road, there is an existing sidewalk. Additionally, there is existing storm drain along E. 2nd Street, which varies in size, and is 24 inch closest to the terminus of the storage area. There is a sewer line that extends on E. 2nd Street and stops at the entrance of the Kohl's shopping center.

Figure 6. Existing Terminus of E. 2nd Street.

3.2 Existing Drainage System

There is an existing storm drain along Pennsylvania Avenue that begins approximately 500 feet north of Pennsylvania Avenue and 6th Street intersection and ends approximately one hundred feet north of the existing 10 off-ramp. The 42-inch reinforced concrete pipe mainline continues east along 6th Street and ends approximately 300 feet east of Illinois Avenue. A temporary bubbler structure consisting of a 60-inch standpipe lies downstream terminus of the existing storm drain west of Pennsylvania Avenue. Additionally, an existing 18-inch corrugated metal pipe is located along the east side of Pennsylvania Avenue that collects water emanating from Caltrans right-of-way. There is an existing culvert/storm drain *Figure 7 and Figure 8* crossing 2nd Street near the north west corner of the Kohl's site.

Figure 7. Existing Culvert/Storm Drain South of E. 2nd St.

Figure 8. Existing Culvert/Storm Drain North of E. 2nd St.

A drainage system north of I-10 collects drainage from the existing off-ramp and outlets to an existing headwall. The storm drain continues south and connects to an existing catch basin just south of the I-10 overpass. Lastly, there are 6 existing cross culverts; 4 culverts cross underneath Pennsylvania Avenue, refer to *Figure 9,* and two culverts cross the Union Pacific Rail East of Pennsylvania Avenue and South of the I-10.

Figure 9. Existing Culvert due East of Pennsylvania Avenue.

3.3 Disadvantages of the Existing Road/Drainage System

3.3.1 Existing Road

The current road does not intersect the major arterial road, Pennsylvania Avenue. Pennsylvania Avenue has a higher traffic carrying capacity than E. 2nd Street. Additionally, if further developments are made, the existing E. 2nd Street will not be able to accommodate for the increased traffic flow. The extension of E. 2nd Street will provide a safer and easier access to the commercial developments for pedestrians and cars from the west.

3.3.2 Existing Drainage System

The existing drainage system allows flow to be collected based on different parameters. New drainage conditions must be analyzed because additional runoff from the new pavement is to be produced and needs to be captured.

The existing culverts underneath Pennsylvania Avenue will be extended, and the culverts will not be upsized nor will an additional parallel culvert be finished.

3.3.3 Summary

- The existing E. 2nd Street will experience higher traffic volumes if more commercial developments are made. Beaumont sees that most likely this will occur in the future because they welcome both small and large developments.
- If developments are made, the current 2nd Street would be heavily trafficked and would not be able to meet the carry-capacity demand.
- E. 2nd Street must be widened and extended to connect to Pennsylvania Avenue so that it will allow for less traffic congestion and a more pleasant experience for shoppers.
- Improvement of Pennsylvania Avenue interchange will facilitate the traffic flow from the freeway I-10 to the commercial areas.
- New pavement means increased drainage which must be accounted for and captured.

Section 4: Potential Environmental Issues

The main environmental issues associated with this project are related to animals and plants in the project proximity. This is of essence due to the laws and regulations that exist to halt the rapid loss of plant and animal life. It is important to protect species because healthy ecosystems depend on plant and animal species as their foundations. When the species become endangered, it means that the ecosystem is slowly falling apart. Thus, it is important to discuss the endangered species that may be associated with the scope of work of this project.

4.1 Existing Species in Project Proximity

The following are the animal and plant species associated near the project proximity determined by Searl Biological Services who conducted biological field assessments for the project on July 20 and 29, 2020. The method utilized was to obtain the right-of-way delineation and create 100 feet JD/NEPS survey buffer and 500 feet BUOW/Riparian Birds survey buffer (see below).

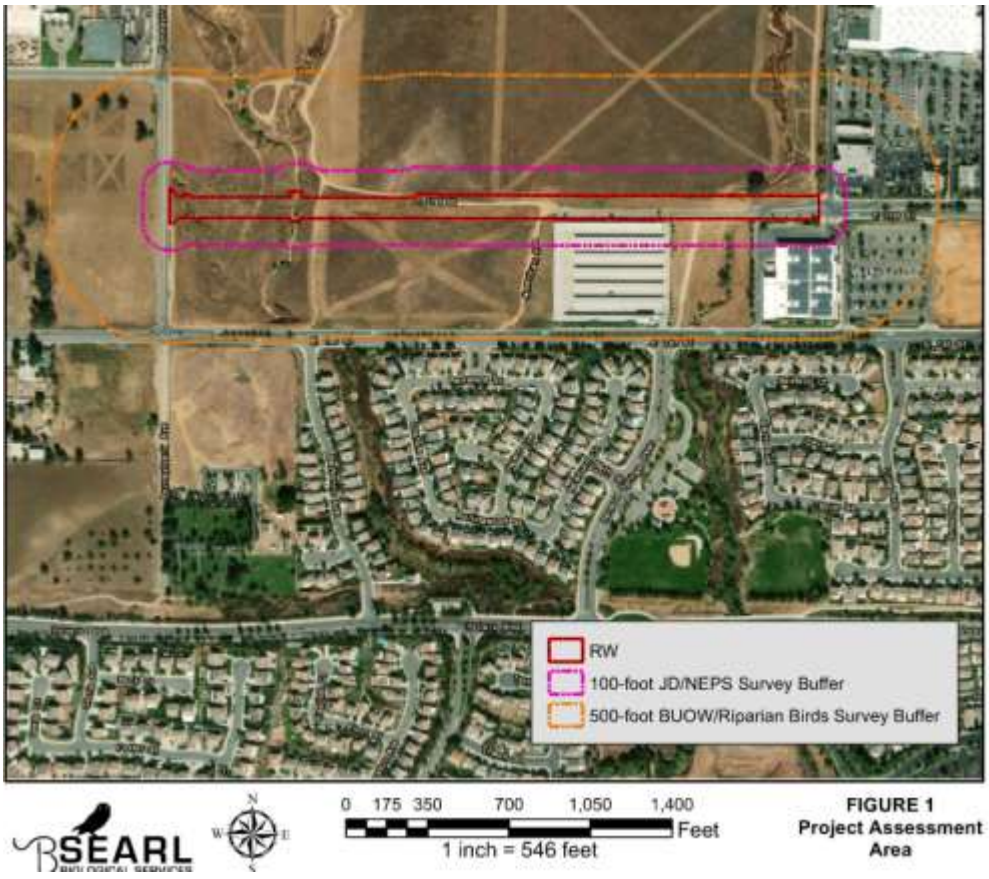


FIGURE 1
Project Assessment Area

- Least Bell's Vireo
    - Suitable habitat, though marginal, is present within the 500-foot survey buffer area.

FIGURE 3
Suitable LBVI Habitat Map

- Least Bell's Vireo (LBVI), see *Figure 10*, was detected 0.8-mile south of the right-of-way in 2015.
- Protocol surveys for the LBVI will be required by the agencies and are highly recommended to be conducted during the 2021 season.
- Good quality habitat was present south of the 500 feet buffer and LBVI was detected in the stream system in the last five years.

Figure 10. Least Bell's Vireo.

- Southwestern Willow Flycatcher (SWFL) *Figure 11.*
    - SWFL was detected 1.8-mile west of the RW in 2007; however, no suitable habitat was present in the 500- foot survey buffer area.
    - Focused surveys not required.

Figure 11. Southwestern Willow Flycatcher.

- Burrowing Owl BUOW *Figure 12.*
    - Suitable habitat was present and numerous California ground squirrel burrows (preferred burrows utilized by BUOW) were observed throughout the site.

Figure 12. Burrowing Owl.

FIGURE 4
Suitable BUOW Habitat Map

- The area also supported California ground squirrels.
- Focused surveys will be required for BUOW which are recommended to be conducted during the 2021 season.

- Narrow Endemic Plants (NEP) *Figure 13*.
  - No suitable habitat was present for the two targeted NEPs.
  - Focused surveys are not required.

- Vernal Pools and Fairy
    - No vernal pools or fairy shrimp habitat were detected on or within 500 feet of the right-of-way.
    - No focused surveys will be required.

4.2 Summary

- There are potential issues that may affect the successful completion of the project. The first is that of animals and plants in danger of becoming extinct. There have been three identified animals – Least Bell's Vireo, Southwestern Willow Flycatcher, and Burrowing Owl.
- It is important to identify endangered species because the health of an ecosystem is maintained by its plants and animals. When they become endangered, the ecosystem is not balanced. Additionally, the conservation of endangered species is important for human health because a well-balanced ecosystem purifies the environment which gives humans clean air to breath amongst other benefits.
- Lastly, a potential right-of-way issue may arise because the northeast corner of the intersection of Pennsylvania Avenue and 2nd Street is not dedicated to the City of Beaumont.
- In conclusion, the following will be required:

Requirements Based on Assessment
1. Least Bell's Vireo
2. Burrowing Owl Focused Survey
3. MSHCP Consistency Analysis
4. Determination of Biologically Equivalent or Superior Preservation
5. Jurisdictional Report
6. Agency Applications

Section 5: Jurisdictional Requirements

There are a few jurisdictional delineations from four public agencies/authorities. The four public agencies/authorities are- United States Army Corps of Engineers (USACE), State and Regional Water Quality Control Board (SWQCB), California Department Fish and Wildlife (CDFW), and the Western Riverside County Regional Conservation Authority (WR-MSHCP).

5.1 United States Army Corps of Engineers

- Section 404 Clean Water Act (CWA)
- This section of the Act requires permits for the discharge of dredged or fill material into the waters of the United States, which includes wetlands.
- There are some exempt activities under this act: established farming, ranching, silviculture activities, harvesting for the production of food, fiber, and forest products; maintenance of drainage ditches; construction and maintenance of farm or stock ponds; construction and maintenance of farm and forest roads; and maintenance of structures such as dams, dikes and levees.
- The activity for the purpose of this project does not fall into the above-mentioned exempt activities.
- The nature of this project will require compliance with this agency.

5.2 State and Regional Water Quality Control Board

- Section 401 CWA /Porter-Cologne Act
- The program is responsible for regulating discharges of dredged or fill material to the waters of the state.
- The nature of this project will require compliance with this agency.

5.3 California Department of Fish and Wildlife

- 1600 streambeds
- Fish and Game Code section 1602 “requires any person, state, or local governmental agency or public utility to notify CDFW prior to beginning any activity that may do one or more of the following: divert or obstruct the natural flow of any river, stream or lake; change the bed, channel, or bank of any river, stream, or lake; use material from any river, stream or lake; or deposit or dispose of material into any river, stream, or lake.”
- The definition of “any river, stream, or lake” also includes those that are dry for periods of time and those that flow year-round.
- The nature of this project will require compliance with this agency.

5.4 Western Riverside County Regional Conservation Authority

- This conservation authority was established in 2004 to protect, restore and enhance habitats for the conservation of 146 species. It protects a 500,000-acre habitat and is the nation's largest habitat conservation plan. The MSHCP improves sustainability and the quality of life in Western Riverside County by alleviating traffic congestions, protecting natural resources, and improving air quality.
- The MSHCP also manages land it acquires so that animals and plants can thrive and monitors habitat loss and the behavior and welfare of protected plants and animals. Additionally, the authority reviews applications for infrastructure or development projects.
- The nature of this project will require compliance with this authority.

5.5 Results and Recommendations

- MSHCP Riparian/Riverine Areas were identified as well as LBVI Suitable Habitat within 500 feet of the right-of-way it is recommended to have protocol surveys for LBVI to be conducted during the 2021 season. Regarding the Riparian/Riverine Areas, the MSHCP requires a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis and report.
- No vernal pools or fairy shrimp were detected on or within 500 feet of the right-of-way, thus no focused surveys for fairy shrimp will be required.
- No suitable habitat (the area consists of sandy loam soils) was present for either ALMU or DUMU - 63 rare plant species that require clay soils for living, hence no focused surveys for ALMU or DUMU will be required.
- Lastly, the area within 500 feet of the right-of-way is suitable for burrowing owls (BUOW) and focused surveys will be required.

5.6 Summary

There are four different agencies/public authorities in which the project will have to comply. The four are as follows- United States Army Corps of Engineers, State and Regional Water Quality Control Board, California Department of Fish and Wildfire and Western Riverside County Regional Conservation Authority.

They are four different entities but each dictates requirements that must be respected by any project in the areas that they govern. The U.S. Army Corps of Engineers is relevant because of Section 404 Clean Water Act. The State/Regional Water Quality Control Board is relevant because of Section 401 Clean Water Act/Porter-Cologne Act. The California Department of Fish and Game is relevant because of the existing streambeds. Lastly, the Western Riverside County Regional Conservation Authority is of relevance because of the nature of project location that may disturb protected wildlife.

It is important to abide by the requirements set forth by these governing agencies to ensure that the project can be completed, and all parties will be satisfied with the requirements.

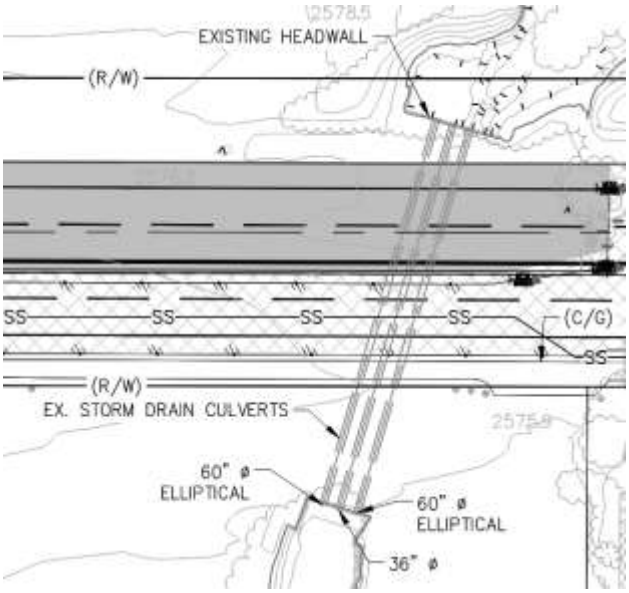
It is required for some focused surveys to be established and not for others as none were detected. Refer to section above for requirements.

Section 6: Hydrology Requirements

6.1 Existing Conditions

6.1.1 Existing Drainage and Drainage Facilities

The current project area is composed of moderately sloping valley terrain that falls generally to the southwest. There is little history of flooding problems. It is expected that the increase of flow generated with paving the existing soil will be collected in this channel. The channel crosses underneath of 2nd St. This channel is composed of two existing headwalls with three pipes: (2)- 60" diameter elliptical and (1)- 36" diameter pipe, refer to below image.



There is also an existing storm drain system along Pennsylvania Avenue that begins 500 feet north of Pennsylvania Avenue and 6th Street intersection and ends 300 feet east of Illinois Avenue. An existing 18-inch corrugated metal pipe is located along the east side of Pennsylvania Avenue and collects stormwater emanating from Caltrans right-of-way. An existing drainage ditch located north of I-10 Freeway collects drainage from the existing off-ramp and outlets to the existing headwall. However, it is expected that this existing storm drain will be replaced with the MDP Line 2 project, refer to Section 6.2 below.

In addition to the two existing storm drain systems, there are 6 existing cross culverts. There are four existing culverts that cross underneath Pennsylvania Avenue and two other culverts that cross the Union Pacific rail east of Pennsylvania Avenue and south of I-10 Freeway. The culverts under Pennsylvania Avenue will be extended but will not be upsized nor will additional parallel culverts be furnished. It is understood that the flow from the 18" and 30" do not drain to the existing site because the train tracks, which are owned and operated by Union Pacific Railroad, currently provide a barrier.

Figure 14, below depicts the City of Beaumont's current master drainage plan as well as the legend. It depicts proposed storm drain and open channel.

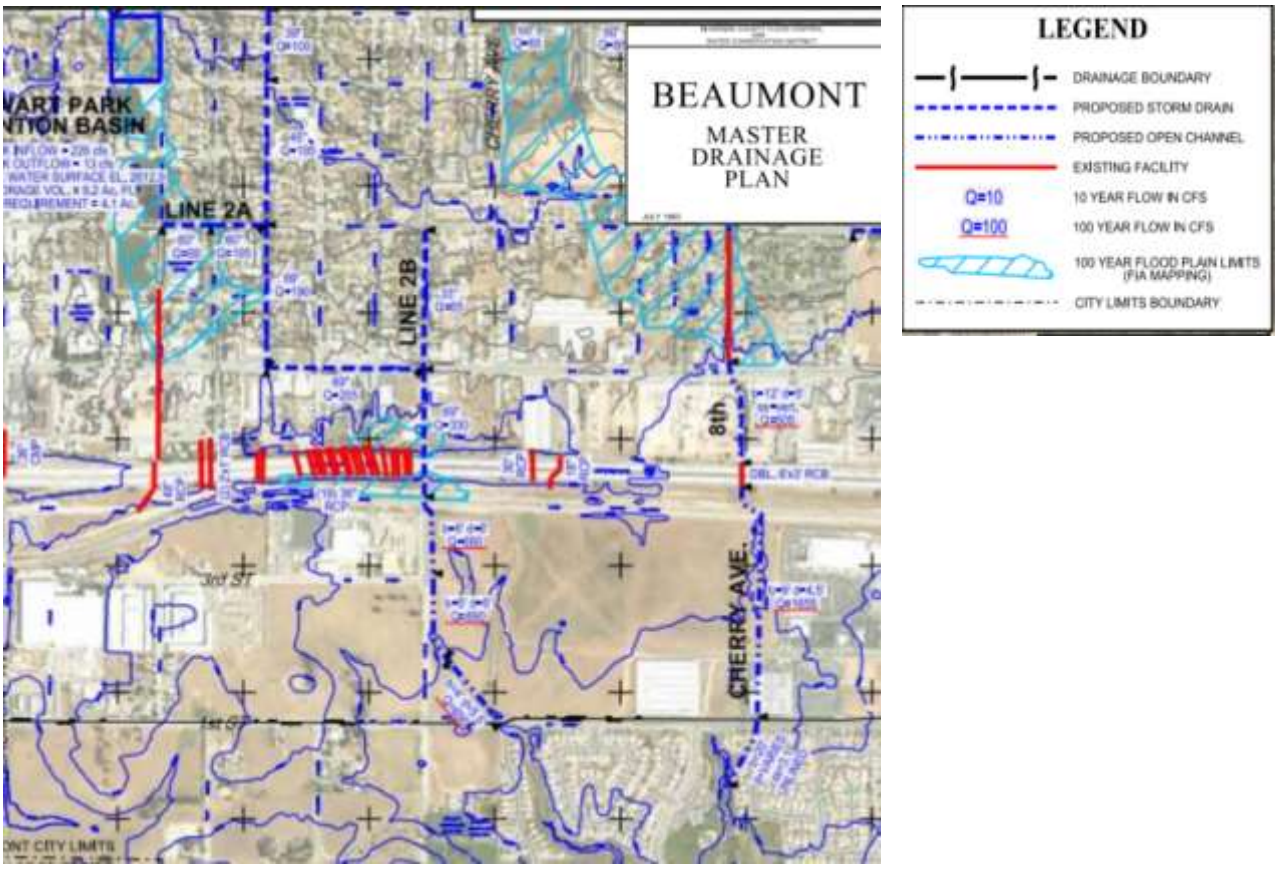


Figure 14. Depicts City of Beaumont's Master Drainage Plan.

6.2 Other Projects: MDP Line 2

6.2.1 MDP Line 2

MDP Line 2 is another project in the area of interest. It is anticipated that the line will collect a lot of the tributary flows north of the I-10 Freeway. Additionally, there is an existing improvement plan for the Pennsylvania Avenue Roadway Widening Project. The project depicts proposed drainage structures as well as existing along the intersection of 1st Street and Pennsylvania Avenue as well as on Pennsylvania Avenue. It is expected that the flow generated by construction of the 2nd St. extension will be eliminated by this proposed Pennsylvania Avenue Storm Drain.

6.2.2 Design Criteria

Criteria is based on the drainage section from the County of Riverside Transportation Department Plan Check Policies and Guidelines. It was determined that 10-year frequency will be contained below the tops of curbs and the 100-year frequency will be contained within the street right-of-way. Design discharges were calculated using the rational method. Runoff coefficients for impervious materials (concrete/asphalt) and pervious material (cut and fill) used were 1.00 and 0.60, respectively. Intensity duration data were used from RCFC&WCD Hydrology Manual.

6.2.3 Anticipated Runoff Capture & Foreseen Complications

Anticipated stormwater runoff is expected to be captured and discharged to the existing storm drain structure and to this proposed Pennsylvania Avenue Storm Drain. The project location does not fall in a troublesome flood zone so no major flow, Q is expected to be achieved. However, for design purposes, both a 10-year and 100-year frequency is considered using a similar approach implemented by a project along Pennsylvania Avenue Criteria is based on the drainage section from the County of Riverside Transportation Department Plan Check Policies and Guidelines. It was determined that 10-year frequency will be contained below the tops of curbs and the 100- year frequency will be contained within the street right-of-way. Runoff coefficients for impervious materials (concrete/asphalt) and pervious material (cut and fill) used were 1.00 and 0.60, respectively. Intensity duration data were used from RCFC&WCD Hydrology Manual.

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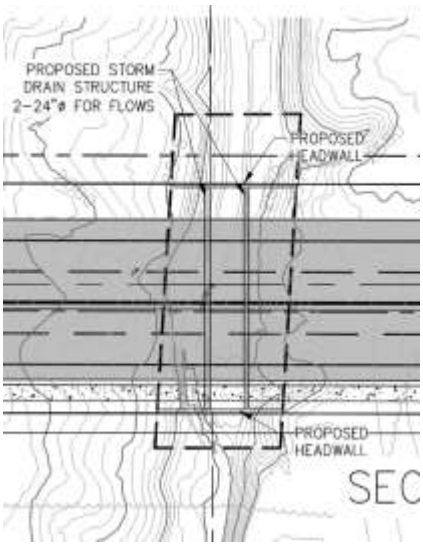
Criteria is based on the drainage section from the County of Riverside Transportation Department Plan Check Policies and Guidelines. It was determined that 10-year frequency will be contained below the tops of curbs and the 100- year frequency will be contained within the street right-of-way. Design discharges were calculated using the rational method. Runoff coefficients for impervious materials (concrete/asphalt) and pervious material (cut and fill) used were 1.00 and 0.60, respectively. Intensity duration data were used from RCFC&WCD Hydrology Manual.

6.3 Proposed Storm Drain Structures

6.3.1 New Storm Drain

In addition to the existing storm drain system near 2nd St. and the proposed Pennsylvania Avenue Storm Drain, there is a proposed storm drain structure between Pennsylvania Avenue and Whitney Place, see below and Section 12 of this report for the complete exhibit showing its placement relative to the existing streets.



This proposed system consists of two proposed headwalls and (2)- 24" diameter RCP pipes for flow collection and transport. It is anticipated that this new storm drain structure will collect some of the newly generated flow. The material and more details for the proposed storm drain will be discussed later. This final design will capture the flow from the existing 18" and 30" and flow generated by the existing land. To determine the flow in the final design, the Rational Method for flow determination will be utilized to verify that the (2)-24" RCP pipes will convey the flow.

Summary

The current project location is an area that is not susceptible to flooding. There are existing storm drain systems/structures and culverts in the project area that capture stormwater runoff. City of Beaumont has a Master Storm Drain plan which depicts proposed storm drain and open channels as well as existing storm facilities which can be seen above in Figure 14. Runoff will be captured and diverted into existing storm drain structures as well as to the proposed storm drain structure along 2nd St. between Pennsylvania Avenue and Whitney Place. Additional flows will be eliminated by the proposed Pennsylvania Avenue Storm Drain as part of the MDP Line 2 Project and with the new storm drain capture system along 2nd Street near Pennsylvania Avenue (refer to Appendix H for location) and/or Section 12 "Preliminary Design" to for the visual depiction as to where these storm drain capture systems are placed/to be placed.

Section 7: Right-of-Way Requirements

The City of Beaumont lies in the County of Riverside. Parcel maps from the County of Riverside assessor's page were utilized to map out the existing rights-of-way, road centerlines, and lot divisions associated with the project. Hence, it is believed that it should not be considered an issue since this proposed project will improve the existing conditions.

7.1 Right-of-Way Dedication Matter

After the existing right-of-ways were mapped using Parcel Map No. 31948, reference *Figure 15*, it can be determined that the westernmost section of E. 2nd Street is not dedicated to the City of Beaumont. This is the section on the parcel map nearest to Pennsylvania Avenue. It is approximately 574.60 feet in length and has a bearing of N89°52'32" W. Nonetheless, it is expected that it should not be an issue to the owner of the dedication since this project will improve the existing conditions/site. See image below for the location for potential non-dedicated error area.

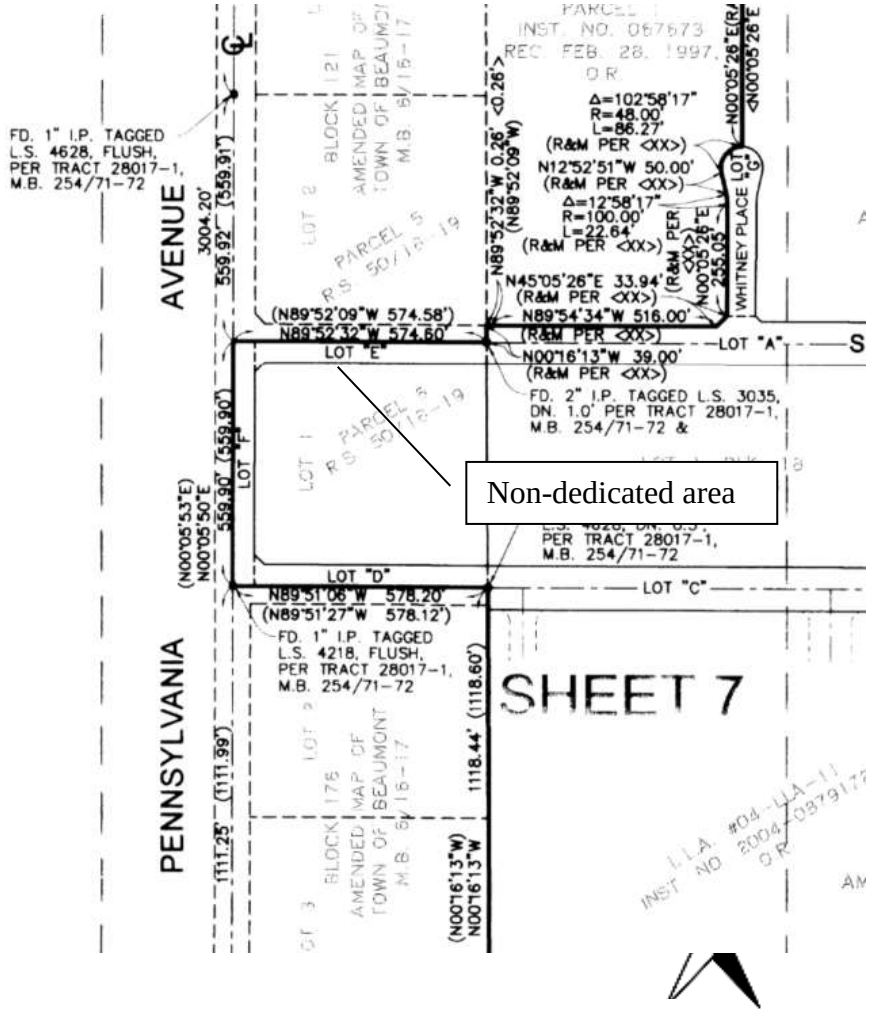


Figure 15. Parcel Map Showing Non-Dedicated Area.

7.2 Existing Right-of-Way

Additional right-of-way issues will be determined after the alignment is reviewed as well as right-of-way records are reviewed. A main identified issue of concern is the right-of-way associated with the westerly side of 2nd Street site. The existing right-of-way at the northeast corner of the intersection of Pennsylvania Avenue is not dedicated to the City of Beaumont. Parcel Map No. 31948, sheet 3 of 7, depicts the westernmost piece of land along 2nd Street and intersection at Pennsylvania Avenue that has not been dedicated to the City of Beaumont. However, it is considered that it should not be an issue since the project will improve the site.

7.3 Summary

There are no major complications associated with right-of-ways except for the section that lies to the westerly side of the proposed project close to Pennsylvania Avenue. The piece of land is not dedicated to the City of Beaumont but instead to Loma Linda University. However, it is presumed that the dedicatees will accept due to the nature that the implemented project will improve the existing conditions of the dedicated area.

Section 8: Potential Utility Conflicts

There are existing utilities in the proposed project location. No existing utilities pose a conflict to the proposed project, this is because there are not many existing developments along E. 2nd Street for the purposes of this project, research was conducted to identify utilities present; these utilities include and are not limited to: water, sewer, electric, gas, telecommunications, internet, etc. The contacted companies are as follows:

- Southern California Edison
- Southern California Gas Company
- Charter Cable
- Frontier Communications
- Beaumont-Cherry Valley Water District
- City of Beaumont
- MCI Verizon Business

8.1 Existing Utilities

8.1.1 Southern California Edison

There is an existing underground electric line that extends approximately from westerly corner of the entrance of the existing shopping center to the east of the existing Verizon store commercial development. There are no nearby overhead electric lines in project proximity. See picture to the right *Figure 16*, for the mapped existing underground electric line.

Figure 16. Existing Underground SCE and Frontier Communication Line in Project Location.

8.1.2 Southern California Gas Company

Upon receipt of SoCalGas Maps. No relevant gas lines exist near the project location. However, per the SoCalGas maps, there is an existing gas line along E. 1st Street that extends towards Pennsylvania Avenue. This information can be relevant when trying to connect to the existing gas line.

8.1.3 Charter Communications

Upon receipt of Charter Communications utility maps, it was determined that no relevant Charter Communication lines exist near the project location. Nevertheless, there is an existing Charter underground line along E. 1st Street that extends to Pennsylvania Avenue. There are no aerial facilities within the project limits.

8.1.4 Frontier Communications

There are existing Frontier Communication lines near the entrance of the Verizon store shopping center, due east of the existing 2nd Street. The maps received from Frontier Communications depict both copper and fiber facilities towards the easterly portion of 2nd Street. Additionally, both the copper and fiber facilities extend southerly along Commerce Way and along E. 1st Street. It can further be seen that additional new proposed facilities will be made along Commerce Way. However, these should not cause much interference with the proposed extensions. See image *Figure 16*, for existing Frontier Communication line.

8.1.5 Beaumont Cherry Valley Water District

BCVWD provided both water and sewer maps. Along E. 2nd Street, there is an existing 8-inch sewer line that extends westerly towards the end of American Avenue. No water line is present along E. 2nd Street. However, in the intersection of E. 2nd Street and Commerce Way to the right, there are water main lines that exist. There is a 12-inch water line that extends southerly along Commerce Way and extends westerly towards E. 1st Street. The 8-inch sewer line along E. 2nd Street easterly towards Commerce Way both northerly and southerly and then westerly along E. 1st Street. This information is useful to know so that future water and sewer connections can be made to the existing main lines.

8.1.6 Storm Drain

There is an existing storm drain structure *Figure 17*, near the entrance of the Kohl's shopping center. The storm drain structure is approximately 13 feet in width and can be seen in the image below. Additionally, there are City of Beaumont owned culverts near the intersection of Pennsylvania Avenue and E. 3rd Street.

Figure 17. Depicts Existing Storm Drain Structure Along E. 2nd Street.

8.1.6 Existing Culverts

The City of Beaumont owns and maintains existing culverts near the area of interest. The City of Beaumont has provided Cozad & Fox, Inc. with As-Built Drawings of the existing culverts.

8.1.7 MCI Verizon Business

MCI Verizon Business confirmed that there are no existing facilities at the proposed project location. Hence, no MCI Verizon Business lines are taken into consideration or identified as a potential hazard to the 2nd Street Improvement design.

8.2 Summary

Along the proposed project location, no utilities in place pose a risk to the design and development of the 2nd Street Improvement. From utility plotting, it can be observed that the only existing utilities near the project location are: 1) an existing 8-inch water line and 2) an existing storm drain structure. However, neither of these pose a risk in the design and construction of the extension of E. 2nd Street. Because there are no major developments along E. 2nd Street towards Pennsylvania Avenue, it makes sense that no existing utilities extend to Pennsylvania Avenue. The first is that of underground electric lines and existing communication lines, north of E. 2nd Street near the Verizon store commercial development. If working near the area, it is advised to take the proper planning cautions. In addition, city owned storm drains and culverts were spotted and mapped in the project location. As-Built drawings of the existing culverts were provided by the City of Beaumont. Both water and sewer lines are present along E. 2nd Street. This is important to know for design purposes as well as for future connections. It was determined that no gas lines are in the project vicinity to interfere with the project. Lastly, because E. 2nd Street does not have many developments, there are not that many utilities to be worried about when designing and constructing for this project.

Section 9: Preliminary Cost Estimate

9.1 Cost Estimate Explanation

The cost estimate, see *Table 1,* includes quantities for street improvements, erosion, sediment control, right of way, drainage, excavation, construction costs and labor costs. The cost estimate includes the following headers: quantity, units, item, unit cost and total dollar amount. The front page of the preliminary construction cost estimate depicts that the total estimated cost to be about $2.48M. For the complete construction cost estimate refer to Appendix E.

Linear and square footage quantities for the street improvements were determined utilizing the program, AutoCAD Civil 3D. These quantities were determined by using measuring or length tools as well as area calculations tools. The units are based on the type of quantities. The item is described based on its requirement based on design. The description for the street improvement objects is based on the "Improvement Plan Check Policies and Guidelines" provided by the County of Riverside Transportation Department; revised December 2015. Additionally, for other unit costs, not included in the aforementioned source, professional judgement was used for the unit cost associated based on previous project numbers and current unit costs. This report gives the unit cost for various of the items associated with the street improvements, units, and an itemized description.

Table 1, shows the Preliminary Cost Estimate Totals. The complete and itemized cost estimate to determine the total cost can be referenced at Appendix E. The major categories used to determine the total costs were as follows:

- Mobilization
- Streets
- Erosion Control
- Culvert
- Excavation
- Labor
- Plan Check
- Administrative

For each of the above-mentioned costs, a 20% contingency fee was added to cover any unexpected costs that can arise. The costs associated with street improvements, erosion and sediment control and associated right-of-way acquisition costs totaled approximately $1.5M with the 20% contingency fee accounted for. The total cost associated with drainage, excavation/construction and labor was about $739,718.40 with the 20% contingency fee accounted for. The total costs associated with streets/erosion control was that of $1,504,714.00. A plan check fee and administrative fee was added, $4,200 and $3000, respectively. The subtotal was $1,876,360 without contingency costs. With contingency costs accounted for, the grand total estimate for this project is that of $2,476,075.

This is a preliminary cost estimate, and the total does not represent an accurate number regarding the cost of 2nd Street Improvement Project. The cost can be more because some items may have been not included but might be required or less and might have to be subtracted out. The total sum is just an estimate in USD. The budget allotted for this project was communicated to be $2.5M, thus, from a monetary perspective, the project is feasible.

Cozad & Fox, Inc.

CIVIL / STRUCTURAL ENGINEERS
MUNICIPAL CONSULTANTS
SURVEYORS / PLANNERS
WATER RESOURCES
TRANSPORTATION

PRELIMINARY CONSTRUCTION COST ESTIMATE

Street Improvements

PROJECT: City of Beaumont - 2nd Street Improvements **DATE:** 1/19/21

IMPROVEMENTS	Subtotal	20% Contigency	Total
Mobilization	not to exceed 10%		$224,443
Streets/Erosion Control	$1,253,928	$250,786	$1,504,714
Drainage/Excavation/Labor	$616,432	$123,286	$739,718
Plan Check	$3,500	$700	$4,200
Adminstrative	$2,500	$500	$3,000
Total	**$1,876,360**	**$375,272**	**$2,476,075**

Table 1. Preliminary Cost Estimate.

Section 10: Project Schedule

For the 2nd Street Improvement Project there are various tasks associated with the project schedule *Table 2,* which depicts the original anticipated project schedule and dates. In its totality, there are twelve different tasks, some of which occur simultaneously. The tasks associated are as follows:

1. Kick Off Meeting
2. Meetings
3. Research and Review Records
4. Compile Feasibility Study
5. Potential Environmental Issues and Reporting
6. Potential Jurisdictional Requirements and Permits – Searl Biological
    a. Project preparation
    b. Species Queries
    c. Field Habitat Assessment
7. Potential Hydrological and Hydraulic Issues
8. Potential Utility Conflicts and Issues
9. Potential Right-of-Way Issues
10. Preliminary Design Plan
11. Itemized Cost Estimate for Anticipated Improvements
12. Geotechnical Report

All these tasks are to be completed by their respective projected due dates. The schedule is tentative to change due to unforeseen event(s). In accordance with the schedule. However, these dates are tentative to change due to delays in the reports for some of the subcontracted portions of the project listed in the project schedule. For example, a revision to this schedule is that the Preliminary Design Report (Phase I-Feasibility Study) turn in date will be January 20, 2021. Once this is submitted, this will end Phase I of the contract and Phase II: Final Engineering can commence. Refer to *Table 2* for the more detailed schedule that shows the tasks associated with their respective start and end dates.

Engineering and Surveying Services
City of Beaumont
2nd Street Improvements Project
Feasibility Study
August 14, 2020

City of Beaumont 2nd Street Improvements Project – Feasibility Study Schedule/Process

Schedule	6/15/20 – 7/3/20	7/6/20 – 7/24/20	7/27/20 – 8/14/20	8/17/20 – 9/4/20	9/7/20 – 9/25/20
1. Kick Off Meeting – 6/10/20					
2. Meetings				→	→
3. Research and Review Records	→	→	→	→	
4. Compile Feasibility Study	→	→	→	→	→
5. Potential Environmental Issues and Reporting			→	→	
6. Potential Jurisdictional Requirements and Permits (Searl Biological)			→	→	
a. Project Preparation	→	→	→	→	
b. Species Queries	→	→	→		
c. Field Habitat Assessment (Least Bells Vireo 7/10/020)	→	→			
d. GIS Analysis and Mapping			→	→	→
7. Potential Hydrological and Hydraulic Issues		→	→	→	
8. Potential Utility Conflicts and Issues	→	→	→	→	→
9. Potential Right-of-Way Issues	→	→	→	→	→
10. Preliminary Design Plan			→	→	→
11. Itemized Cost Estimate for Anticipated Improvements				→	→
12. Geotechnical Report				→	→

Z:\2001800\Project Docs\Preliminary Design Report\Word Document Sections\Section 10.doc

Table 2. Project Schedule

Section 11: Geotechnical Report

A geotechnical investigation was performed by Sladden Engineering. The purpose of the Geotechnical Report was to explore subsurface conditions in the proposed project location site, located from the portion of 2nd Street extending west from the westerly boundary of the Home Depot shopping center to Pennsylvania Avenue. To provide relevant information used in foundation design and site preparation. Refer to *Appendix H* for full Geotechnical Report.

11.1 Scope of Work

The scope of work included measuring existing asphalt pavement thicknesses, subsurface soil sampling, laboratory testing, engineering evaluation, reporting, and providing an engineering recommendation of project feasibility.

11.2 Tests Performed

Various tests, both classification and compaction testing as well as soil mechanics testing, were performed on the collected soil samples. The exact tests performed were unit weight/moisture content, maximum density-optimum moisture determinations, classification testing, expansion testing, direct shear tests, consolidation, corrosion series testing and R-Value Testing. After analyzation of gathered results, it is recommended to design using an R-Value of 30 which is conservative and an intermediate design value appropriate for preliminary pavement design.

11.3 Investigation Findings

A total of 10 borehole locations were drilled and investigated. The alignment, seen in *Figure 18,* shows the investigated borehole locations. Out of the 10 borehole locations, two of them were unsatisfactory due to auger refusal so no information relating to existing conditions are readily available; refer to section 11.3 of the report for more exact information.

Figure 18. Alignment Showing Borehole Locations for Investigation.

The following was determined:

- All borehole location subgrades have a soil type SC (Clayey Sand)
- Borehole location 1 has an asphalt thickness of 5” and a base thickness of 15”
- Borehole location 2 has an asphalt thickness of 4.5” and a base thickness of 6”
- Borehole location 3 has an asphalt thickness of 4” and a base thickness of 20”
- Borehole location 4 has an asphalt thickness of 3.5”
- Borehole location 5 has an asphalt thickness of 3.5”
- Borehole location 6 has an asphalt thickness of 4” and a base thickness of 13”
- Borehole location 7 currently is existing SC
- Borehole location 8 currently is existing SC
- Borehole location 9 currently is existing SC
- Borehole location 10 currently is existing SC

In all these locations no groundwater, seepage nor bedrock was encountered so no dewatering measures will have to take place.

11.4 Tests Performed

After analyzation of gathered results, it is recommended to design using an R-Value of 30 which is conservative and an intermediate design value appropriate for preliminary pavement design.

11.5 Potential Conflicts

There was concrete pavement directly encountered under the asphalt where borings BH-4 and BH-5 were bored along the north side of First Street Storage Facility. In both of these locations, the auger refused to go through due to the underlying concrete present two feet under the 3.5 inches of existing asphalt. Due to this situation, there is no relevant information regarding soil type or strength and not coefficients of design are determinable.

Additionally, the project location demonstrated to have the soil type of SC (Clayey Sands). These types of soils are typically unwanted as they tend to expand with moisture and contract when dry. This may cause foundation problems and many other structural and financial problems. Because of this, preventive measures must be taken. This includes the following solution methods: mixing and compaction of existing soils, removal and replacement of soils, and/or stabilization with chemicals.

11.6 Engineering Recommendation

After analyzation of gathered results, it is recommended to design using an R-Value of 30 which is conservative and an intermediate design value appropriate for preliminary pavement design in the locations where boreholes were successful in determining project conditions. A table showing the recommendations of the pavement design section can be seen below.

PAVEMENT DESIGN SECTION – FOR DESIGN R-VALUE = 30				
Pavement Material	Recommended Thickness (inches)			
	TI = 7.0	TI = 7.5	TI = 8.0	TI = 8.5
Asphalt Concrete Surface Course	4.0	5.0	5.5	6.0
Class II Aggregate Base Course	9.5	9.0	10.0	10.5
Compacted Subgrade Soil	12.0	12.0	12.0	12.0

Additionally, the asphalt concrete must conform to the specifications of the Standard Specifications for Public Works or Caltrans Standard Specifications. Aggregate base should conform to Section 26 of the Caltrans Standard Specifications or Greenbook. The subgrade soil should be compacted to at least 90% of maximum density and the aggregate base material should be compacted to at least 95% of the maximum dry density as determined by ASTM Method D 1557.

Lastly, in the project area where boreholes 4 and 5 are located, there is no relevant information to determine current project conditions. As of this moment, there is no known reason for the purpose of the existing concrete; further investigation will have to be made.

A particularly important element of concern regarding project feasibility is that the geotechnical investigation deduced that there are many clayey sand (SC). These soils are highly problematic as they are not stable. All 10 boreholes demonstrated to have SC soil type. The SC soil type has a potential for moderate expansion. When expansive soils obtain moisture, they expand or swell up and increase the volume 10% or more. On the other hand, when expansive soils dry

out, they tend to shrink. The cycle of swelling and shrinking put repeated stress on concrete foundations and can cause fissures in the soil that allow water runoff to seep through to basement walls. This can create problems If the moisture content is stabilized, however, it will not cause foundation problems. In addition to foundation problems, cracked floors, and damage to upper floors of buildings may occur when the motion of the structure is significant. This is especially true since clayey soils are a big issue in Beaumont. To remediate this, geotechnical consultant has provided the option to either mix and compact the soil or excavate and fill those soils altogether. Additionally, another form to remediate this issue is to use chemical stabilizers, such as AGSS-ICS, to treat these types of soils. This product works by reducing the capillary action of the soil particles in order to minimize the shrinking potential. Once treated, an irreversible change occurs in the molecular structure of the soil particles so that they are no longer able to attract or hold on to the water. The process can either be done prior to construction or after. If prior to construction, the chemical is mixed/injected into the native soils. If post construction, the chemical is injected into the soil beneath and around the existing structure(s) through small injection probe. From a geotechnical standpoint, via Sladden Engineering, this project is feasible.

Section 12: Preliminary Design

12.1 City of Beaumont Roadway Standards

A preliminary design for the extension of 2nd Street was completed. The design is based on the City of Beaumont's General Plan. For the design, the existing topographical conditions were analyzed and the road type best to fit the need was that of a secondary street. The typical average daily traffic volume (ADT) for such road is that of 25,000; where ADT is the average 24-hour traffic volume at a given location for some period of time less than a year. According to the standards, the new design is a secondary street and has a total of 4 total travel lanes. There is a minor adjustment and/or difference in that the measurement from right-of-way to right-of-way is 100 feet in the design. According to *Figure 19*, the right-of-way width should be 76-88 feet. This is a discrepancy based on the roadway classification standards; however, such was done to reduce costs. A secondary street's function is like the function of a major highway which is to move large volumes of inter-city traffic and generally direct traffic through major development nodes. The major difference is that secondary streets do not carry the same volumes of through traffic. All secondary streets contain two travel lanes in each direction *Figure 19*. The existing 2nd Street is designated as divided collector.

Table 3-1
Roadway Classification Standards

	Travel Lanes	Parking Lanes	Right-of-way Width	Pavement Width	Typical Volumes (ADT)
Express Corridor	6 to 8	0	120'-134'	110'-118'	60,000+
Urban Arterial	6	0	120'–134'	102'	50,000+
Augmented Major Highway	6	0	110'	92'	50,000+
Arterial Highway	6	0	110'	86'	40,000+
Major Roadways	4	0-2	100'	70'-76'	40,000
Secondary Street	4	0-2	76'-88'	56'-64'	25,000
Collector Street	4	0-2	66'-78'	44'-56'	25,000
Local Streets	2	0-2			2,000
Note: ADT refers to average daily traffic volumes.					

Figure 19. City of Beaumont General Plan Roadway Classification Standards.

The current road classification *Figure 20* for E. 2nd Street. The designation in accordance with the legend provided is that of divider collector *Figure 21.*

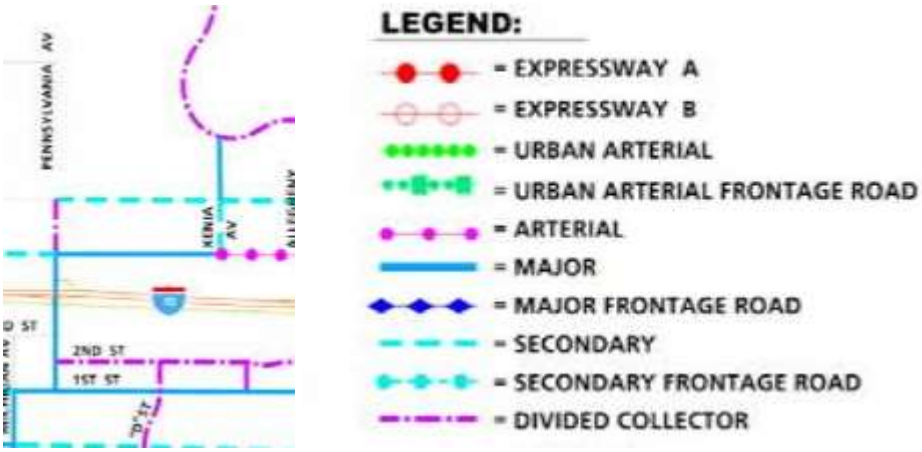


Figure 20. Circulation Map Showing Existing Road Designation for 2nd St.

Figure 21. 2nd St., A Divided Collector Due West.

12.2 2nd St. Preliminary Design

The span from the edge of asphalt to the edge of asphalt is 64 feet and the right-of-way distance is 100 feet. The approximate total length of the proposed asphalt concrete road is 2,470 feet.

Figure 22 shows the 2nd Street Improvements and road extension, and *Figure 23* depicts the cross section of the design. For this design, the existing topographical conditions can be seen. Additionally, coordination with the utility purveyors was made and the utilities were drawn in the existing conditions. As mentioned in the utility portion of this report, it is expected that the existing utilities will not present any issues with the design presented. This road is a straight line shown in plan view below. The design includes two lanes for each way commencing at the edge of 2nd Street (to which the new design will match existing) and extends to Pennsylvania Avenue. In addition to this, the existing curb and gutter and sidewalk on the southern portion of 2nd Street will be matched to existing near the storage facility to the west until the driveway approach on Pennsylvania Avenue. This proposed sidewalk is 6 feet in width and the curb and gutter is 2 feet in width and will be constructed for a total length of 1618 feet. This sidewalk has a 2% grade in accordance with ADA maximum allowable slopes. The distance from the edge of the proposed asphalt concrete pavement to the right of way is 12.85 feet. For a bigger resolution of the preliminary design plan reference *Appendix H*. The drive approach at the end of the west of the 2nd St. design near Pennsylvania Avenue will be designed by another civil consultant.

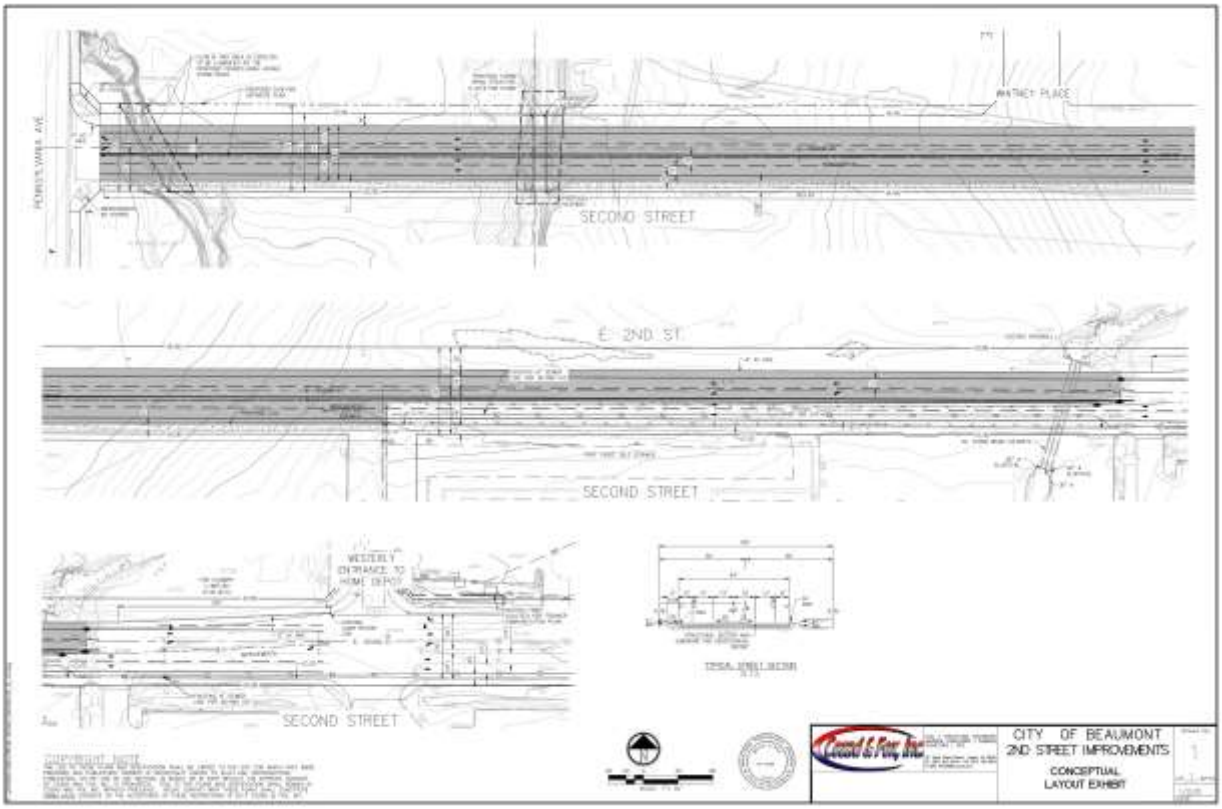


Figure 22. Preliminary Design.

Figure 23 shows the cross section of the proposed preliminary design. The total length of the right-of-way is 100 feet. Next, the distance from the right-of-way to the centerline is 50 feet. Each lane a total of 12 feet in width. From the centerline, the roadway is designed to be sloping away at a grade of 2% for the water to drain off which will be captured and redirected to the proposed curb and gutter and on the opposite extreme, the flowline. The total distance from edge of asphalt concrete pavement is 64 feet. Near the right of way of the storage facility, there will be construction of a 6-foot sidewalk that is sloped away from the right-of-way at 2%. At the edge of this sidewalk, there is a proposed curb and gutter as well. On the other edge of the right of way, there is a proposed asphalt concrete dike.

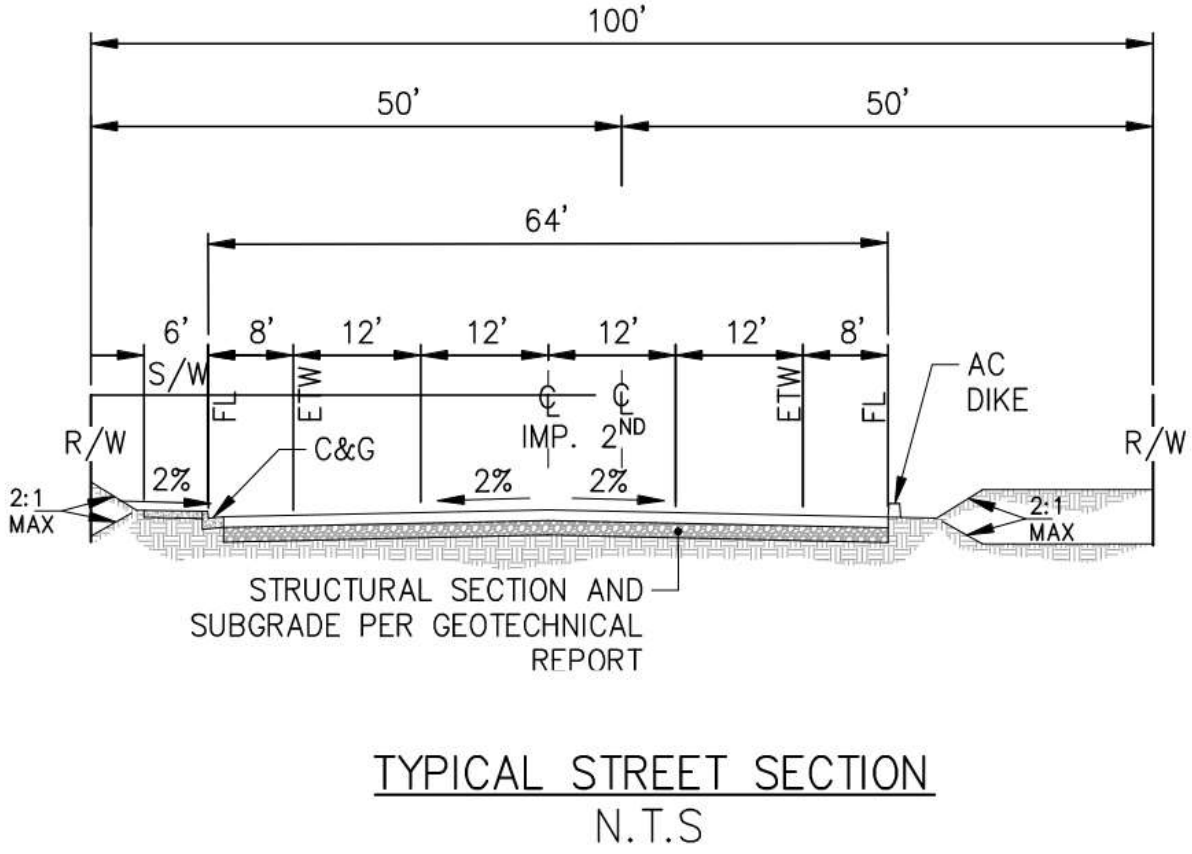


Figure 23. Cross Section of Preliminary Design.

The subgrade recommendation was deteremined by the geotechnical consultant. It is determined that there will be substantial grading to take place. Thus, mixing and blending will take place. These recommended values are based on the subgrade soil investigation and pavement coring. The recommedation values are more detailed shown in *Figure 24*. The recommended R-Value is that of 30 for the subgrade. Recommended thickness in inches can be seen in *Figure 24*. The asphalt concrete should conform to the Standard Specifications for Public Workds Construction (Greenbook) or Caltrans Standard Specifications. Aggregate base has to conform to section 26 of the Caltrans Standard Specifications or Greenbook. Subgrade soil must be compacted to at least 90% of maximum density and for the aggregate base at least 95% compaction determined by the ASTM Method D 1557. If wet and potential unstable subgrade soil is encountered during contruction, this soil should be allowed to dry before compaction or the soil should be removed and replaced with drier material.

PAVEMENT DESIGN SECTION – FOR DESIGN R-VALUE = 30				
Pavement Material	Recommended Thickness (inches)			
	TI = 7.0	TI = 7.5	TI = 8.0	TI = 8.5
Asphalt Concrete Surface Course	4.0	5.0	5.5	6.0
Class II Aggregate Base Course	9.5	9.0	10.0	10.5
Compacted Subgrade Soil	12.0	12.0	12.0	12.0

Figure 24. Geotechnical Recommendation for Pavement Design.

Appendix A

Environmental Habitat Assessment Report

MEMORANDUM

SUMMARY OF JURISDICTIONAL DELINEATION & WESTERN RIVERSIDE COUNTY MSHCP HABITAT ASSESSMENT RESULTS

PREPARED FOR: Cozad & Fox, Inc.
151 South Girard Street
Hemet, CA 92544

PREPARED BY: Tim Searl, Biologist, Searl Biological Services
U. S. Fish & Wildlife Service Permit Number: TE02351A-1
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Hemet, CA 92544
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PROJECT: City of Beaumont - 2nd Street Expansion

DATE: September 1, 2020

INTRODUCTION

On July 20 and 29, 2020, Searl Biological Services (SBS) conducted biological field assessments for the proposed 2nd Street Expansion project (Project) in the City of Beaumont, California (City). SBS conducted a state and federal Jurisdictional Delineation (JD) for:

1. Section 404 of the Clean Water Act (CWA) - U. S. Army Corps of Engineers (USACE)
2. Section 401 of the CWA and waters of the state per the Porter-Cologne Act (PCA) – California Regional Water Quality Control Board (CRWQCB)
3. Section 1600 of the California Fish and Game Code (CFGC) – California Department of Fish and Wildlife (CDFW)

SBS also conducted habitat assessments for the required Western Riverside County Multiple-Species Habitat Conservation Plan[1] (MSHCP) assessments which included:

1. *MSHCP Section 6.1.2 Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools* (MSHCP Section 6.1.2) habitat assessment
    a. Includes habitat assessments for the following six species
        i. Fairy Shrimp
            1. Riverside fairy shrimp (*Streptocephalus woottoni*) (RFS)
            2. vernal pool fairy shrimp (*Branchinecta lynchi*) (VPFS)
            3. Santa Rosa Plateau fairy shrimp (*Linderiella santarosae*) (SRPFS)

[1] The City is a Permittee of the MSHCP.

ii. Riparian Birds[2]
    1. Least Bell's Vireo (*Vireo bellii pusillus*) (LBVI)
    2. Southwestern Willow Flycatcher (*Empidonax traillii extimus*) (SWFL)
    3. Western Yellow-billed Cuckoo (*Coccyzus americanus*; western distinct population segment) (YBCU)

2. *MSHCP Section 6.1.3 Narrow Endemic Plant Species* (MSHCP Section 6.1.3) Assessment Area #8 which includes the following two species
    a. Marvin's [Yucaipa] onion (*Allium marvinii*) (ALMU)
    b. many-stemmed dudleya (*Dudleya multicaulis*) (DUMU)
3. *MSHCP Section 6.3.2 Additional Survey Needs and Procedures* (MSHCP Section 6.3.2)
    a. Burrowing Owl (*Athene cunicularia*) (BUOW)

The purpose of this summary memorandum is to provide the results of the above-listed assessments, and briefly describe future requirements based on the results.

PROJECT ASSESSMENT AREA

SBS obtained an AutoCAD and PDF file of the preliminary proposed Right-of-Way (RW) for the Project from Cozad & Fox (Fox). SBS then utilized those files in ArcGIS to create both a 100-foot JD/NEPS survey buffer, and a 500-foot BUOW/Riparian Birds survey buffer. *Figure 1 – Project Assessment Area* (attached in order) depicts the RW and the extent of the survey area assessed by SBS.

JURISDICTIONAL DELINEATION

Methods

USACE Non-Wetland Waters of the U.S.

The lateral limits of the USACE jurisdiction (i.e., width) for non-wetland waters were determined by the presence of physical characteristics indicative of the Ordinary High-Water Mark (OHWM). The OHWM was identified in accordance with the applicable Code of Federal Regulations (CFR) sections (33 CFR 328.3 and 33 CFR 328.4) and Regulatory Guidance Letter No. 05-02, as well as in reference to various relevant technical publications, including, but not limited to, *Review of Ordinary High Water Mark Indicators for Delineating Arid Streams in the Southwestern United States*, *Distribution of Ordinary High Water Mark (OHWM) Indicators and Their Reliability in Identifying the Limits of "Waters of the United States" in Arid Southwestern Channels*, *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*, and *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*.

USACE Wetland Waters of the U.S.

Potential wetland features were evaluated for presence of wetland indicators; specifically, hydrophytic vegetation, hydric soils, and wetland hydrology, according to routine delineation procedure within the *Wetlands Delineation Manual* and *Regional Supplement to the Corps of Engineers Wetland Delineation*

[2] These are bird species found in closely associated or adjacent habitats such as vegetated margins, adjacent fields, and bridges and other structures located over or near water.

Manual: Arid West Region. The *USACE Arid West 2016 Regional Wetland Plant List* was used to determine the indicator status of the examined vegetation by the following indicator status categories: Upland (UPL), Facultative Upland (FACU), Facultative (FAC), Facultative Wetland (FACW), and Obligate Wetland (OBL).

CRWQCB Waters of the State

On May 28, 2020, the CRWQCB formally implemented the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*, which provides a wetland definition, framework for determining if a wetland is a water of the State, and wetland delineation procedures. The CRWQCB defines an area as a wetland if, under normal circumstances:

1. the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both;
2. the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and
3. the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

The CRWQCB's *Implementation Guidance for the Wetland Definition and Procedures for Discharges of Dredge and Fill Material to Waters of the State*, states that waters of the U.S. and waters of the State should be delineated using the standard USACE delineation procedures, taking into consideration that the methods shall be modified only to allow for the fact that a lack of vegetation does not preclude an area from meeting the definition of a wetland. The CRWQCB Procedures only apply to wetlands, and they do not include updated definitions or delineation methods for non-wetland aquatic features.

The limits of waters of the State, as defined under the Porter-Cologne Act (California Water Code section 13000 et seq.), were determined by first examining the topography and morphology to identify those features with an OHWM. The extent of waters of the State was delineated within these features as the boundaries of the streams/channels OHWM, coterminous with USACE's jurisdiction.

CDFW Streams and Riparian Habitat

The extent of potential streambeds, streambanks, and riparian habitat subject to CDFW jurisdiction under Section 1600 et seq. of the CFGC was delineated by reviewing the topography and morphology of potentially jurisdictional features to determine the outer limit of riparian vegetation, where present, or the tops of banks for stream features. It's important to note that MSHCP Riparian/Riverine areas are coterminous with CDFW jurisdiction limits.

Results

SBS identified and assessed a total of four potentially jurisdictional features, designated as Features A, B, C, and D, within 100-feet of the RW. These features are expected to be subject to USACE 404, CRWQCB 401, CDFW 1600, and MSCHP Riparian/Riverine jurisdiction and will require consultation with each respective agency. No Wetland Waters were present in the assessment area. SBS has provided the potentially jurisdictional acreage for each feature within the RW and 100-foot assessment area in *Table 1 - Potentially Jurisdictional Areas* (Page 4) for informational purposes. In order to determine accurate impacts, SBS will need to overlay the Daylight/Limits of Grading associated with the RW once finalized. *Figure 2 – JD Map* (attached in order) depicts the location and extent of the features.

Table 1 - Potentially Jurisdictional Areas

Feature	Waters of the United States/State[1] (acres)		CDFW Jurisdictional Area/MSHCP RR[2] (acres)	
	RW	**100-Foot Buffer**	**RW**	**100-Foot Buffer**
A	0.002	0.02	0.12	0.35
B	0.013	0.05	0.18	0.52
C	0.008	0.05	0.03	0.28
D[3]	0	0.02	0	0.08
TOTAL	**0.023**	**0.14**	**0.33**	**1.23**

1. Calculated to OHWM
2. Calculated to top of bank or outer limits of the associated riparian vegetation (i.e. drip line, whichever is greater.)
3. Feature D was not accessible in the field due to the presence of a wrought iron fence; therefore, it was not mapped to submeter accuracy.

Recommendations/Requirements

The JD findings and conclusions presented in this memorandum, including the location and extent of waterbodies potentially subject to regulatory jurisdiction, represent the professional opinion of SBS. These findings and conclusions should be considered preliminary until verified by the appropriate regulatory agencies. SBS recommends that these agencies be consulted to confirm their roles and requirements, and that all required permits be acquired prior to initiating the Project.

MSHCP ASSESSMENTS

The MSHCP "...is a comprehensive, multi-jurisdictional Habitat Conservation Plan (HCP) focusing on Conservation of species and their associated Habitats in Western Riverside County". The MSHCP encompasses approximately 1.26 million acres of land that stretches from the crest of the San Jacinto Mountains west to the Orange County boundary. Ultimately, the MSHCP will result in the conservation of more than 500,000 acres (347,000 acres on existing Public/Quasi-Public Lands [PQP] and 153,000-acres of Additional Reserve Lands [ARL]) that focuses on the 146-species covered by the MSHCP.

MSHCP Section 6.1.2

MSHCP Section 6.1.2 requires all subject properties under the jurisdiction of the MSHCP that are proposing a land use change and/or applying for a discretionary permit, including all public projects, to conduct a MSHCP Section 6.1.2 assessment. This includes a habitat assessment and mapping of Riparian/Riverine areas including three bird species: 1) LBVI, 2) SWFL, and 3) YBCU; Vernal Pools/Fairy Shrimp habitat including three fairy shrimp species: 1) RFS, 2) VPFS, and 3) SRPFS. If the assessment identifies suitable habitat for any of the six-species associated with riparian/riverine areas and vernal pools listed above, focused surveys could be required, and avoidance and minimization measures will be implemented in accordance with the MSHCP's species-specific objectives for these species.

Riparian/Riverine Areas & Riparian Birds

The MSHCP defines Riparian/Riverine Areas as "lands which contain habitat dominated by trees, shrubs, persistent emergents, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year."

Results

SBS identified and mapped MSHCP Riparian/Riverine Areas in Features A, B, C, and D. The extent of the MSHCP Riparian/Riverine Areas was coterminous with CDFW jurisdiction with the acreages provided in the previously referenced Table 1 and depicted on the aforementioned Figure 2. Low-quality suitable habitat was present within 500-feet of the RW for LBVI in Features C and D as depicted by *Figure 3 – Suitable LBVI Habitat Map* (attached in order). Additionally, LBVI was detected within one mile of the RW in 2015. No suitable habitat was present for SWFL or YBCU.

Recommendations/Requirements

Protocol surveys for LBVI will likely be required by the agencies and are recommended by SBS to be conducted during the 2021 season. Although the habitat quality of the area within 500-feet of the RW is low, good quality LBVI habitat was present just south of the 500-foot buffer and LBVI has been detected in this stream system in the last five years.

In addition, if the Project proposes impacts to MSHCP Riparian/Riverine areas, which the current RW alignment does, the MSHCP requires that a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis and report be prepared. The DBESP details project impacts, why avoidance was not feasible, and project design/compensatory mitigation measures demonstrating a biological equivalent or superior resource.

Vernal Pools & Fairy Shrimp

The MSHCP defines vernal pools as

> *"…seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season. Obligate hydrophytes and facultative wetlands plant species are normally dominant during the wetter portion of the growing season, while upland species (annuals) may be dominant during the drier portion of the growing season. The determination that an area exhibits vernal pool characteristics, and the definition of the watershed supporting vernal pool hydrology, must be made on a case-by-case basis. Such determinations should consider the length of the time the area exhibits upland and wetland characteristics and the manner in which the area fits into the overall ecological system as a wetland. Evidence concerning the persistence of an area's wetness can be obtained from its history, vegetation, soils, and drainage characteristics, uses to which it has been subjected, and weather and hydrologic records."*

and provides general guidance for fairy shrimp by stating "For Riverside, vernal pool and Santa Rosa fairy shrimp, mapping of stock ponds, ephemeral pools and other features shall also be undertaken as determined appropriate by a qualified biologist."

Results

No vernal pools or fairy shrimp habitat was detected on or within 500-feet of the RW.

Recommendations/Requirements

No focused surveys for fairy shrimp will be required.

MSHCP Section 6.1.3

The MSHCP specifically covers 63 rare plant species through the implementation of the species-specific objectives. MSHCP Section 6.1.3 are those species that information regarding the distribution and presence throughout western Riverside County was considered insufficient to ensure their long-term conservation. Therefore, the MSHCP established 10 MSHCP Section 6.1.3 "survey areas" based on historic records, soils, and habitats where these 14-plant species could potentially occur. All public and private projects located within any of these survey areas must, in the least, conduct a habitat assessment. As noted at the beginning of this memorandum, the RW and areas within 100-feet were located within a designated survey area for ALMU and DUMU.

Results

Both ALMU and DUMU require clay soils as a key habitat characteristic. The RW and areas within 100-feet did not support clay soils. The entire area consisted of sandy loam soils. No suitable habitat was present for either ALMU or DUMU.

Recommendations/Requirements

No focused surveys for ALMU or DUMU will be required.

MSHCP Section 6.3.2 – Burrowing Owl

The MSHCP covers 146 species of plants and animals of which 40 species have specific survey requirements. 34 of the 40 species, including BUOW, have an associated survey area map that designates areas where focused surveys may be required if suitable habitat is present. The RW and areas within 500-feet were located within a survey area for BUOW.

Results

The majority of the RW and areas within 500-feet support suitable habitat for BUOW as depicted by *Figure 4 – Suitable BUOW Habitat Map* (attached in order). Additionally, the assessment area supported numerous California ground squirrel (*Spermophilus beecheyi*) burrows, a preferred nest and roost burrow for BUOW.

Recommendations/Requirements

Focused surveys for BUOW will be required, and SBS recommends they be conducted during the 2021 season.

CONCLUSION

The Project will require consultation with the agencies regarding the JD results, and consistency with the MSHCP prior to initiation. Based on the results of this assessment, the surveys and reports listed below and detailed in the Cost Estimate prepared by SBS (dated June 7, 2020) will be required. Other items will be required in support of those listed below and include project preparation, sensitive species queries, and GIS mapping. Please refer to the Cost Estimate for details regarding each item.

1. Least Bell's Vireo Survey
2. Burrowing Owl Focused Survey
3. MSHCP Consistency Analysis
4. DBESP
5. Jurisdictional Report
6. Agency Applications

ATTACHMENTS

- Figure 1 – Project Assessment Area
- Figure 2 – JD Map
- Figure 3 – Suitable LBVI Habitat Map
- Figure 4 – Suitable BUOW Habitat Map

FIGURE DISCLAIMER

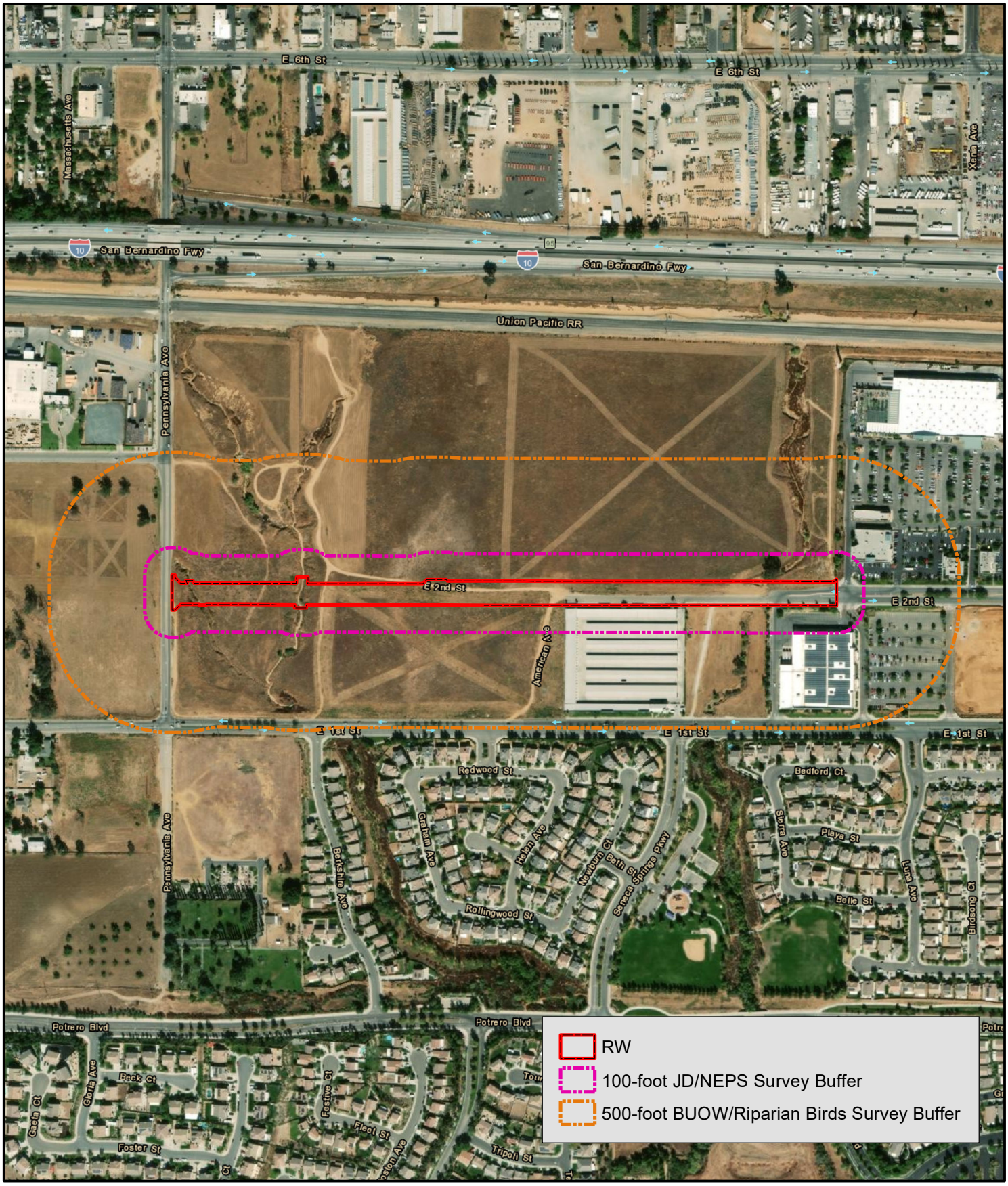
Figures and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. Tim Searl, SBS makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on any of the Figures associated with this report.

CERTIFICATION

I hereby certify that the statements furnished above, the associated figures, and the attached appendices present data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Signed: Tim Searl Date: September 1, 2020

Tim Searl, Owner/Biologist, Searl Biological Services



BSEARL BIOLOGICAL SERVICES

N W E S

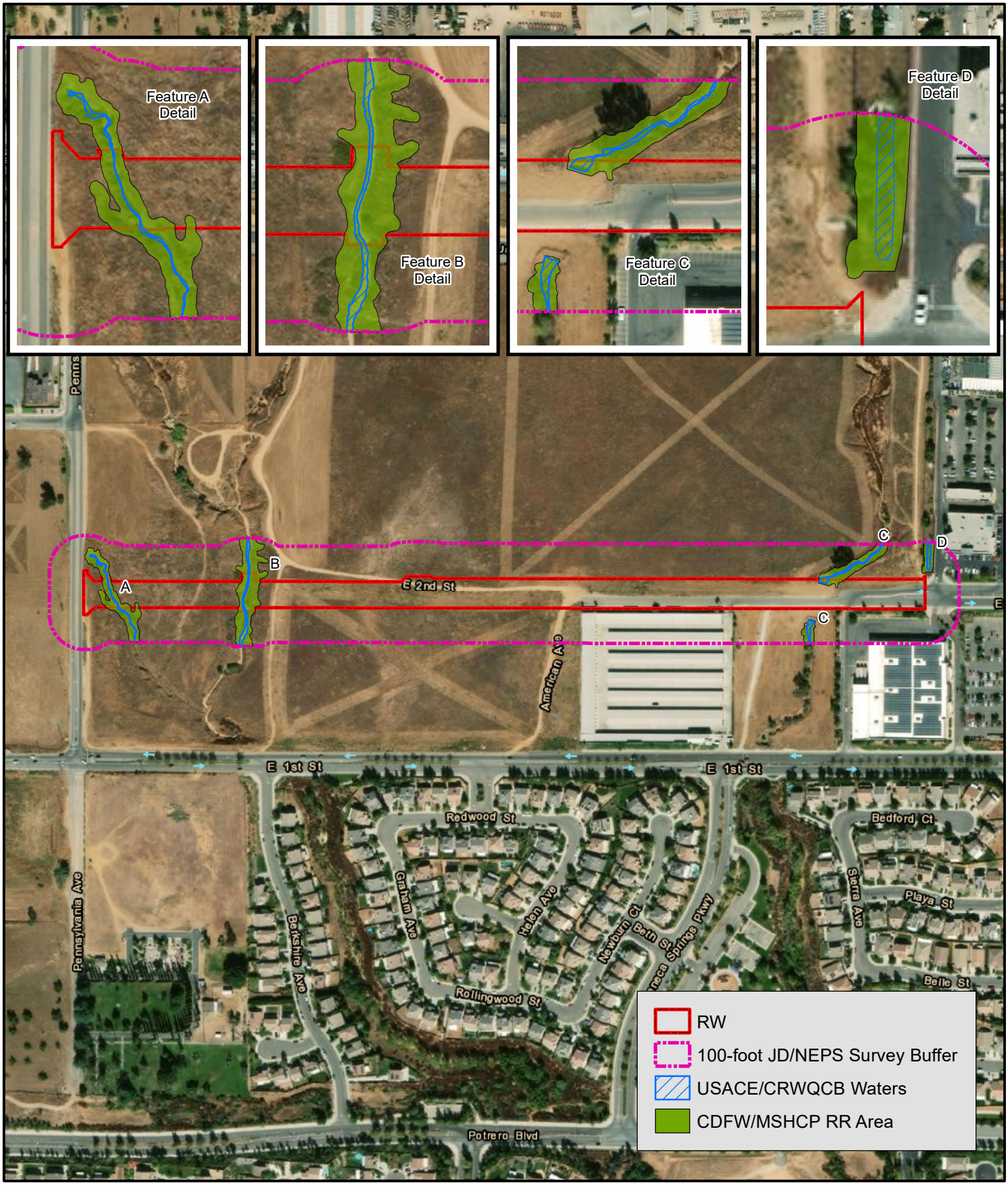
0 175 350 700 1,050 1,400 Feet

1 inch = 546 feet

FIGURE 1
Project Assessment Area

DATE: August 31, 2020
COORDINATE SYSTEM: NAD 1983 State Plane Zone VI (feet)
SOURCE: ESRI World Imagery & Transportation, Cozad & Fox

2nd Street Expansion Project
City of Beaumont



BSEARL BIOLOGICAL SERVICES

N W E S

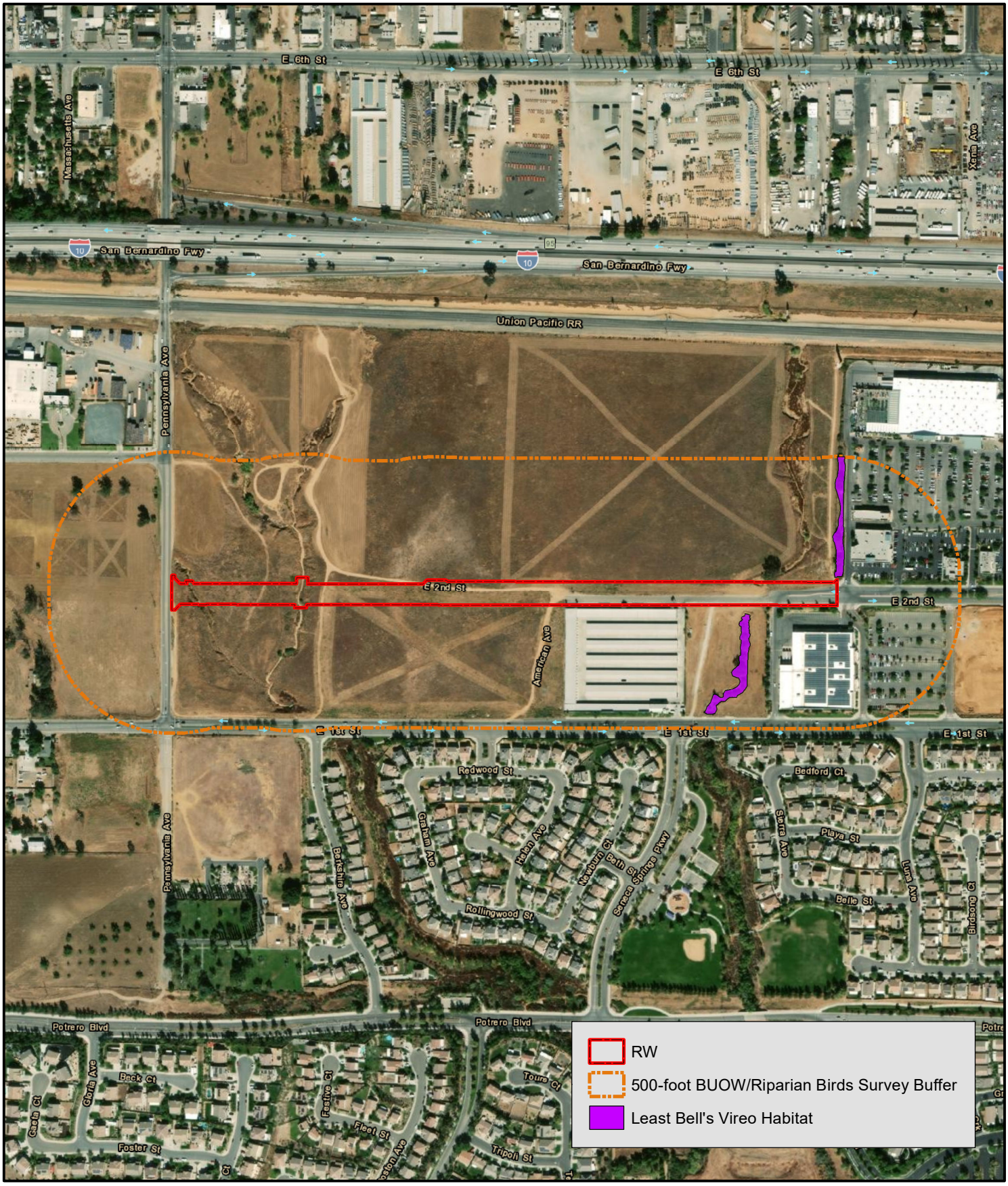
0 150 300 600 900 1,200 Feet

1 inch = 431 feet

FIGURE 2
JD Map

DATE: August 31, 2020
COORDINATE SYSTEM: NAD 1983 State Plane Zone VI (feet)
SOURCE: ESRI World Imagery & Transportation, Cozad & Fox

2nd Street Expansion Project
City of Beaumont



BSEARL BIOLOGICAL SERVICES

N
W E
S

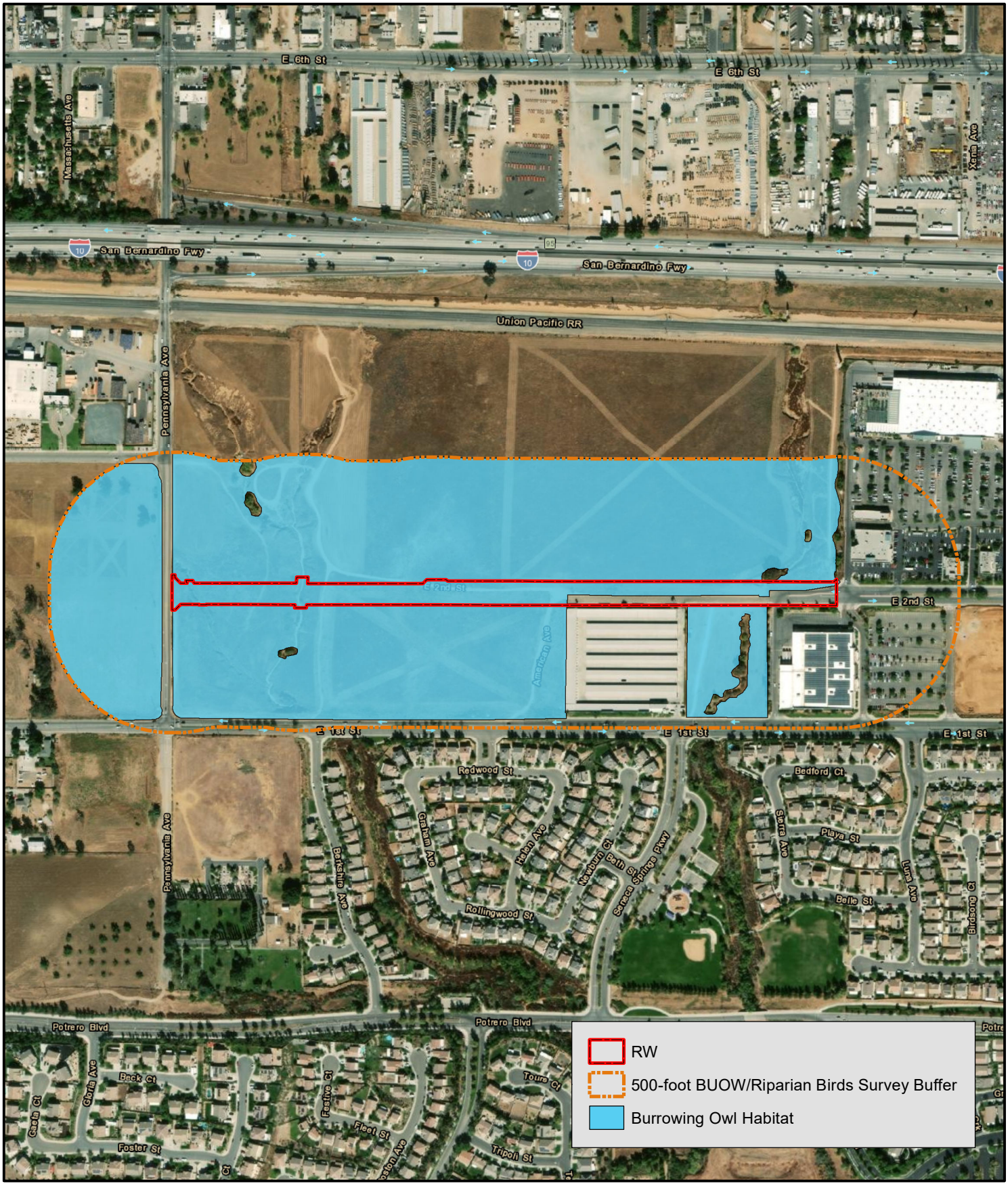
0 200 400 800 1,200 1,600 Feet

1 inch = 546 feet

FIGURE 3
Suitable LBVI Habitat Map

DATE: August 31, 2020
COORDINATE SYSTEM: NAD 1983 State Plane Zone VI (feet)
SOURCE: ESRI World Imagery & Transportation, Cozad & Fox, SBS

2nd Street Expansion Project
City of Beaumont



BSEARL BIOLOGICAL SERVICES

N
W E
S

0 200 400 800 1,200 1,600 Feet

1 inch = 546 feet

FIGURE 4
Suitable BUOW Habitat Map

DATE: September 1, 2020
COORDINATE SYSTEM: NAD 1983 State Plane Zone VI (feet)
SOURCE: ESRI World Imagery & Transportation, Cozad & Fox, SBS

2nd Street Expansion Project
City of Beaumont

Appendix B

Hydrology Requirements Report

Pennsylvania Avenue Roadway Widening And Interchange Improvements Project

DRAFT Hydrology and Hydraulics Report

Prepared for:

City of Beaumont
Public Works Department
550 East 6th Street
Beaumont, CA 92223

Prepared By:

Kimley-Horn and Associates, Inc.
765 The City Drive, Suite 200
Orange, CA 92868

February 2018

Pennsylvania Avenue Roadway Widening and Interchange Improvements Project

DRAFT DRAINAGE REPORT

FEBRUARY 2018

Prepared By:

Kimley-Horn and Associates, Inc.
765 The City Drive, Suite 200
Orange, CA 92868

Contents

Figures

Tables

Exhibits

Appendices

This Drainage Study Report has been prepared by or under the direction of the following registered civil engineer. The undersigned civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

Jimmy Medellin, P.E.

Date

INTRODUCTION

PURPOSE

The City of Beaumont proposes the Pennsylvania Avenue Improvements Project that will widen Pennsylvania Avenue from 1st Street to 6th Street. The widening will include new curb and gutter, raised median, cross culvert extensions, and improvements at the 6th Street intersection. Additionally, the project will include the redesign and construction of the existing Interstate 10 off-ramp. The project will expand the Pennsylvania Avenue interchange to include a new westbound on-ramp and eastbound off-ramp to complement the existing ramps and create a full interchange. Figure 1 shows the project limits for the project limits for the street improvements. The purpose of this report is to evaluate the adequacy of the existing drainage facilities and to establish that the proposed facilities within the Pennsylvania Avenue and the Interstate 10 interchange project meet the criteria set forth in the California Department of Transportation (Caltrans) *Highway Design Manual*, Sixth Edition (HDM).

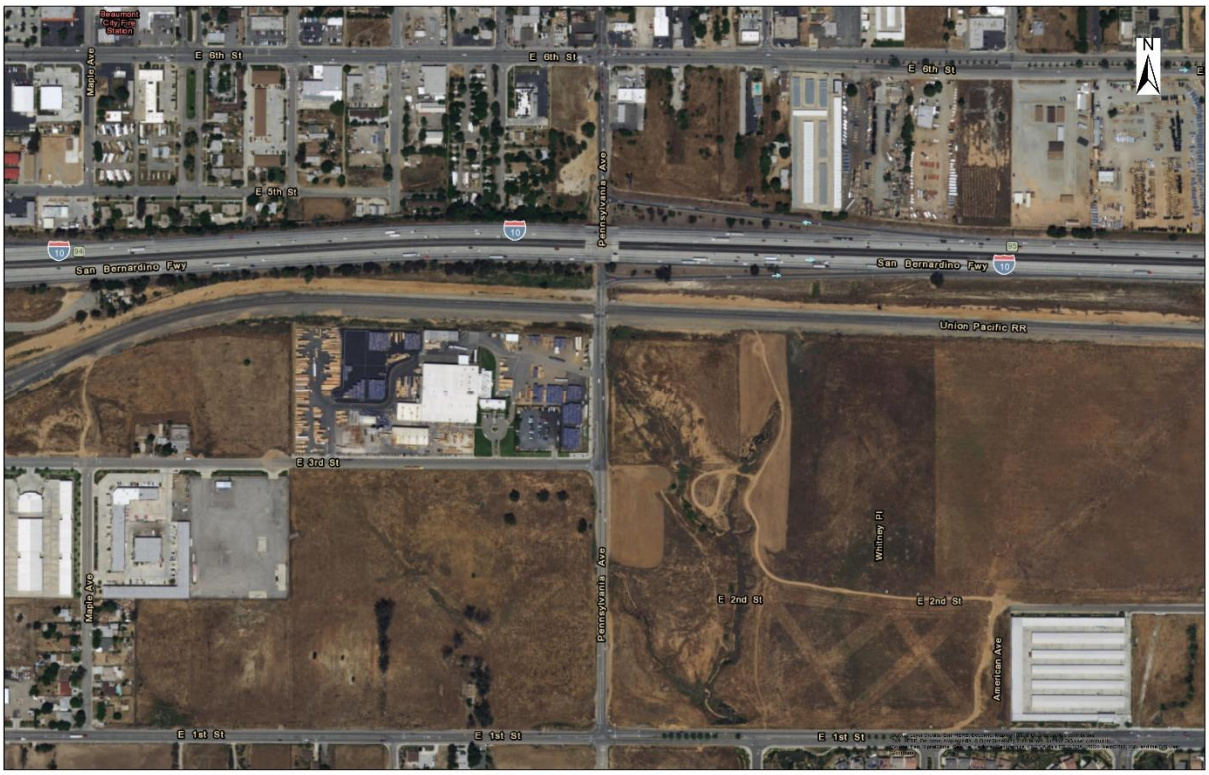


Figure 1: Pennsylvania Avenue Improvements Vicinity Map

SCOPE

The scope of this drainage report is to establish and define the drainage design policies and criteria as set forth in the HDM, and where applicable, the Federal Highway Administration *Urban Drainage Design Manual, Hydraulic Engineering Circular Number 22* (HEC-22). In addition, this report will provide an overview of the existing drainage facilities and proposed drainage improvements within the project area.

EXISTING CONDITIONS

EXISTING DRAINAGE

The project area is composed of moderately sloping valley terrain falling generally to the southwest. Per the effective Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS), the City of Beaumont has little history of flooding problems. This is due to its situation on the very crest of San Gorgonio Pass. Because it is on the crown of the alluvial fan which forms the divide, major flows generated in the mountains north and northeast of the city flow to the west and east of it, respectively (FEMA, 2017).

The only flood protection and control measure constructed by the Riverside County Flood Control and Water Conservation District (RCFC&WCD) in the City of Beaumont is the Cherry Avenue Channel. This channel, while it does not contain the 1-percent annual chance discharge, does keep the flooding down to shallow sheet flow, except in a low-lying residential area west of the channel, below 8th Street (FEMA, 2017).

The upper segment of Beaumont Channel from 13th Street to Michigan Avenue is a sheet flow area through a shallow natural swale. Significant ponding occurs along Beaumont Channel at Pennsylvania Avenue due to the high freeway embankment intersecting the channel. Beaumont Channel is located within the project area and is mapped as an Zone“AO” immediately upstream and downstream of I-10. Zone “AO” is defined as areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain), where average depths are between one and three feet. The FEMA Flood Insurance Rate Map (FIRM) shows ponding of three (3) feet (FEMA, 2017).

EXISTING DRAINAGE FACILITIES

There is an existing storm drain system along Pennsylvania Avenue that begins approximately five hundred (500) feet north of the Pennsylvania Avenue and 6th Street intersection and ends approximately one hundred (100) feet north of the existing Interstate 10 (I-10) off-ramp. The 42-inch reinforced concrete pipe (RCP) mainline continues east along 6th Street and ends approximately three hundred (300) feet east of Illinois Avenue. A temporary “bubbler” structure consisting of a 60-inch stand pipe was constructed at the downstream terminus of the existing storm drain west of Pennsylvania Avenue. Stormwater overflows out

of the 60-inch stand pipe, and travels southerly toward the I-10 embankment. Stormwater is conveyed through the embankment through 36-inch culverts.

An existing 18-inch corrugated metal pipe (CMP) is located along the east side of Pennsylvania Avenue. It collects stormwater water emanating from Caltrans right-of-way. An existing drainage ditch located north of I-10 collects drainage from the existing off-ramp and outlets to an existing headwall. The storm drain continues south and connects to an existing catch basin just south of the I-10 overpass. The storm drain terminates at headwall just south of the I-10 on-ramp.

Besides these two storm drain systems, there are 6 existing cross culverts. Four existing culverts cross underneath Pennsylvania Avenue. The other two culverts cross the Union Pacific rail east of Pennsylvania Avenue and south of I-10. The culverts underneath Pennsylvania Avenue will be extended; the culverts will not be upsized nor will an additional parallel culvert be furnished.

Table 1: Summary of Existing Pennsylvania Avenue Drainage Facilities

Approximate Location		Facility	Summary
Station	Location		
20+75	Centerline	18-inch RCP	Protect-in-Place
26+95	Centerline	36-inch CMP	Protect-in-Place
36+25	Centerline	18-inch RCP	Protect-in-Place
37+50	Right	24-inch RCP	Abandon
37+50	Right	42-inch RCP	Protect-in-Place
38+05	Centerline	18-inch RCP	Protect-in-Place
40+50	Right	18-inch CMP	Remove
43+00	Left	42-inch RCP	Protect-in-Place

HYDROLOGY ANALYSIS

DRAINAGE BOUNDARIES AND HYDROLOGIC PARAMETERS

The drainage boundaries and points of storm flow concentration were determined using onsite survey, RCFC&WCD digital topographic maps, and project aerial topography. The horizontal datum for the topographic data is North American Datum of 1983 (NAD83); the vertical datum is North American Vertical Datum of 1988 (NAVD88). The upstream drainage boundary was East 6th Street; the downstream boundary was East 1st Street.

.

The hydrologic soil type, precipitation, and land use chosen for the hydrologic analysis was obtained from the RCFC&WCD Hydrology Manual. The soil map on Plate C-1.19 within the Hydrology Manual shows hydrologic soil type B within the majority of the project area, with only small isolated areas of soil type D within Beaumont Channel. Group B type soils are classified as soils having moderate infiltration rates when thoroughly wetted. The standard intensity-duration curve for the City of Beaumont (Hydrology Manual Plate D-4.1) was used to complete the rational method analysis.

DESIGN CRITERIA

The drainage design criteria for Pennsylvania Avenue outside of Caltrans right-of-way was based on Section V (Drainage) from the County of Riverside Transportation Department Plan Check Policies & Guidelines. Per these guidelines, the 10-year frequency storm will be contained below the tops of curbs (or dikes), and the 100-year frequency storm will be contained within street right-of-way.

Hydrologic calculations for watersheds within the Caltrans right-of-way were computed in accordance with the parameters outlined in the HDM, Chapter 830. Specifically, the rational method was used exclusively to determine all design discharges within the Caltrans right-of-way. The runoff coefficient used for impervious materials such as concrete or asphalt is 1.00 and for pervious surfaces such as cut and fill slopes is 0.60.

According to Table 831.3 of the HDM, hydrologic calculations for roadway drainage are based upon a 25-year return frequency for areas within the freeway traveled way and 10-year return frequency for minor ramps and frontage roads. In instances where roadway depressions require pumping, a 50-year return frequency is used within the freeway traveled way and 25-year frequency within local streets and undercrossings. The improvement project does not include any depressions that require pumping; therefore the 25-year frequency event will be the design storm for facilities within Caltrans right-of-way.

RAINFALL INTENSITY

Intensity-duration data used for the 10-year and 100-year onsite hydrologic calculations for the project area was obtained from Plate D-4.1 within the RCFC&WCD Hydrology Manual. A 5-minute time of concentration was used for watersheds to determine rainfall intensity. The corresponding 25-year rainfall intensity value for the project is 3.7 inches/hour. The intensity value was determined using Plates D-4.5 and D-4.7 in the Hydrology Manual. Supporting hydrology references are included in Appendix A.

PROJECT CONDITIONS

The Pennsylvania Avenue improvements include widening to four (4) lanes between 1st Street and 6th Street, new curb and gutter, and new sidewalk to improve the arterial service level. A raised median will be constructed between street station 35+50 to 39+00, providing a divided roadway. A new 24-inch storm drain will be constructed within the northbound lane, and the terminus of the 42-inch mainline will be moved west

of the proposed widening. Cross culverts will be extended to accommodate the proposed widening. Appendix B contains the rational method output files for project conditions.

HYDRAULIC ANALYSIS

PAVEMENT DRAINAGE

Per the County of Riverside Transportation Department, arterial highways such as Pennsylvania Avenue must have the following design protection levels:

Storm Frequency	Maximum Allowable Flooding
10 year	Top of Curb
100 year	At or below Right-of-Way Line

Street capacity calculations were computed using Manning's equations using Bentley FlowMaster (V8i). Flooded width calculations were performed to confirm that the current design contains the 10-year flow below the top of curb and 100-year flow within the right of way, in this case the back of sidewalk. A Manning's roughness coefficient of 0.015 was used for the entire roadway section.

Catch basin capacity calculations were completed in accordance with HEC-22 Urban Drainage Design Manual (FHWA, 2009). This circular supersedes HEC-12 Drainage of Highway Pavements. HEC-12 and HEC-22 both use the same equations for calculating the catch basin length and efficiency. The circulars differ in methodology for calculating the capacity of a catch basin in a sump. HEC-12 calculates the capacity using the weir equation for depths below the top of curb, and the orifice equation for depths above the top of curb. HEC-22 methodology calculates the catch basin capacity using the weir equation up the curb opening height and as an orifice at depths greater than 1.4 times the opening height. At depths between 1 and 1.4 times the opening height, flow is in a transitional stage. Bentley FlowMaster (V8i) was used to complete the catch basin sizing calculations. The street capacity and catch basin sizing calculations are included in Appendix C.

STORM DRAIN HYDRAULICS

Hydraulic calculations will be performed using Civil Design Water Surface Pressure Gradient for Windows (WSPGW Version 14.06) to determine the hydraulic grade line for the proposed storm drain systems along Pennsylvania Avenue. Hydraulic models were created for the two mainlines (Storm Drain Line "A" and "B") that will be constructed within the north and south bound lanes. The project scope does not include design and construction of the RCFC&WCD master drainage plan improvements, which includes a new 69-inch RCP mainline within Pennsylvania Avenue.

PENNSYLVANIA AVENUE INTERCHANGE

The second phase of the project includes design of the Pennsylvania Avenue Interchange Improvements. The existing partial interchange has only a westbound off-ramp and an eastbound on-ramp. Pennsylvania Avenue's two lanes of traffic intersect with the Union Pacific Railroad at an at-grade intersection south of the I-10 freeway. Two existing grade separations within the vicinity of the project at Beaumont Avenue and Highland Springs Avenue experience a high volume of traffic due to regional commuters and shoppers. In order to avoid congestion at these locations, an increasingly high volume of vehicles are using Pennsylvania Avenue, creating a defined need and purpose for completing the interchange for full access.

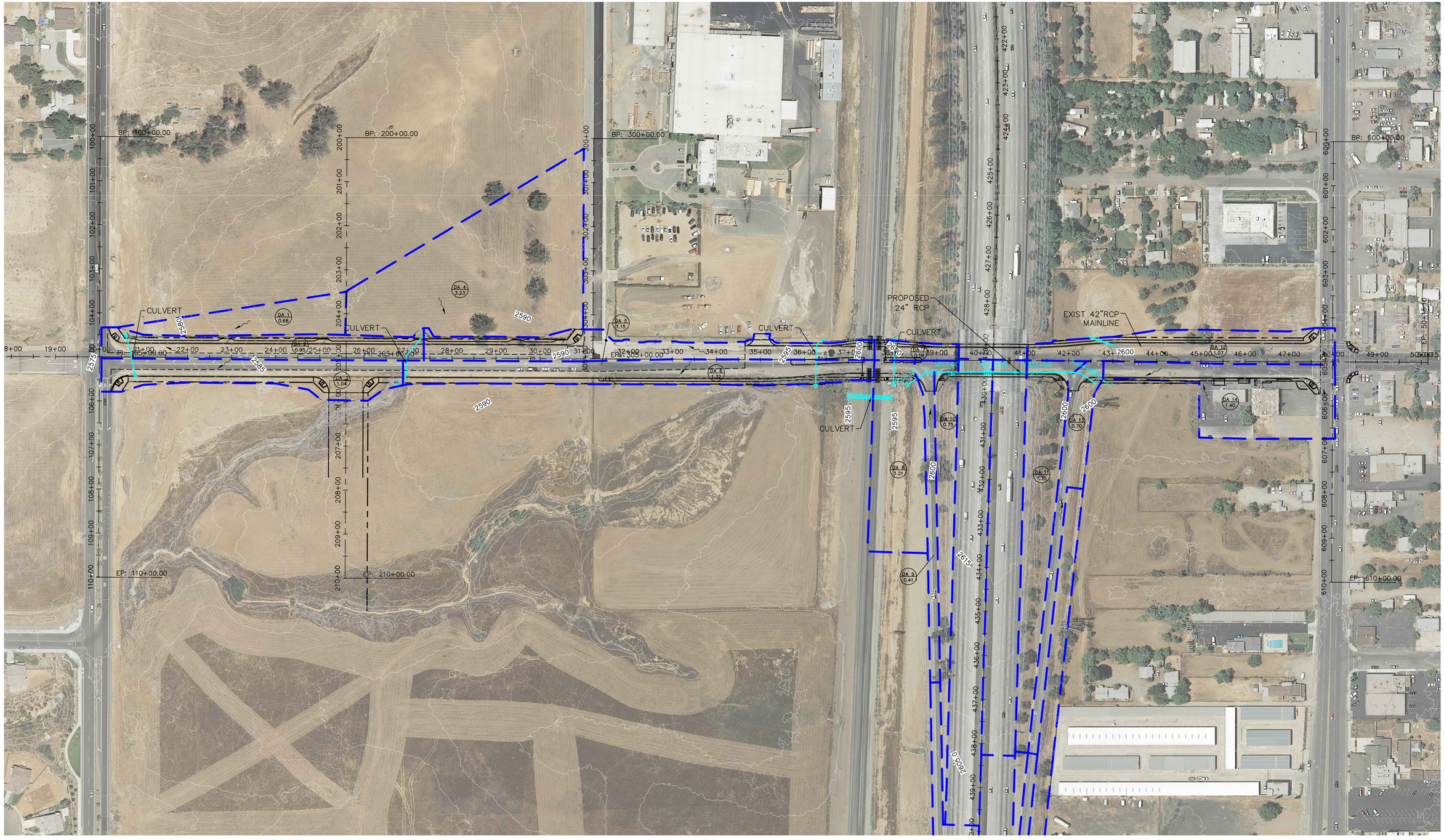
The interchange improvements will include expanding to a full interchange, providing a new eastbound off-ramp and new loop ramp for the westbound on and off-ramps. This drainage report will be updated to include the drainage design in support of these improvements in the future.

REFERENCES

1. Riverside County Flood Control and Water Conservation District. Hydrology Manual, April 1978.
2. Riverside County Flood Control and Water Conservation District. Master Drainage Plan for the Beaumont Area, July 1983.
3. Caltrans. Highway Design Manual. March 2014.
4. FEMA. Flood Insurance Study (FIS), Riverside County, CA, and Incorporated Areas (Study Number 06065CV001C). April 2017.
5. FEMA. Flood Insurance Rate Map (FIRM 06065C0812G), Riverside County, CA, and Incorporated Areas, August 2008.

Exhibit 1: Pennsylvania Avenue Improvements
Existing Drainage Facilities

Kimley»Horn



LEGEND:

SUBAREA BOUNDARY

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

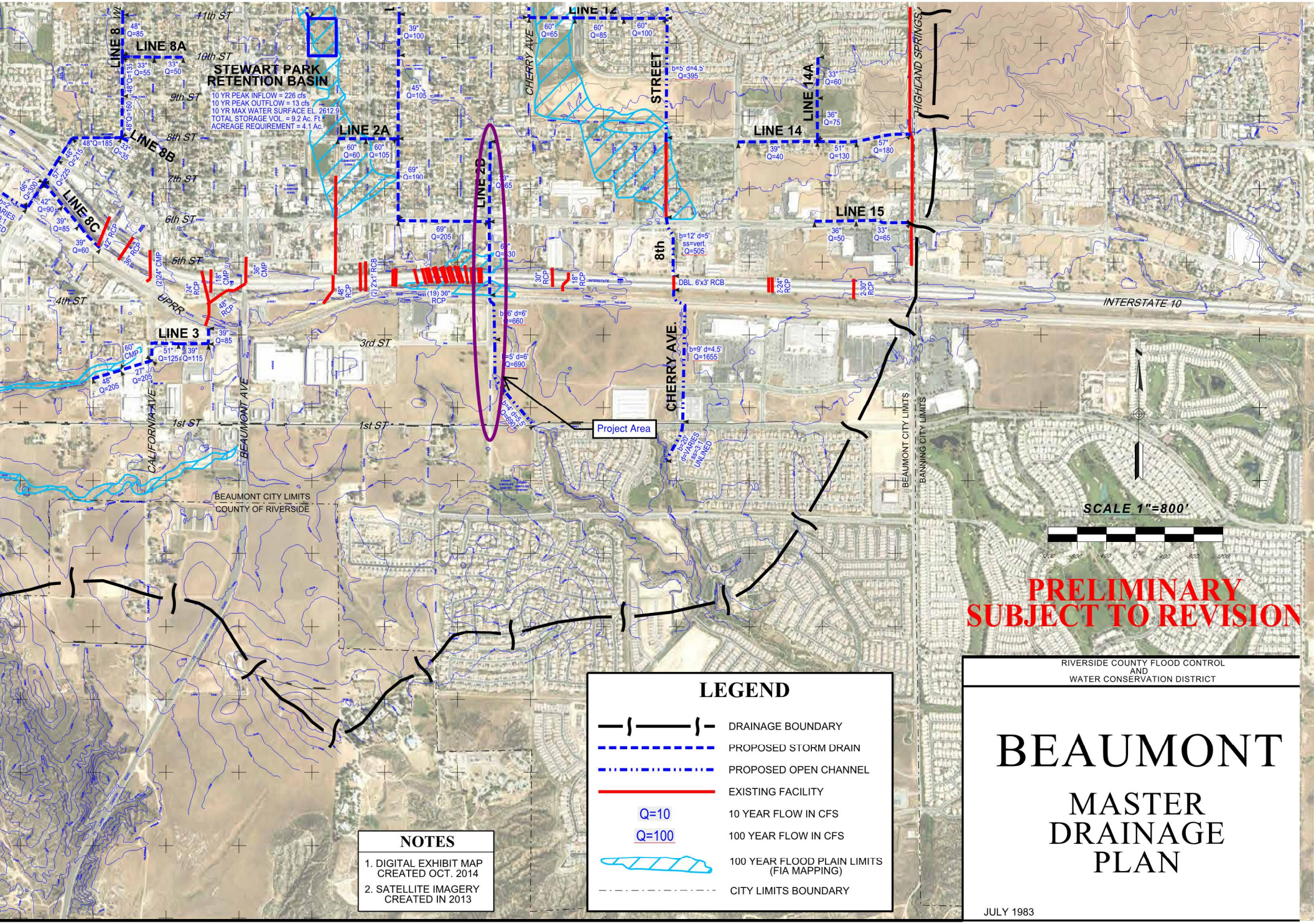
SCALE
1" = 100'
WHEN PRINTED AT FULL SIZE (24"X36")

PENNSYLVANIA AVENUE IMPROVEMENTS
EXHIBIT 2: PROJECT HYDROLOGY MAP

Kimley»Horn

K:\DEN_RDWY\194018001 - I-10 Pennsylvania Interchange\Working\07 Exhibits\Drainage\Hydrology-Project-working.dwg

APPENDIX A: EXISTING CONDITIONS HYDROLOGY ANALYSIS



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

BEAUMONT

MASTER DRAINAGE PLAN

JULY 1983

BEAUMONT

MASTER DRAINAGE PLAN

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

JULY 1983

PRELIMINARY SUBJECT TO REVISION

SCALE 1"=800'

LEGEND

- DRAINAGE BOUNDARY
- PROPOSED STORM DRAIN
- PROPOSED OPEN CHANNEL
- EXISTING FACILITY
- Q=10 — 10 YEAR FLOW IN CFS
- Q=100 — 100 YEAR FLOW IN CFS
- 100 YEAR FLOOD PLAIN LIMITS (FIA MAPPING)
- CITY LIMITS BOUNDARY

NOTES

1. DIGITAL EXHIBIT MAP CREATED OCT. 2014
2. SATELLITE IMAGERY CREATED IN 2013

MOUNTAIN VIEW RETENTION BASIN
100 YR PEAK INFLOW = 1330 cfs
100 YR PEAK OUTFLOW = 270 cfs
100 YR MAX WATER SURFACE EL. 2914.8
TOTAL STORAGE VOL. = 55.4 Ac. Ft.
ACREAGE REQUIREMENT = 5.0 Ac.

LITTLE SAN GORGONIO CREEK DEBRIS BASIN
DEBRIS STORAGE VOL.= 206 Ac. Ft.
ACREAGE REQUIREMENT = 23.9 Ac.
RCFC OWNED ACREAGE = 19.3 Ac.

STEWART PARK RETENTION BASIN
10 YR PEAK INFLOW = 226 cfs
10 YR PEAK OUTFLOW = 13 cfs
10 YR MAX WATER SURFACE EL. 2612.9
TOTAL STORAGE VOL. = 9.2 Ac. Ft.
ACREAGE REQUIREMENT = 4.1 Ac.

WINESAP RETENTION BASIN
100 YR PEAK INFLOW = 1300 cfs
100 YR PEAK OUTFLOW = 255 cfs
100 YR MAX WATER SURFACE EL. 2673.9
TOTAL STORAGE VOL. =93.7 Ac. Ft.
ACREAGE REQUIREMENT = 9.25 Ac.

ORCHARD ST. CHANNEL
ORCHARD ST. DRAIN
LINE 9
CHANNEL
VIEW
MOUNTAIN
LITTLE SAN GORGONIO CREEK CHANNEL
CREEK
NOBLE
LINE 16
CHANNEL
CREEK
LINE 7
LINE 6
LINE 11A
LINE 11
LINE 10
LINE 5
LINE 4
LINE 10A
LINE 11B
LINE 17
LINE 1
LINE 2
LINE 13
LINE 8
LINE 8A
LINE 2A
LINE 2B
LINE 12
CHANNEL
STREET
LINE 8B
LINE 8C
LINE 14A
LINE 14
LINE 15
LINE 3
HIGHLAND SPRINGS CHANNEL (SEE BANNING MDP)
CHERRY AVE.

ORCHARD ST
VINELAND AVE
CHERRY VALLEY BLVD
BROOKSIDE AVE
GRAND AVE
LINCOLN ST
16th ST
14th STREET
13th ST
12th ST
11th ST
10th ST
9th ST
8th ST
7th ST
6th ST
5th ST
4th ST
3rd ST
1st ST
FLORENCE AVE
HANNON RD
UNION ST
NANCY AVE
EDGAR AVE
EUCLID AVE
BEAUMONT AVE
ORANGE AVE
PALM AVE
CHESTNUT AVE
PENNSYLVANIA AVE
ELM AVE
WELLWOOD AVE
CALIFORNIA AVE
HIGHLAND SPRINGS AVE

LIMIT OF STUDY
COUNTY OF RIVERSIDE
BEAUMONT CITY LIMITS
BANNING CITY LIMITS

INTERSTATE 10
SAN TIMOTEO CANYON RD
HIGHWAY 60
UPRR
NOBLE CREEK
SAN TIMOTEO CREEK
MARSHAL CREEK
LITTLE SAN GORGONIO CREEK

drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

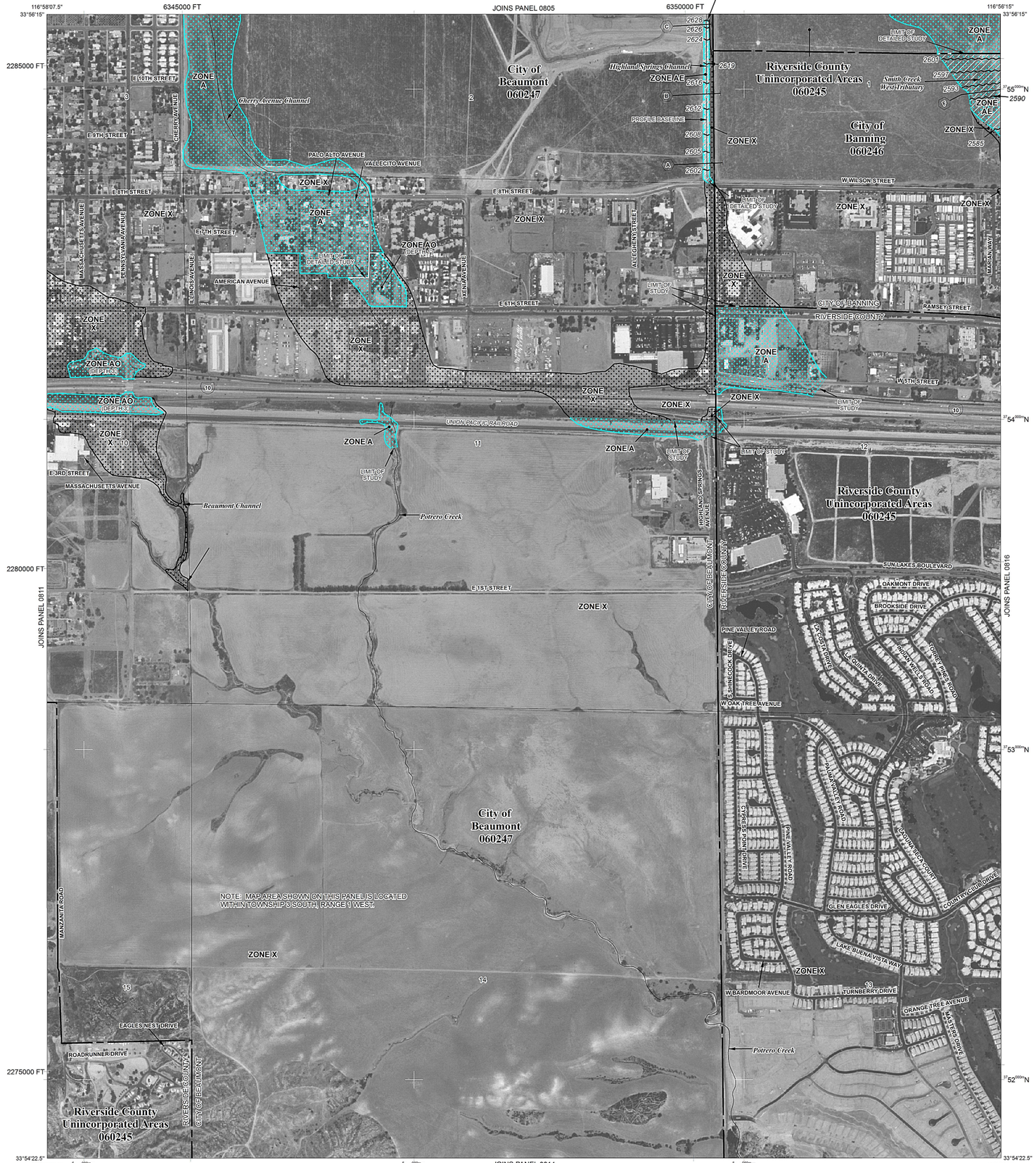
This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4276000mN — 1000-meter Universal Transverse Mercator grid values, zone 11N
- 600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0812G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 812 OF 3805

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

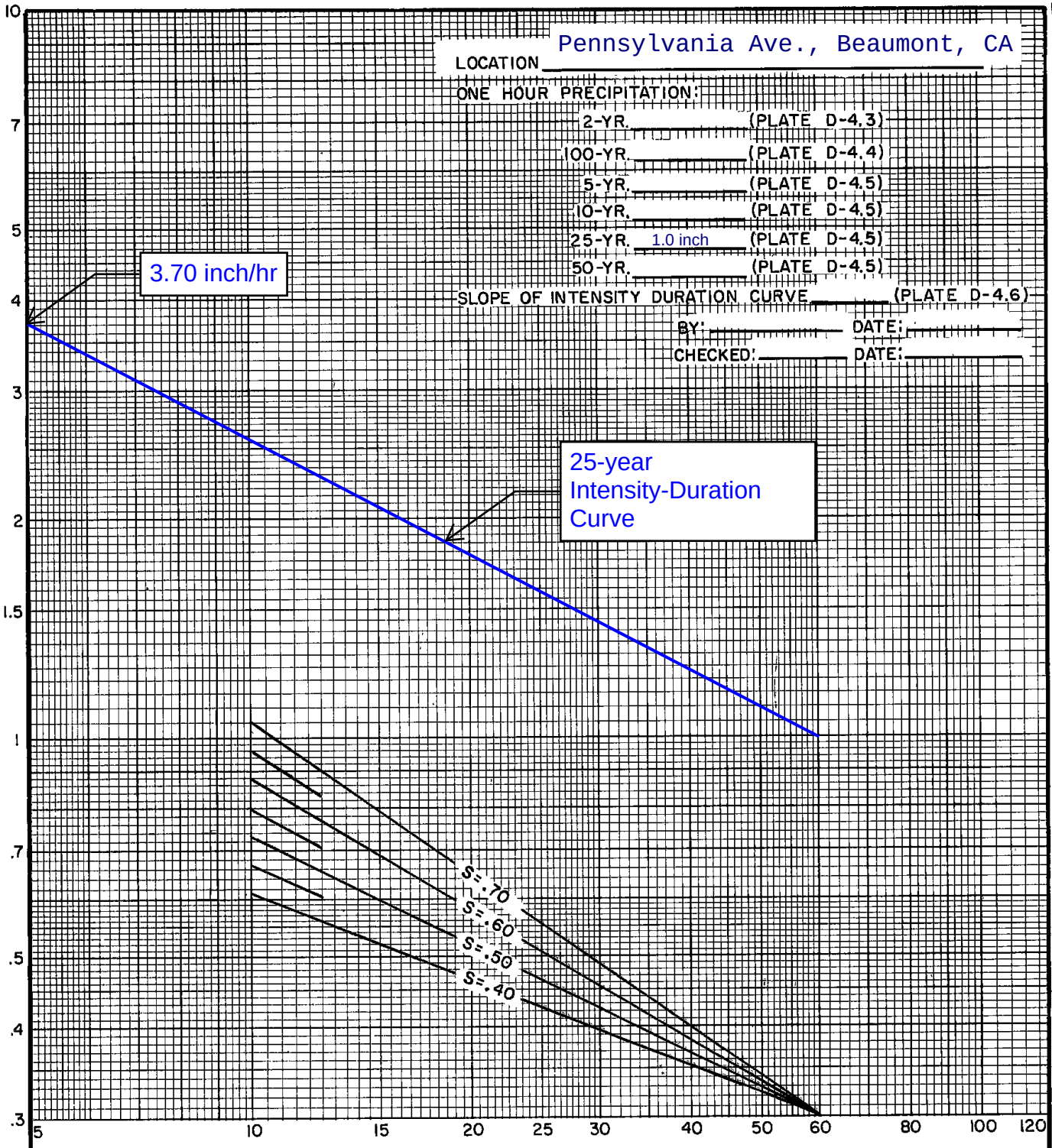
COMMUNITY	NUMBER	PANEL	SUFFIX
BANNING, CITY OF	060246	0812	G
BEAUMONT, CITY OF	060247	0812	G
RIVERSIDE COUNTY	060245	0812	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C0812G

EFFECTIVE DATE
AUGUST 28, 2008

NATIONAL FLOOD INSURANCE PROGRAM

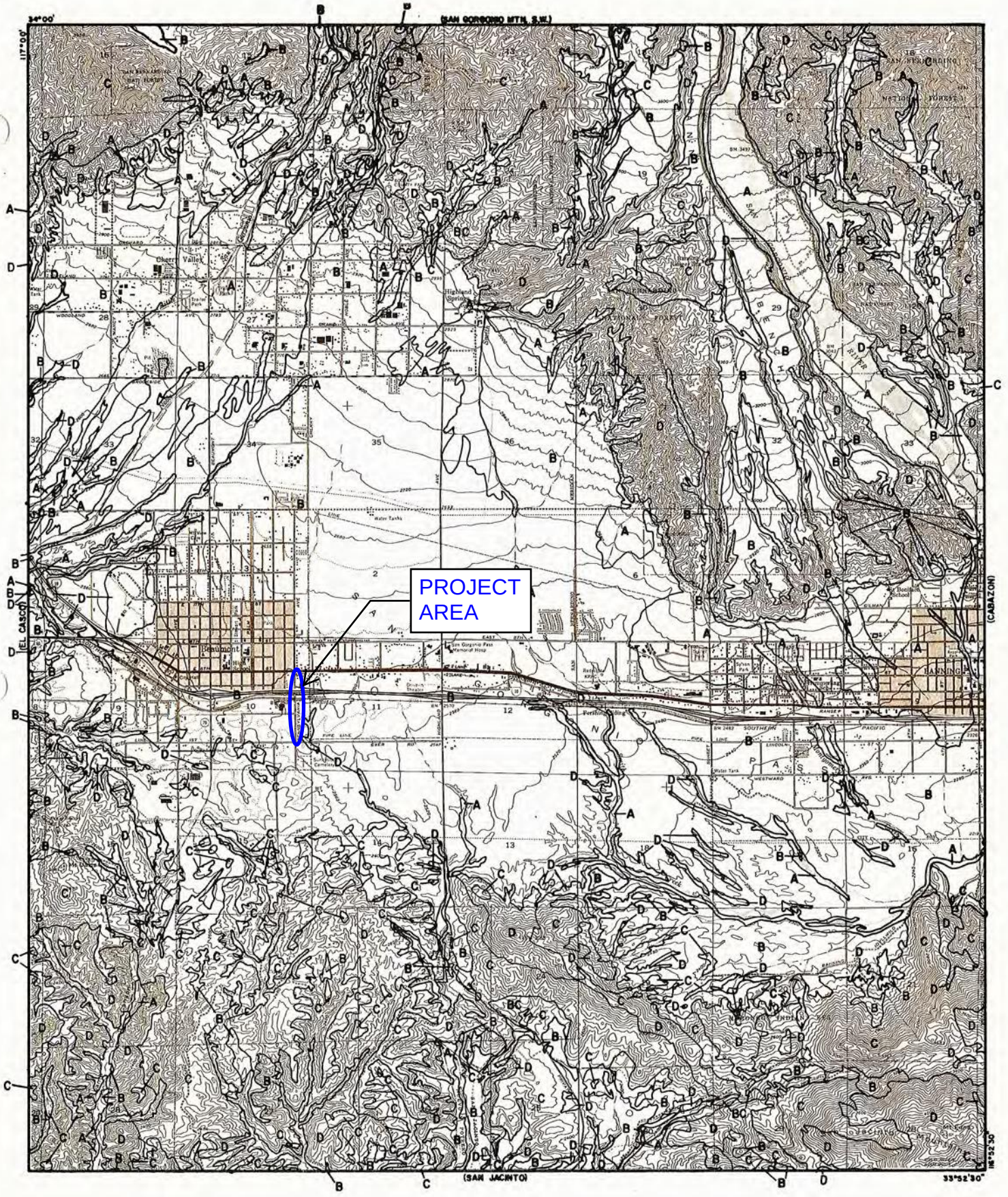


RCFC & WCD

HYDROLOGY MANUAL

INTENSITY—DURATION CURVES CALCULATION SHEET

PLATE D-4.7



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR BEAUMONT

PLATE C-1.19

RCFC & WCD

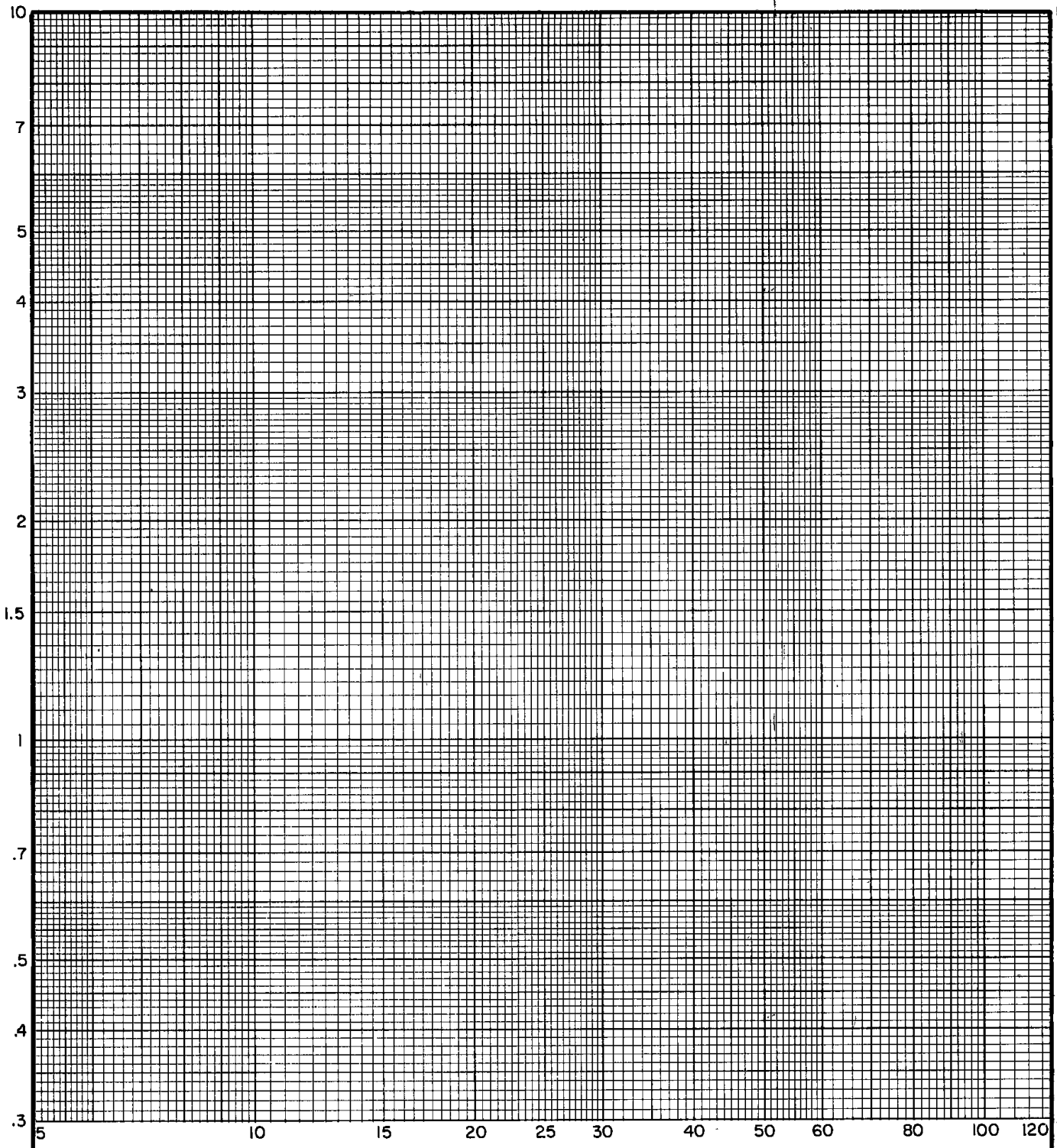
HYDROLOGY MANUAL

RAINFALL INTENSITY–INCHES PER HOUR

ANZA			BANNING			BEAUMONT			CALIMESA			CANYON LAKE		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	4.23	6.85	5	3.32	4.93	5	3.32	4.93	5	3.57	5.30	5	3.07	4.61
6	3.80	6.16	6	3.02	4.47	6	3.02	4.47	6	3.23	4.79	6	2.81	4.23
7	3.48	5.63	7	2.78	4.12	7	2.78	4.12	7	2.97	4.40	7	2.61	3.93
8	3.22	5.21	8	2.59	3.84	8	2.59	3.84	8	2.76	4.09	8	2.45	3.68
9	3.01	4.87	9	2.43	3.61	9	2.43	3.61	9	2.58	3.83	9	2.31	3.48
10	2.83	4.58	10	2.30	3.41	10	2.30	3.41	10	2.44	3.62	10	2.20	3.31
11	2.67	4.33	11	2.19	3.24	11	2.19	3.24	11	2.31	3.43	11	2.10	3.16
12	2.54	4.12	12	2.09	3.10	12	2.09	3.10	12	2.21	3.27	12	2.01	3.03
13	2.43	3.93	13	2.00	2.97	13	2.00	2.97	13	2.11	3.13	13	1.94	2.92
14	2.33	3.77	14	1.92	2.85	14	1.92	2.85	14	2.03	3.01	14	1.87	2.82
15	2.23	3.62	15	1.86	2.75	15	1.86	2.75	15	1.95	2.89	15	1.81	2.72
16	2.15	3.49	16	1.79	2.66	16	1.79	2.66	16	1.88	2.79	16	1.75	2.64
17	2.08	3.37	17	1.74	2.58	17	1.74	2.58	17	1.82	2.70	17	1.70	2.56
18	2.01	3.26	18	1.68	2.50	18	1.68	2.50	18	1.76	2.62	18	1.66	2.50
19	1.95	3.16	19	1.64	2.43	19	1.64	2.43	19	1.71	2.54	19	1.62	2.43
20	1.89	3.06	20	1.59	2.36	20	1.59	2.36	20	1.67	2.47	20	1.58	2.37
22	1.79	2.90	22	1.51	2.25	22	1.51	2.25	22	1.58	2.34	22	1.51	2.27
24	1.70	2.76	24	1.45	2.15	24	1.45	2.15	24	1.51	2.23	24	1.44	2.17
26	1.62	2.63	26	1.39	2.06	26	1.39	2.06	26	1.44	2.14	26	1.39	2.09
28	1.56	2.52	28	1.33	1.98	28	1.33	1.98	28	1.38	2.05	28	1.34	2.02
30	1.49	2.42	30	1.29	1.91	30	1.29	1.91	30	1.33	1.98	30	1.30	1.95
32	1.44	2.33	32	1.24	1.84	32	1.24	1.84	32	1.29	1.91	32	1.26	1.89
34	1.39	2.25	34	1.20	1.78	34	1.20	1.78	34	1.24	1.85	34	1.22	1.84
36	1.34	2.18	36	1.17	1.73	36	1.17	1.73	36	1.21	1.79	36	1.19	1.79
38	1.30	2.11	38	1.13	1.68	38	1.13	1.68	38	1.17	1.74	38	1.16	1.74
40	1.27	2.05	40	1.10	1.64	40	1.10	1.64	40	1.14	1.69	40	1.13	1.70
45	1.18	1.91	45	1.04	1.54	45	1.04	1.54	45	1.07	1.58	45	1.07	1.61
50	1.11	1.80	50	.98	1.45	50	.98	1.45	50	1.01	1.49	50	1.02	1.53
55	1.05	1.70	55	.93	1.38	55	.93	1.38	55	.95	1.42	55	.97	1.46
60	1.00	1.62	60	.89	1.32	60	.89	1.32	60	.91	1.35	60	.93	1.40
65	.95	1.55	65	.85	1.27	65	.85	1.27	65	.87	1.29	65	.89	1.35
70	.91	1.48	70	.82	1.22	70	.82	1.22	70	.84	1.24	70	.86	1.30
75	.88	1.42	75	.79	1.17	75	.79	1.17	75	.80	1.19	75	.84	1.26
80	.85	1.37	80	.76	1.13	80	.76	1.13	80	.78	1.15	80	.81	1.22
85	.82	1.32	85	.74	1.10	85	.74	1.10	85	.75	1.11	85	.79	1.18
SLOPE = .580			SLOPE = .530			SLOPE = .530			SLOPE = .550			SLOPE = .480		

STANDARD INTENSITY–DURATION CURVES DATA

PLATE D-4.1 (1 of 6)

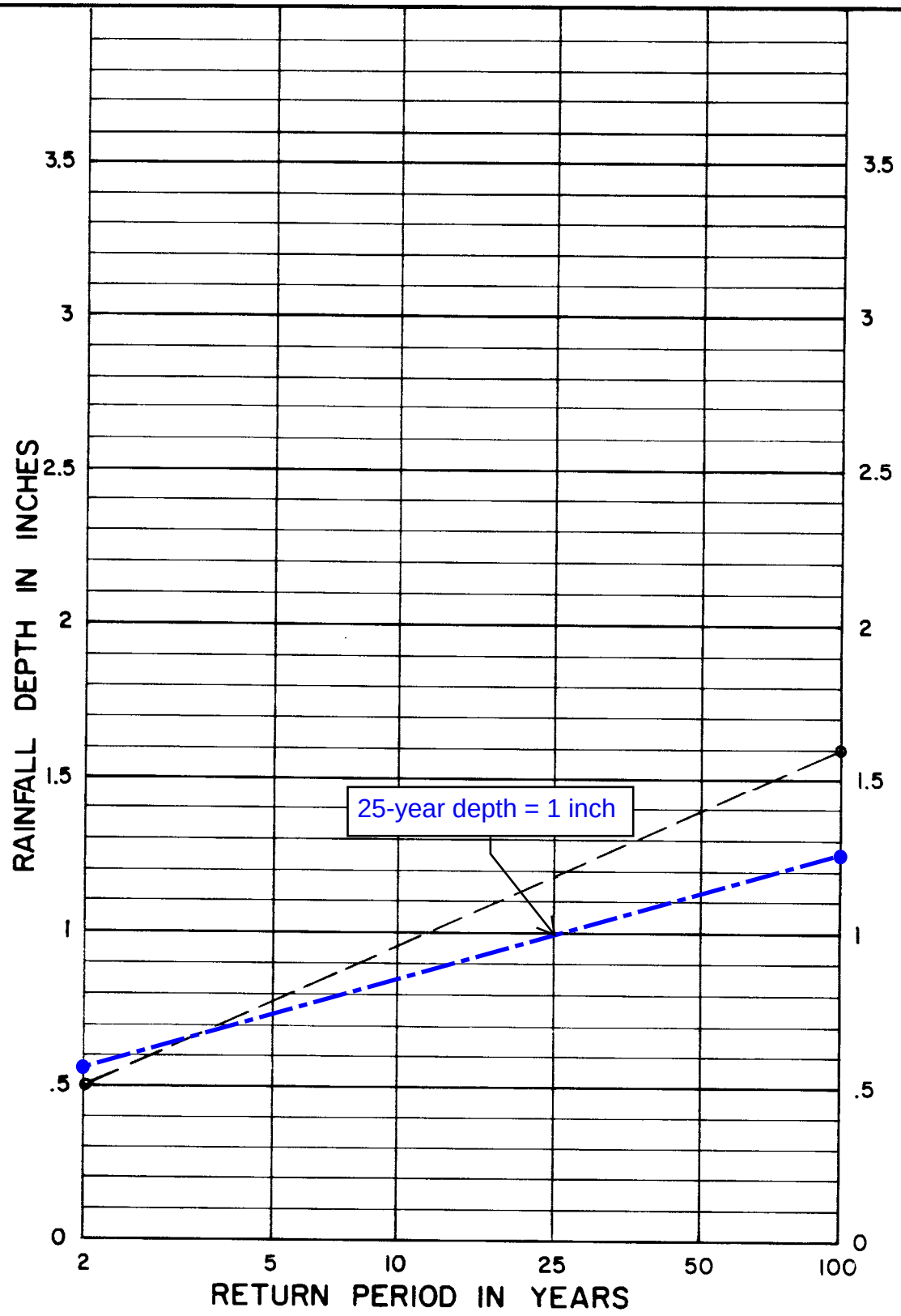


RCFC & WCD

HYDROLOGY MANUAL

INTENSITY – DURATION CURVES

PLATE D-4.2



NOTE:

1. For intermediate return periods plot 2-year and 100-year one hour values from maps, then connect points and read value for desired return period. For example given 2-year one hour = .50" and 100-year one hour = 1.60", 25-year one hour = 1.18"

Reference: NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD

HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

PLATE D-4.5

APPENDIX B: PROJECT CONDITIONS HYDROLOGY ANALYSIS

Pennsylvania Avenue Improvements (Beaumont, CA)

Hydrology Calculations - Project Conditions

Based on Riverside County Flood Control and Water Conservation District Hydrology Manual

Rational Method Calculation				
10-year Storm				
Subarea ID	Total Area (ac)	C	I (in/hr)	Q (cfs)
#1	0.68	0.60	3.32	1.35
#2	0.95	0.95	3.32	3.00
#3	1.04	0.95	3.32	3.28
#4	3.23	0.60	3.32	6.43
#5	1.15	1.00	3.32	3.82
#6	1.32	1.00	3.32	4.38
#7	0.18	1.00	3.32	0.60
#8	1.21	0.60	3.32	2.41
#9	0.41	1.00	3.32	1.36
#10	0.75	0.70	3.32	1.74
#11	1.35	0.70	3.32	3.14
#12	1.07	0.95	3.32	3.37
#13	0.70	0.95	3.32	2.21
#14	1.40	1.00	3.32	4.65

Note: Minimum Tc of 5 minutes used for design purposes

Pennsylvania Avenue Improvements (Beaumont, CA)

Hydrology Calculations - Project Conditions

Based on Riverside County Flood Control and Water Conservation District Hydrology Manual

Rational Method Calculation				
25-year Storm				
Subarea ID	Total Area (ac)	C	I (in/hr)	Q (cfs)
#1	0.68	0.60	3.70	1.51
#2	0.95	0.95	3.70	3.34
#3	1.04	0.95	3.70	3.66
#4	3.23	0.60	3.70	7.17
#5	1.15	1.00	3.70	4.26
#6	1.32	1.00	3.70	4.88
#7	0.18	1.00	3.70	0.67
#8	1.21	0.60	3.70	2.69
#9	0.41	1.00	3.70	1.52
#10	0.75	0.70	3.70	1.94
#11	1.35	0.70	3.70	3.50
#12	1.07	0.95	3.70	3.76
#13	0.70	0.95	3.70	2.46
#14	1.40	1.00	3.70	5.18

Note: Minimum Tc of 5 minutes used for design purposes

Pennsylvania Avenue Improvements (Beaumont, CA)

Hydrology Calculations - Project Conditions

Based on Riverside County Flood Control and Water Conservation District Hydrology Manual

Rational Method Calculation				
100-year Storm				
Subarea ID	Total Area (ac)	C	I (in/hr)	Q (cfs)
#1	0.68	0.60	4.93	2.01
#2	0.95	0.95	4.93	4.45
#3	1.04	0.95	4.93	4.87
#4	3.23	0.60	4.93	9.55
#5	1.15	1.00	4.93	5.67
#6	1.32	1.00	4.93	6.51
#7	0.18	1.00	4.93	0.89
#8	1.21	0.60	4.93	3.58
#9	0.41	1.00	4.93	2.02
#10	0.75	0.70	4.93	2.59
#11	1.35	0.70	4.93	4.66
#12	1.07	0.95	4.93	5.01
#13	0.70	0.95	4.93	3.28
#14	1.40	1.00	4.93	6.90

Note: Minimum Tc of 5 minutes used for design purposes

APPENDIX C: PAVEMENT DRAINAGE CALCULATIONS

Gutter - Pennsylvania Ave, Rt (East) Report

Label	Channel Slope (ft/ft)	Discharge (ft^3/s)	Gutter Width (ft)	Gutter Cross Slope (ft/ft)	Road Cross Slope (ft/ft)	Spread (ft)	Manning Coefficient	Flow Area (ft^2)	Depth (ft)	Velocity (ft/s)
Gutter - 47+42 to 47+00	0.01900	4.65	2.00	0.083	0.020	10.08	0.015	1.14	0.33	4.07
Gutter - 47+00 to 46+50	0.01900	4.65	2.00	0.083	0.022	9.51	0.015	1.12	0.33	4.16
Gutter - 46+50 to 46+00	0.01700	4.65	2.00	0.083	0.020	10.33	0.015	1.19	0.33	3.89
Gutter - 46+00 to 45+50	0.01600	4.65	2.00	0.083	0.020	10.48	0.015	1.22	0.34	3.80
Gutter - 45+50 to 45+00	0.01200	4.65	2.00	0.083	0.023	10.26	0.015	1.33	0.36	3.49
Gutter - 45+00 to 44+50	0.00800	4.65	2.00	0.083	0.023	11.20	0.015	1.56	0.38	2.97
Gutter - 44+50 to 44+00	0.01000	4.65	2.00	0.083	0.022	10.97	0.015	1.45	0.36	3.22
Gutter - 44+00 to 43+50	0.00800	4.65	2.00	0.083	0.023	11.20	0.015	1.56	0.38	2.97
Gutter - 43+50 to 43+00	0.00800	4.65	2.00	0.083	0.024	10.92	0.015	1.55	0.38	3.00
Gutter - 43+00 to 42+50	0.00400	4.65	2.00	0.083	0.019	14.59	0.015	2.15	0.41	2.16
Gutter - 42+50 to 42+00	0.01100	4.65	2.00	0.083	0.004	31.25	0.015	2.11	0.28	2.20
Gutter - 42+00 to 41+50	0.00800	4.65	2.00	0.083	0.003	40.19	0.015	2.58	0.28	1.80
Gutter - 41+50 to 41+00	0.00900	3.14	2.00	0.083	0.010	15.33	0.015	1.32	0.30	2.38
Gutter - 41+00 to 40+50	0.06000	3.14	2.00	0.083	0.003	19.98	0.015	0.76	0.22	4.14
Gutter - 40+50 to 40+00	0.00500	3.14	2.00	0.083	0.003	37.53	0.015	2.27	0.27	1.38
Gutter - 40+00 to 39+50	0.00300	3.14	2.00	0.083	0.008	22.54	0.015	2.18	0.33	1.44
Gutter - 39+50 to 39+00	0.00100	3.14	2.00	0.083	0.010	24.65	0.015	3.18	0.39	0.99
Gutter - 37+37 to 37+00	0.04800	4.38	2.00	0.083	0.013	10.16	0.015	0.81	0.27	5.40
Gutter - 37+00 to 36+50	0.02900	4.38	2.00	0.083	0.040	5.95	0.015	0.79	0.32	5.51
Gutter - 36+50 to 36+00	0.02300	4.38	2.00	0.083	0.036	6.65	0.015	0.89	0.33	4.93
Gutter - 36+00 to 35+50	0.02200	4.38	2.00	0.083	0.020	9.47	0.015	1.02	0.32	4.28
Gutter - 35+50 to 35+00	0.02000	4.38	2.00	0.083	0.010	14.86	0.015	1.25	0.29	3.50
Gutter - 35+00 to 34+50	0.01500	4.38	2.00	0.083	0.007	19.90	0.015	1.54	0.29	2.85
Gutter - 34+50 to 34+00	0.01500	4.38	2.00	0.083	0.015	12.34	0.015	1.28	0.32	3.43
Gutter - 34+00 to 33+50	0.01100	4.38	2.00	0.083	0.014	13.82	0.015	1.47	0.33	2.97
Gutter - 33+50 to 33+00	0.00700	4.38	2.00	0.083	0.010	18.84	0.015	1.92	0.33	2.28
Gutter - 33+00 to 32+50	0.00300	4.38	2.00	0.083	0.020	14.63	0.015	2.27	0.42	1.93
Gutter - 32+50 to 32+00	0.00600	4.38	2.00	0.083	0.014	15.78	0.015	1.88	0.36	2.33
Gutter - 32+00 to 31+50	0.00300	4.38	2.00	0.083	0.019	15.10	0.015	2.30	0.41	1.91

Gutter - Pennsylvania Ave, Rt (East) Report

Label	Channel Slope (ft/ft)	Discharge (ft^3/s)	Gutter Width (ft)	Gutter Cross Slope (ft/ft)	Road Cross Slope (ft/ft)	Spread (ft)	Manning Coefficient	Flow Area (ft^2)	Depth (ft)	Velocity (ft/s)
Gutter - 31+50 to 31+00	0.00700	4.38	2.00	0.083	0.018	13.06	0.015	1.67	0.37	2.63
Gutter - 31+00 to 30+50	0.00600	4.38	2.00	0.083	0.016	14.52	0.015	1.82	0.37	2.41
Gutter - 30+50 to 30+00	0.00600	4.38	2.00	0.083	0.015	15.11	0.015	1.85	0.36	2.37
Gutter - 30+00 to 29+50	0.00600	4.38	2.00	0.083	0.011	18.34	0.015	1.99	0.35	2.20
Gutter - 29+50 to 29+00	0.00600	4.38	2.00	0.083	0.012	17.37	0.015	1.95	0.35	2.24
Gutter - 29+00 to 28+50	0.00700	4.38	2.00	0.083	0.012	16.80	0.015	1.84	0.34	2.39
Gutter - 28+50 to 28+00	0.00400	4.38	2.00	0.083	0.011	20.00	0.015	2.34	0.36	1.87
Gutter - 28+00 to 27+50	0.00500	4.38	2.00	0.083	0.010	20.25	0.015	2.20	0.35	1.99
Gutter - 27+50 to 27+00	0.00400	4.38	2.00	0.083	0.015	16.47	0.015	2.17	0.38	2.02
Gutter - 27+00 to 26+50	0.00600	3.28	2.00	0.083	0.013	14.56	0.015	1.52	0.33	2.16
Gutter - 26+50 to 26+00	0.00400	3.28	2.00	0.083	0.013	15.92	0.015	1.79	0.35	1.84
Gutter - 26+00 to 25+50	0.00400	3.28	2.00	0.083	0.014	15.20	0.015	1.76	0.35	1.87
Gutter - 25+50 to 25+00	0.00600	3.28	2.00	0.083	0.015	13.32	0.015	1.47	0.34	2.24
Gutter - 25+00 to 24+50	0.01100	3.28	2.00	0.083	0.014	12.11	0.015	1.16	0.31	2.82
Gutter - 24+50 to 24+00	0.01400	3.28	2.00	0.083	0.013	11.97	0.015	1.07	0.30	3.06
Gutter - 24+00 to 23+50	0.02500	3.28	2.00	0.083	0.016	9.13	0.015	0.80	0.28	4.10
Gutter - 23+50 to 23+00	0.03200	3.28	2.00	0.083	0.021	7.28	0.015	0.68	0.28	4.82
Gutter - 23+00 to 22+50	0.03600	3.28	2.00	0.083	0.014	8.99	0.015	0.70	0.26	4.66
Gutter - 22+50 to 22+00	0.03800	3.28	2.00	0.083	0.009	11.63	0.015	0.76	0.25	4.33
Gutter - 22+00 to 21+50	0.03600	3.28	2.00	0.083	0.023	6.70	0.015	0.64	0.27	5.16
Gutter - 21+50 to 21+00	0.03000	3.28	2.00	0.083	0.010	11.62	0.015	0.82	0.26	4.00
Gutter - 21+00 to 20+50	0.01300	3.28	2.00	0.083	0.004	25.64	0.015	1.47	0.26	2.23
Gutter - 20+50 to 20+00	0.00600	3.28	2.00	0.083	0.010	17.16	0.015	1.62	0.32	2.03

Gutter - Pennsylvania Ave, Lt (West) Report

Label	Channel Slope (ft/ft)	Discharge (ft^3/s)	Gutter Width (ft)	Gutter Cross Slope (ft/ft)	Road Cross Slope (ft/ft)	Spread (ft)	Manning Coefficient	Flow Area (ft^2)	Depth (ft)	Gutter Depression (ft)	Velocity (ft/s)
Gutter - 47+45 to 47+00	0.01900	3.37	2.00	0.083	0.020	8.66	0.015	0.88	0.30	0.13	3.85
Gutter - 47+00 to 46+50	0.01900	3.37	2.00	0.083	0.017	9.55	0.015	0.91	0.29	0.13	3.71
Gutter - 46+50 to 46+00	0.01700	3.37	2.00	0.083	0.015	10.59	0.015	0.98	0.29	0.14	3.45
Gutter - 46+00 to 45+50	0.01600	3.37	2.00	0.083	0.010	13.83	0.015	1.10	0.28	0.15	3.06
Gutter - 45+50 to 45+00	0.01200	3.37	2.00	0.083	0.014	12.01	0.015	1.15	0.31	0.14	2.93
Gutter - 45+00 to 44+50	0.00800	3.37	2.00	0.083	0.015	12.64	0.015	1.33	0.33	0.14	2.53
Gutter - 44+50 to 44+00	0.01000	3.37	2.00	0.083	0.010	15.46	0.015	1.34	0.30	0.15	2.51
Gutter - 44+00 to 43+50	0.00800	3.37	2.00	0.083	0.010	16.28	0.015	1.47	0.31	0.15	2.29
Gutter - 43+50 to 43+00	0.00800	3.37	2.00	0.083	0.015	12.64	0.015	1.33	0.33	0.14	2.53
Gutter - 43+00 to 42+50	0.00400	3.37	2.00	0.083	0.017	13.63	0.015	1.71	0.36	0.13	1.97
Gutter - 42+50 to 42+00	0.01000	3.37	2.00	0.083	0.006	21.35	0.015	1.52	0.28	0.15	2.22
Gutter - 42+00 to 41+50	0.00800	3.37	2.00	0.083	0.003	34.89	0.015	1.99	0.26	0.16	1.70
Gutter - 41+50 to 41+00	0.00900	3.37	2.00	0.083	0.007	19.84	0.015	1.53	0.29	0.15	2.20
Gutter - 41+00 to 40+50	0.00600	3.37	2.00	0.083	0.003	37.20	0.015	2.24	0.27	0.16	1.51
Gutter - 40+50 to 40+00	0.00500	3.37	2.00	0.080	0.006	25.04	0.015	2.03	0.30	0.15	1.66
Gutter - 40+00 to 39+50	0.00300	3.37	2.00	0.080	0.004	36.09	0.015	2.76	0.30	0.15	1.22
Gutter - 39+50 to 39+00	0.00100	3.97	2.00	0.080	0.017	19.49	0.015	3.35	0.46	0.13	1.18
Gutter - 39+00 to 38+50	0.00500	3.97	2.00	0.080	0.018	13.51	0.015	1.77	0.37	0.12	2.25
Gutter - 37+50 to 37+00	0.04100	3.82	2.00	0.080	0.020	7.68	0.015	0.71	0.27	0.12	5.38
Gutter - 37+00 to 36+50	0.02900	0.00	2.00	0.080	0.019	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 36+50 to 36+00	0.02300	0.00	2.00	0.080	0.012	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 36+00 to 35+50	0.02200	3.82	2.00	0.083	0.013	11.55	0.015	1.01	0.29	0.14	3.79
Gutter - 35+50 to 35+00	0.02000	3.82	2.00	0.083	0.017	10.02	0.015	0.99	0.30	0.13	3.87
Gutter - 35+00 to 34+50	0.01500	3.82	2.00	0.083	0.022	9.18	0.015	1.05	0.32	0.12	3.64
Gutter - 34+50 to 34+00	0.01500	3.82	2.00	0.083	0.026	8.31	0.015	1.01	0.33	0.11	3.78
Gutter - 34+00 to 33+50	0.01100	3.82	2.00	0.083	0.025	9.12	0.015	1.16	0.34	0.12	3.31
Gutter - 33+50 to 33+00	0.00700	3.82	2.00	0.083	0.020	11.53	0.015	1.46	0.36	0.13	2.62
Gutter - 33+00 to 32+50	0.00600	3.82	2.00	0.083	0.019	12.31	0.015	1.57	0.36	0.13	2.44
Gutter - 32+50 to 32+00	0.00600	3.82	2.00	0.083	0.019	12.31	0.015	1.57	0.36	0.13	2.44

Gutter - Pennsylvania Ave, Lt (West) Report

Label	Channel Slope (ft/ft)	Discharge (ft^3/s)	Gutter Width (ft)	Gutter Cross Slope (ft/ft)	Road Cross Slope (ft/ft)	Spread (ft)	Manning Coefficient	Flow Area (ft^2)	Depth (ft)	Gutter Depression (ft)	Velocity (ft/s)
Gutter - 32+00 to 31+50	0.00300	3.82	2.00	0.083	0.019	14.27	0.015	2.06	0.40	0.13	1.85
Gutter - 31+50 to 31+00	0.00700	3.82	2.00	0.083	0.018	12.31	0.015	1.49	0.35	0.13	2.56
Gutter - 31+00 to 30+50	0.00600	3.82	2.00	0.083	0.020	11.93	0.015	1.55	0.36	0.13	2.47
Gutter - 30+50 to 30+00	0.00600	3.82	2.00	0.083	0.022	11.25	0.015	1.51	0.37	0.12	2.52
Gutter - 30+00 to 29+50	0.00600	3.82	2.00	0.083	0.012	16.37	0.015	1.75	0.34	0.14	2.18
Gutter - 29+50 to 29+00	0.00600	3.82	2.00	0.083	0.009	19.61	0.015	1.88	0.32	0.15	2.03
Gutter - 29+00 to 28+50	0.00700	3.82	2.00	0.083	0.009	18.96	0.015	1.76	0.32	0.15	2.16
Gutter - 28+50 to 28+00	0.00400	3.82	2.00	0.083	0.014	16.23	0.015	1.98	0.37	0.14	1.93
Gutter - 28+00 to 27+50	0.00500	3.82	2.00	0.083	0.017	13.71	0.015	1.73	0.37	0.13	2.21
Gutter - 27+50 to 27+00	0.00500	0.00	2.00	0.083	0.017	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 27+00 to 26+50	0.00600	0.00	2.00	0.083	0.010	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 26+50 to 26+00	0.00400	0.00	2.00	0.083	0.013	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 26+00 to 25+50	0.00500	0.00	2.00	0.083	0.016	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 25+50 to 25+00	0.00600	0.00	2.00	0.083	0.004	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 25+00 to 24+50	0.01100	0.00	2.00	0.083	0.006	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 24+50 to 24+00	0.01400	0.00	2.00	0.083	0.008	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 24+00 to 23+50	0.02500	0.00	2.00	0.083	0.014	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 23+50 to 23+00	0.03200	0.00	2.00	0.083	0.016	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 23+00 to 22+50	0.03600	0.00	2.00	0.083	0.010	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 22+50 to 22+00	0.03800	0.00	2.00	0.083	0.019	0.00	0.015	0.00	0.00	0.00	0.00
Gutter - 22+00 to 21+50	0.03600	1.35	2.00	0.083	0.022	3.93	0.015	0.29	0.21	0.12	4.62
Gutter - 21+50 to 21+00	0.03000	1.35	2.00	0.083	0.026	3.90	0.015	0.31	0.22	0.11	4.32
Gutter - 21+00 to 20+50	0.01300	1.35	2.00	0.083	0.023	5.43	0.015	0.46	0.24	0.12	2.94
Gutter - 20+50 to 20+00	0.00600	1.35	2.00	0.083	0.013	9.44	0.015	0.72	0.26	0.14	1.88

Worksheet for Curb Inlet In Sag - STA 20+64

Project Description

Solve For	Spread

Input Data

Discharge		3.28	ft^3/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.080	ft/ft
Road Cross Slope		0.010	ft/ft
Curb Opening Length		7.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Local Depression		2.00	in
Local Depression Width		2.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	26.26	ft
Depth	0.40	ft
Gutter Depression	0.14	ft
Total Depression	0.31	ft

Worksheet for Curb Inlet On Grade - STA 26+97

Project Description

Solve For	Efficiency

Input Data

Discharge	4.38	ft³/s
Slope	0.00400	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080	ft/ft
Road Cross Slope	0.015	ft/ft
Roughness Coefficient	0.015	
Curb Opening Length	14.00	ft
Local Depression	2.00	in
Local Depression Width	2.00	ft

Results

Efficiency	100.00	%
Intercepted Flow	4.38	ft³/s
Bypass Flow	0.00	ft³/s
Spread	16.52	ft
Depth	0.38	ft
Flow Area	2.18	ft²
Gutter Depression	0.13	ft
Total Depression	0.30	ft
Velocity	2.01	ft/s
Equivalent Cross Slope	0.07216	ft/ft
Length Factor	1.09	
Total Interception Length	12.81	ft

Worksheet for Curb Inlet In Sag - STA 39+31

Project Description

Solve For	Spread

Input Data

Discharge		4.88	ft^3/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.080	ft/ft
Road Cross Slope		0.010	ft/ft
Curb Opening Length		10.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Local Depression		2.00	in
Local Depression Width		2.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	28.98	ft
Depth	0.43	ft
Gutter Depression	0.14	ft
Total Depression	0.31	ft

APPENDIX D: WSPG RESULTS

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T1 Pennsylvania Avenue Improvements                                          0
T2  Storm Drain Line "A"
T3  25-year Storm Event (Proposed Conditions)
SO 100000.0002590.480  1                          2590.480
R  100043.6202590.700  1      .013                                  .000
R  100055.0002590.770  1      .013                                  .000
R  100103.2502590.930  1      .013                                  .000
JX 100104.7502590.940  1  2   .013    5.440         2591.180           .0         .000
R  100252.0002591.690  1      .013                                  .000
JX 100256.5002591.890  1      .013                                     .0         .00
R  100432.5002594.840  1      .013                                  .000
SH 100432.5002594.840  1                          142.900
CD   1  4   0    .000   2.000     .000  .000  .000  .000
CD   2  4   0    .000   1.500     .000  .000  .000  .000
Q             7.110   .0
```

Program Package Serial Number: 1911

WATER SURFACE PROFILE LISTING Date: 3- 2-2018 Time: 3:57: 9

Pennsylvania Avenue Improvements
Storm Drain Line "A"
25-year Storm Event (Proposed Conditions)

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
100000.000	2590.480	1.274	2591.754	12.55	5.94	.55	2592.30	.00	1.27	1.92	2.000	.000	.00	0 .0
11.938	.0050					.0054	.06	1.27	1.00	1.33	.013	.00	.00	PIPE
100011.900	2590.540	1.328	2591.868	12.55	5.67	.50	2592.37	.00	1.27	1.89	2.000	.000	.00	0 .0
31.680	.0050					.0051	.16	1.33	.92	1.33	.013	.00	.00	PIPE
100043.600	2590.700	1.328	2592.028	12.55	5.67	.50	2592.53	.00	1.27	1.89	2.000	.000	.00	0 .0
3.266	.0062					.0054	.02	1.33	.92	1.24	.013	.00	.00	PIPE
100046.900	2590.720	1.274	2591.994	12.55	5.94	.55	2592.54	.00	1.27	1.92	2.000	.000	.00	0 .0
HYDRAULIC JUMP														
100046.900	2590.720	1.241	2591.961	12.55	6.13	.58	2592.54	.00	1.27	1.94	2.000	.000	.00	0 .0
.555	.0062					.0062	.00	1.24	1.05	1.24	.013	.00	.00	PIPE
100047.400	2590.723	1.241	2591.965	12.55	6.13	.58	2592.55	.00	1.27	1.94	2.000	.000	.00	0 .0
7.563	.0062					.0059	.04	1.24	1.05	1.24	.013	.00	.00	PIPE
100055.000	2590.770	1.274	2592.044	12.55	5.94	.55	2592.59	.00	1.27	1.92	2.000	.000	.00	0 .0
1.984	.0033					.0054	.01	1.27	1.00	1.58	.013	.00	.00	PIPE
100057.000	2590.777	1.328	2592.104	12.55	5.67	.50	2592.60	.00	1.27	1.89	2.000	.000	.00	0 .0
8.430	.0033					.0048	.04	1.33	.92	1.58	.013	.00	.00	PIPE
100065.400	2590.804	1.385	2592.190	12.55	5.40	.45	2592.64	.00	1.27	1.85	2.000	.000	.00	0 .0
22.125	.0033					.0043	.09	1.39	.85	1.58	.013	.00	.00	PIPE

Program Package Serial Number: 1911

WATER SURFACE PROFILE LISTING Date: 3- 2-2018 Time: 3:57: 9

Pennsylvania Avenue Improvements
Storm Drain Line "A"
25-year Storm Event (Proposed Conditions)

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
100087.500	2590.878	1.448	2592.325	12.55	5.15	.41	2592.74	.00	1.27	1.79	2.000	.000	.00	0 .0

15.711	.0033					.0039	.06	1.45	.78	1.58	.013		.00	.00	PIPE	
100103.300	2590.930	1.472	2592.402	12.55	5.06	.40	2592.80	.00	1.27	1.76	2.000	.000	.00	0	.0	
JUNCT STR	.0067					.0024	.00	1.47	.75		.013		.00	.00	PIPE	
100104.800	2590.940	1.799	2592.739	7.11	2.39	.09	2592.83	.00	.95	1.20	2.000	.000	.00	0	.0	
22.789	.0051					.0009	.02	1.80	.27	.93	.013		.00	.00	PIPE	
100127.500	2591.056	1.694	2592.750	7.11	2.51	.10	2592.85	.00	.95	1.44	2.000	.000	.00	0	.0	
18.781	.0051					.0010	.02	1.69	.31	.93	.013		.00	.00	PIPE	
100146.300	2591.152	1.607	2592.759	7.11	2.63	.11	2592.87	.00	.95	1.59	2.000	.000	.00	0	.0	
16.414	.0051					.0011	.02	1.61	.35	.93	.013		.00	.00	PIPE	
100162.700	2591.235	1.531	2592.766	7.11	2.76	.12	2592.88	.00	.95	1.70	2.000	.000	.00	0	.0	
14.742	.0051					.0012	.02	1.53	.39	.93	.013		.00	.00	PIPE	
100177.500	2591.310	1.461	2592.772	7.11	2.89	.13	2592.90	.00	.95	1.77	2.000	.000	.00	0	.0	
13.430	.0051					.0013	.02	1.46	.43	.93	.013		.00	.00	PIPE	
100190.900	2591.379	1.398	2592.777	7.11	3.03	.14	2592.92	.00	.95	1.83	2.000	.000	.00	0	.0	
12.367	.0051					.0015	.02	1.40	.47	.93	.013		.00	.00	PIPE	
100203.300	2591.442	1.339	2592.781	7.11	3.18	.16	2592.94	.00	.95	1.88	2.000	.000	.00	0	.0	
11.477	.0051					.0017	.02	1.34	.51	.93	.013		.00	.00	PIPE	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100214.800	2591.500	1.285	2592.784	7.11	3.33	.17	2592.96	.00	.95	1.92	2.000	.000	.00	0 .0
10.688	.0051					.0019	.02	1.28	.56	.93	.013		.00	PIPE
100225.400	2591.554	1.233	2592.788	7.11	3.50	.19	2592.98	.00	.95	1.94	2.000	.000	.00	0 .0
4.547	.0051					.0021	.01	1.23	.60	.93	.013		.00	PIPE
100230.000	2591.578	1.185	2592.762	7.11	3.67	.21	2592.97	.00	.95	1.97	2.000	.000	.00	0 .0
HYDRAULIC JUMP														
100230.000	2591.578	.704	2592.281	7.11	7.20	.81	2593.09	.00	.95	1.91	2.000	.000	.00	0 .0
5.648	.0051					.0140	.08	.70	1.77	.93	.013		.00	PIPE
100235.600	2591.606	.704	2592.310	7.11	7.20	.80	2593.12	.00	.95	1.91	2.000	.000	.00	0 .0

5.711	.0051					.0150	.09	.70	1.76	.93	.013	.00	.00	PIPE	
100241.300	2591.635	.680	2592.315	7.11	7.55	.89	2593.20	.00	.95	1.89	2.000	.000	.00	0	.0
5.438	.0051					.0171	.09	.68	1.89	.93	.013	.00	.00	PIPE	
100246.800	2591.663	.657	2592.320	7.11	7.92	.97	2593.29	.00	.95	1.88	2.000	.000	.00	0	.0
5.219	.0051					.0195	.10	.66	2.02	.93	.013	.00	.00	PIPE	
100252.000	2591.690	.634	2592.324	7.11	8.31	1.07	2593.40	.00	.95	1.86	2.000	.000	.00	0	.0
JUNCT STR	.0444					.0188	.08	.63	2.16		.013	.00	.00	PIPE	
100256.500	2591.890	.671	2592.561	7.11	7.69	.92	2593.48	.00	.95	1.89	2.000	.000	.00	0	.0
63.719	.0168					.0168	1.07	.67	1.94	.67	.013	.00	.00	PIPE	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100320.200	2592.958	.671	2593.629	7.11	7.69	.92	2594.55	.00	.95	1.89	2.000	.000	.00	0	.0
57.719	.0168					.0161	.93	.67	1.94	.67	.013	.00	.00	PIPE	
100377.900	2593.926	.685	2594.611	7.11	7.47	.87	2595.48	.00	.95	1.90	2.000	.000	.00	0	.0
24.273	.0168					.0145	.35	.69	1.86	.67	.013	.00	.00	PIPE	
100402.200	2594.333	.710	2595.042	7.11	7.12	.79	2595.83	.00	.95	1.91	2.000	.000	.00	0	.0
11.461	.0168					.0127	.15	.71	1.74	.67	.013	.00	.00	PIPE	
100413.700	2594.525	.735	2595.260	7.11	6.79	.72	2595.98	.00	.95	1.93	2.000	.000	.00	0	.0
6.906	.0168					.0112	.08	.74	1.62	.67	.013	.00	.00	PIPE	
100420.600	2594.640	.761	2595.402	7.11	6.47	.65	2596.05	.00	.95	1.94	2.000	.000	.00	0	.0
4.547	.0168					.0098	.04	.76	1.52	.67	.013	.00	.00	PIPE	
100425.100	2594.717	.789	2595.505	7.11	6.17	.59	2596.10	.00	.95	1.95	2.000	.000	.00	0	.0
3.070	.0168					.0086	.03	.79	1.42	.67	.013	.00	.00	PIPE	
100428.200	2594.768	.818	2595.586	7.11	5.89	.54	2596.12	.00	.95	1.97	2.000	.000	.00	0	.0
2.063	.0168					.0075	.02	.82	1.32	.67	.013	.00	.00	PIPE	
100430.300	2594.802	.848	2595.650	7.11	5.61	.49	2596.14	.00	.95	1.98	2.000	.000	.00	0	.0
1.305	.0168					.0066	.01	.85	1.24	.67	.013	.00	.00	PIPE	

```
100431.600  2594.824      .879  2595.703       7.11     5.35      .44  2596.15      .00      .95     1.99    2.000      .000   .00   0   .0
         -|-        -|-       -|-        -|-        -|-      -|-      -|-        -|-      -|-       -|-       -|-      -|-      -|-      |-
      .711    .0168                                                 .0058      .00      .88     1.15      .67    .013        .00   .00  PIPE
♀ FILE: penn-linea.WSW                        W S P G W - CIVILDESIGN Version 14.06                                          PAGE    5
                                  Program Package Serial Number: 1911
                                                      WATER SURFACE PROFILE LISTING                   Date: 3- 2-2018  Time: 3:57: 9
                            Pennsylvania Avenue Improvements
                               Storm Drain Line "A"
                                 25-year Storm Event (Proposed Conditions)
 ************************************************************************************************************************ ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel   |  Energy  | Super  |Critical|Flow Top|Height/|Base Wt|       |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head  |  Grd.El.|  Elev  |  Depth | Width  |Dia.-FT|or I.D.|  ZL   |Prs/Pip
         -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF    |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR   |Type Ch
 *********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
          |         |        |         |         |               |          |        |        |        |       |       |       |
100432.300  2594.836      .911  2595.748       7.11     5.10      .40  2596.15      .00      .95     1.99    2.000      .000   .00   0   .0
         -|-        -|-       -|-        -|-        -|-      -|-      -|-        -|-      -|-       -|-       -|-      -|-      -|-      |-
      .227    .0168                                                 .0051      .00      .91     1.07      .67    .013        .00   .00  PIPE
          |         |        |         |         |               |          |        |        |        |       |       |       |
100432.500  2594.840      .946  2595.787       7.11     4.86      .37  2596.15      .00      .95     2.00    2.000      .000   .00   0   .0
         -|-        -|-       -|-        -|-        -|-      -|-      -|-        -|-      -|-       -|-       -|-      -|-      -|-      |-
♀
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Appendix C

Parcel Map

23/73

AMENDED MAP OF A PORTION
OF THE SUBDIVISION OF SEC. 11 T. 3 S., R. 1 W., S.B.M.

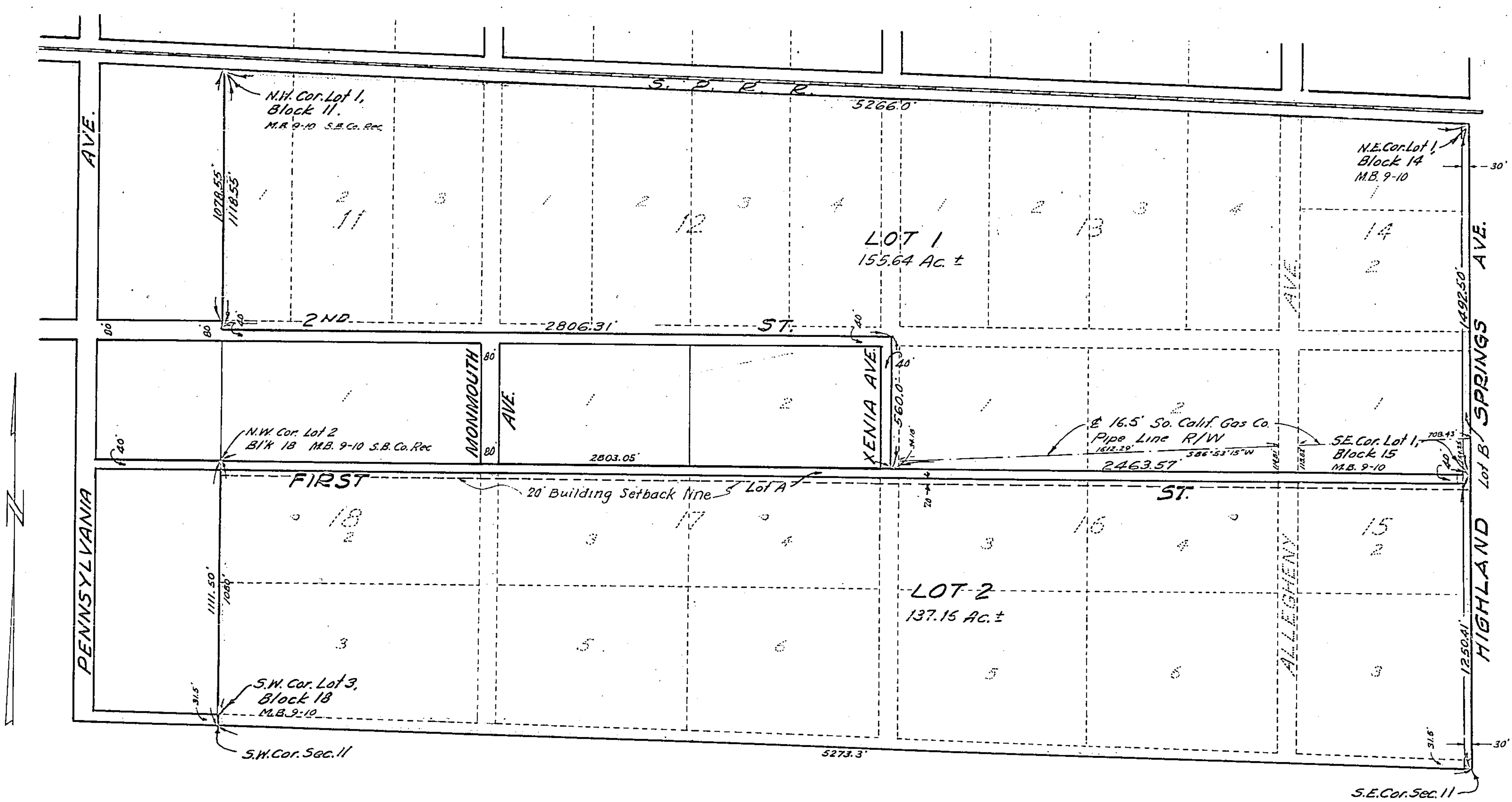
THE PURPOSE OF THIS MAP IS REVERSION TO ACREAGE
OF BLOCKS 11, 12, 13, 14, 15, 16, AND PORTIONS OF BL'KS 17 & 18, ALSO A PORTION OF MONMOUTH AVE., XENIA AVE., ALLEGHENY AVE., AND SECOND STREET, AND THAT PORTION OF THE UNNAMED STREET LYING SOUTHERLY OF BLOCKS 15, 16, 17, 18, AS SHOWN ON MAP OF SUBDIVISION OF SEC. 11, T.3S. R.1W. S.B.B.&M.; M.B. 9-10, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA

MAY 1949

SCALE 1" = 400'

J. F. DAVIDSON – CIVIL ENGINEER

FILED
MAR. 9, 1950
No. 1509 at 11:00 A.M.
Jack A. Ross
COUNTY RECORDER
by O.A. Thiest
DEPUTY
Fee $5.00
Filed by County Clerk



NOTE
Bearings and distances shown on this map are identical with those shown on Subdivision of Sec. 11, T.3S., R.1W., S.B.M. M.B. 9, page 10 except where noted.
Dotted lines and figures represent original lots, blocks and streets shown on Sub. Sec. 11, Map Book 9 page 10, S.B. Co.

We hereby certify that we are the owners of or interested in the land included within the subdivision shown on the annexed map consisting of one (1) sheet, that we are the only persons whose consent is necessary to pass a clear title to said land and we hereby consent to the making of said map and subdivision as shown within the colored border line, and offer for dedication to public use, lots A & B

Clara Stewart Beasley
Form. Clara M. Stewart
Laura M. Stewart

STATE OF CALIFORNIA } SS
COUNTY OF RIVERSIDE }
On this 8th day of February 1950 before me Beulah M. Vaught a Notary Public in and for said County, personally appeared Clara Stewart Beasley and Laura M. Stewart known to me to be the persons whose names are subscribed to within instrument and acknowledged to me that they executed the same.

7324-R

Beulah M. Vaught
Notary Public in and for the County of Riverside, State of California.

The County of Riverside, State of California by and thru its duly authorized officers hereby approves said final map of an Amended Map of a Portion of the Subdivision of Sec. 11, T.3S., R.1W., S.B.M., and accepts the foregoing dedication.
Dated this 6 day of March 1950

ATTEST:
GORDON A. PEQUEGNAT
County Clerk and Ex-officio Clerk of the Board of Supervisors
By ... Deputy

COUNTY OF RIVERSIDE STATE OF CALIFORNIA
by Floyd E. Gilmore
Chairman of the Board of Supervisors

I hereby certify that according to the records of this office as of this date there are no liens against the property shown on the annexed map for unpaid State, County, Municipal or local taxes or special assessments collected as taxes. Dated this 8 day February 1950.

R.T. Hicks By H. C. Strode, Deputy
County Auditor of the County of Riverside, State of California.

I hereby certify that I have examined the annexed map; that all provisions of Chapter 670 (Subdivision Map Act) Statutes of California 1937, and Riverside County Ordinance No 336 have been complied with and I am satisfied that this map is technically correct.

A. C. Keith
County Surveyor

Approved by the Riverside County Planning Commission in accordance with the requirements of law in duly authorized meeting held this 14 day of February 1950.

Hazel I. Evensen
Secretary

Book No 5

M.B. 23/73

Copy

254/72

IN THE CITY OF BEAUMONT, COUNTY OF RIVERSIDE, CALIFORNIA

TRACT 28017-1

BEING A SUBDIVISION OF A PORTION OF LOT 1 OF AMENDED MAP OF A PORTION OF THE SUBDIVISION OF SECTION 11, T.3S., R.1W., S.B.M. AS SHOWN BY MAP ON FILE IN BOOK 23 OF MAPS AT PAGE 73 THEREOF, RECORDS OF RIVERSIDE COUNTY, CALIF.

APRIL 1995 SCALE: 1"=400'

J. F. DAVIDSON ASSOCIATES, INC.

RIVERSIDE, CALIFORNIA

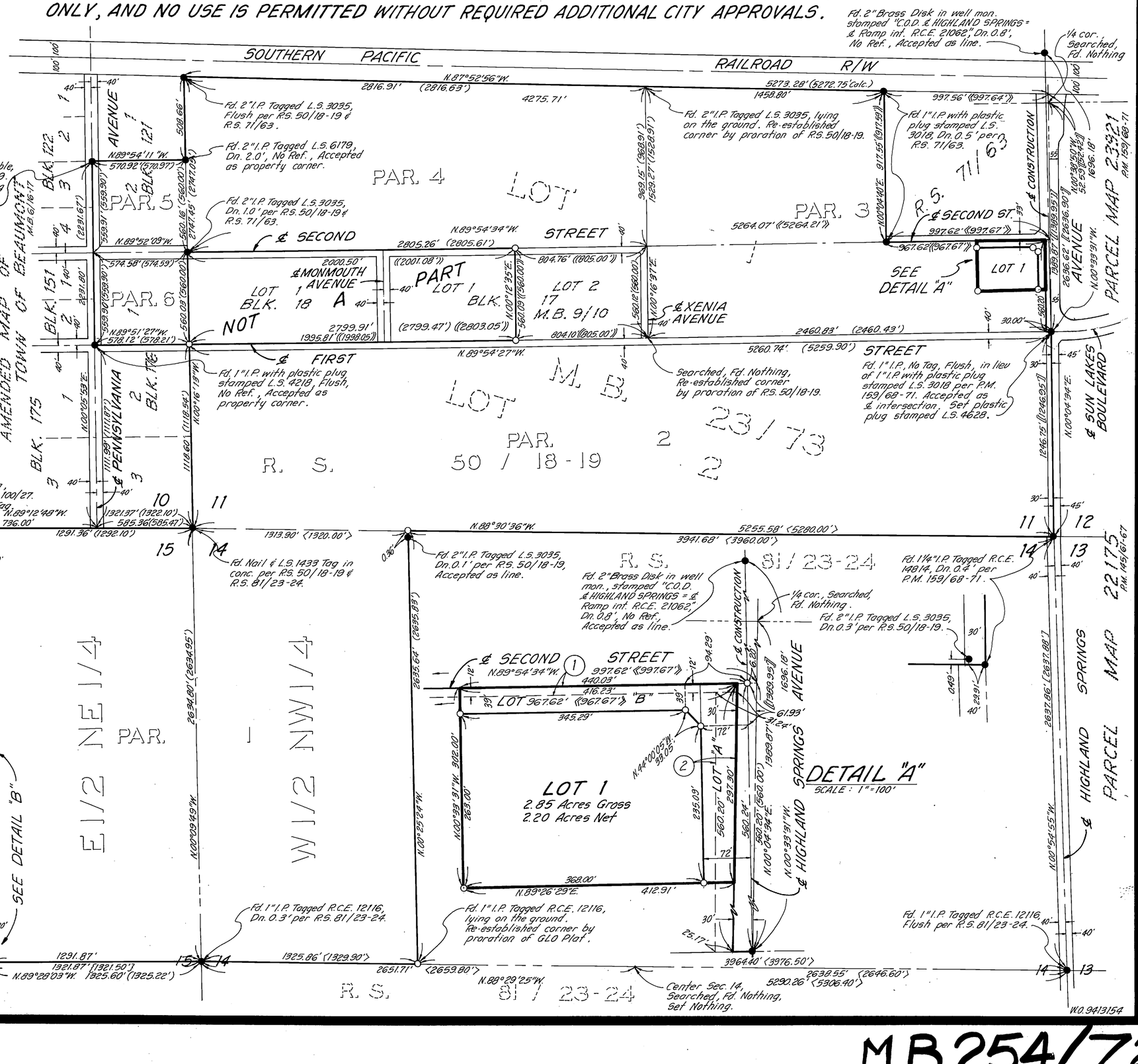
THIS MAP HAS BEEN RECORDED FOR FINANCING AND CONVEYANCE PURPOSES ONLY, AND NO USE IS PERMITTED WITHOUT REQUIRED ADDITIONAL CITY APPROVALS.

SHEET 2 OF 2 SHEETS

SURVEYOR'S NOTES

Bearings are based upon the centerline of HIGHLAND SPRINGS AVENUE as being N.00°04'34"E. as shown on PARCEL MAP 23921 by map on file in Book 159 of Parcel Maps of Pages 68-71 thereof, Records of Riverside County, California.

- ● Indicates Found Monuments as noted.
- ○ Indicates Set 1" I.P. with plastic plug stamped L.S.4628, Flush, unless otherwise noted.
- (~) Indicates Record Data per G.L.O. Plat dated Feb. 3, 1897.
- ((~)) Indicates Record Data per M.B. 9/10.
- [[~]] Indicates Record Data per P.M. 159/68-71.
- (~) Indicates Record Data per R.S. 50/18-19.
- «~» Indicates Record Data per R.S. 71/63.
- [~] Indicates Record Data per R.S. 81/23-24.
- {~} Indicates Record Data per R.S. 21/45.



MB 254/72

2005-0172652
Original
212/13

SHEET 3 OF 7

NUMBER OF PARCELS: 4
AREA = 297.90 ACRES GROSS

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

PARCEL MAP NO. 31948

BEING A SUBDIVISION OF A PORTION OF LOT 1 AND LOT 2 OF AMENDED MAP OF A PORTION OF THE SUBDIVISION OF SECTION 11, T.3 S., R.1 W., S.B.B.M. AS SHOWN BY MAP ON FILE IN BOOK 23, PAGE 73 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, TOGETHER WITH LOT 1, IN BLOCK 176 OF AMENDED MAP OF THE TOWN OF BEAUMONT AS SHOWN BY MAP ON FILE IN BOOK 6, PAGES 16 AND 17 OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA, AND LOTS 1 AND 2, IN BLOCK 17 AND LOT 1, BLOCK 18 OF THE SUBDIVISION OF SECTION 11, T.3 S., R.1 W., S.B.B.M., AS SHOWN BY MAP ON FILE IN BOOK 9, PAGE 10 OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA AND LOT LINE ADJUSTMENT #04-LLA-11 RECORDED NOVEMBER 5, 2004 AS INSTRUMENT NO. 2004-0879172, O.R., RECORDS OF SAID RIVERSIDE COUNTY

MICHAEL SIMON, P.L.S. 6034 TAIT & ASSOCIATES, INC.
DATE OF SURVEY: SEPTEMBER, 2003

0 300 450 600
(IN FEET)
1 INCH = 300 FEET

MONUMENTATION NOTES

- ● INDICATES FOUND MONUMENT AS NOTED
- □ SET 2" IRON PIPE TAGGED "P.L.S. 6034" OR LEAD & TACK TAGGED "P.L.S. 6034" OR GEAR SPIKE & WASHER TAGGED "P.L.S. 6034", FOR ALL BOUNDARY CORNERS
- ○ SET 1" IRON PIPE TAGGED "P.L.S. 6034" OR LEAD & TACK TAGGED "P.L.S. 6034" OR GEAR SPIKE & WASHER TAGGED "P.L.S. 6034", FOR ALL PARCEL CORNERS

SET 1" IRON PIPE TAGGED "P.L.S. 6034", DOWN 0.4', AT ALL CENTERLINE POINTS OF CONTROL

NOTE

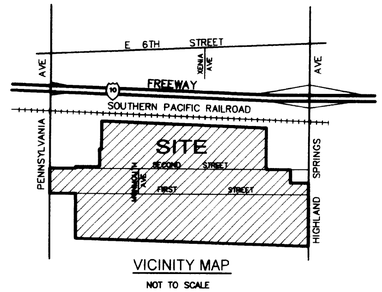
PARCEL 1 OF R.S. 50/18-19 IS CONTIGUOUS OWNERSHIP AT THE TIME OF RECORDING OF THIS MAP.

RECORD MAP REFERENCE

(XX') INDICATES RECORD AND MEASURED DATA PER TRACT 28017-1 M.B. 854/71-72
[XX'] INDICATES RECORD AND MEASURED DATA PER R.S. 71/63
{XX'} INDICATES RECORD AND MEASURED DATA PER PARCEL MAP 23921, M.B. 159/68-71
((XX')) INDICATES RECORD AND MEASURED DATA PER M.B. 9/10
[[XX']] INDICATES RECORD AND MEASURED DATA PER R.S. 50/18-19

DEED REFERENCE

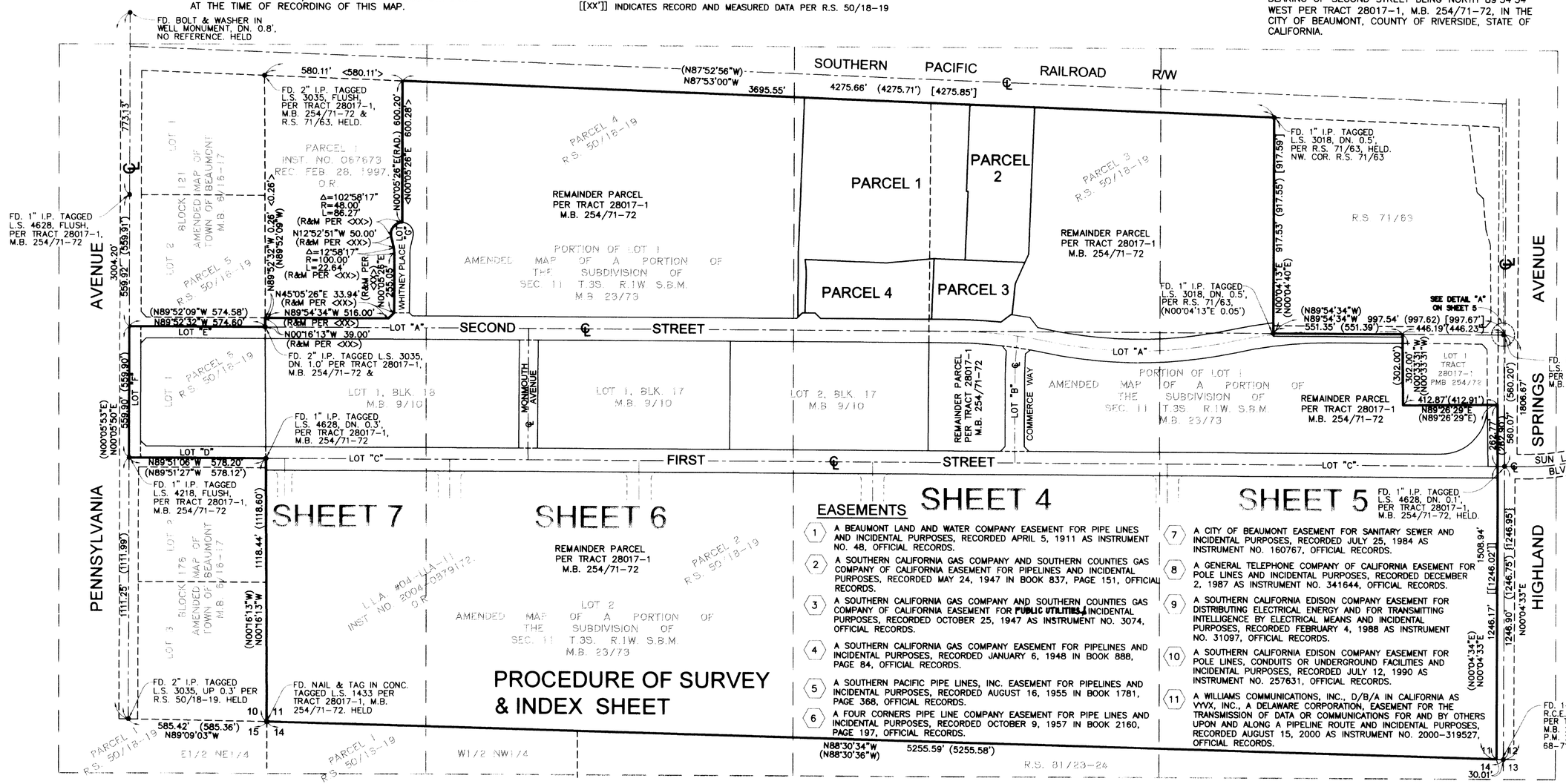
<XX'> INSTRUMENT NO. 067673 RECORDED FEBRUARY 28, 1997, OFFICIAL RECORDS.



VICINITY MAP
NOT TO SCALE

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING OF SECOND STREET BEING NORTH 89°54'34" WEST PER TRACT 28017-1, M.B. 254/71-72, IN THE CITY OF BEAUMONT, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA.



SHEET 4

EASEMENTS

1. A BEAUMONT LAND AND WATER COMPANY EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES, RECORDED APRIL 5, 1911 AS INSTRUMENT NO. 48, OFFICIAL RECORDS.
2. A SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES, RECORDED MAY 24, 1947 IN BOOK 837, PAGE 151, OFFICIAL RECORDS.
3. A SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA EASEMENT FOR PUBLIC UTILITIES & INCIDENTAL PURPOSES, RECORDED OCTOBER 25, 1947 AS INSTRUMENT NO. 3074, OFFICIAL RECORDS.
4. A SOUTHERN CALIFORNIA GAS COMPANY EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES, RECORDED JANUARY 6, 1948 IN BOOK 888, PAGE 84, OFFICIAL RECORDS.
5. A SOUTHERN PACIFIC PIPE LINES, INC. EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES, RECORDED AUGUST 16, 1955 IN BOOK 1781, PAGE 368, OFFICIAL RECORDS.
6. A FOUR CORNERS PIPE LINE COMPANY EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES, RECORDED OCTOBER 9, 1957 IN BOOK 2160, PAGE 197, OFFICIAL RECORDS.

SHEET 5

7. A CITY OF BEAUMONT EASEMENT FOR SANITARY SEWER AND INCIDENTAL PURPOSES, RECORDED JULY 25, 1984 AS INSTRUMENT NO. 160767, OFFICIAL RECORDS.
8. A GENERAL TELEPHONE COMPANY OF CALIFORNIA EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES, RECORDED DECEMBER 2, 1987 AS INSTRUMENT NO. 341644, OFFICIAL RECORDS.
9. A SOUTHERN CALIFORNIA EDISON COMPANY EASEMENT FOR DISTRIBUTING ELECTRICAL ENERGY AND FOR TRANSMITTING INTELLIGENCE BY ELECTRICAL MEANS AND INCIDENTAL PURPOSES, RECORDED FEBRUARY 4, 1988 AS INSTRUMENT NO. 31097, OFFICIAL RECORDS.
10. A SOUTHERN CALIFORNIA EDISON COMPANY EASEMENT FOR POLE LINES, CONDUITS OR UNDERGROUND FACILITIES AND INCIDENTAL PURPOSES, RECORDED JULY 12, 1990 AS INSTRUMENT NO. 257631, OFFICIAL RECORDS.
11. A WILLIAMS COMMUNICATIONS, INC., D/B/A IN CALIFORNIA AS VYVX, INC., A DELAWARE CORPORATION, EASEMENT FOR THE TRANSMISSION OF DATA OR COMMUNICATIONS FOR AND BY OTHERS UPON AND ALONG A PIPELINE ROUTE AND INCIDENTAL PURPOSES, RECORDED AUGUST 15, 2000 AS INSTRUMENT NO. 2000-319527, OFFICIAL RECORDS.

SHEET 6

SHEET 7

PROCEDURE OF SURVEY & INDEX SHEET

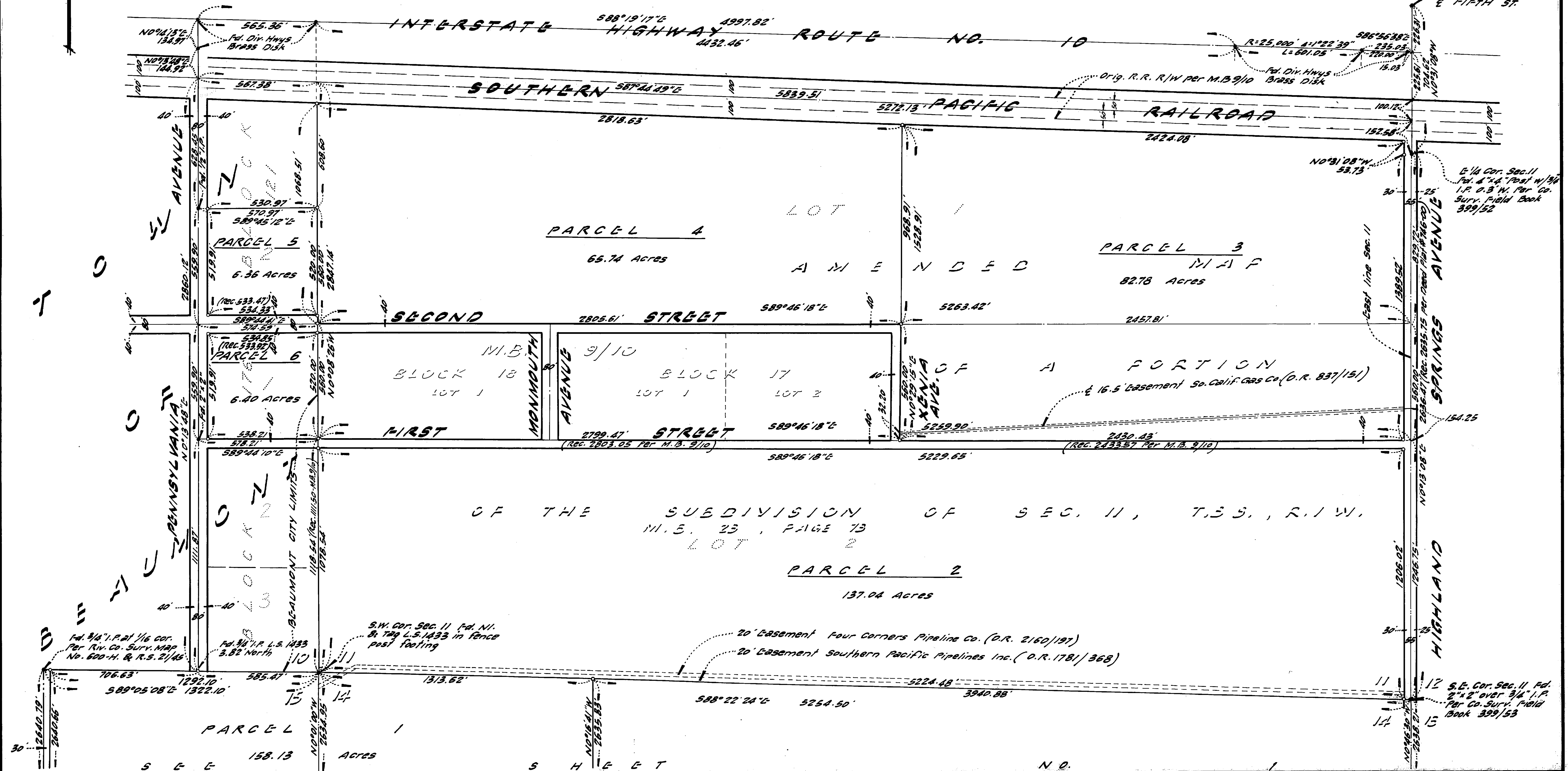
IN THE COUNTY OF RIVERSIDE

RECORD OF SURVEY

SHOWING A SURVEY OF THE WEST ONE-HALF OF THE NORTHWEST ONE-QUARTER OF SECTION 14, THE EAST ONE-HALF OF THE NORTH EAST ONE-QUARTER OF SECTION 15, T.3S. R.1W. S.B.B.&M., LOTS 1 & 2 OF AMENDED MAP OF SUBDIVISION OF SECTION 11, T.3S. R.1W. S.B.B.&M. PER PLAT RECORDED IN BOOK 23 OF MAPS, PAGE 73, RECORDS OF RIVERSIDE COUNTY CALIFORNIA, LOT 1 BLOCK 176, AND LOT 2, BLOCK 121, OF AMENDED MAP OF THE TOWN OF BEAUMONT, PER PLAT RECORDED IN BOOK 6 OF MAPS, PAGES 16 & 17, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA.

GARNER TEE TRACADAS & TROY -- CIVIL ENGINEERING · LAND SURVEYING NOV. 1966

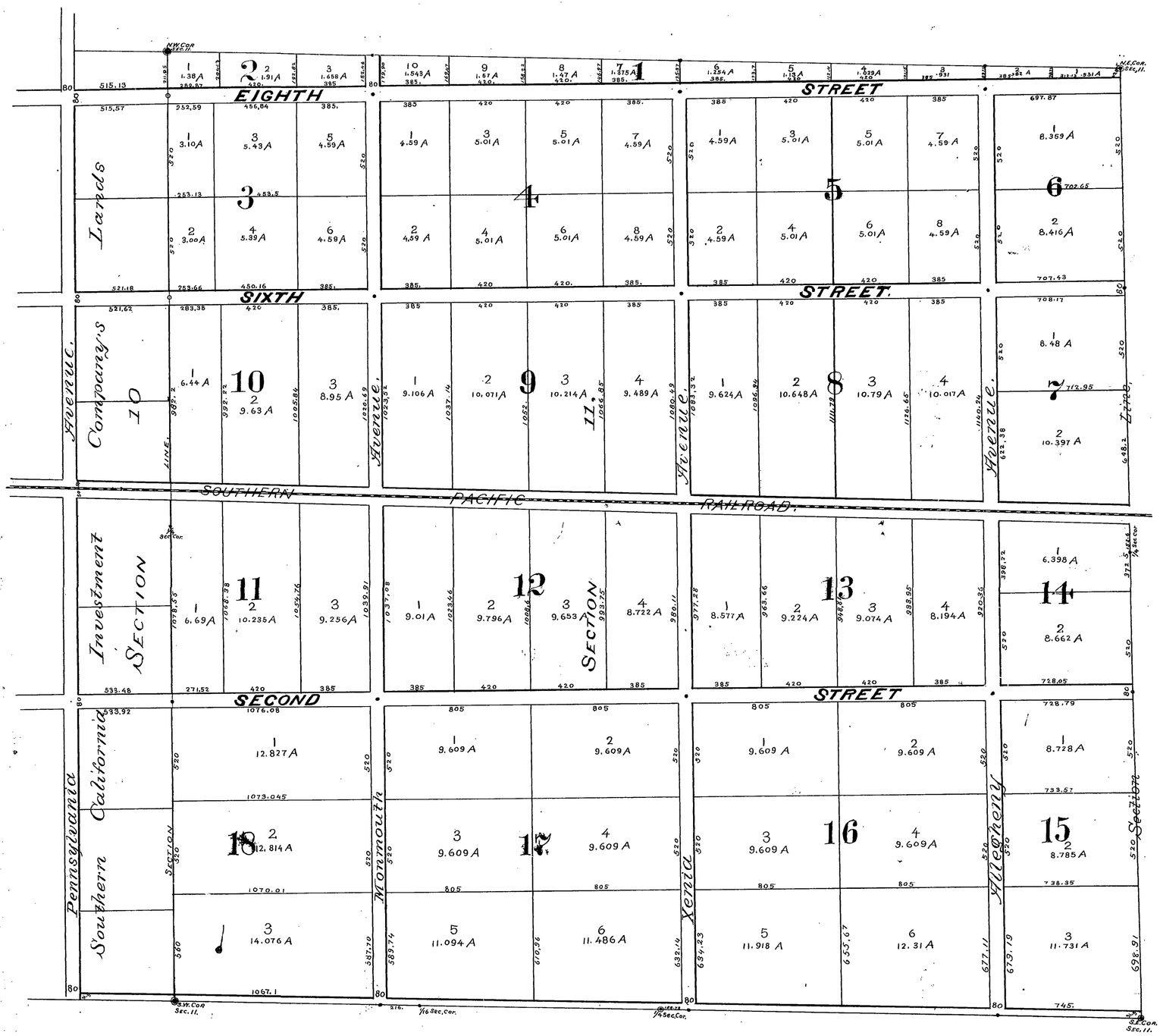
Scale: 1" = 300'


INTERSTATE HIGHWAY ROUTE NO. 10
SOUTHERN PACIFIC RAILROAD
S88°19'17"E 4997.82'
4432.46'
565.36'
567.38'
S87°44'49"E
5839.51'
5272.13'
2818.63'
2424.08'
Fd. Div. Hwys. Brass Disk
Fd. Div. Hwys. Brass Disk at ℄ FIFTH ST.
Orig. R.R. R/W per M.B. 9/10
R=25,000' Δ=1°22'39" L=601.05'
S86°56'38"E 235.03'
N0°31'08"W 53.73'
E 1/4 Cor. Sec. 11 Fd. 4"x4" Post w/ 3/4" I.P. 0.3' W. Per Co. Surv. Field Book 399/52
PARCEL 4
65.74 Acres
PARCEL 3
82.78 Acres
PARCEL 5
6.36 Acres
PARCEL 6
6.40 Acres
PARCEL 2
137.04 Acres
PARCEL 1
158.13 Acres
LOT 1
AMENDED MAP
OF A PORTION
OF THE SUBDIVISION OF SEC. 11, T.3S., R.1W.
M.B. 23, PAGE 73
LOT 2
SECOND STREET
FIRST STREET
2805.61'
S89°46'18"E
5263.42'
2457.81'
2799.47'
5259.90'
2430.43'
(Rec. 2803.05 Per M.B. 9/10)
(Rec. 2433.57 Per M.B. 9/10)
5229.65'
M.B. 9/10
BLOCK 18
BLOCK 17
MONMOUTH AVENUE
XENIA AVE.
PENNSYLVANIA AVENUE
HIGHLAND SPRINGS AVENUE
East line Sec. 11
℄ 16.5' Easement So. Calif. Gas Co. (O.R. 837/151)
20' Easement Four Corners Pipeline Co. (O.R. 2160/197)
20' Easement Southern Pacific Pipelines Inc. (O.R. 1781/368)
S.W. Cor. Sec. 11 Fd. N.I. & Tag L.S. 1433 in fence post footing
Fd. 3/4" I.P. L.S. 1433 3.82' North
Fd. 3/4" I.P. at 1/16 cor. Per Riv. Co. Surv. Map No. 600-H & R.S. 21/45
S.E. Cor. Sec. 11 Fd. 2"x2" over 3/4" I.P. Per Co. Surv. Field Book 399/53
BEAUMONT CITY LIMITS
TOWN OF BEAUMONT
S89°05'08"E 1322.10'
706.63'
585.47'
1313.62'
S88°22'24"E 5264.50'
5224.48'
3940.88'
SEE SHEET NO. 1

10

MB-9

10



MAP

OF THE

Subdivision of

SEC. 11,

T. 3S. R. 1W. S.B.M.

San Bernardino Co. Cal.

ADJOINING THE TOWN OF

BEAUMONT

IN THE SAN GORGONIO VALLEY.

Surveyed by C.S. Compton in Oct & Nov. 1887.

Avenues North & South, Streets East & West.

Scale 400 ft. = 1 inch.

Var 14° 15' E.

- Wooden Stake 3"x3"x18" Nail center
- ⊙ Iron Stake 1"x1"x2.5"

Recorded at request of J. Carruthers
Feb. 4th 1889.

A.S. Davidson
County Recorder

Appendix D

Utility Plans

1 inch = 189 feet

Map Number: 0990-20-2000

Map Type: Gas Asset Map

Printed By: GTTS

Printed Date: 6/3/2020

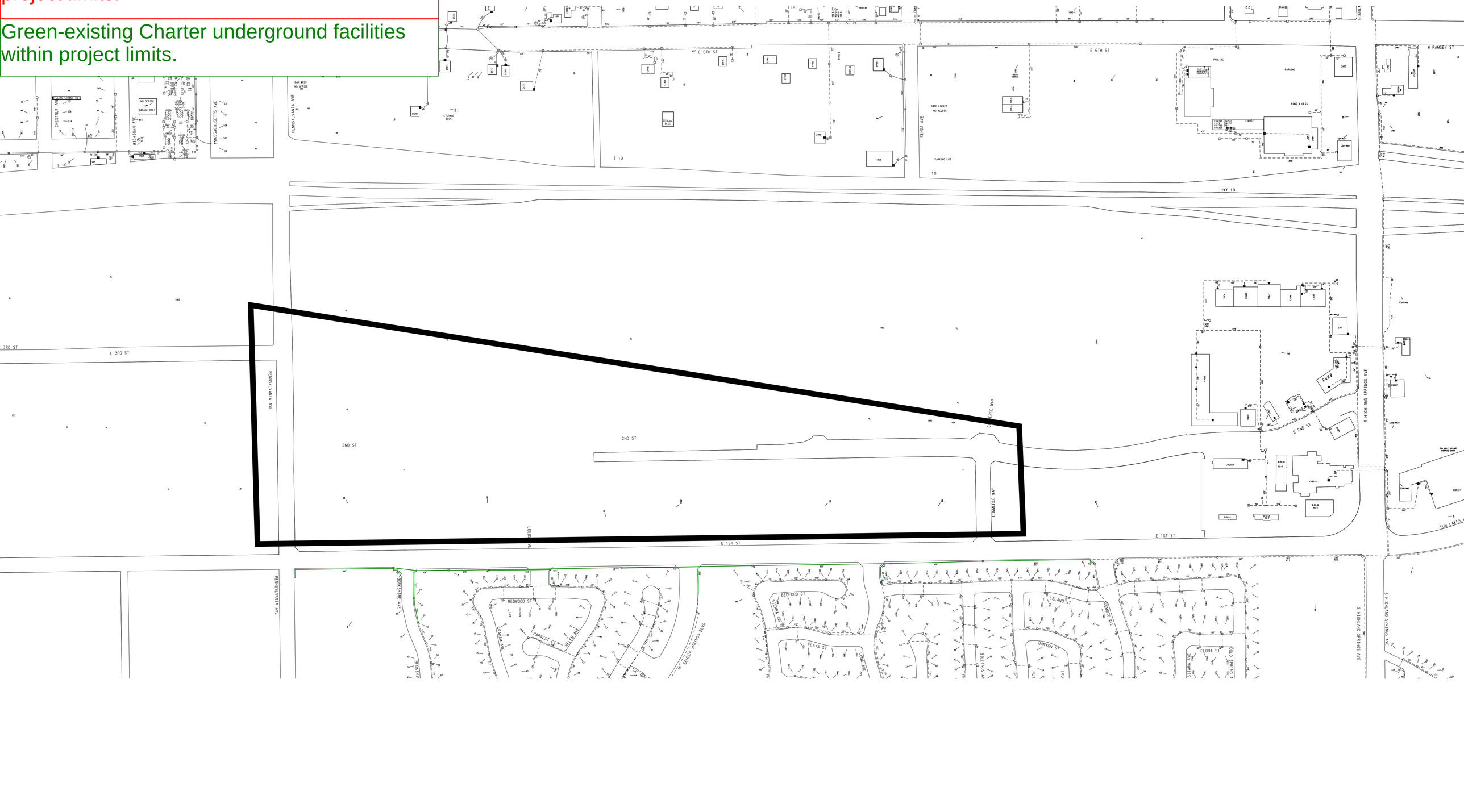
Southern California Gas Company

A Sempra Energy utility®

East 2nd Street
Map
Beaumont, CA 92223

Red-existing Charter aerial facilities within project limits.

Green-existing Charter underground facilities within project limits.



BEAUMONT

RIVERSIDE CO. 640-1782-1

642-1782-1

640-1779-1

640-1785-1

SEC 10

SEC 11
T 3 S R 1 W
SBM

EAST FIFTH ST

MICHIGAN AVE

MASSACHUSETTS AVE

PENN

VARIES STATE HWY VARIES

S P R R

R/W

FOIL SUB

BANNING-FOIL-GARNET-MARASCHINO-WINDFARM
04212 (IDLE)

115KV

EAST THIRD ST

PENNSYLVANIA

002
015

LOT 1

POR OF AMENDED MAP
OF A POR OF
SUB OF SEC 11

66 PL WHITNEY 66

NO CHARGE

CONFIDENTIAL:
CRITICAL ENERGY INFRASTRUCTURE
This diagram contains information relating to Southern California Edison Company's electric transmission / distribution system. It is classified as Critical Energy Infrastructure Information as defined in 18 code of Federal Regulations section 388.113(c)(1).

FOR REFERENCE ONLY
This map has been created to SCE standards to be used by SCE personnel only and is not intended to be a legal representation of real property. Please don't forget to call Dig Alert: 1-800-227-2600

10-18 FNIET 11-18 NJAMS
1-19 MVALA 9-18 AKOUC

SCALE IN FEET 0 100 200 300 400
SCALE IN METERS 0 30 60 90 120

8-84

638-1782-1

REDLANDS

1,782,000

ZONE 6

640,000

BEAUMONT

RIVERSIDE CO. 638–1782–1

640–1782–1

638–1779–1

638–1785–1

636–1782–1

CONFIDENTIAL: CRITICAL ENERGY INFRASTRUCTURE
This diagram contains information relating to Southern California Edison Company's electric transmission / distribution system. It is classified as Critical Energy Infrastructure Information as defined in 18 code of Federal Regulations section 388.113(c)(1).

FOR REFERENCE ONLY
This map has been created to SCE standards to be used by SCE personnel only and is not intended to be a legal representation of real property. Please don't forget to call Dig Alert: 1-800-227-2600

SECOND
FIRST
MASSACHUSETTS
MICHIGAN
PENNSYLVANIA
BERKSHIRE
WHITNEY PL
LEEDS AVE
REDWOOD
GRAHAM
HARVEST CT
HELEN
NEWBURN
ROLLINGWOOD
GORDON CT
BETH ST
SENECA SPRINGS
MONMOUTH
POTRERO
BANNING–FOIL–GARNET–MARASCHINO–WINDFARM 04212 (IDLE)

LOT 1
POR BLK 176
BLK 18
POR OF AMENDED MAP OF A POR OF SUB OF SEC 11
BLK 17
LOT A

002
015
SEC 10
T 3 S R 1 W
SBM

TR 31521–5
TR 31521–4
TR 31521–1
TR ?????
SENECA SPRINGS PKWY
REDLANDS

8–12 WHARV 9–15 PASOM
3–18 RDIEU 9–18 AKOUC

SCALE IN FEET
SCALE IN METERS

ZONE 6
1,782,000
638,000

6–08

BEAUMONT

RIVERSIDE CO. 638-1785-1

640-1785-1

POR OF AMENDED MAP OF A POR OF SUB OF SEC 11

LOT 1

POR OF AMENDED MAP OF A POR OF SUB OF SEC 11

LOT 1

212/11-17

212/47-49

220/61-64

NO CHARGE

BLK 17

BASE ONLY – NO FACILITIES

002
015

PM

SECOND

FIRST

COMMERCE WY

ST

BEDFORD CT

PLAYA ST

BELLE ST

FLAMINGO ST

LELAND ST

SIERRA AVE

NEWBURN CT

SENECA SPRINGS PKWY

LUNA AVE

BIRDSONG CT

BILLINGS AVE

NUTWOOD AVE

BANYON ST

IVORY AVE

EMORY AVE

FLORA ST

SITARA AVE

LESLIE ST

FOUR SEASONS BLVD

POTRERO BLVD

31519-1

31520-1

31519-2

31519

TR

TR ????? — 9-11 STEXA | 1-09 FVENE | 1-09 BCOST | 4-10 AMEND

TR 32660-1

32660

638-1782-1

638-1788-1

636-1785-1

1,785,000

638,000

ZONE 6

SCALE IN FEET

SCALE IN METERS

REDLANDS

6-08

CONFIDENTIAL:
CRITICAL ENERGY INFRASTRUCTURE
This diagram contains information relating to Southern California Edison Company's electric transmission / distribution system. It is classified as Critical Energy Infrastructure Information as defined in 18 code of Federal Regulations section 388.113(c)(1).

FOR REFERENCE ONLY
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BEAUMONT

RIVERSIDE CO. 639-1786-5

POR OF AMENDED MAP OF A POR OF SUB OF SEC 11

640-1786-5

212/47-49

LOT 1

220/61-64

212/11-17

PM

P9457 TO C/L X1375
186' 2-4" 06
186' 3-2-12KV 08

P9457 TO C/L X9214
186' 1-4" 06
186' 3-2-12KV 07

P9457 TO C/L CAP
186' 1-4" 06

C/L P9458 TO CAP
55' 2-3" 06

P5509457 06
10'6"X5'X7'
1-PME-10 06

P9457 TO C/L S9458
163' 2-4" 06
163' 2-5" 06
163' 3-350-12KV 06

P9457 TO CAP
225' 2-4" 06

C/L V4971 TO M5324
605' 2-5" 06
605' 3-750-12KV 07

M5324 TO P9457
746' 2-5" 06

M5565324 06
5'X10'6"X7'

P9457 TO POLE
223' 1-4" 06
10' 1-4" 07

V1611 TO P9457
223' 2-5" 06
472' 2-5" 07
695' 3-750-12KV 07

V1611 TO CAP
342' 1-4" 07

V1611 TO CAP
172' 1-4" 07

V1611 TO C/L CAP
210' 2-4" 07

V1611 TO C/L P1612
210' 2-4" 07
210' 3-1/0-12KV 07
210' 3-1/0-12KV 07

V5601611 07
6'X12'X7'
1-SW RAM GS 07
25/6.9
4913884207
120/240

GS 1452

V1611 TO H
173' 1-3" 08
173' 1/0 08

CAP TO V1611
135' 1-4" 07
5' 1-4" 08

SERV ACCT
3' 1/0 07

PED TO H
3' 1-3" 07

TRAFCNTL

V1809 TO V1611
632' 2-5" 07
632' 1-2-6.9/12KV 07

SERV ACCT
7' 1/0 07

PED TO H
7' 1-3" 07

V1809 TO H
25' 1-3" 07
25' 1/0 07

V1809 TO CAP
10' 1-4" 07

V5601809 07
6'X12'X7'
25/6.9
5044334407
120/240

V1809 TO CAP
10' 1-4" 07

CAP TO V1809
148' 1-4" 07
148' 2-5" 07

C/L V8614 TO C/L M8615
1500' 4-5" 05
1500' 3-750-12KV 05
1500' 3-1000-12KV 07

CAP TO CAP
62' 1-4" 06

X6837 TO P6838
210' 1-4" 05
96' 1-4" 06
306' 3-2-12KV 06

X5586837 06
2'X3'X3'

C/L V8614 TO V1611
327' 1-5" 05
156' 1-5" 07
482' 3-750-12KV 07

H TO H
18' 1-3" 06
18' #2-M 06

H TO H
114' 1-3" 06
114' 4/0 06

H CUST

C/L P0861 TO H
94' 1-3" 06
94' 4/0 06

C/L V8614 TO X6837
686' 1-4" 05
35' 1-4" 06
721' 3-2-12KV 06

P5580854 06
48"X54"
W/13"X24" INV H
75/6.9
5732655005
120/240

X6839 TO P0854
371' 1-3" 06
371' 1-2-6.9/12KV 06

P0854 TO H
109' 1-3" 06
109' 350 06

P0854 TO H
114' 1-3" 06
114' 350 06

P0854 TO H
85' 1-3" 06
85' 4/0 06

P5586838 06
4'X6'
W/2'6"X4' PULLBOX
1-PME-4 06

H TO H
60' 1-3" 06
60' 350 06

H TO H
98' 1-3" 06
98' 4/0 06

H TO H
15' 1-3" 06
15' #2-M 06

X5586839 06
2'6"X4'X3'6"

P6838 TO X6839
46' 1-4" 06
46' 3-2-6.9/12KV 06

H TO H
127' 1-3" 06
127' 350 06

X6839 TO P6840
339' 1-3" 06
339' 1-2-6.9/12KV 06

P6840 TO H
131' 1-3" 06
131' 350 06

P5586840 16
48"X54"
W/17"X30"X15" INV H
75/6.9
2901543615
120/240

P6840 TO C/L P6841
225' 1-3" 06
225' 1-2-6.9/12KV 06

P6840 TO H
133' 1-3" 06
133' 4/0 06

H TO H
60' 1-3" 06
60' #2-M 06

P6840 TO H
156' 1-3" 06
156' 4/0 06

P6840 TO H
81' 1-3" 06
81' 4/0 06

X6839 TO C/L P6847
147' 1-3" 06
147' 1-2-6.9/12KV 06

C/L H TO H
28' 1-3" 06
28' 350 06

H TO H
70' 1-3" 06
70' #2-M 06

C/L P0861 TO C/L P0862
315' 1-3" 06
315' 1-2-6.9/12KV 06

P0854 TO C/L P0855
366' 1-3" 06
366' 1-2-6.9/12KV 06

C/L H TO H
40' 1-3" 06
40' 4/0 06

002
015

31519

4-10 AMEND 9-11 LRODR
7-16 EESCA 5-09 LRODR

638-1786-5

639-1785-0

639-1788-0

1,786,500

639,000

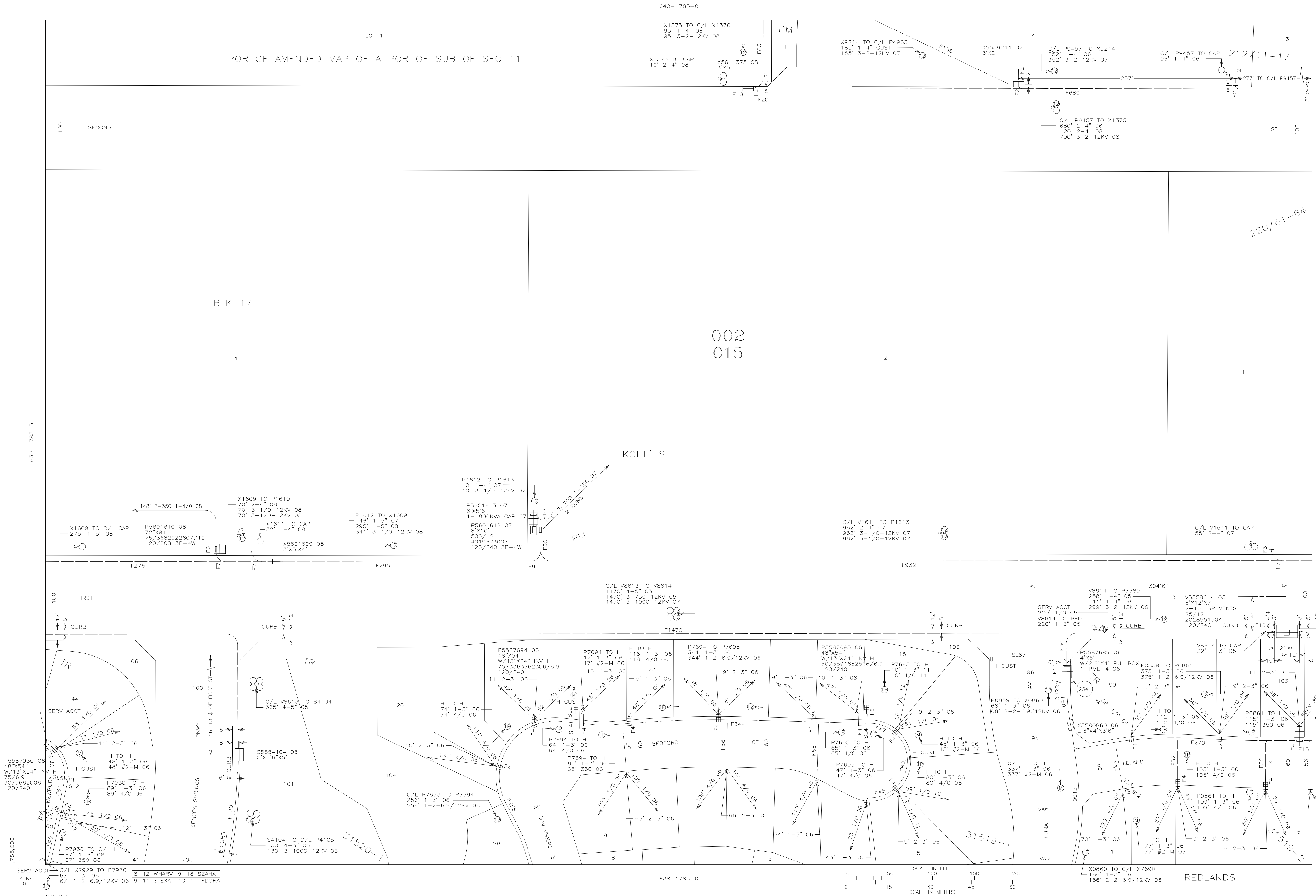
ZONE 6

SCALE IN FEET
0 50 100 150 200

SCALE IN METERS
0 15 30 45 60

REDLANDS

9-08



BEAUMONT

RIVERSIDE CO. 640–1782–0

641–1782–0

S P R R

80

AVE

80

AVE

80

AVE

R/W

FOIL
SUBSTATION

002
015

MICHIGAN

80

POLE TO P7817
100' 1–4" CUST
30' 1–4" UP 00
130' 3–2–12KV 00

1261
789E

F94

30' 3–700 1–350 00
3 RUNS

P5457817
8'X10' CUST
750/2767892599/12
277/480 3P 4W

F6

MASSACHUSETTS

80

NO CHARGE

640–1780–5

80

EAST THIRD

ST

80

80

AVE

80

AVE

20

20

(VAC)

(VAC)

MICHIGAN

MASSACHUSETTS

PENNSYLVANIA

80

80

80

7–00

JCS

1,782,000

ZONE
6

640,000

6–08 FVENE	1–09 FVENE
	MVALA

639–1782–0

SCALE IN FEET
0 50 100 150 200
SCALE IN METERS
0 15 30 45 60

REDLANDS

BEAUMONT

RIVERSIDE CO. 640-1786-5

641-1786-5

STATE HWY

10

200

SP

RR

R/W

200

P9459 TO P9460
10' 1-4" 06

P5509460 06
7'10"X6'

2356

F10

F120

F10

P9459 TO C/L P9461
120' 1-4" CUST
120' 3-2-12KV 06

P5509459 06
10'6"X5'X7'
1-PME-10 06

F125

110' 3-700 1-350 07
5 RUNS

P5564962
6'X8'6" CUST
500/12
5138984106
120/208 3P-4W

WICKES

P4962 TO P9459
10' 1-4" 06
125' 1-4" CUST
135' 3-1/0-12KV 07

212/11-17

48'

F65

P9459 TO X1218
251' 1-4" 06
251' 3-1/0-12KV 06

X1218 TO P9459
580' 1-4" CUST
580' 3-1/0-12KV 06

F580

X5541218 06
2'X3'X3'

2351

F4

P9463 TO P9464
4' 1-4" CUST
4' 3-1/0-12KV 06

P5509463
48"X72" CUST
W/2'X3' PULLBOX
1-PME-5 06

P5509464
10'X12' CUST
1500/12
5368894605
277/480 4W 3P

15' 3-700 1-350 06
7 RUNS

6'6"

CURB

C/L P4980 TO P4981
70' 1-4" 08
70' 3-1/0-12KV 08

P4981 TO CAP
50' 1-4" 08

F50

F70

3-700 1-350 08

212/47-49

P5564981 08
72"X94"
150/12
1150810308
120/208 3P-4W

SUB OF SEC 11

PETCO

640-1785-0

640-1788-0

F732

S9458 TO P9459
732' 1-4" 06
732' 2-5" 06
732' 3-1/0-12KV 06
732' 3-350-12KV 06

S9458 TO X1218
594' 2-4" 06

SEC 11
T 3 S R 1 W
SBM

002
015

1

2

P4981 TO P4982
495' 1-4" 08
495' 3-1/0-12KV 08

F495

LOT 1

OF A POR OF

P5564982 08
8'X10'
1000/12
2917161807
120/208 3P-4W

F110

C/L X4986 TO P4982
110' 1-4" 08
110' 3-1/0-12KV 08

60' 3-700 1-350 08
10 RUNS

CURB

6'6"

4'6"

S5509458 06
5'X8'6"X5'

PM

S9458 TO C/L P4968
159' 1-4" 06
267' 1-4" 07
426' 3-2-12KV 07

S9458 TO C/L CAP
183' 2-3" 06

F183

C/L P9457 TO S9458
183' 2-4" 06
183' 2-5" 06
183' 3-350-12KV 06

60' 3-700 1-350 07

3

X5564969 07
2'6"X4'

F267

F8

PM

C/L P4968 TO X4969
202' 2-5" 07
202' 3-700 1-350 07
202' 3-700 1-350 07

SERV ACCT
70' 3-700 1-350 07

6'6"

POR OF AMENDED MAP

3-08

JCS

1,786,500

ZONE 6

640,000

9-11 LRODR	7-08 FHERR
2-09 MVALA	9-11 STEXA

639-1786-5

SCALE IN FEET
0 50 100 150 200
SCALE IN METERS
0 15 30 45 60

REDLANDS

642-1785-1

4115634E 45 4A-12 BF15 00201 2303453E 45 25/12 2943433712 120/240 1/0AT-120 4555615E 35

4115632E 45 BF15 00200 6AD-M 4088746E 35 12 1/0AT-120 6AD-M 1248036E 40 25/12 4088456E 35-SL 4AT-120 2260996E 35-SL 6AD-M 4704707E 35

4809498E 45 50/12 1631501409 37.5/12 1683051509 120/240 1112852E 45 1/0AQ-240 1971507E 40 25/12 0572469 120/240 782336E 40-UG87 4AQ-120/240 782335E 40 4418462E 45 4AQ-120/240 782333E 45 4A-12 1/0A-240 1512096E 40 4AT-120 2181944 35

4115629E 50 BF15 00209 12 80 AVE 6AD-M NO # NO HT 4698301E 45 37.5/12 2520953109 120/240 4A-12 4A-12 XENIA 1512236E 45-SL 50/12 1266310713 120/240 4AT-120 80 1865340E 35

SEC 11
T 3 S R 1 W
SBM

POR LOT 1
BLK 8
MB 009/010

POR LOT 2
BLK 8
MB 009/010

BF15 00199 4115627E 45 1865333E 35 GT66489 35 6AD-M 6BC-12 4-120 1992675E 35 746501E 35 4AT-120 4666080E 45 25/4491703805/12 120/240

POR LOT 3&4
BLK 8
MB 009/010

NO CHARGE

STATE

HWY

640-1782-1

640-1788-1

200 SP

RR

R/W 200

PM

LOT 1

POR OF AMENDED MAP
OF A POR OF
SUB OF SEC 11

1

002
015

2

4

3

212/11-17

PM

212/47-49

SUB OF SEC 11

POR OF AMENDED MAP OF A POR OF

LOT 1

1

8-84

1,785,000

ZONE 6

640,000

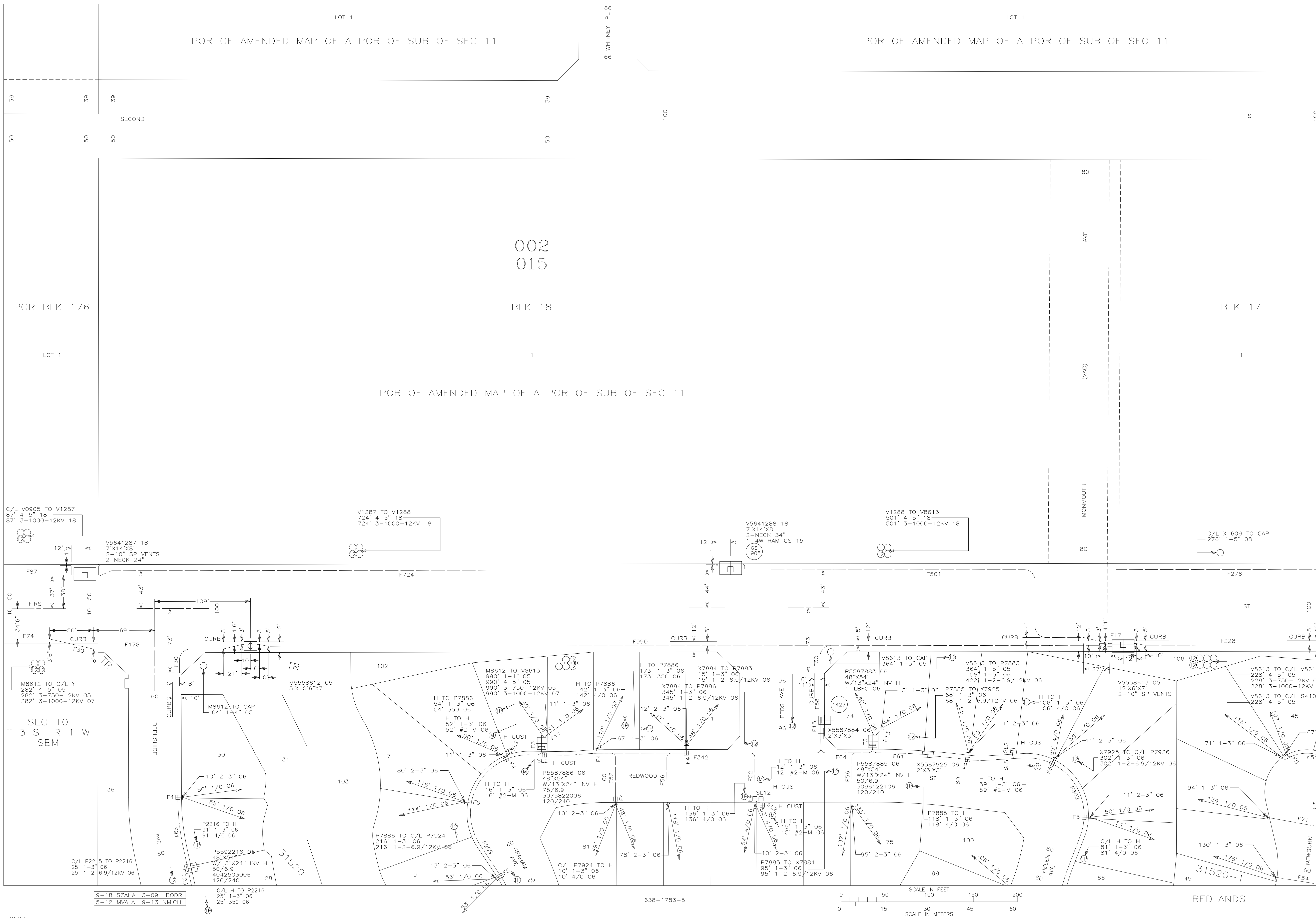
9-18 AKOUC	11-14 LVELO
2-15 PASOM	12-16 LDELI

638-1785-1

SCALE IN FEET
0 100 200 300 400
SCALE IN METERS
0 30 60 90 120

REDLANDS

BEAUMONT RIVERSIDE CO. 639-1783-5



ZONE 6

1,783,500

639,000

7-08

CONFIDENTIAL: CRITICAL ENERGY INFRASTRUCTURE
This diagram contains information relating to Southern California Edison Company's electric transmission / distribution system. It is classified as Critical Energy Infrastructure Information as defined in 18 code of Federal Regulations section 388.113(c)(1).

FOR REFERENCE ONLY
This map has been created to SCE standards to be used by SCE personnel only and is not intended to be a legal representation of real property. Please don't forget to call Dig Alert: 1-800-227-2600

BEAUMONT

RIVERSIDE CO. 640–1785–0

641–1785–0

S P R R

R/W

P1377 TO CAP
10' 1–4" 08
SERV ACCT
45' 3–1/0 1–2 08

F10

P1377 TO CAP
10' 1–4" 08

P5611377 08
72"X84"
75/12
2722463613
120/208 3P

P/W

185' 3–700 1–350 06
2 RUNS

F139

P5509461
10'X12' CUST
500/12
5549344805
120/240

C/L P9459 TO P9461
139' 1–4" CUST
139' 3–2–12KV 06

HOME DEPOT

X1376 TO P1377
440' 1–4" 08
440' 3–2–12KV 08

F440

LOT 1

POR OF AMENDED
MAP OF A
PORTION OF SUBDIVISION
OF SEC 11

X5611376 08
3'X5'

1

FIRESTONE TIRE
CENTER

002
015

C/L X1375 TO X1376
420' 1–4" 08
420' 3–2–12KV 08

F420

30' 3–1/0 1–2 13

P4963 TO P7246
258' 1–5" CUST
258' 3–1/0–12KV 13

P5647246
72"X94" CUST
75/12
2425122812
120/208 3P–4W

F258

P4968 TO C/L X4969
68' 2–5" 07
68' 3–700 1–350 07
68' 3–700 1–350 07

P5564963
6'X8'6" CUST
225/12
3473574162
120/208 3P–4W

C/L S9458 TO P4968
68' 1–4" 07
68' 3–2–12KV 07

10' 3–1/0 1–2 07

212/11–17

50' 3–700 1–350 06
2 RUNS

P5564968 07
6'X8'6"
225/12
2278381904
120/208

F68

C/L X9214 TO P4963
145' 1–4" CUST
145' 3–2–12KV 06

F145

SERV ACCT
60' 3–700 1–350 07

4

640–1786–5

7–08

1,785,000

ZONE 6

640,000

1–14 PJAYA	2–09 MVALA
5–09 LRODR	8–13 WHARV

639–1785–0

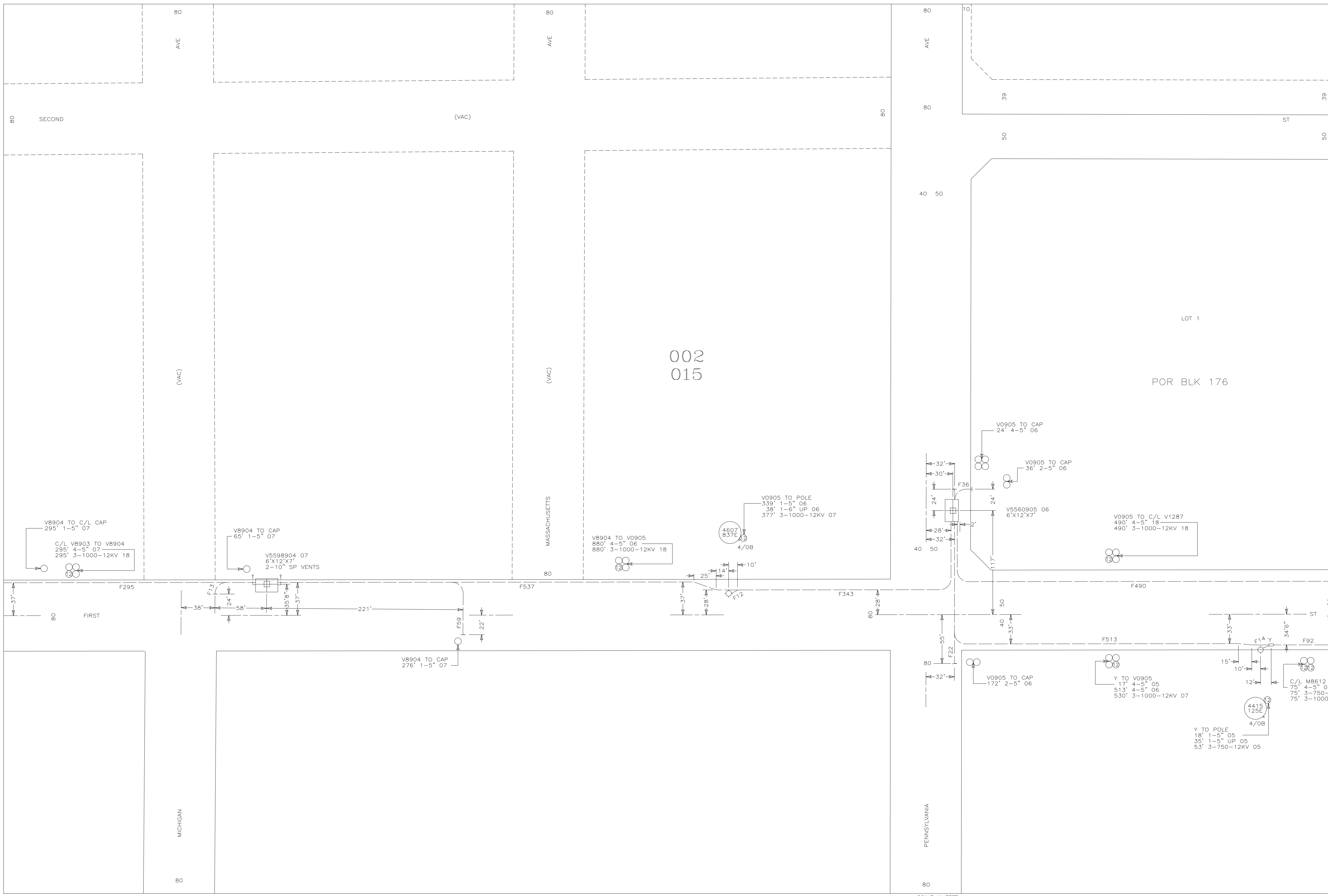
SCALE IN FEET
0 50 100 150 200
SCALE IN METERS
0 15 30 45 60

REDLANDS

BEAUMONT

RIVERSIDE CO. 639-1782-0

640-1782-0



SECOND
(VAC)
FIRST
ST
AVE
MASSACHUSETTS
MICHIGAN
PENNSYLVANIA
002
015
LOT 1
POR BLK 176
V8904 TO C/L CAP
295' 1-5" 07
C/L V8903 TO V8904
295' 4-5" 07
295' 3-1000-12KV 18
V8904 TO CAP
65' 1-5" 07
V5598904 07
6'X12'X7'
2-10" SP VENTS
V8904 TO V0905
880' 4-5" 06
880' 3-1000-12KV 18
V0905 TO POLE
339' 1-5" 06
38' 1-6" UP 06
377' 3-1000-12KV 07
4607
837E
4/0B
V0905 TO CAP
24' 4-5" 06
V0905 TO CAP
36' 2-5" 06
V5560905 06
6'X12'X7'
V0905 TO C/L V1287
490' 4-5" 18
490' 3-1000-12KV 18
V8904 TO CAP
276' 1-5" 07
V0905 TO CAP
172' 2-5" 06
Y TO V0905
17' 4-5" 05
513' 4-5" 06
530' 3-1000-12KV 07
C/L M8612 TO Y
75' 4-5" 05
75' 3-750-12KV 05
75' 3-1000-12KV 07
4415
125E
4/0B
Y TO POLE
18' 1-5" 05
35' 1-5" UP 05
53' 3-750-12KV 05
F295
F537
F343
F490
F513
F92
F36
F59
F22
F13
F12
F14

639-1780-5

639-1783-5

1-09

1,782,000

ZONE 6

639,000

5-09 RBISS	11-11 MSTOC
9-13 NMICH	9-18 SZAHA

638-1782-0

SCALE IN FEET 0 50 100 150 200
SCALE IN METERS 0 15 30 45 60

REDLANDS

Frontier

LEGEND	*MAPS ARE NOT TO SCALE*
	CONDUIT FACILITIES
	COPPER FACILITIES
	FIBER FACILITIES
	PROPOSED FACILITIES
	LOT LINES
	STREET CENTER LINE
	JOINT POLES
	FRONTIER POLES
	CALL 811 FOR LOOK UP

N

UNION PACIFIC

UNION PACIFIC

WHITNEY PL

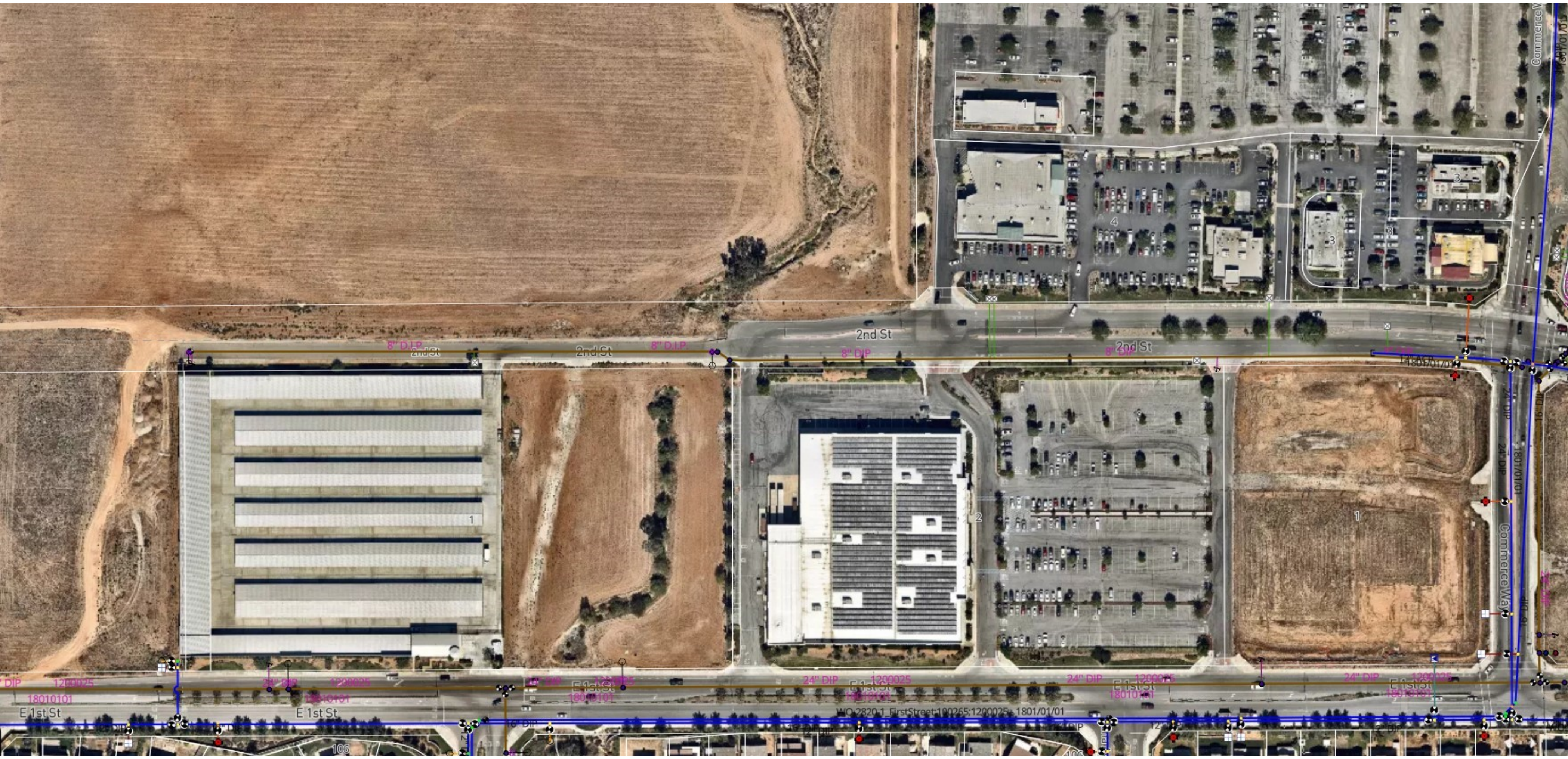
PENNSYLVANIA AVE

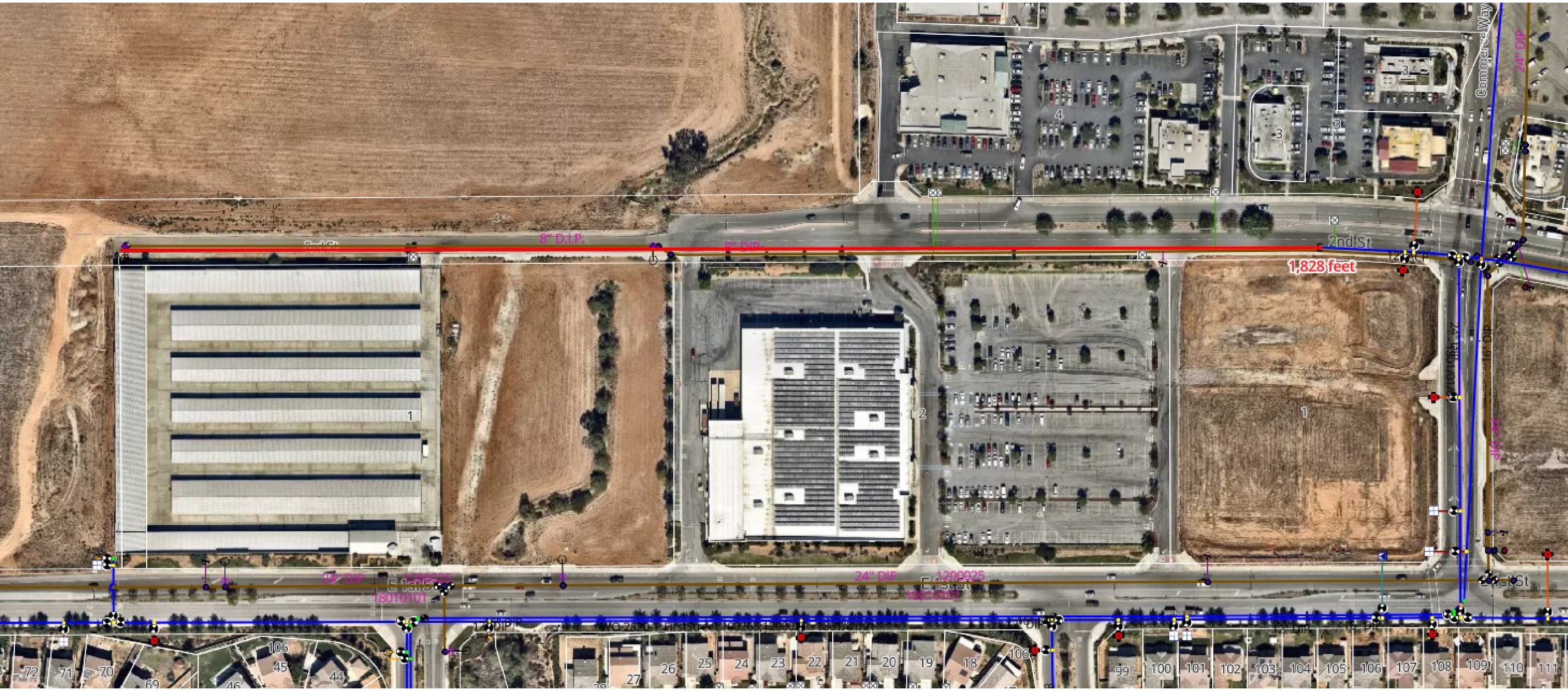
AMERICAN AVE

COMMERCE WAY

E 2ND ST

E 1ST ST


2nd St
8" D.I.P.
8" DIP
E 1st St
24" DIP
1200025
18010101
Commerce Way
1801/01/01
WO-2820-1_FirstStreet:190265:1200025 - 1801/01/01



8" D.I.P.
8" DIP
2nd St
1,828 feet
Commerce Way
24" DIP
E 1st St
1200025
18010101

Appendix E

Cost Estimate

Cozad & Fox, Inc.

CIVIL / STRUCTURAL ENGINEERS
MUNICIPAL CONSULTANTS
SURVEYORS / PLANNERS
WATER RESOURCES
TRANSPORTATION

PRELIMINARY CONSTRUCTION COST ESTIMATE

Street Improvements

PROJECT: City of Beaumont - 2nd Street Improvements **DATE:** 1/19/21

IMPROVEMENTS	Subtotal	20% Contigency	Total
Mobilization	not to exceed 10%		$224,443
Streets/Erosion Control	$1,253,928	$250,786	$1,504,714
Drainage/Excavation/Labor	$616,432	$123,286	$739,718
Plan Check	$3,500	$700	$4,200
Adminstrative	$2,500	$500	$3,000
Total	**$1,876,360**	**$375,272**	**$2,476,075**

Name typed or printed: _____

Preliminary

Civil Engineer's Stamp

Signature: _____

Date: _____

Cozad & Fox, Inc.

CIVIL / STRUCTURAL ENGINEERS
MUNICIPAL CONSULTANTS
SURVEYORS / PLANNERS
WATER RESOURCES
TRANSPORTATION

PRELIMINARY CONSTRUCTION COST ESTIMATE

PROJECT: City of Beaumont - 2nd Street Improvements **DATE:** 1/19/21

Street Improvements

Quantity	Unit	Item	Unit Cost	Amount
Paving and Drainage				
3250	Ton	Asphaltic Concrete	$140.00	$455,000.00
5600	Ton	Class 2 Aggregate Base	$60.00	$336,000.00
1625	L.F.	6" P.C.C. Type "A-6" Curb	$38.00	$61,750.00
2807	L.F.	6" A.C. Curb	$25.00	$70,175.00
9750	S.F.	P.C.C. Sidewalk	$10.00	$97,500.00
2790	S.Y.	Grind and Overlay Existing A.C. Paving	$20.00	$55,800.00
863	L.F.	Sawcut Existing A.C. Paving	$17.00	$14,671.00
2562	S.Y.	Remove Existing AC Paving	$3.50	$8,967.00
15678	L.F.	Paint Traffic Stripe (2 Coats)	$1.00	$15,678.00
1	EA.	Street Name Sign & Installation	$500.00	$500.00
2	EA.	Under Sidewalk Drain	$500.00	$1,000.00
2	EA.	A.C. Overside Drain	$500.00	$1,000.00
1627	L.F.	12" RCP	$50.00	$81,350.00
1	EA.	Adjust Water Valve	$150.00	$150.00
1	EA.	Adjust Manhole to grade	$400.00	$400.00
10	EA.	Barricades	$100.00	$1,000.00
68	EA.	Pavement Marker, reflective	$2.75	$187.00
Erosion and Sediment Control				
500	EA.	Gravel Bags	$3.00	$1,500.00
2000	L.F.	Silt Fence	$7.00	$14,000.00
1	L.S.	Dust Abatement	$5,000.00	$5,000.00
1	EA.	Concrete Washout	$2,500.00	$2,500.00
1	EA.	Stabilized Entrance	$4,800.00	$4,800.00
Right of Way				
1	EA.	Right of Way Acquisition	$25,000.00	$25,000.00
SUBTOTAL				$1,253,928.00
20% CONTIGENCY				$250,785.60
TOTAL STREET IMPROVEMENT COST				**$1,504,713.60**

Cozad & Fox, Inc.

CIVIL / STRUCTURAL ENGINEERS
MUNICIPAL CONSULTANTS
SURVEYORS / PLANNERS
WATER RESOURCES
TRANSPORTATION

PRELIMINARY CONSTRUCTION COST ESTIMATE

PROJECT: City of Beaumont - 2nd Street Improvements **DATE:** 1/19/21

Drainage				
Quantity	**Unit**	**Item**	**Unit Cost**	**Amount**
1	E.A.	Flat Outlet Drainage Structure (downdrain)	$2,000.00	$2,000.00
150	C.Y.	Rip Rap	$60.00	$9,000.00
200	L.F.	24" Reinforced Concrete Pipe (RCP)	$48.00	$9,600.00
2	E.A.	Catch Basin	$10,000.00	$20,000.00
2	EA.	Pipe Headwall	$4,500.00	$9,000.00
Excavation/Construction Costs				
30000	C.Y.	Project with No Grading Plan; Excavate and Fill	$5.00	$150,000.00
1	EA.	Street Lights lincluding conduit)	$7,500.00	$7,500.00
1	L.S.	Traffic Signal and Lighting	$300,000.00	$300,000.00
861	L.F.	Utility Trench, one side (total length of streets)	$12.00	$10,332.00
Labor				
1	L.S.	Traffic Control	$8,000.00	$8,000.00
1	L.S.	Dust Abatement	$4,000.00	$4,000.00
1	L.S.	Native American Cultural Resource Treatment	$7,000.00	$7,000.00
1	L.S.	Biological Clearance (Burrowing Owl)	$5,000.00	$5,000.00
1	L.S.	Storm Water Pollution Control	$20,000.00	$20,000.00
1	L.S.	Soils & Material Testing	$40,000.00	$40,000.00
1	L.S.	Clearing and Grubbing	$15,000.00	$15,000.00
SUBTOTAL				$616,432.00
20% CONTIGENCY				$123,286.40
TOTAL CULVERT CROSSING/EXCAVATION/LABOR IMPROVEMENT COST				**$739,718.40**

Appendix F

Project Schedule

Engineering and Surveying Services
City of Beaumont
2nd Street Improvements Project
Feasibility Study
August 14, 2020

City of Beaumont 2nd Street Improvements Project – Feasibility Study Schedule/Process

Schedule	6/15/20 – 7/3/20	7/6/20 – 7/24/20	7/27/20 – 8/14/20	8/17/20 – 9/4/20	9/7/20 – 9/25/20
1. Kick Off Meeting − 6/10/20					
2. Meetings				→	→
3. Research and Review Records	→	→	→	→	
4. Compile Feasibility Study	→	→	→	→	→
5. Potential Environmental Issues and Reporting			→	→	
6. Potential Jurisdictional Requirements and Permits (Searl Biological)			→	→	
a. Project Preparation	→	→	→	→	
b. Species Queries	→	→	→		
c. Field Habitat Assessment (Least Bells Vireo 7/10/020)	→				
d. GIS Analysis and Mapping			→	→	→
7. Potential Hydrological and Hydraulic Issues		→	→	→	
8. Potential Utility Conflicts and Issues	→	→	→	→	→
9. Potential Right-of-Way Issues	→	→		→	→
10. Preliminary Design Plan			→	→	→
11. Itemized Cost Estimate for Anticipated Improvements				→	→
12. Geotechnical Report				→	→

Appendix G

Geotechnical Report

GEOTECHNICAL INVESTIGATION
SECOND STREET EXTENSION PROJECT
FROM HOME DEPOT SHOPPING CENTER
WESTERN BOUNDARY
TO PENNSYLVANIA AVENUE
BEAUMONT, CALIFORNIA

-Prepared By-

Sladden Engineering

450 Egan Avenue
Beaumont, California 92223
(951) 845-7743

Sladden Engineering

45090 Golf Center Parkway, Suite F, Indio, CA 92201 (760) 863-0713 Fax (760) 863-0847
6782 Stanton Avenue, Suite C, Buena Park, CA 90621 (714) 523-0952 Fax (714) 523-1369
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863
www.SladdenEngineering.com

August 25, 2020

Project No. 644-20020
20-07-064

Cozad & Fox, Inc.
151 South Girard Street
Hemet, California 92544

Subject: Geotechnical Investigation

Project: Second Street Improvement Project
From Home Depot Shopping Center to
Pennsylvania Avenue
Beaumont, California

Sladden Engineering is pleased to present the results of our geotechnical investigation performed for the Second Street extension project proposed for the portion of Second Street extending west from the westerly boundary of the Home Depot shopping center to Pennsylvania Avenue in the City of Beaumont, California. Our services were completed in accordance with our revised proposal for geotechnical engineering services dated March 19, 2020 and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site in order to provide recommendations for foundation design and site preparation. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented into design and carried out during construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

James W. Minor III
Senior Geologist

PROFESSIONAL GEOLOGIST
JAMES W. MINOR III
No. 9735
STATE OF CALIFORNIA

Brett L. Anderson
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
BRETT L. ANDERSON
No. C45389
CIVIL ENGINEERING
STATE OF CALIFORNIA

SER/jm

Copies: 4/Addressee

GEOTECHNICAL INVESTIGATION
SECOND STREET EXTENSION PROJECT
FROM HOME DEPOT SHOPPING CENTER WESTERN BOUNDARY
TO PENNSYLVANIA AVENUE
BEAUMONT, CALIFORNIA

August 25, 2020

TABLE OF CONTENTS

August 25, 2020

Project No. 644-20020
20-07-064

INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the street improvements proposed for the portion of Second Street extending west from the westerly boundary of the Home Depot shopping center to Pennsylvania Avenue in the City of Beaumont, California. The approximate location of the project alignment is indicated on the Site Location Map (Figure 1).

SCOPE OF WORK

The purpose of our investigation was to determine the pavement thicknesses within the existing segment of Second Street and the subgrade soil conditions along the roadway extension alignment in order to provide recommendations for new pavement construction. Our investigation included measuring the existing asphalt pavement thicknesses, subsurface soil sampling, laboratory testing, engineering evaluation and the preparation of this report.

The scope of services performed was as outlined in our revised proposal dated March 19, 2020. This investigation was performed in accordance with contemporary geotechnical engineering principles and practice. We make no other warranty, either express or implied.

PROJECT DESCRIPTION

The proposed Second Street Extension project includes the portion of Second Street extending west from the westerly boundary of the Home Depot shopping center to Pennsylvania Avenue in the City of Beaumont, California. The segment of Second Street extending west from the western boundary of the Home Depot shopping center to the western boundary of the First Street Storage facility that was previously paved will be widened to the full design width. The remaining segment extended west from the First Street Storage facility to Pennsylvania Avenue that remains vacant will consist of new construction. The approximate borehole locations are indicated on the Borehole Location Photograph (Figure 2) included within this report.

The eastern portions of the existing roadway segment previously constructed in conjunction with the development of the Home Depot shopping center consist of asphalt pavement with concrete curbs and gutters along portions of the streets. The preliminary project plans prepared by Cozad & Fox, Inc. indicate that the existing paved section of Second Street between the western boundary of First Street Storage facility and the western boundary of the Home Depot shopping center will be widened. It is proposed to extend Second Street from the western boundary of First Street Storage facility to Pennsylvania Avenue through currently vacant property. In addition, Pennsylvania Avenue will be widened within the vicinity of the Second Street intersection.

EXISTING PAVEMENT SECTION THICKNESSES

The existing pavement thickness was determined by measuring the existing asphalt and base material sections within the 6 borehole locations within existing pavement. Concrete pavement was encountered directly underlying the existing asphalt pavement within the vicinity of Boreholes 4 & 5 (BH-4 & BH-5). The approximate asphalt and base material thickness measurements are presented along with the corresponding borehole locations within the following table. The approximate borehole locations are indicated on the borehole Location Photograph (Figures 2).

Borehole	Street	Locality	Asphalt Thickness (in)	Base Thickness (in)	Subgrade Soil Type
BH-1	2nd Street	West Bound Lane	5.0	15.0	SC
BH-2	2nd Street	West Lane	4.5	6.0	SC
BH-3	2nd Street	Center Lane	4.0	20.0	SC
BH-4	2nd Street	Center Lane	3.5 inches asphalt over > 3.0 inches concrete	N/A	SC
BH-5	2nd Street	Center Lane	3.5 inches asphalt over > 6.0 inches concrete	N/A	SC
BH-6	2nd Street	West Bound Lane	4.0	13.0	SC
BH-7	2nd Street (Proposed)	N/A	N/A	N/A	SC
BH-8	2nd Street (Proposed)	N/A	N/A	N/A	SC
BH-9	2nd Street (Proposed)	N/A	N/A	N/A	SC
BH-10	2nd Street (Proposed)	N/A	N/A	N/A	SC

SUBSURFACE SOIL CONDITIONS

Our field exploration included collecting soil samples to evaluate the near surface soil conditions. Based upon our field exploration and laboratory testing, it is apparent that the subgrade soil conditions vary somewhat throughout the subject roadway alignment. The near surface soil encountered within our bores consisted primarily of silty sand (SM) and clayey sand (SC) with minor portions of sandy clay (CL). The near surface soil appeared relatively firm within the majority of our borehole locations.

Laboratory testing indicated R-Values of 74 by expansion pressure and 76 by exudation pressure for the silty sand (SM) materials. Laboratory testing indicated R-Values of 15 by expansion pressure and 10 by exudation pressure for the clayey sand materials (SC). Expansion testing indicated that the silty sand materials (SM) are generally non-expansive (E.I. = 1) and the clayey sand materials (SC) are potentially moderately expansive (E.I. = 50). Graphic representations of the laboratory test results are included within Appendix B of this report.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types, although the transitions may be gradual and variable across the site.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 20 parts per million (ppm). The soil is considered to have a "negligible" corrosion potential with respect to concrete. The use of Type V cement and special sulfate resistant concrete mixes should not be necessary.

The pH levels of the surface soil was determined to be 8.8 & 8.0. Based on soluble chloride concentration testing (50 & 60 ppm), the soil is considered to have a "negligible" corrosion potential with respect to normal grade steel. The minimum resistivity of the surface soil was found to be 9,100 & 2,900 ohm-cm, that indicates the site soil is considered to have a "low & moderate" corrosion potential with respect to ferrous metal installations. A corrosion expert should be consulted regarding mitigation for corrosion sensitive installations.

DISCUSSIONS AND CONCLUSIONS

The majority of the pavement within the existing segment of Second Street roadway remains in good condition. The existing asphalt thickness varies from 4.0 to 5.0 inches except where concrete was encountered. The existing base material thickness varies from 6.0 inches to 20.0 inches. In our opinion, significant modifications or repairs to the existing asphalt pavement do not appear warranted. The existing pavement sections are near the new pavement design sections recommended in this report and should remain adequate. It should be noted that concrete pavement was encountered directly beneath the asphalt within BH-4 and BH-5 that are located along the north side of First Street Storage facility. The drillers were unable to penetrate the concrete that should be expected to be at least 6 inches thick.

PAVEMENT DESIGN RECOMMENDATIONS

The following recommendations are based upon the pavement coring, our subgrade soil investigation and our understanding of the proposed roadway construction project. Because the subgrade soil conditions vary somewhat with location and the R-Values test results varied significantly, it is our opinion that an intermediate R-Value would be appropriate for use in pavement design. Because significant grading will be necessary to accomplish the proposed new roadway construction, we expect that substantial mixing and blending of the surface soil will occur during roadway construction. In our opinion an intermediate design R-Value of 30 is conservatively appropriate for use in preliminary pavement design. The actual R-Value of the subgrade soil should be determined after subgrade has been established to verify the adequacy of the preliminary design sections. The following new pavement design sections are based upon a preliminary design R-Value of 30.

PAVEMENT DESIGN SECTION – FOR DESIGN R-VALUE = 30				
Pavement Material	Recommended Thickness (inches)			
	TI = 7.0	TI = 7.5	TI = 8.0	TI = 8.5
Asphalt Concrete Surface Course	4.0	5.0	5.5	6.0
Class II Aggregate Base Course	9.5	9.0	10.0	10.5
Compacted Subgrade Soil	12.0	12.0	12.0	12.0

Asphalt concrete should conform to the latest edition of the Standard Specifications for Public Works Construction (Greenbook) or Caltrans Standard Specifications. Aggregate base should conform to Section 26 of the Caltrans Standard Specifications or Greenbook, latest edition. The subgrade soil should be compacted to at least 90 percent of maximum density and the aggregate base material should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557. Precise control of grades and thicknesses should be maintained throughout the paving operations.

It is possible that wet and potentially unstable subgrade soil may be encountered in during pavement construction operations. Wet or unstable soil should be allowed to dry prior to compaction or excessively wet soil should be removed and replaced with drier soil or base material.

GENERAL

The findings and recommendations presented in this report are based upon an interpolation of the pavement thickness and soil conditions between core locations and extrapolation of these conditions throughout the subject roadway area. Should conditions encountered during reconstruction appear different than those indicated in this report, this office should be notified.

This report is considered applicable for use by the Cozad & Fox and the City of Beaumont for the specific project described herein. The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the reconstruction operations by a representative of Sladden Engineering. All recommendations are considered tentative pending our review of the roadway reconstruction operations and additional testing, if necessary.

REFERENCES

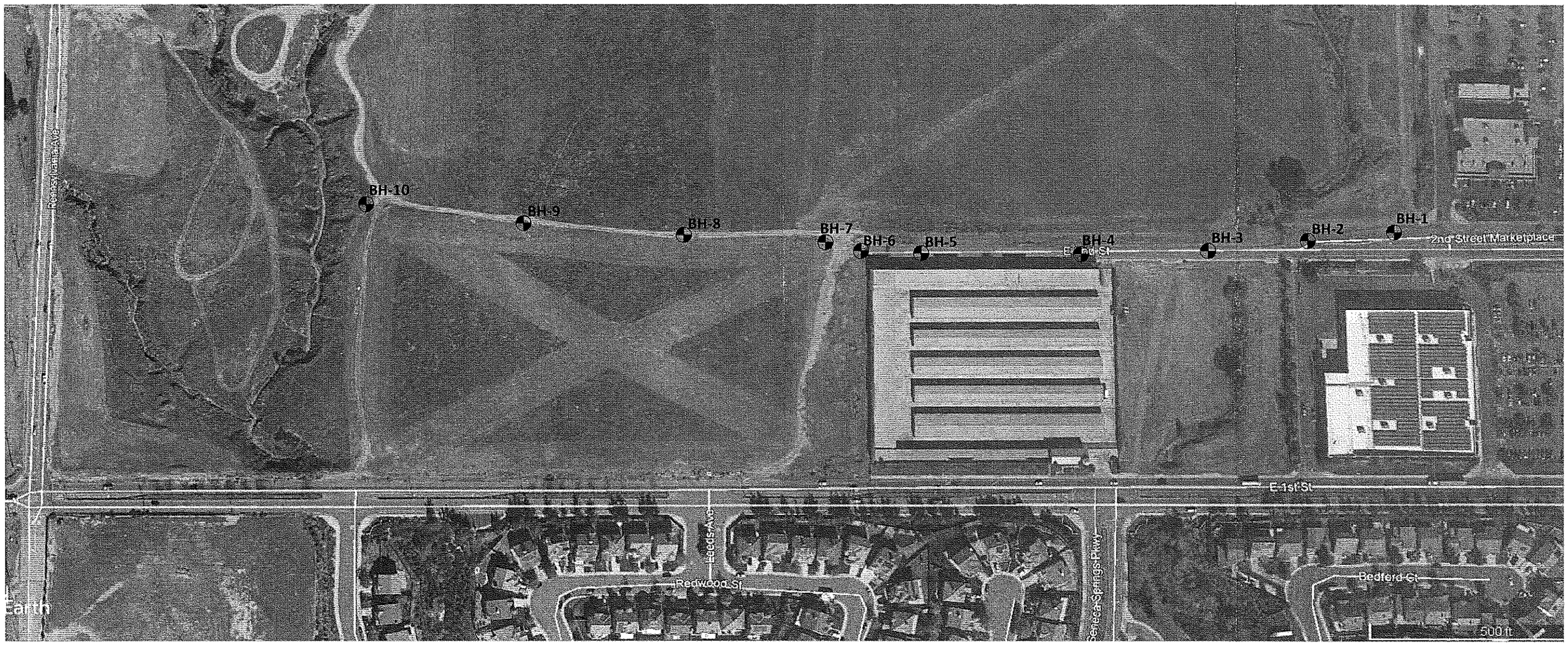
California Building Code (CBC), 2019, California Building Standards Commission.

GoogleEarth.com, 2020, Vertical Aerial Photograph for the Beaumont area, California, Undated, Variable Scale.

FIGURES

SITE LOCATION MAP
BOREHOLE LOCATION PHOTOGRAPH

	SITE LOCATION MAP		FIGURE
Sladden Engineering	Project Number:	644-20020	1
	Report Number:	20-07-064	
	Date:	August 5, 2020	



Google Earth (2020)

LEGEND

BH-10 Approximate Exploratory Borehole Location

Sladden Engineering

BOREHOLE LOCATION PHOTOGRAPH

Project Number:	644-20020
Report Number:	20-07-064
Date:	August 5, 2020

FIGURE

2

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

For our field investigation ten (10) exploratory bores were excavated on July 1, 2020 utilizing a truck mounted hollow stem auger rig (Mobile B-61). Continuous logs of the materials encountered were made by a representative of Sladden Engineering. Materials encountered in the boreholes were classified in accordance with the Unified Soil Classification System which is presented in this appendix.

Representative undisturbed samples were obtained within our borings by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140-pound automatic-trip hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									5.0 inches asphalt over 15.0 inches base.
	7/8/10	1	1	31.4	11.0	123.4	2		Silty Sand (SM); brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	6/9/9			29.9	11.4	121.2	4		Silty Sand (SM); brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	3/4/5			25.3	11.4		6		Silty Sand (SM); brown, moist, loose, fine-to-coarse grained with trace gravel.
	11/17/24			17.6	6.6	116.3	8		Silty Sand (SM); brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							10		
							12		
							14		
							16		
							18		Terminated at ~ 16.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									4.5 inches asphalt over 6.0 inches base.
	7/8/10			33.7	8.7	131.1	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							4		
	6/9/9			23.4	7.6		6		Clayey Sand (SC); yellowish brown, moist, loose, fine-to-coarse grained with trace gravel.
							8		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									4.0 inches asphalt over 20.0 inches base.
	16/28/29			32.5	9.2	123.9	2		Clayey Sand (SC); yellowish brown, moist, dense, fine-to-coarse grained with trace gravel.
							4		
	12/17/15			31.7	9.1	128.9	6		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							8		
	1/2/2			66.1	21.6		10		Sandy Clay (CL); yellowish brown, moist to very moist, soft, high plasticity with trace gravel.
							12		
							14		
	5/7/8			44.9	15.3	113.9	16		Clayey Sand (SC); yellowish brown, moist, loose, fine-to-coarse grained with trace gravel.
							18		Terminated at ~ 16.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		3.5 inches asphalt over concrete.
							2		Practical Auger Refusal due to Concrete.
							4		No Groundwater or Seepage Encountered
							6		No Bedrock Encountered
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									3.5 inches asphalt over concrete.
							2		Practical Auger Refusal due to Concrete.
							4		No Groundwater or Seepage Encountered
							6		No Bedrock Encountered
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									4.0 inches asphalt over 13.0 inches base.
	5/9/13			40.3	10.7	125.3	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	3/4/6			48.2	12.5		4 6		Clayey Sand (SC); yellowish brown, moist, loose, fine-to-coarse grained with trace gravel.
							8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered

Completion Notes:

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-7

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	17/31/42			55.5	11.4	125.2	2		Sandy Clay (CL); yellowish brown, slightly moist to moist, hard, medium to high plasticity with trace gravel.
	32/41/50-5"			58.5	10.4	118.7	4		Sandy Clay (CL); yellowish brown, slightly moist to moist, hard, medium to high plasticity with trace gravel.
							6		
							8		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-8

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	10/18/24			40.7	11.6	123.1	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	13/13/13			30.9	11.0		6		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	20/36/25			21.4	6.0	123.1	10		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							12		Terminated at ~ 11.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-9

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	7/14/25			39.5	5.9	121.6	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							4		
	13/16/16			43.6	7.4	130.1	6		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							8		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
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							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-10

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	19/31/36	1	50	51.4	10.0		4		Sandy Clay (CL); yellowish brown, slightly moist to moist, hard, medium to high plasticity with trace gravel.
	10/12/10			46.1	9.6		6		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	20/36/44			36.5	7.4	124.7	10		Clayey Sand (SC); yellowish brown, moist, very dense, fine-to-coarse grained with trace gravel.
							12		Terminated at ~ 11.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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Report No: 20-07-064

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soil underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of this testing are presented graphically in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil. This is shown on the Boring Logs, and is useful in estimating the strength and compressibility of the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soil and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: Two (2) bulk samples were selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Direct Shear Tests: One (1) bulk sample was selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Consolidation: One (1) relatively undisturbed sample was selected for consolidation testing. For this test, a one-inch thick test specimen was subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. Testing was performed in accordance with ASTM Test Method D-2435.

Corrosion Series Testing: The soluble sulfate concentrations of the surface soil were determined in accordance with California Test Method Number (CA) 417. The pH and Minimum Resistivity were determined in accordance with CA 643. The soluble chloride concentrations were determined in accordance with CA 422.

R-Value Testing: Two (2) representative bulk samples were selected for R-Value testing. The R-Value test measures the response of compacted subgrade soil to a vertically applied load. The R-Value tests and traffic indices are used for determining pavement design.

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Maximum Density/Optimum Moisture

ASTM D698/D1557

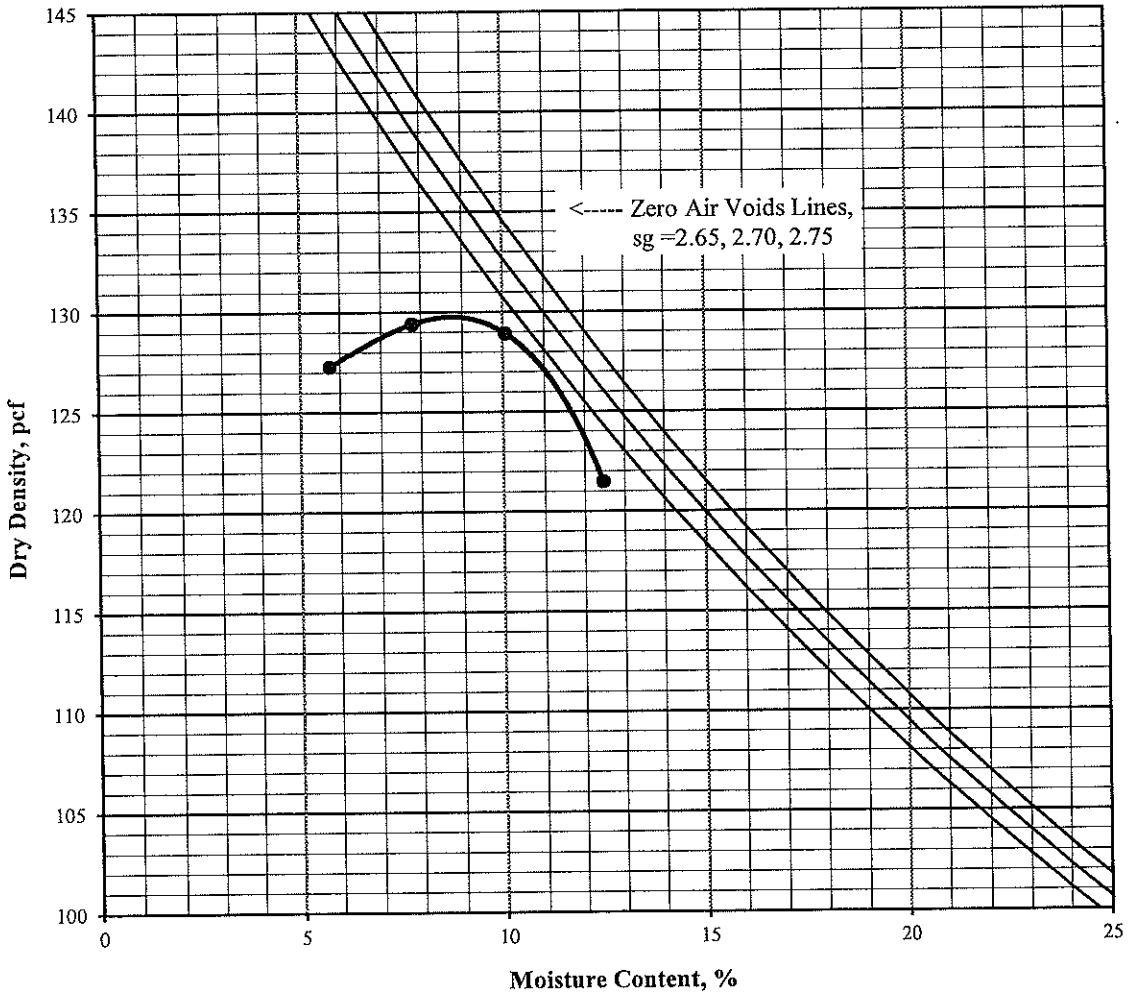
Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample Location: BH-1 Bulk 1 @ 0-5'
Description: Brown Silty Sand (SM)

July 27, 2020

ASTM D-1557 A
Rammer Type: Machine

Maximum Density: 130 pcf
Optimum Moisture: 9%

Sieve Size	% Retained
3/4"	
3/8"	
#4	8.5



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Maximum Density/Optimum Moisture

ASTM D698/D1557

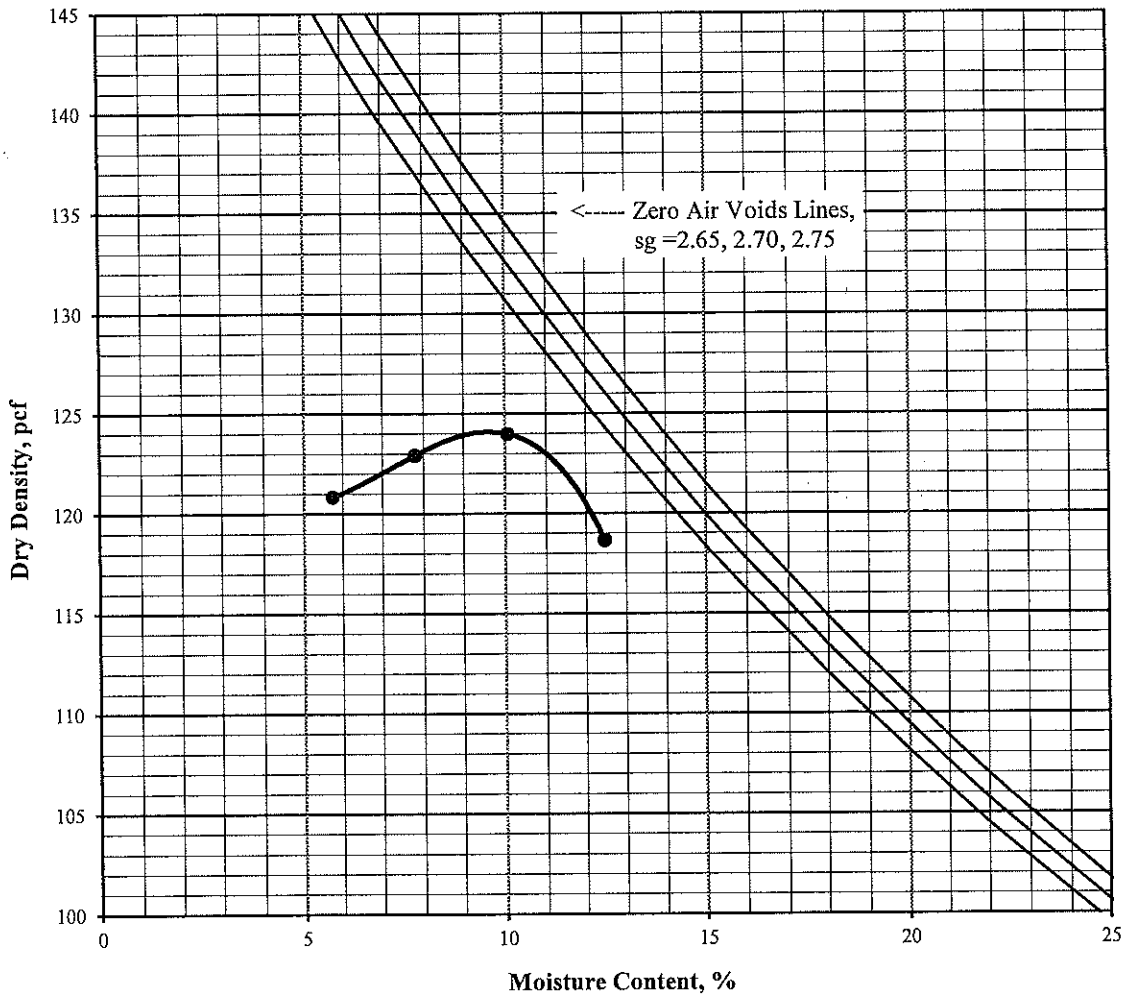
Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample Location: BH-10 Bulk 2 @ 0-5'
Description: Red Brown Clayey Sand (SC)

July 27, 2020

ASTM D-1557 A
Rammer Type: Machine

Maximum Density: **124 pcf**
Optimum Moisture: **9.5%**

Sieve Size	% Retained
3/4"	
3/8"	
#4	1.5



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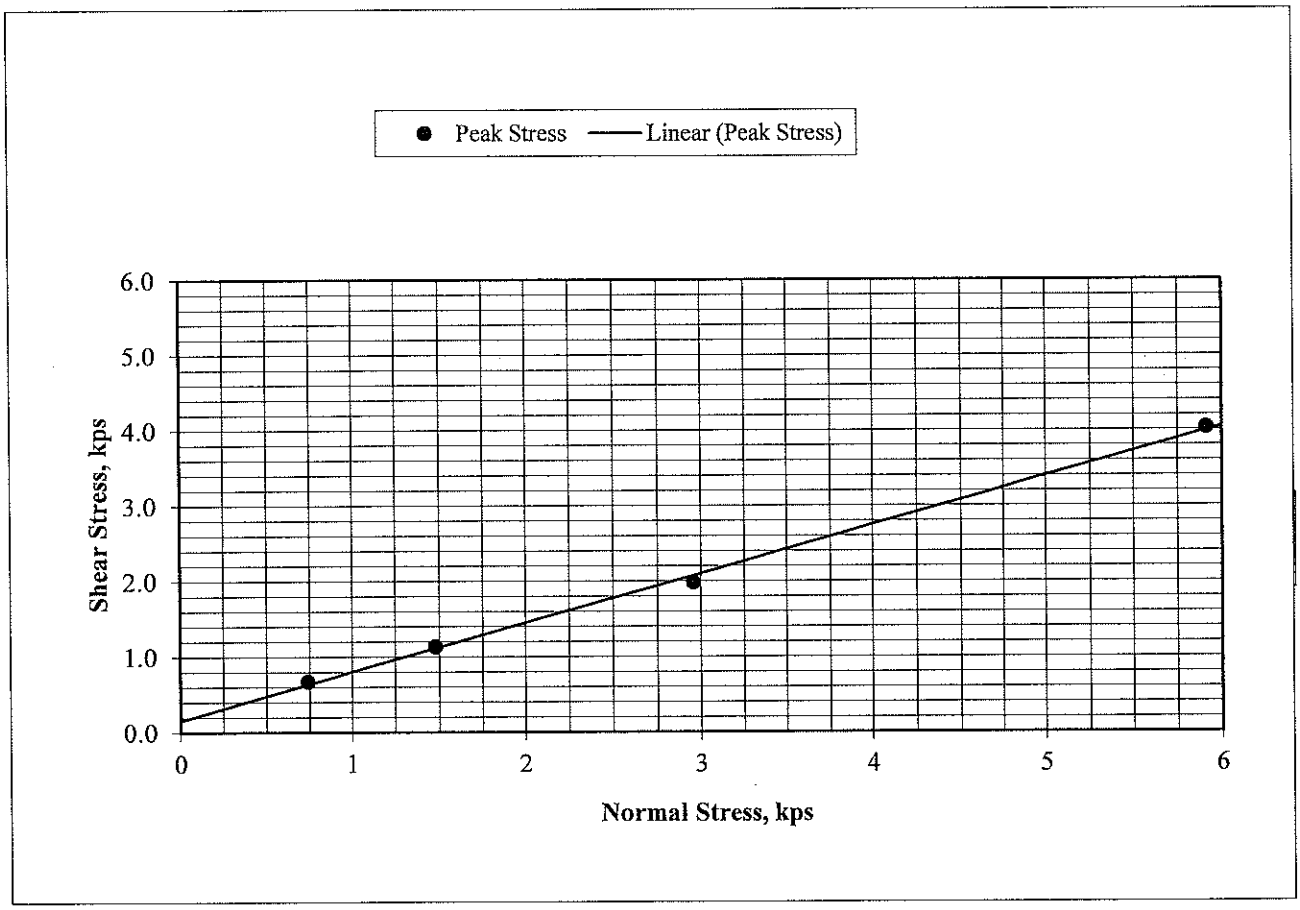
Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number: 644-20020
Job Name 2nd Street Improvements
Lab ID No. LN6-20316
Sample ID BH-1 Bulk 1 @ 0-5'
Classification Brown Silty Sand (SM)
Sample Type Remolded @ 90% of Maximum Density

July 27, 2020
Initial Dry Density: 116.5 pcf
Initial Mosture Content: 9.3 %
Peak Friction Angle (Ø): 33°
Cohesion (c): 160 psf

Test Results	1	2	3	4	Average
Moisture Content, %	14.9	14.9	14.9	14.9	14.9
Saturation, %	90.0	90.0	90.0	90.0	90.0
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.676	1.134	1.984	4.033	



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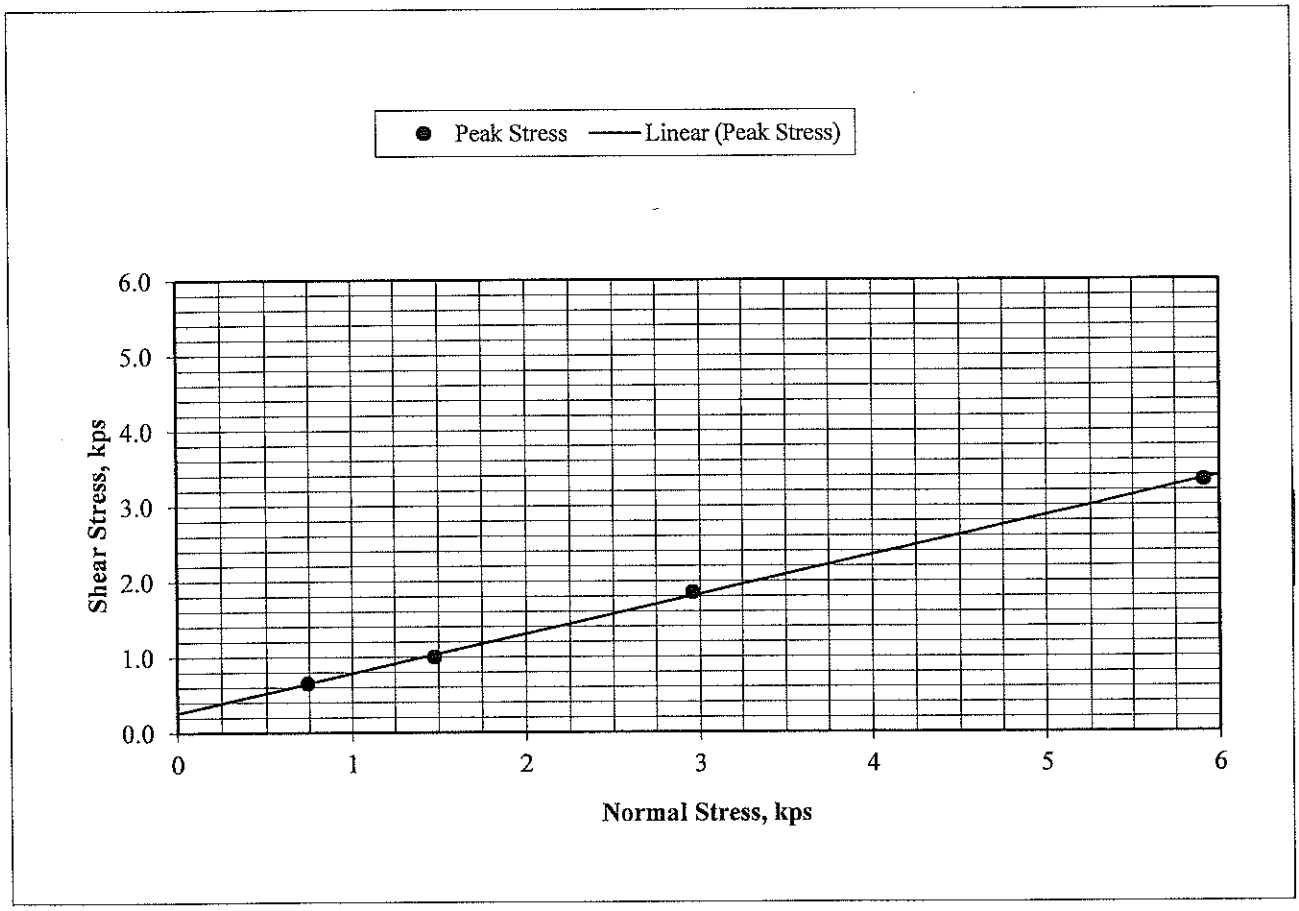
Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	644-20020		July 27, 2020
Job Name	2nd Street Improvements		Initial Dry Density: 111.9 pcf
Lab ID No.	LN6-20316		Initial Mosture Content: 9.3 %
Sample ID	BH-10 Bulk 2 @ 0-5'		Peak Friction Angle (Ø): 28°
Classification	Red Brown Clayey Sand (SC)		Cohesion (c): 270 psf
Sample Type	Remolded @ 90% of Maximum Density		

Test Results	1	2	3	4	Average
Moisture Content, %	19.1	19.1	19.1	19.1	19.1
Saturation, %	101.9	101.9	101.9	101.9	101.9
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.654	1.003	1.853	3.335	



Job Number: 644-20020
Job Name: 2nd Street Improvements
Date: 7/27/2020

Moisture Adjustment		Remolded Shear Weight	
Wt of Soil:	1,000	Max Dry Density:	130.0
Moist As Is:	9.9	Optimum Moisture:	9.0
Moist Wanted:	9.0		
ml of Water to Add:	-8.2	Wt Soil per Ring, g:	153.4

UBC

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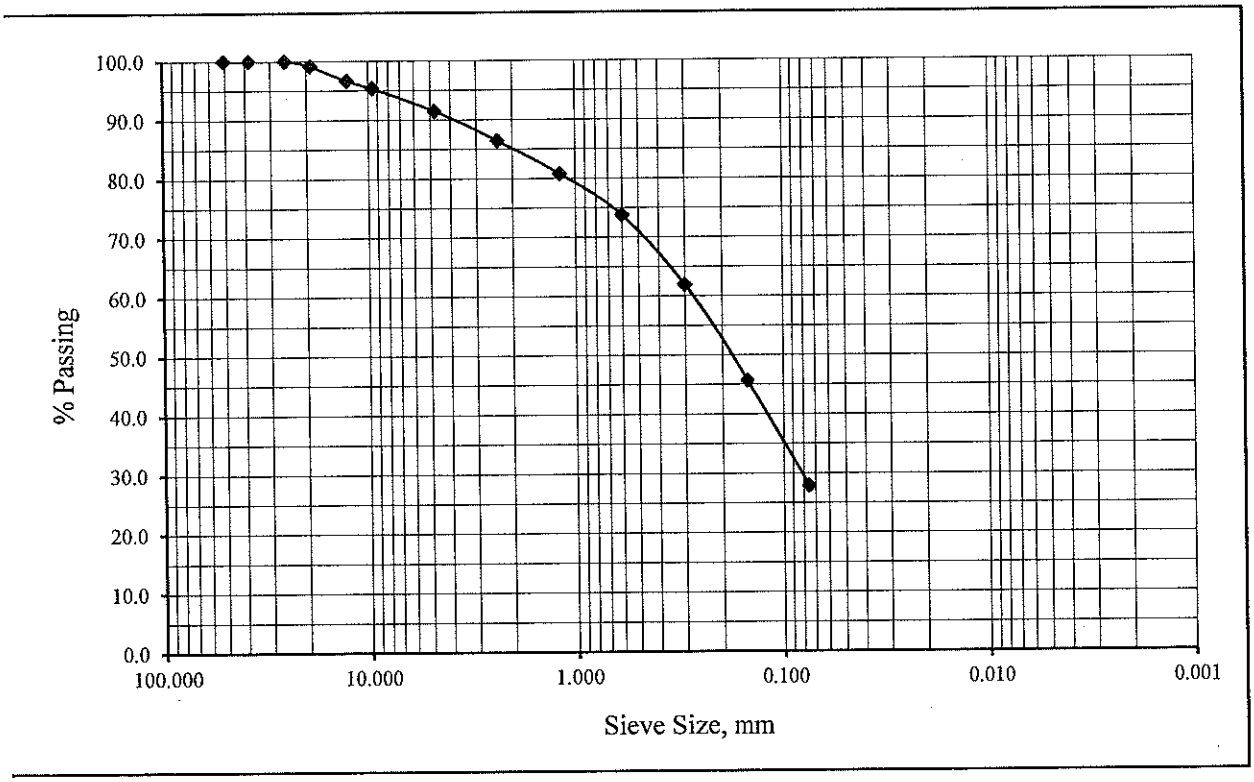
Gradation

ASTM C117 & C136

Project Number: 644-20020 July 27, 2020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 Bulk 1 @ 0-5' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.2
1/2"	12.7	96.7
3/8"	9.53	95.4
#4	4.75	91.5
#8	2.36	86.5
#16	1.18	80.8
#30	0.60	73.8
#50	0.30	62.0
#100	0.15	45.7
#200	0.075	27.9



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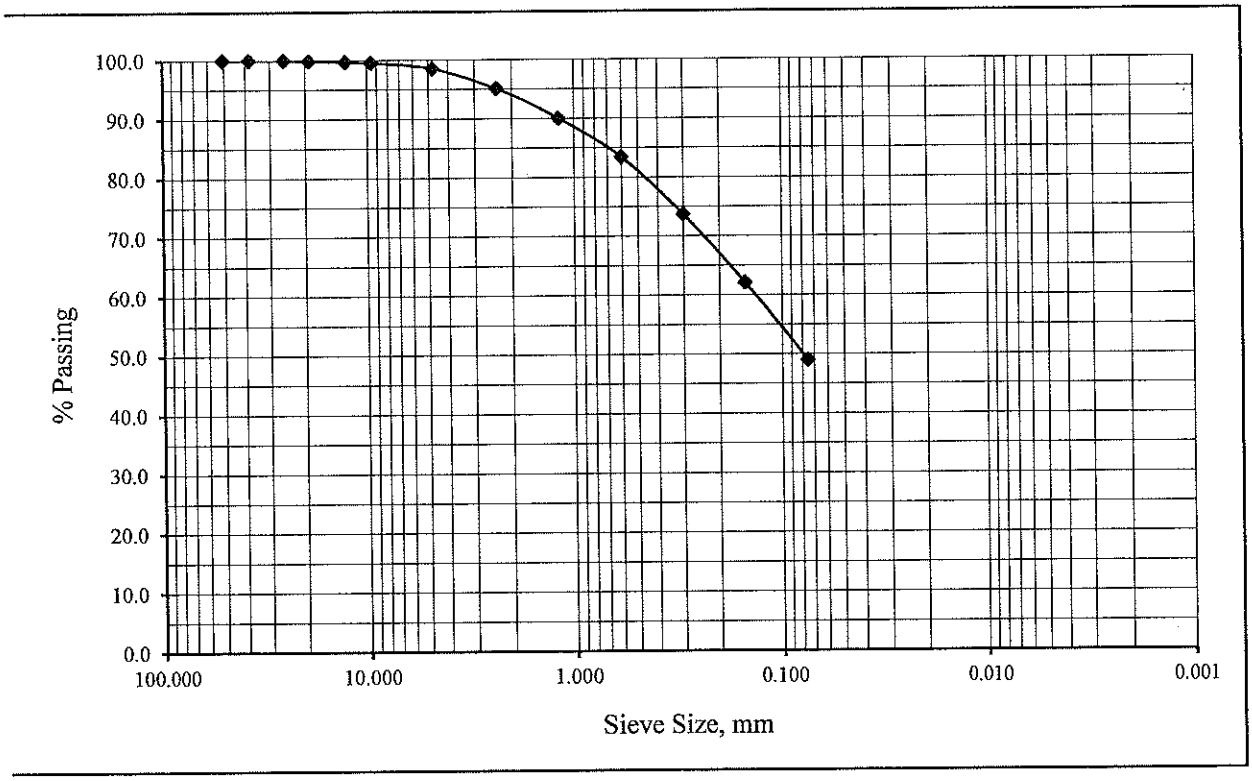
Gradation

ASTM C117 & C136

Project Number: 644-20020 July 27, 2020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 Bulk 2 @ 0-5' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.9
1/2"	12.7	99.7
3/8"	9.53	99.5
#4	4.75	98.5
#8	2.36	95.1
#16	1.18	90.1
#30	0.60	83.4
#50	0.30	73.7
#100	0.15	62.1
#200	0.075	49.0



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Gradation

ASTM C117 & C136

Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 R-2 @ 5'

July 27, 2020

Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	99.3
#4	4.75	97.6
#8	2.36	94.0
#16	1.18	88.9
#30	0.60	82.9
#50	0.30	70.1
#100	0.15	47.9
#200	0.074	29.9

Sladden Engineering

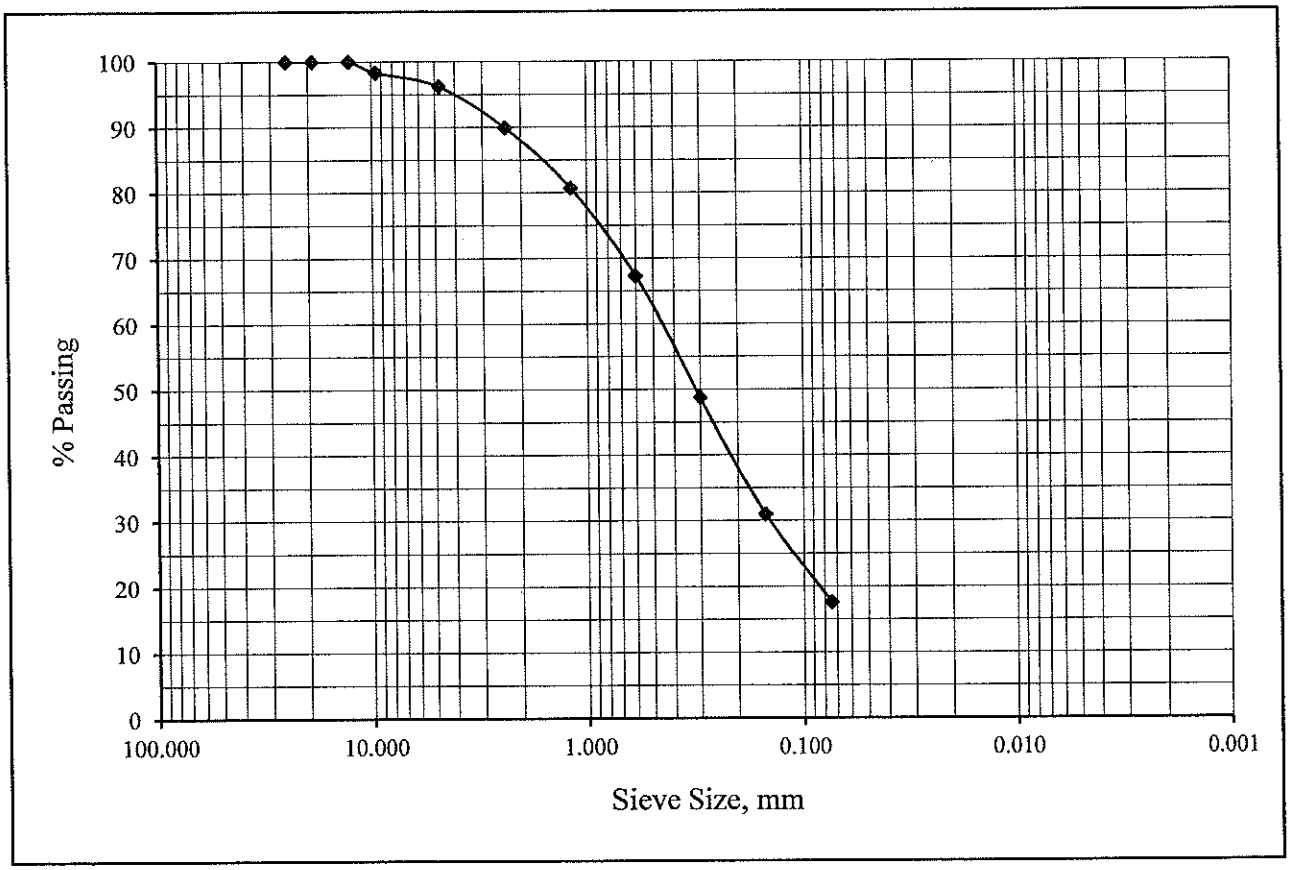
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Gradation

ASTM C117 & C136

Project Number: 644-20020 July 27, 2020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 R-4 @ 15' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	98.3
#4	4.75	96.2
#8	2.36	89.9
#16	1.18	80.7
#30	0.60	67.3
#50	0.30	48.8
#100	0.15	31.0
#200	0.074	17.6



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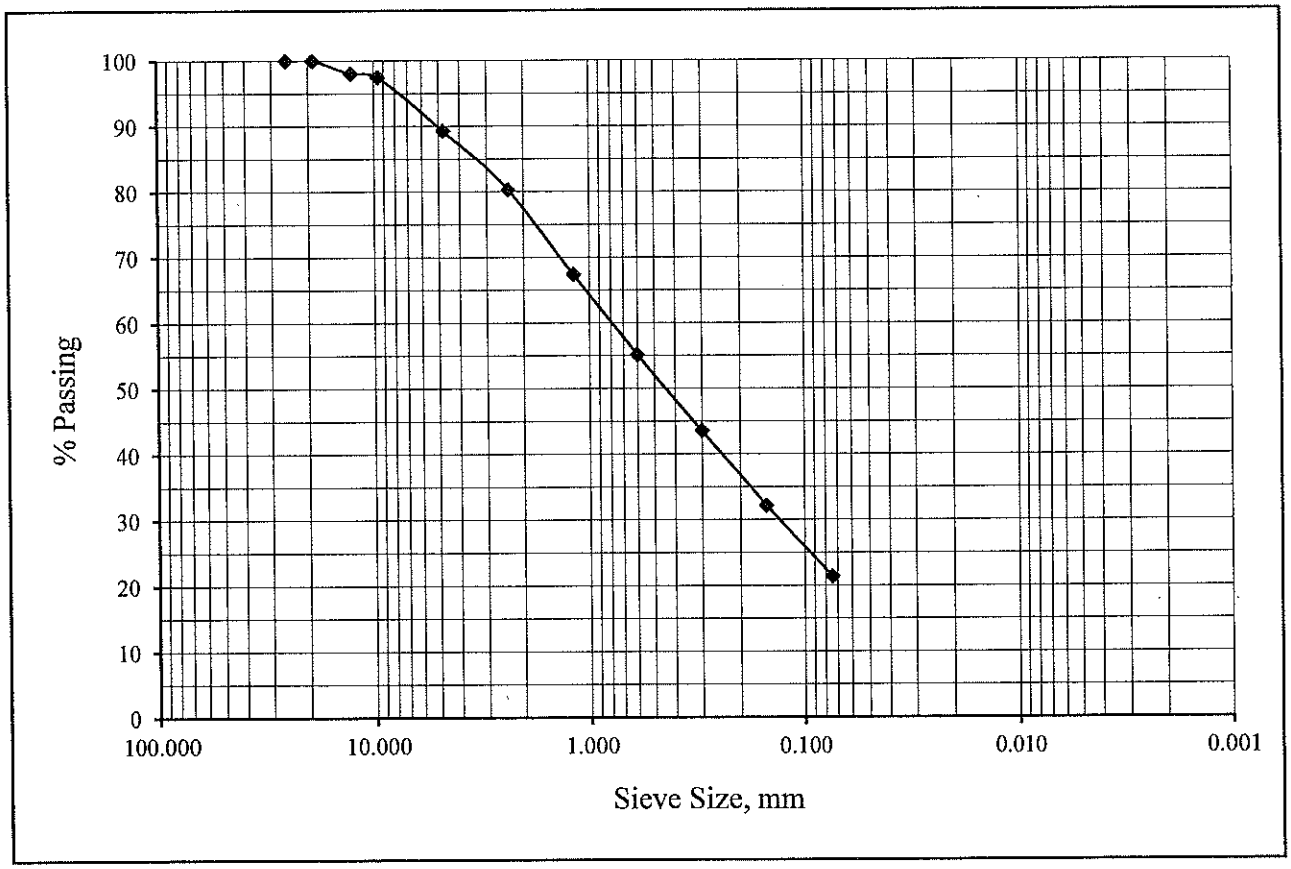
Gradation

ASTM C117 & C136

Project Number: 644-20020 July 27, 2020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-8 R-3 @ 10' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	98.0
3/8"	9.53	97.5
#4	4.75	89.3
#8	2.36	80.3
#16	1.18	67.4
#30	0.60	55.2
#50	0.30	43.5
#100	0.15	32.2
#200	0.074	21.4



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Gradation

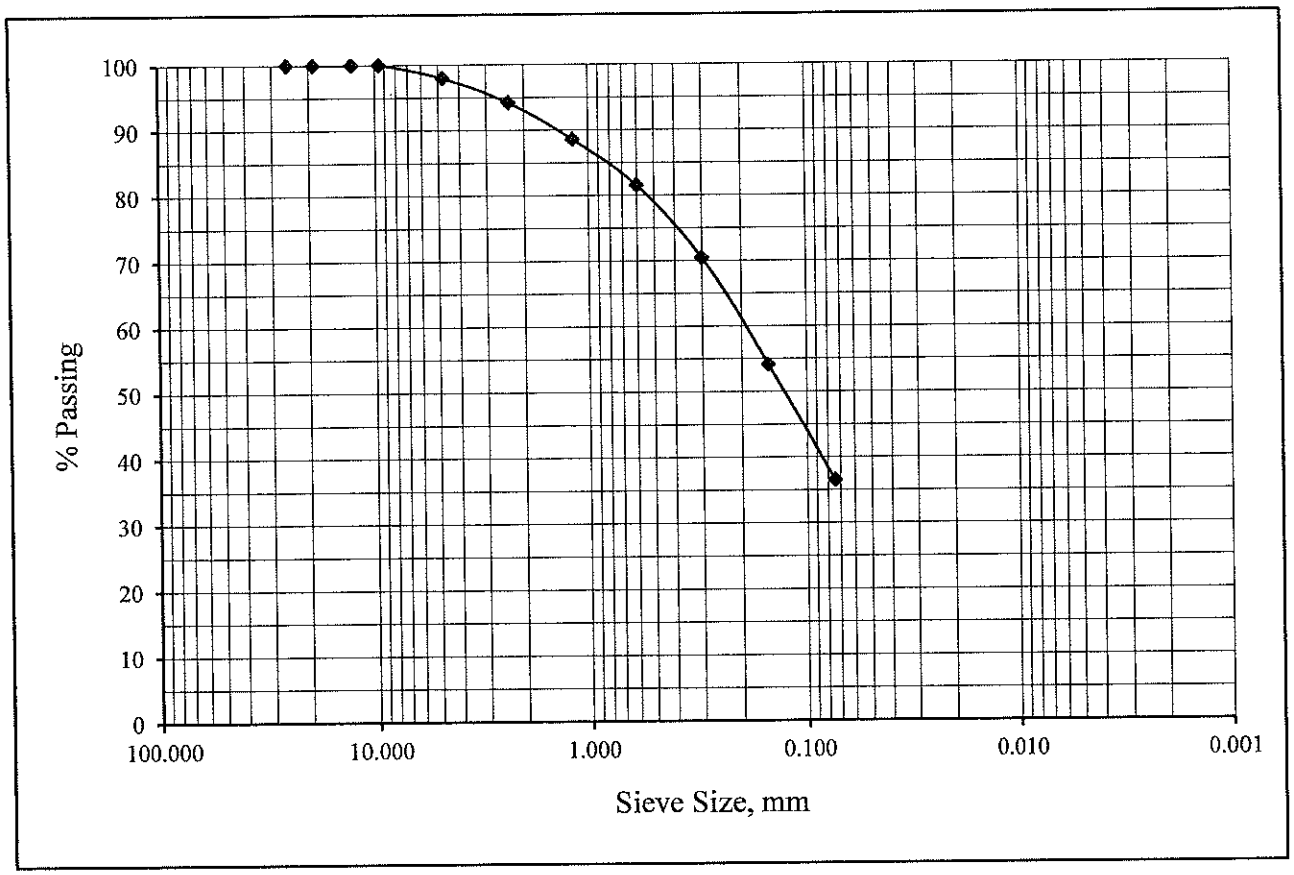
ASTM C117 & C136

July 27, 2020

Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 R-3 @ 10'

Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.0
#8	2.36	94.2
#16	1.18	88.6
#30	0.60	81.6
#50	0.30	70.5
#100	0.15	54.1
#200	0.074	36.5



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Expansion Index

ASTM D 4829

July 27, 2020

Job Number: 644-20020
Job Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 Bulk 1 @ 0-5'
Soil Description: Brown Silty Sand (SM)

Wt of Soil + Ring:	595.6
Weight of Ring:	192.0
Wt of Wet Soil:	403.6
Percent Moisture:	7.1%
Sample Height, in	0.95
Wet Density, pcf:	129.2
Dry Denstiy, pcf:	120.6

% Saturation:	48.3

Expansion **Rack # 2**

Date/Time	7/23/2020	2:45 PM
Initial Reading	0.0000	
Final Reading	0.0013	

Expansion Index **1**

(Final - Initial) x 1000

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Expansion Index

ASTM D 4829

July 27, 2020

Job Number: 644-20020
Job Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 Bulk 2 @ 0-5'
Soil Description: Red Brown Clayey Sand (SC)

Wt of Soil + Ring:	576.7
Weight of Ring:	194.9
Wt of Wet Soil:	381.8
Percent Moisture:	9.1%
Sample Height, in	0.95
Wet Density, pcf:	122.2
Dry Denstiy, pcf:	112.0

% Saturation:	48.7

Expansion **Rack # 3**

Date/Time	7/23/2020	2:35 PM
Initial Reading	0.0000	
Final Reading	0.0498	

Expansion Index **50**

(Final - Initial) x 1000

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One Dimensional Consolidation

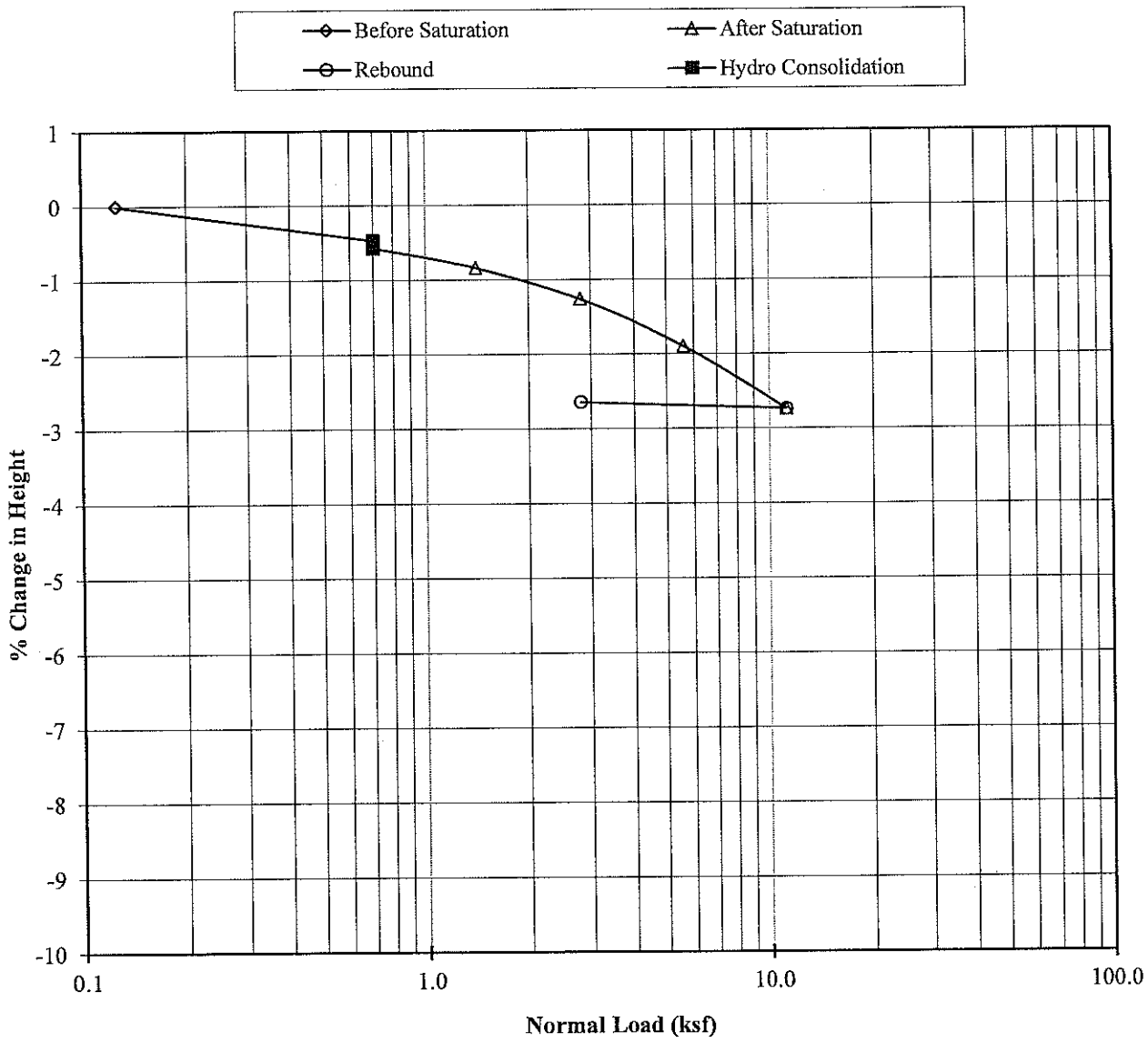
ASTM D2435 & D5333

July 27, 2020

Job Number: 644-20020
Job Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 R-2 @ 5'
Soil Description: Brown Silty Sand (SM)

Initial Dry Density, pcf:	117.7
Initial Moisture, %:	11.4
Initial Void Ratio:	0.416
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



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One Dimensional Consolidation

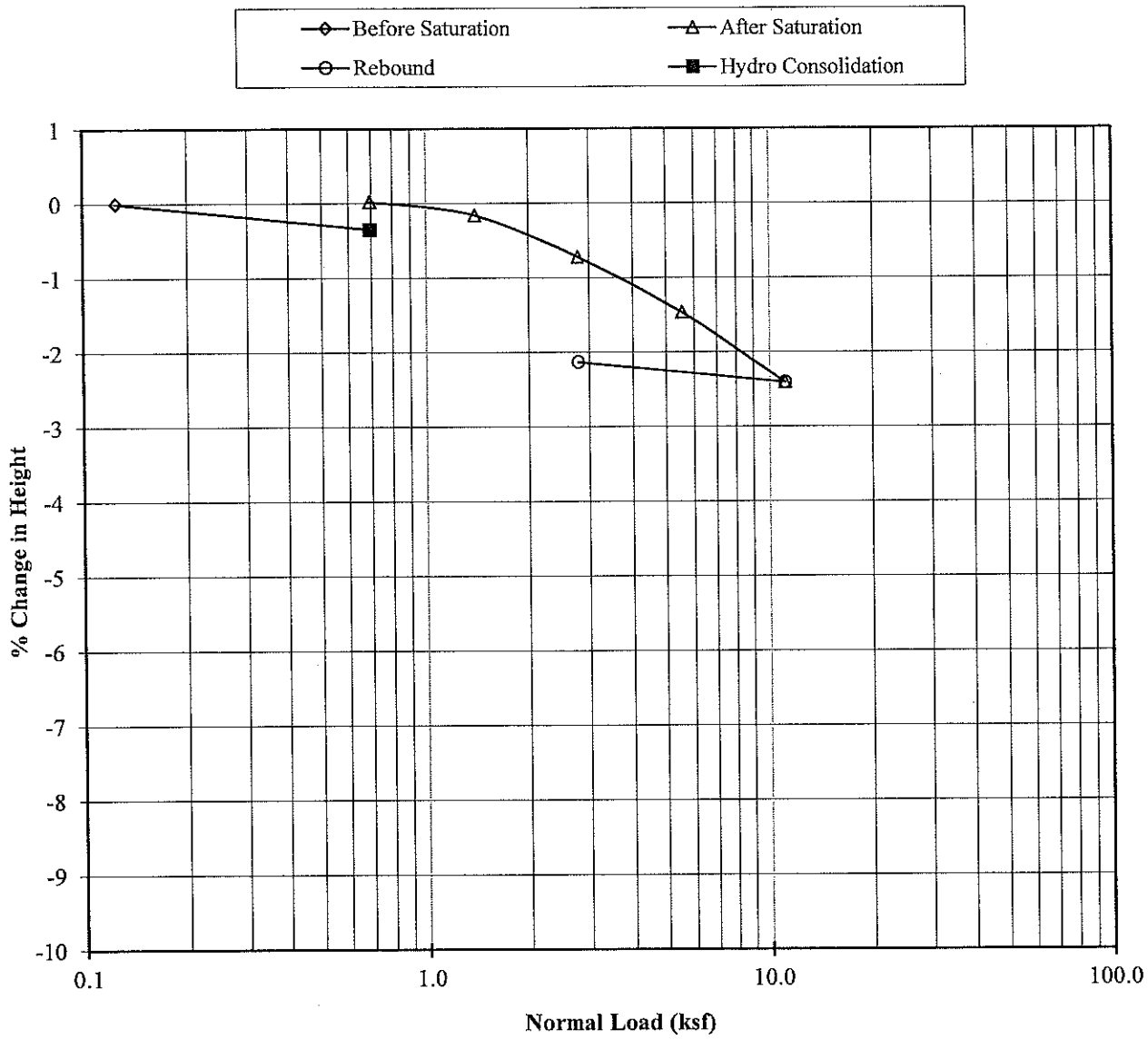
ASTM D2435 & D5333

July 27, 2020

Job Number: 644-20020
Job Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 R-3 @ 10'
Soil Description: Red Brown Clayey Sand (SC)

Initial Dry Density, pcf:	122.4
Initial Moisture, %:	7.4
Initial Void Ratio:	0.362
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



Sladden Engineering

6782 Stanton Ave., Suite A, Buena Park, CA 90621 (714) 523-0952 Fax (714) 523-1369
45090 Golf Center Pkwy, Suite F, Indio CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: July 27, 2020

Account No.: 644-20020

Customer: Cozad and Fox, Inc

Location: 2nd Street, Beaumont

Analytical Report

Corrosion Series

	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
BH-1 @ 0-5'	8.8	20	50	9100
BH-10 @ 0-5'	8.0	20	60	2900

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RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

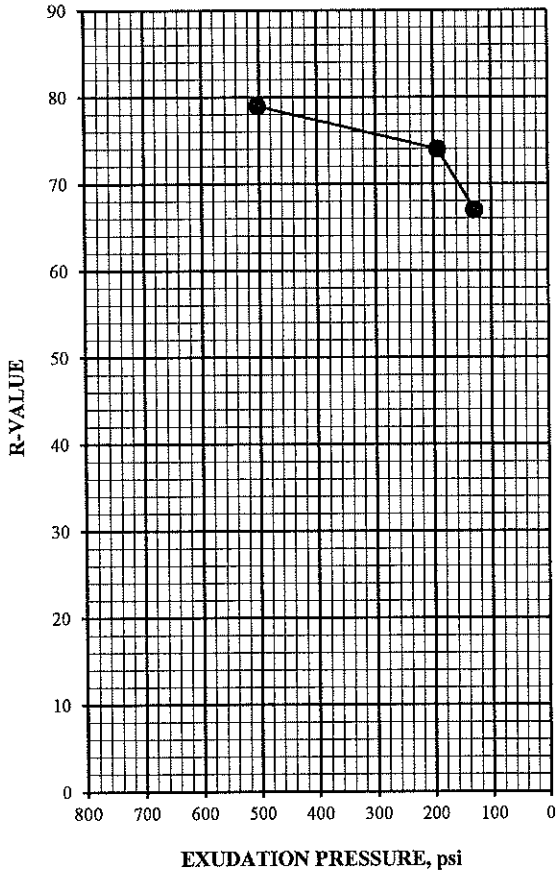
CTM 301

July 27, 2020

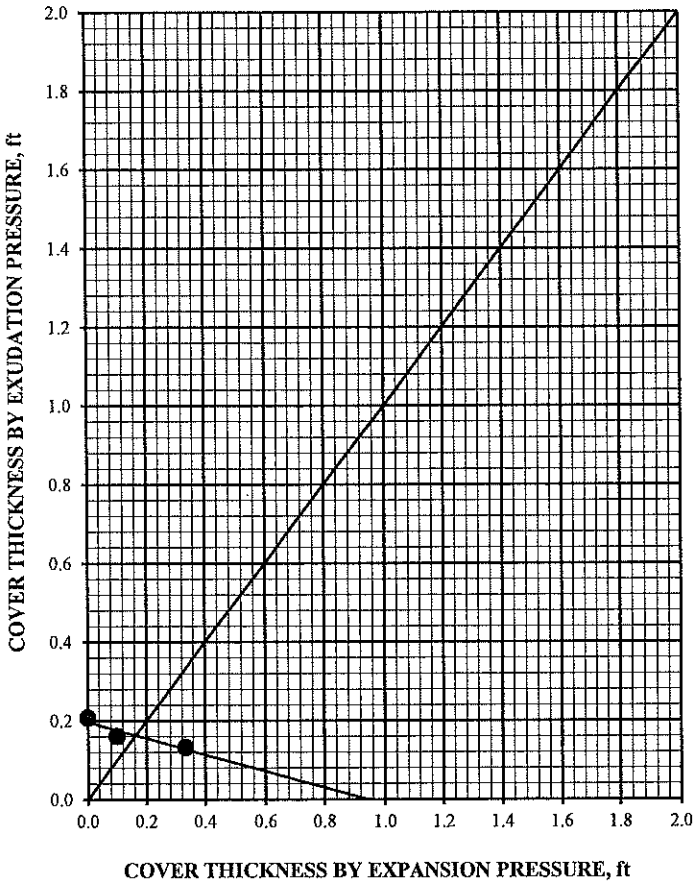
Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 Bulk 1 @ 0-5'
Sample Description: Brown Silty Sand (SM)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 124.8-pcf
%Moisture @ 300 psi Exudation Pressure: 10.0%
R-Value - Exudation Pressure: 76
R-Value - Expansion Pressure: 74
R-Value @ Equilibrium: 74

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART



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RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

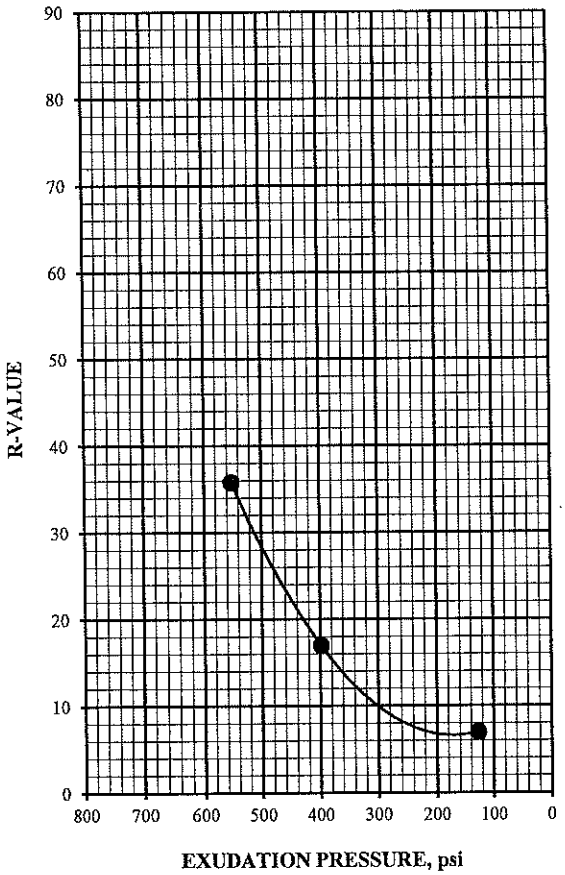
CTM 301

July 27, 2020

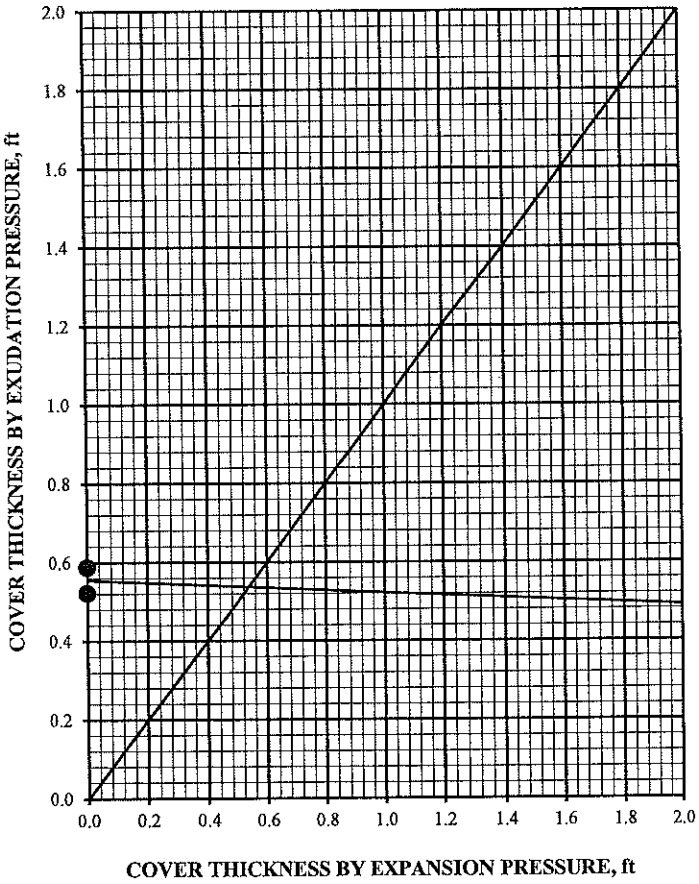
Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 Bulk 2 @ 0-5'
Sample Description: Red Brown Clayey Sand (SC)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 114.0-pcf
%Moisture @ 300 psi Exudation Pressure: 15.8%
R-Value - Exudation Pressure: 10
R-Value - Expansion Pressure: 15
R-Value @ Equilibrium: 10

EXUDATION PRESSURE CHART

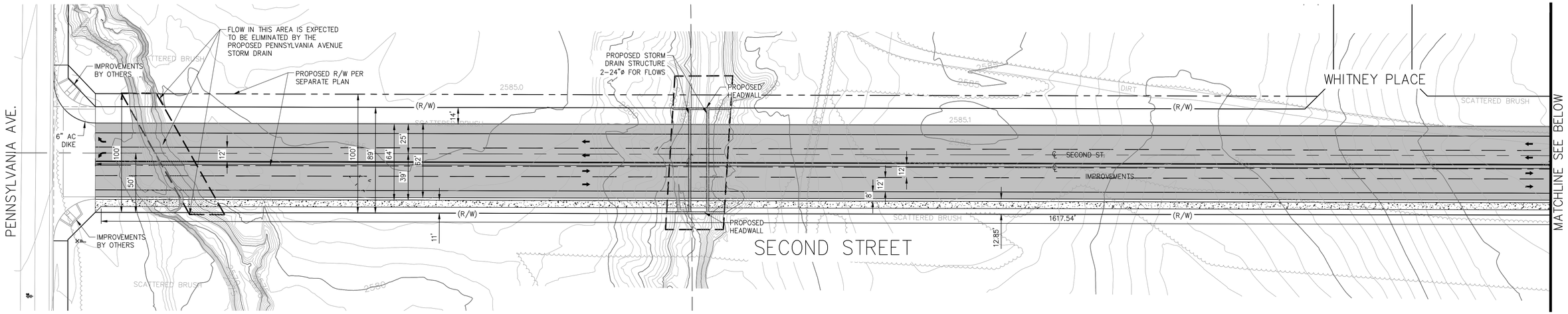


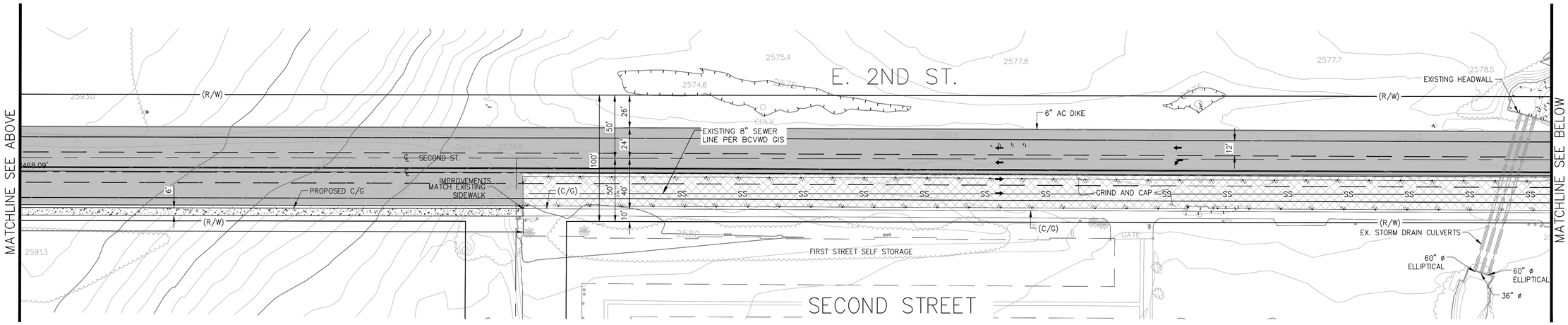
EXPANSION PRESSURE CHART

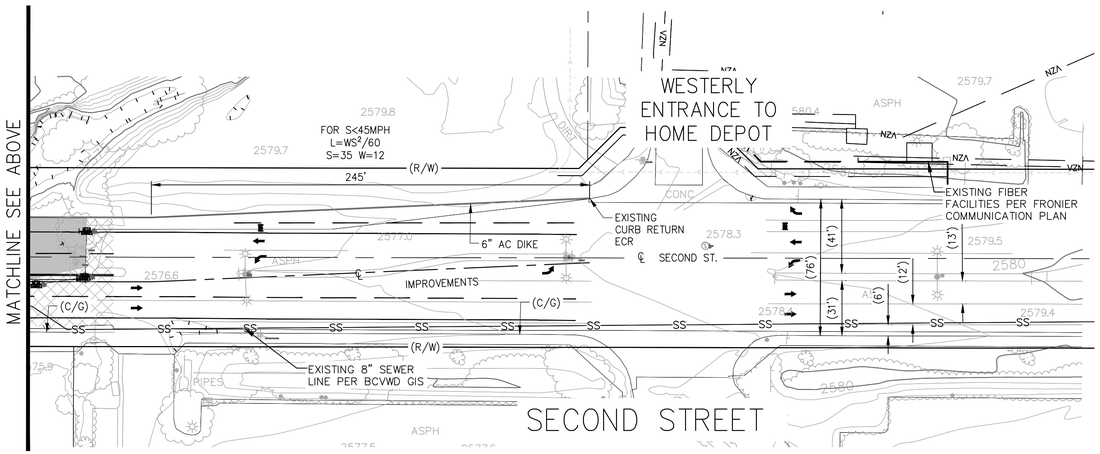


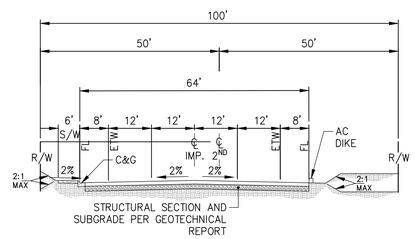
Appendix H

Preliminary Design

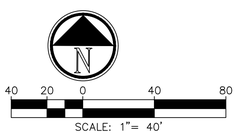








TYPICAL STREET SECTION
N.T.S



SCALE: 1"= 40'

REGISTERED PROFESSIONAL ENGINEER
BRIAN D. FOX
No. 57264
CIVIL
STATE OF CALIFORNIA

Cozad & Fox, Inc.
CIVIL / STRUCTURAL ENGINEERS
MUNICIPAL CONSULTANTS / PLANNERS
SURVEYORS / GPS
151 South Girard Street• Hemet, Ca 92544
TEL. (951) 652-4454• FAX (951) 766-8942
E-MAIL BFOX@kbcozad.com

CITY OF BEAUMONT
2ND STREET IMPROVEMENTS

CONCEPTUAL LAYOUT EXHIBIT

Sheet No. 1 OF 1 SHTS

1/20/21 DATE

Z:\2001800\DWG\PRELIM DESIGN\2001800.00_SI_v4.dwg