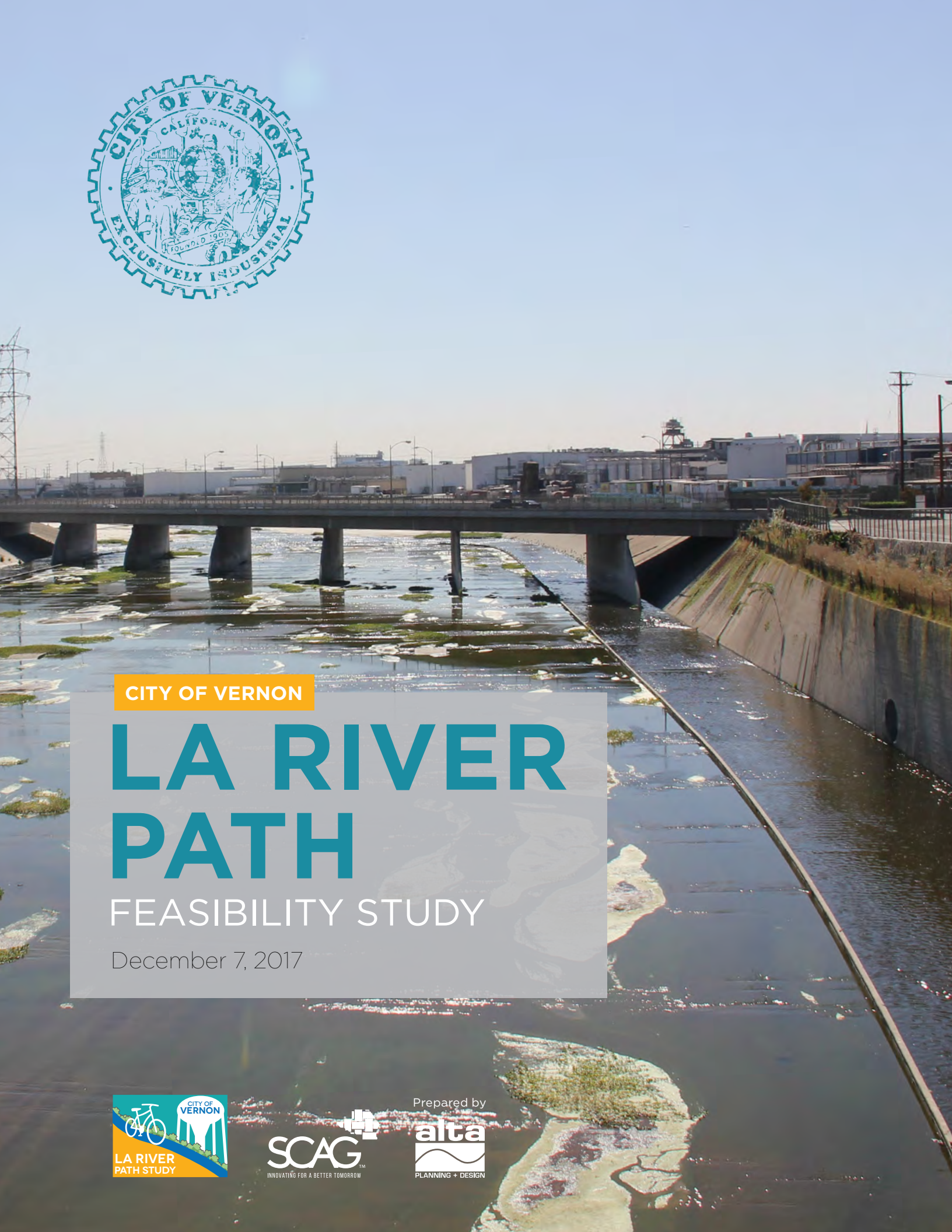

CITY OF VERNON

LA RIVER PATH

FEASIBILITY STUDY

December 7, 2017

Prepared by

alta PLANNING + DESIGN


Salad Farm
SOUTH BANK
Los Angeles River


CITY OF
VERNON

Acknowledgments

CITY OF VERNON

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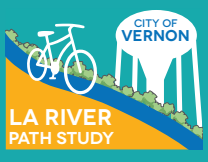
The City would like to thank the members of the Steering Committee who provided guidance and support throughout the study. The City would also like to thank the surrounding community members who participated in the outreach events and helped shaped this feasibility study.

The Plan was funded by a Caltrans Sustainability Planning Grant.



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Details the core path alignment (The "Fly-Over") and two alternatives.

7: NEXT STEPS

Outlines preliminary cost estimates, funding strategies, and next steps for the path.

Study Overview

WHAT IS THIS STUDY ABOUT?

The Los Angeles (LA) River Path extends from the San Fernando Valley to Long Beach, with only an 8-mile gap from downtown LA to Vernon. The purpose of this study is to develop preliminary pathway alignments and design concepts for the 3-mile segment of the LA River in Vernon. This study will be used to inform the current Metro LA River Bike Path Gap Closure Project, which includes design and construction of the entire 8-mile gap.

WHAT IS THE GOAL?

The goal of this project is to provide an implementable vision for the complex and constrained 3-mile stretch of LA River Path in Vernon. The study synthesizes community input, stakeholder concerns, physical opportunities & constraints, and implementation strategies for the path. This study is crucial for building local consensus and guiding the next phase of design and construction during the LA River Bike Path Gap Closure Project.

WHY BUILD A PATH IN VERNON?

Transportation: create a direct connection to and from Vernon for employees and residents and provide a route for regional path users to pass through Vernon.

Safety: provide an off-street path separate from traffic and lower the risk of on-street collisions to bicyclists and pedestrians.

Health: encourage active transportation, which increases physical activity, improves health, and decreases healthcare costs for employers.

Recreation: connect the local community to regular exercise opportunities and open space regional destinations along the river.

LA River & City of Vernon

The LA River through the City of Vernon represents a unique opportunity to connect employees to businesses. The City of Vernon is a regional employment and industrial center for manufacturing, meat packing, cold-storage, and processing, with thousands of businesses and nearly 38,000 daily commuters. (US Census LEHD, 2015) Despite a permanent residential population of 112 people, 88,848 people live within a 20-minute walk (one mile) of the project site, and 680,950 live within an hour walk (three miles) of the project site. (US Census, 2010)

The project area focuses on the LA River corridor in the City of Vernon. This 3-mile segment passes through Vernon's unique landscape including the Vernon water tower, major rail yards, the bending of the LA River, and numerous rail and vehicular bridges.

The northern-most portion of the LA River in Vernon.

Commuter Options

The LA River Path provides new commute options to the 38,000 Vernon employees. In addition to connecting to neighborhoods to the north and south, the 8-mile LA River Bike Path Gap Closure Project will connect Union Station to Vernon.

Currently, there is not a direct public transit service from Union Station to Vernon. With the complete LA River Path, commute times from Union Station to the intersection of Soto St. and Bandini Blvd. would reliably be 2-3 times faster by bike than transit (Figure 1-1).

Figure 1-1: Commute times from Union Station to the intersection of Soto St. and Bandini Blvd.

How Fast Could You Get to Soto/Bandini from Union Station?

On Bike

12-23
Typical (10-20mph)

12-14
Electric Bike (16-20mph)

On Foot

~75
Typical (3 mph)

Transit

35-48
Requires transfers; subject to delays

Car / Rideshare

10-28
Subject to traffic delays

All time estimates based on conditions at 8 a.m. on a workday; All time in minutes

Process

In 2016, the City of Vernon retained a team of consultants led by Alta Planning + Design to prepare this LA River Path Feasibility Study. The development of the Feasibility Study involved several phases, including coordination with project partners, public outreach at local events, data collection & analysis of the existing physical environment, development of alternative alignments, conceptual design, development of funding & implementation strategies, and documentation of the plan.

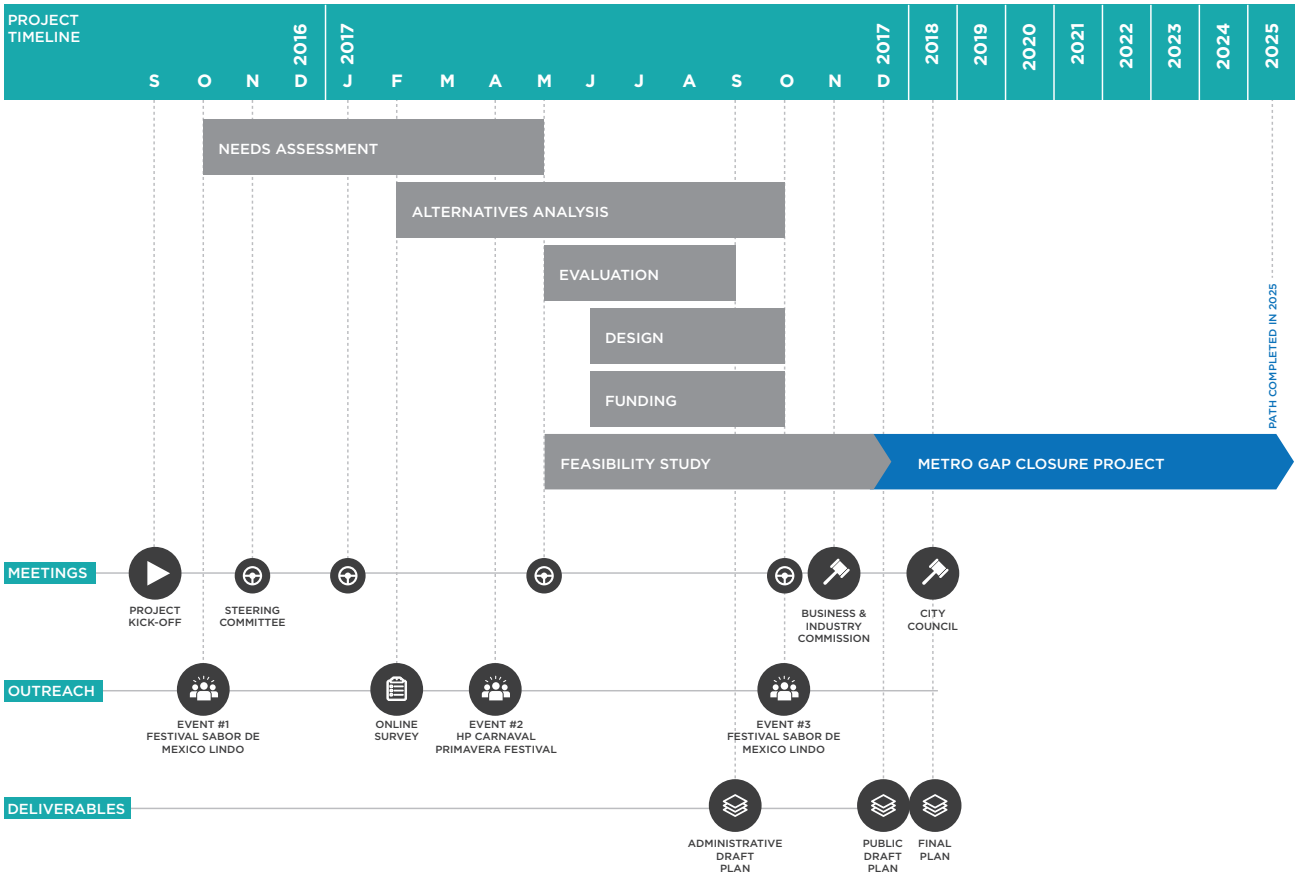


Figure 1-2: Feasibility study process diagram

Outreach

Chapter 2 summarizes community outreach. The Vernon community is comprised of people who live or own businesses within Vernon city limits, the many people who commute to Vernon for work, and those who live in surrounding communities who would use the path. The majority of the community speaks Spanish as their primary language, and all outreach was conducted in both Spanish and English.

Through outreach events and surveys, feedback was gathered from over 400 people. Three major outreach events were held to coincide with local events: Festival Sabor de México Lindo in October 2016, the Huntington Park Carnaval Primavera in April 2017, and back to Festival Sabor de México Lindo in October 2017.

The lessons learned from the community served as valuable resources to steer the direction of the project. Residents and employees questions, concerns, and desires for the path were documented and used to inform the design and planning process.

Additional input was gathered directly from employment stakeholders at a Business and Industry Commission meeting. Chapter 2 provides focused information on the needs of Vernon's industrial business development freight and rail operations, and flood control.

2016 Festival Sabor de México Lindo.

Opportunities & Constraints

Chapter 3 analyzes the physical opportunities and constraints in the corridor. The study area is incredibly constrained by the river channel itself and the railways, utilities, bridges, and parcel ownership within it.

The river features two unique channel typologies - a box channel with vertical walls that transitions to a trapezoidal channel with sloped walls south of Bandini Boulevard. Active freight railways run adjacent to the west bank south of Bandini Boulevard and the east bank south of Downey Road and a major utility corridor flanks much of the east bank. 8 total bridges pass over the river, each one creating both a challenge for the path to pass over or under while also creating an opportunity to cross the river.

The proposed path will connect to the existing LA River Path that begins at the southern edge of Vernon at Atlantic Boulevard. As it passes through Vernon, the LA River Path will need to connect to key destinations including employment centers, transit stops, a future Eco-Rapid Transit station, and local retail.

Evaluation

Chapter 4 includes a detailed breakdown of the alignment evaluation criteria. The wide range of potential path alignment options included both the east and west banks of the river and 12 different path typologies, including in-channel, suspension bridge, and cantilever paths. In order to focus the options, evaluation criteria based on three categories (function, feasibility, and desirability) were developed by the City of Vernon, the community, and key stakeholders. Through this evaluation process, a core alignment and two alternatives were developed for the study.

CATEGORY 1: FUNCTION

Is it a good idea? Would the path in this location be safe, potentially allowed by the property owners, and make the needed connections? Would the alignment separate freight traffic from people who are walking and biking?

CATEGORY 2: FEASIBILITY

Would it be feasible? Would a path in this location be reasonably feasible to implement with manageable risk and effective use of public funds?

CATEGORY 3: DESIRABILITY

Would it be great? Would a path in this location create a desirable connection and place, attracting users and making positive contributions to the community? Would the design be inspiring and iconic?

Design

Chapter 5 provides detailed design guidelines for the path. A key finding during the outreach process was that the path will be in high demand not just for people riding bikes but also for people walking and running. As a result, the preferred typical cross-section is a 14'-wide bike path with adjacent 6'-wide pedestrian path, as shown in Figure 1-3. The bike path width provides for a 10'-wide path of travel with a 2'-wide clear shoulder on each side. Providing an adjacent pedestrian path helps to alleviate safety concerns between fast-riding cyclists and people walking or running.

FRAME, INDUSTRY, EFFICIENCY

As opposed to creating a new aesthetic, the goal is to design a path that celebrates and integrates into the industrial context it passes through. Durable and structural elements with minimal ornamentation are proposed in tandem with moments to view and engage with Vernon's unique landscape. Such elements include amphitheater steps to the LA River and multi-functional utility posts that serve as lighting and shade structures.

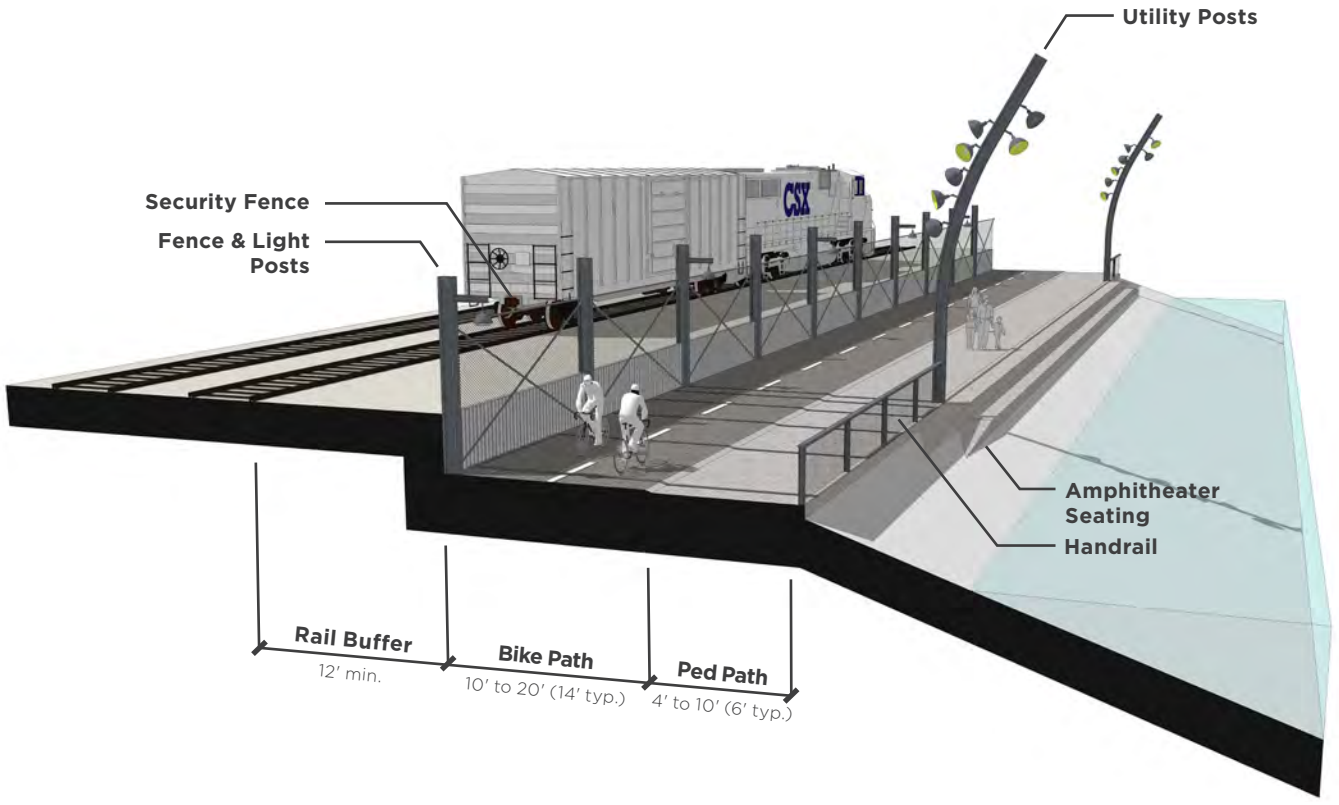


Figure 1-3: Path cross-section.

Alignment Alternatives

Chapter 6 details the alignment alternatives developed for the 3-mile path in Vernon. The alignments - a preferred core alignment and two alternatives - were developed to provide contrasting options, as further evaluation of hydrological and right-of-way impacts are required prior to selecting a final path alignment.

A. THE FLY-OVER (CORE ALIGNMENT)

The Fly-Over's north end starts on the west bank then makes a brief crossing to the east before soaring back across the channel and over Soto Street on a suspension bridge. The Fly-Over is the most direct and most iconic route through Vernon and provides a strong connection to Vernon's commercial district in between Soto Street and Bandini Boulevard.

B. EAST BANK HOP-OVER

This route's primary benefit is that it provides better access to both the east and west banks of the channel. This alignment starts out the same as the Fly-Over in Segment 1, then diverges to stay on the east bank of the river along a utility corridor. The name "Hop-Over" comes from the bridges that provide access to the west bank at Soto Street and Downey Road.

C. WEST BANK CHANNEL

The West Bank Channel Alignment is this study's second alignment alternative. This route stays on the west bank of the channel for the entire corridor, without any added bridges for people walking and biking.

Figure 1-4: The Fly-Over.

Figure 1-5: East Bank Hop-Over

Figure 1-6: West Bank Channel

Next Steps

Chapter 7 provides an overview of next steps needed to implement the vision. Through the Los Angeles County Tax Measure M, Los Angeles Metro secured funding to design and build the 8-mile path closing the existing gap in the LA River Path. The LA River Bike Path Gap Closure Project will build upon this feasibility study and take all 8 miles of path through environmental clearance, design, permitting, and construction. Metro has a goal to open the path by 2025.

LOCAL COORDINATION

As the LA River Bike Path Gap Closure Project moves forward, key issues of Vernon's local business stakeholders require further coordination. Table 1-1 summarizes needs raised by Vernon's Business and Industry Commission. It will also be critical to communicate the benefits the path can bring to Vernon and its businesses.

FUNDING

Chapter 7 also identifies preliminary costs for the three Vernon alignment options that range from $110 to $150 million. It also identifies funding opportunities for gateway enhancements and developing connections into Vernon as well as recommendations for operations and maintenance of the path.

Safety/Security
Ensure adjacent industrial manufacturing and food processing operations properties are secure from path users and prevent trespass onto private property.
Develop an Operations and Maintenance plan that meets the needs of the Vernon Police Department.
Address concerns and develop solutions to prevent potential homeless encampments along the path corridor.
Business Operations
Mitigate construction impacts on local roads.
Maintain rail operations during path construction.
Ensure private property owners are engaged throughout the design and permitting process.
Permitting
Obtain necessary permits from US Army Corps of Engineers and LA County Flood Control which ensure path does not have negative impacts on flood protection.
Ensure environmental clearance process is met prior to construction.

Table 1-1: Local coordination next steps.

8 MILE LA RIVER GAP

METRO MEASURE M FUNDING $365 MILLION

- Alternative analysis
- Environmental clearance
- Permitting
- Trail construction (grade-separated crossings, lighting, access points, transportation-related amenities)

3 MILE LA RIVER GAP

ADDITIONAL FUNDING NEEDS FOR:

- On-street connections to local destinations
- Enhanced gateway elements
- Community amenities

Funding sources and needs.

CHAPTER 1

PROJECT BACKGROUND + PURPOSE

Closing the Gap

Introduction

The City of Vernon, in partnership with the Southern California Association of Governments (SCAG), developed this study to evaluate alignment options for a regionally-connected bikeway in the City's portion of the Los Angeles River. The project began as a bikeway study but it quickly evolved through community and stakeholder engagement to serve more than just people riding bicycles. This study uses the term "path" to describe the active transportation corridor along the river. The LA River Path in Vernon will meet the Caltrans requirements of a Class I Bikeway, but will also provide space for people walking, running, and skating.

After an extensive public outreach process, the project team evaluated community needs, feasibility considerations, and business priorities to determine the core alignment and alignment alternatives. The purpose of this study is to present project context, describe different path alignment options and how they were evaluated, and explain how the core alignment addresses key opportunities and constraints in the corridor.

This project presents a rare opportunity to create an off-street path and community resource through the heart of Los Angeles County, connecting residential neighborhoods to the major employment centers in Vernon, as well as schools, transit, and other destinations. Filling a key gap in the path along the Los Angeles River, this three-mile section is within the City of Vernon and extends from 26th Street south to Atlantic Boulevard.

Figure 1-7 illustrates how critical this segment of path is to the overall connectivity of the larger LA River Path. Once completed, the path will provide access to not only destinations within Vernon, but will connect users to the approximately 17 miles of existing path between Vernon and Long Beach. It represents 3 of the 8 miles needed to connect the path from Long Beach to the San Fernando Valley.

Other Southern California community paths, such as the 28-mile San Gabriel River Bike Path and 15-mile Rio Hondo River Path, have provided communities with the benefits of off-road, protected biking and walking facilities. These paths have connected residents and commuters with trail networks, provided better access to jobs and transit, encouraged healthy and active lifestyles, and created an urban link to the natural environment. The LA River Path will bring these benefits to Vernon and the surrounding communities.

This study builds on previous initiatives to re-imagine the Los Angeles River and develop active transportation corridors along it, such as Metro's Los Angeles River Bikeway Feasibility Study, Rail to River Study, and Active Transportation Strategic Plan. For a summary of all plans reviewed, see Appendix B of this document.

The recommended path alignment was guided by a stakeholder group of agencies, local businesses, and non-profits noted below. Throughout the project, the Project Team also received feedback and input on the proposed alignment from the Lower Los Angeles River Revitalization Working Group. This group is currently engaged in a multi-year effort to produce a plan that will guide the larger revitalization of the LA River between 26th Street in Vernon and its outlet in Long Beach.

Stakeholder Advisory Group

- City of Vernon
- The Southern California Association of Governments (SCAG)
- Los Angeles County Metropolitan Transportation Authority (Metro)
- LA County Department of Public Works (DPW)
- California Department of Transportation (Caltrans)
- The Mountains Recreation and Conservation Authority (MRCA)
- LA County Bike Coalition (LACBC)
- Friends of the Los Angeles River (FOLAR)
- Farmer John
- City of Los Angeles
- US Army Corps of Engineers (USACE)
- Amigos De Los Rios

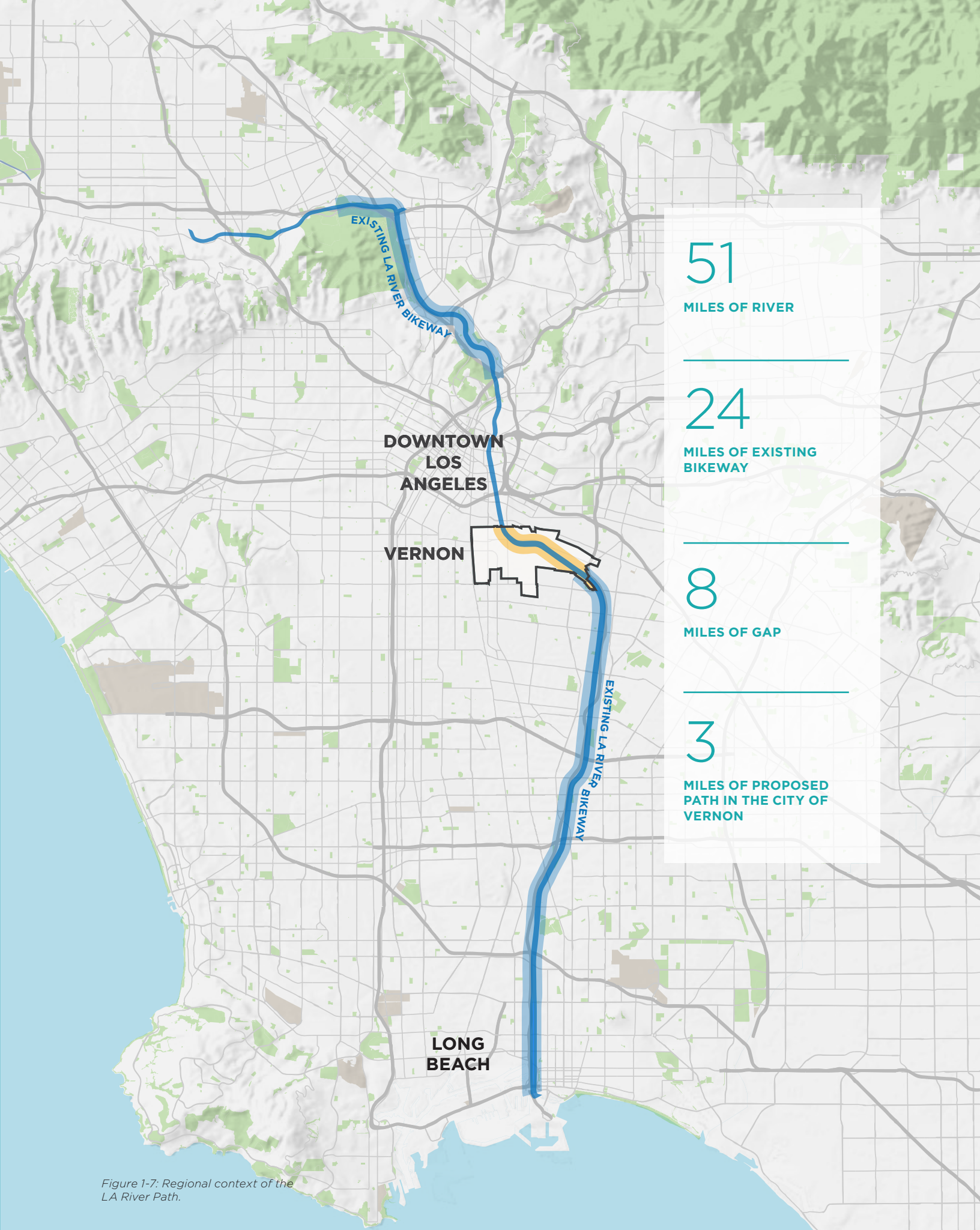


Figure 1-7: Regional context of the LA River Path.

Benefits of a Path

A shared-use path is a paved off-street trail that is universally accessible and designed primarily for people biking and walking, providing regional transportation connections as well as local access. By providing a continuous and connected route, paths provide space for people of all ages and abilities to bike and walk for commuting and recreation. Paths provide benefits from several perspectives, including economic, health, environmental, and social equity benefits.

While most Americans acknowledge the importance of exercise, many do not incorporate it as a daily activity. The U.S. Surgeon General estimates that 60% of American adults are not regularly active and another 25% are not active at all. Lack of physical activity ranks as the third-highest risk factor for death in the U.S., behind only tobacco and alcohol. Creating access to paths can offset the risks of urban cycling and provide a safe and inexpensive opportunity for regularly exercise, as illustrated in Figure 1-8.

Building a well-designed, connected trail system across Los Angeles County will encourage a shift from energy-intensive modes of transportation such as cars and trucks to active modes of transportation such as bicycling and walking. While many of the active living-related benefits of a trail network can be difficult to quantify – such as improved mental health, educational growth, connection to nature, and sense of place – a growing body of literature links parks and trails to increased physical activity and improved air quality. (RBA, 2002; FHWA,1993)

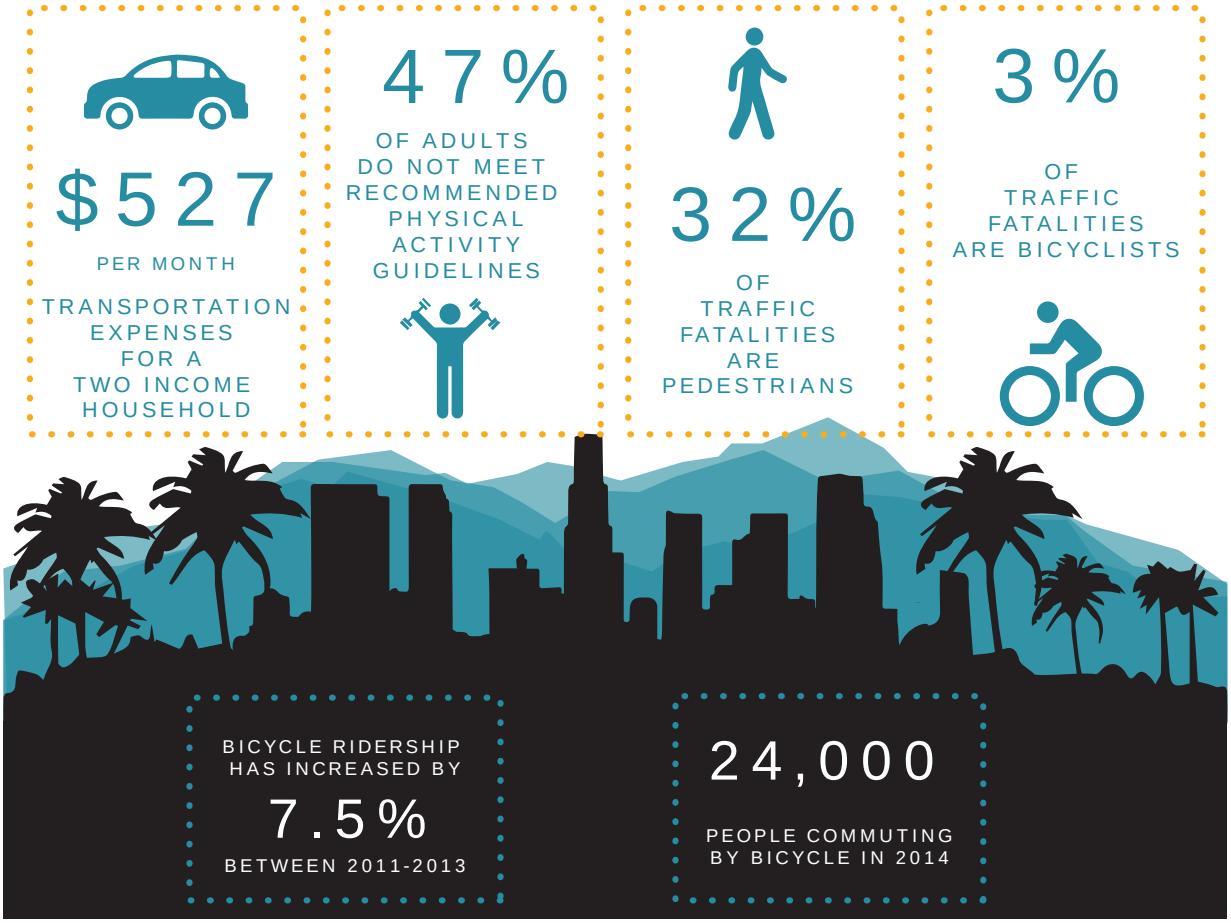


Figure 1-8: Active transportation statistics for the City of Los Angeles.

The health benefits of active transportation benefit employers as well, as walking and cycling have been linked to increased employee productivity, fewer sick days, and lower healthcare costs. (Institute for Employment Studies, 2016)

Studies have shown that exercising before work raises an employee's productivity by an average of 15 percent while physically fit employees have been shown to make 27 percent fewer task errors. Staff members who cycle to work take on average one fewer sick day per year and have a reduced mortality rate of 40%. England's Department for Transportation estimated that if cycling trips to work were to double over 10 years, businesses in England would cumulatively see annual net benefits of $7.5 (£6.4) billion by 2050 due to reduced healthcare costs and boosted productivity. (J McKenna, 2005; H Sjoberg, 1983; Institute for Employment Studies, 2016)

CASE STUDY:
SWAN ISLAND INDUSTRIAL PARK

Swan Island is an industrial park in Portland, Oregon located along the Willamette River. It is a regional hub for major manufacturing, truck building, marine industries, warehousing, and distribution, and had approximately 11,000 employees in 2015.

In 1998, the Swan Island Transportation Management Association was organized to bring high quality alternative transportation options for employees. In addition to rail and bus expansion, the agency oversaw the design and construction of over 2 miles of off-street paths providing access to and around the industrial park.

With the addition of off-street paths, Swan Island businesses have seen a major increase in bike commuters among their employees. Dalmier Trucks, which has over 3,000 employees at Swan Island, added a secure bike parking facility for 53 bikes in 2013 to accommodate the increased demand.

"Some of our employees remember when just one rack was enough. Now we've got racks near all the entrances and they're all filling up."
(Dalmier Trucks Project Manager, 2013)

A section of path in Swan Island. (source: Swan Island TMA)

History of the Los Angeles River

Cutting through the heart of Los Angeles County, the Los Angeles River flows from Canoga Park in the San Fernando Valley to meet the ocean 51 miles south in Long Beach. The river, once the lifeblood of early Los Angeles settlers, was channelized in 1938 by the Army Corps of Engineers for flood prevention. Over the past few decades, agencies and the broader community have studied and planned for a future of the river that involves restoration, recreation, active transportation, and development projects.

A major component of the effort to increase recreation and active transportation along the river is the currently incomplete LA River Path. The northern portion of the path extends 7 miles from Glendale to Elysian Valley, just northeast of downtown Los Angeles. The southern portion is a 16.5-mile path which connects Maywood south to the City of Long Beach. Currently that leaves an 8-mile gap in the bike path through downtown Los Angeles and the City of Vernon.

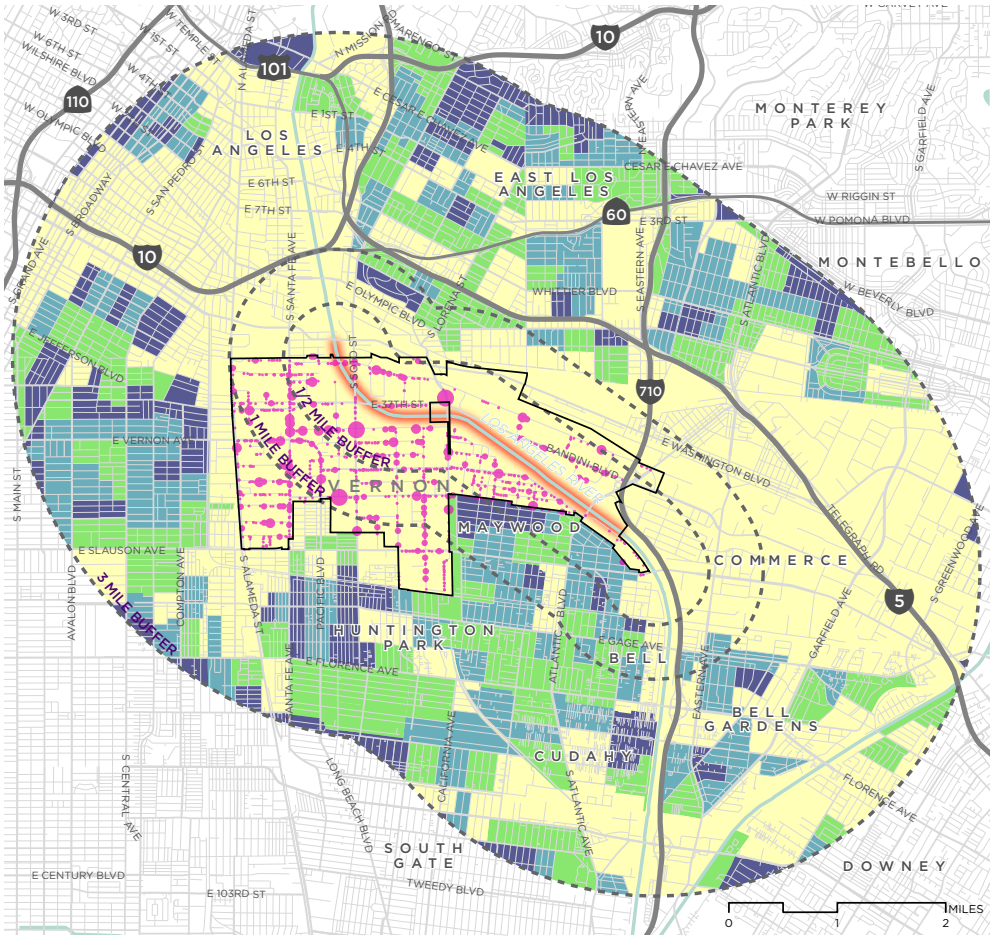
The LA River in Vernon before it was channelized.

Project Context

Located directly south of downtown Los Angeles, the City of Vernon is an industrial center for manufacturing, meat packing, cold-storage, and processing, with a long history of heavy industry. The area is traversed by many active freight transportation routes (both truck and rail). Completing this segment of path is strategically vital because, once completed, it will provide safe, comfortable facilities for people to bike to work, and help reduce conflicts between trucks and people biking on city Streets. By providing a safe, separated space for people to travel by bike, this project will improve roadway safety for both commuters and freight vehicles.

The City of Vernon is home to thousands of businesses. With a permanent residential population of 112 people, the vast majority of workers are commuting to Vernon from surrounding localities - nearly 38,000 people a day! Given this high volume of commuter traffic, this project has tremendous potential to reduce vehicular travel and associated greenhouse gas emissions by encouraging workers to commute to and from Vernon via bike or on foot. It will also increase transportation options for those who do not have access to a personal vehicle, and improve safety for those who already commute to Vernon via these means.

The project stands to benefit not only those employed by Vernon's industry, but those who live in the more populated communities surrounding Vernon. 32,478 people live



RESIDENTIAL AND EMPLOYMENT DENSITY: Vernon features a low residential density but is bordered by several high-density communities. It is a dense employment center of over 1000 companies.

Figure 1-9: Residential and employment density. (US Census, City of Vernon)

within half a mile of the project site, 88,848 people live within a mile of the project site, and 680,950 live within three miles of the project site. Figure 1-9 illustrates the density of employment in Vernon and population in surrounding areas.

As an economic hub, Vernon seeks to promote and improve opportunities and conditions for businesses that take advantage of low-cost utilities, a central location, and access to the vast network of rail lines which move in and out of the city. The City of Vernon operates its own power plant to provide low cost utility rates to companies. Beyond the energy, products, and goods that flow in and out of Vernon, the Los Angeles River also flows directly through the city. Three of the eight miles currently missing from the LA River Path are located within Vernon. Both commuters and businesses report roadway conflicts between freight traffic and people biking from southern communities to downtown Los Angeles.

The combination of freight traffic, vehicular commuters, and existing infrastructure makes Vernon a high risk area for bike and pedestrian collisions. Figure 1-10 highlights the existing conflict between active transportation and vehicular traffic around the project area. It shows the locations of 159 accidents involving people walking and biking. These accidents occurred between 2011 and 2015 within one mile of the project area.

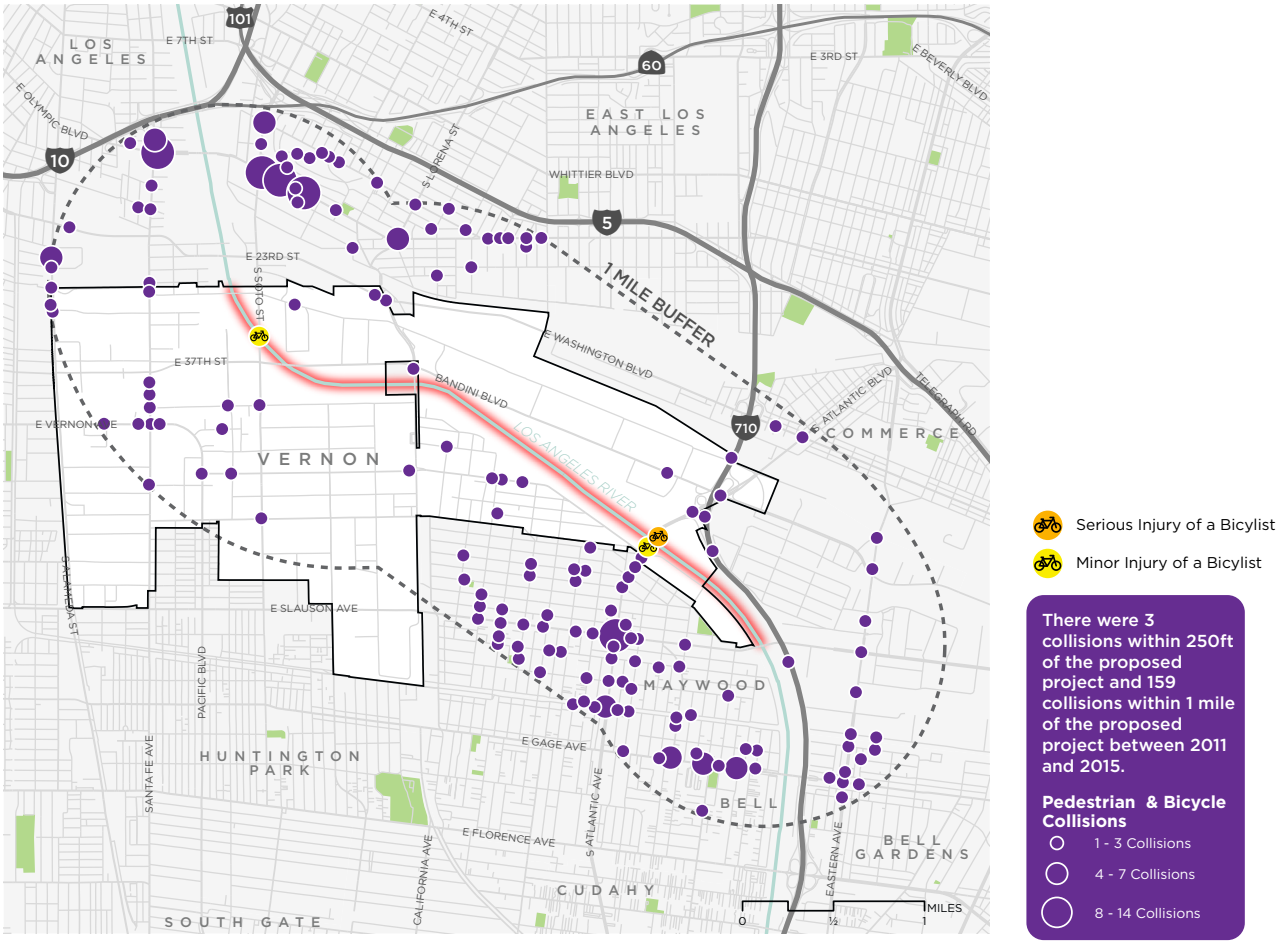


Figure 1-10: Collisions from 2011 to 2015. (SWITRS)

Project Goals

The following goals have been developed to guide the Vernon LA River Bikeway Study. They reflect unique considerations related to the City of Vernon's industrial urban environment, large number of jobs, strategic connection to the river and downtown Los Angeles, and the needs of path users.

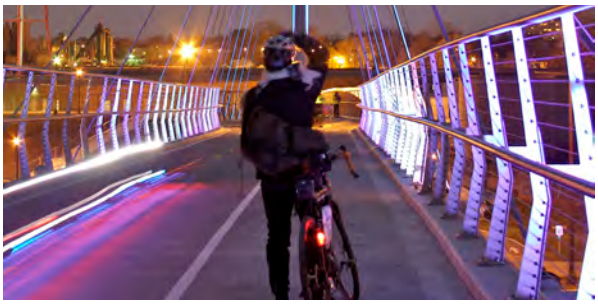
SAFETY:
Build a safe, enjoyable route along the LA River through the City of Vernon.

CONNECTIVITY:
Provide connections to jobs, the LA River Path to the south, and downtown Los Angeles to the north.

WAYFINDING:
Ensure the path is welcoming and easy to navigate via gateways and cohesive wayfinding.

ACCESSIBILITY:
Create a path that is accessible for all abilities, provides separate walking and biking paths, and reflects local preferences.

ENHANCING BUSINESS:
Increase access for Vernon employees while minimizing impacts to existing businesses.



How can lighting and other elements enhance safety?

What are the critical connections to reinforce or create?

What unique wayfinding elements might define the project?

What features make a path accessible to all users?

How can the path serve Vernon employees and businesses?

CHAPTER 2

The Vernon Community

"Exclusively Industrial"

Community + Stakeholder Overview

In order to select the core alignment and alternative alignment options for the LA River Path in Vernon, it was important to understand the needs of the community and relevant stakeholders.

A successful path will incorporate the interests of the Vernon community, industrial business development, freight and rail operations, and flood control.

Most stakeholders share many of the same needs with regard to this project:

- creating an aesthetically pleasing environment,
- connecting people to the river,
- improving safety,
- connecting the regional transportation network
- developing a feasible project.

This chapter identifies stakeholder group needs and provides a summary of the community engagement efforts and feedback.

Community Needs

COMMUNITY ENGAGEMENT

The Vernon community is comprised of people who live within Vernon city limits, many more people who commute to Vernon for work, and those who live in surrounding communities who would use the path. The majority of residents speak Spanish as their primary language. To ensure active participation in community activities and surveys from all community members, the Project Team conducted bilingual outreach. The Project Team used a variety of outreach methods to engage members of the Vernon community in the development of this project.

A bilingual online presence was established to share project developments with the community in real time. This included a project website (http://bikevernon.org), Twitter handle (@Bike_Vernon), and Facebook page (https://www.facebook.com/bikevernon). Regular posts were made on these media platforms throughout the lifetime of the project.

Two surveys were developed, provided in both English and Spanish, to learn more about the community's needs and wants for the project. Project Team staff gathered responses in-person at the pop-up community events, and online surveys were also available. The survey results are summarized in Figure 2-1.

The first outreach event was part of the larger Festival Sabor de México Lindo, an annual weekend-long festival that brought over 50,000 attendees. Community members from Vernon and surrounding cities had an opportunity to voice their opinions about the project through interactive display boards, maps, and surveys at the City's booth. 334 surveys were completed by interviewing event attendees. The most popular reasons shared for why people would use the path were recreation (54%), to commute to work (23%) and to get to downtown Los Angeles (22%).

The second outreach event was held on April 8th, 2017. The City of Vernon hosted a booth at the Huntington Park Carnaval Primavera, a popular annual fair celebrating the spring arrival with performances, food, and family activities. This was a great opportunity for the Project Team to present the plan progress to carnival attendees.

The Project Team engaged people with surveys and interactive display boards with maps and visions of a future path and potential amenities. Attendees were encouraged to identify new potential access points to the LA River and preferred amenities along the path (Figure 2-1 on the following pages). The Project Team collected roughly 50 survey responses throughout the festival, where community members shared their connection with the city of Vernon, their experiences when using the existing path, and their opinions on why they currently use or don't use the LA River Path.

The third and final outreach event was a return to the Festival Sabor de México Lindo on October 6-7, 2017. As opposed to the previous two events, it was an opportunity to share the project work to-date and gather community feedback to the proposed path. Large boards illustrating the proposed alignments, major access points, and design were hung on full display. In-person surveys were conducted and a voting game was utilized to gauge community priorities after seeing the proposed plan.

COMMUNITY PREFERENCES

The Vernon community's three groups - residents, those who commute to work in Vernon, and those who live in nearby communities - have many of the same needs for the LA River Path in Vernon.

For all groups, the path would be a safe and comfortable active transportation connection to the greater Los Angeles area. People on bikes could use the protected path instead of riding with high volumes of freight and rail traffic on the roadways. It would also provide an important recreational amenity, facilitate healthy community lifestyles, and provide an urban connection to a more natural environment.

At events and through the online survey, residents gave their opinions about path amenities, facility design, important destinations, and potential barriers to using the path. The majority of people who gave feedback spoke Spanish as their primary language.

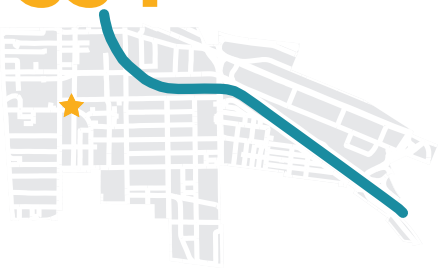
NEEDS

- People want the facility to be safe and comfortable. During stakeholder meetings, community members expressed concern about high speed bicycling and homeless encampments on the path.
- The path should connect from where people live to where people work in Vernon and provide access to regional destinations in addition to other paths and trails.
- People would like to see an aesthetically appealing path that reflects their amenity preferences and community. When asked to choose from a menu of options, the three most popular amenities were lighting, wayfinding, and drinking fountains.
- The Vernon and nearby Los Angeles area community find recreation important. Closing this gap in the LA River Path and establishing more river connections would encourage more people to exercise and get outside.

1 FESTIVAL SABOR DE MEXICO LINDO

OCTOBER 1-2, 2016
IN-PERSON SURVEY

334 PEOPLE



HOW WILL YOU USE THE TRAIL THROUGH VERNON?*

- **54%** RECREATION
- **23%** WORK COMMUTE
- **22%** GET DOWNTOWN
- **4%** NEED TO CARRY THINGS
- **20%** DO NOT PLAN TO USE

** Respondents could check multiple*

2 HP CARNAVAL PRIMAVERA FESTIVAL

APRIL 7-9, 2017
IN-PERSON & ONLINE SURVEY

51 PEOPLE

WHICH ACCESS POINT WOULD YOU USE TO CONNECT TO THE PATH?

- **12%** 26TH ST
- **32%** SOTO ST/ BANDINI BLVD
- **5%** DOWNEY RD
- **7%** DISTRICT BLVD
- **44%** ATLANTIC AVE

ARE THERE REASONS YOU DO NOT CURRENTLY USE THE LA RIVER BIKEWAY?*

- **9%** NOT ENOUGH LIGHTING
- **24%** TOO FAR FROM HOME/WORK
- **24%** BIKEWAY IN POOR CONDITION
- **51%** OTHER REASONS:

"DIRTY"
"MOSQUITOES"
"NOT SAFE"
"BIKING ON STREETS IN VERNON TO GET TO PATH IS TOO SCARY/DANGEROUS"

HOW WILL YOU USE THE TRAIL THROUGH VERNON?*

- **76%** RECREATION
- **4%** RECREATION WITH PET
- **40%** EXERCISE
- **16%** RUN ERRANDS
- **10%** WORK COMMUTE
- **4%** WILL NOT USE

Figure 2-1: Summary of survey results from first two outreach events.

HOW WOULD YOU LIKE TO TRAVEL ON THE BIKEWAY?*

- 83% BIKE
- 38% WALK
- 17% RUN
- 2% ROLLERBLADE
- 0% SKATEBOARD

HOW WOULD YOU ACCESS THE NEW BIKEWAY?*

- 28% FROM EXISTING RIVER PATH S OF ATLANTIC
- 52% BIKE ON STREET
- 13% WALK ON STREET
- 13% PUBLIC TRANSIT
- 17% DRIVE ALONE
- 0% UBER/LYFT

WHAT FEATURES WOULD BE IMPORTANT TO HAVE ALONG THE BIKEWAY?*

- 59% LIGHTING
- 46% WAYFINDING
- 41% DRINKING FOUNTAINS
- 36% SHADE
- 30% EXERCISE EQUIPMENT
- 30% SEATING
- 30% LANDSCAPING
- 23% BIKE REPAIR STATIONS
- 9% INTERPRETIVE SIGNS
- 0% GATEWAYS

3 FESTIVAL SABOR DE MEXICO LINDO

OCTOBER 6-7, 2017
IN-PERSON SURVEY

31 PEOPLE

WHERE DO YOU PREFER THE PATH LOCATION?*

- 45% ABOVE CHANNEL
- 55% TOP OF CHANNEL
- 29% IN CHANNEL

ON WHICH SIDE OF THE RIVER DO YOU PREFER THE PATH?*

- 48% WEST BANK
- 48% EAST BANK

Stakeholder Needs

From Vernon's industrial business leaders to freight and rail operators to flood control agencies, the path must balance the needs of stakeholders while opening up a new corridor for people walking and biking.

The Vernon Business and Industry Commission (VBIC) assists City officials in developing ways to make the City of Vernon more attractive to business, employees, and investors while considering the needs and concerns of surrounding residential communities. The path alignments were presented to the VBIC and primary among their concerns was the safety/security of their employees and businesses as well as the potential disruption the project would have to their economic interests. Some commissioners also wanted to better understand the how the path would benefit Vernon. A transcript of meeting notes is located in Appendix B.

SAFETY/SECURITY:

- Would security walls or fences be included in the project?
- Would the FDA be involved in the design of the path around food facilities?
- Would there be the need for a larger police presence along the path or at pocket parks?
- Would the businesses be liable for accidental injury to trespassers?
- Would the path be located directly adjacent to business or elevated?
- Would in-channel riders be in danger in the event of flooding?

BUSINESS IMPACTS:

- Would the rail be disrupted and, if so, who would offset those profit losses?
- Would there be disruptions or road closures due to construction?

Industry in Vernon flanks the LA River and relies on vehicular and rail access.

INDUSTRIAL BUSINESS DEVELOPMENT

Large industrial businesses in Vernon are the backbone of the local economy. Companies such as Farmer John, Amazon, Command Packaging, NYDJ Apparel, Marietta Corporation, General Mills, and Paramount Export Co. have factories in Vernon because of the convenient location, inexpensive utilities, and general business-friendly political environment. The clustering of industry is indicated in Figure 2-2.

In order to move goods efficiently, these companies require wide, clear roadways and access to rail lines adjacent to the river. Participants in the stakeholder committee described roadway conflicts with people biking. Business interests also want their employees to have safe and comfortable routes to work. A path that would separate people biking from these freight and rail uses would benefit both groups.

NEEDS

- Maximize efficiency on local streets for freight and commuter traffic.
- Address security and safety concerns of Vernon businesses and their employees, including large-scale manufacturers and food production facilities.
- Maintain access between businesses and the rail lines along the river. There is potential to use secured access points (i.e. key cards) to provide targeted access to adjacent businesses for employees.
- Create a safe, easy route for Vernon employees to get to work.

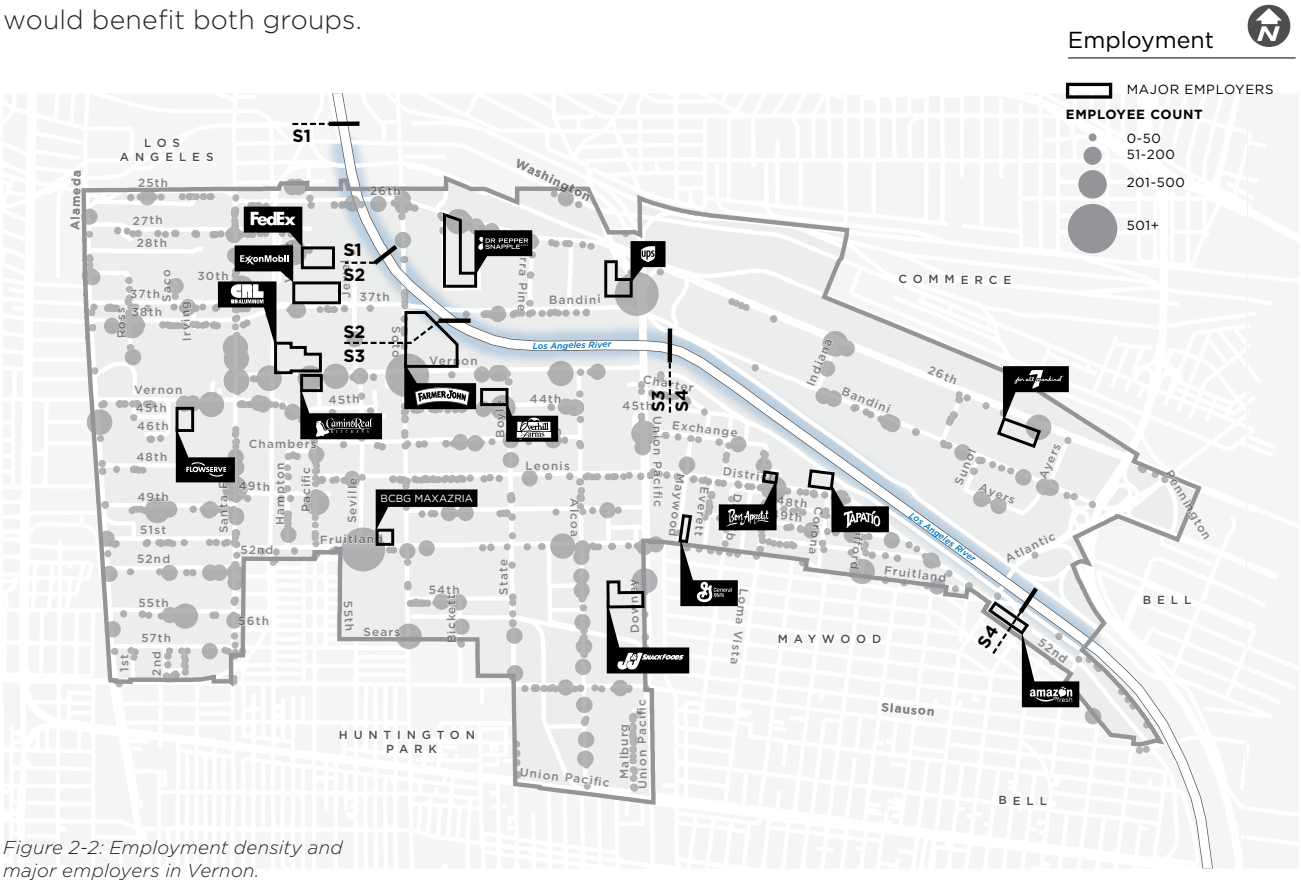


Figure 2-2: Employment density and major employers in Vernon.

FREIGHT AND RAIL OPERATIONS

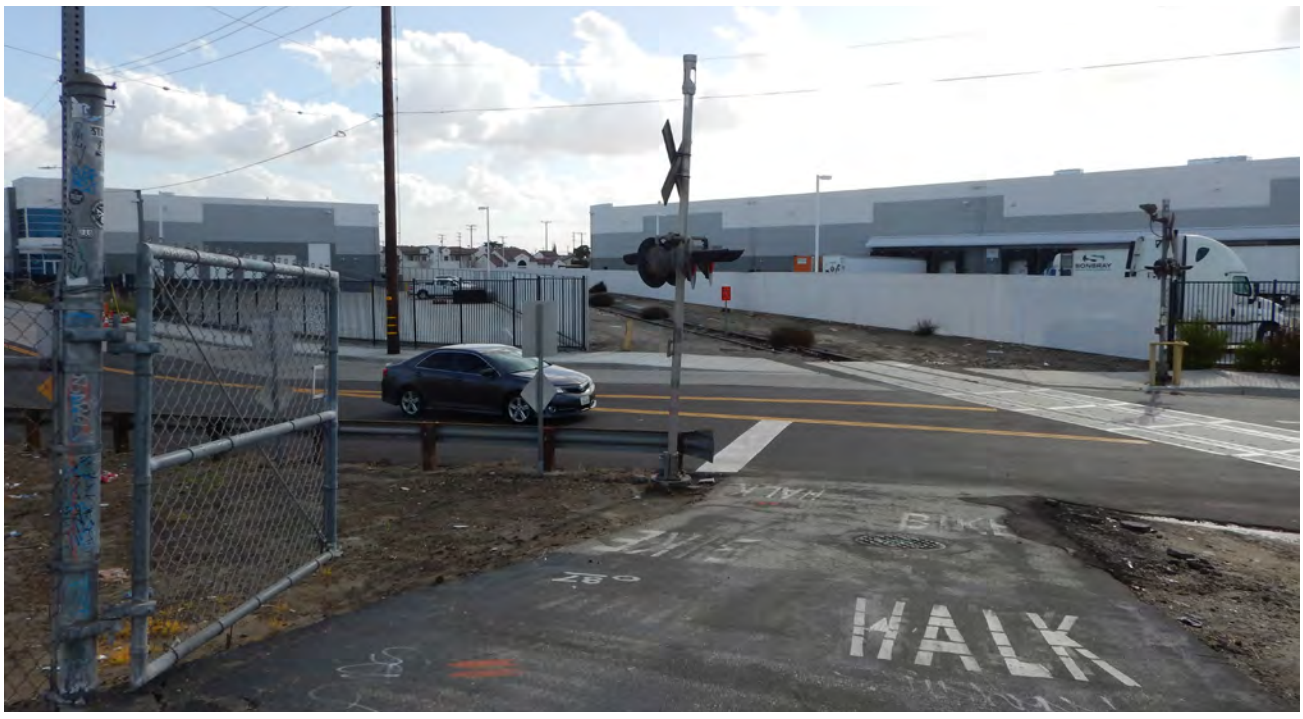
Within the project area, rail lines and bridges run along and across the Los Angeles River and surrounding areas. While the lines vary in type and frequency of use, their presence directly along the river creates frequent obstructions on the top banks of the channel. Rail infrastructure located directly adjacent to the trapezoidal channel is currently only used to move goods.

The Vernon roadways see heavy freight traffic at all hours of the day. Since the roads were not designed for biking, people on bikes share the road with large vehicles, resulting in stress, inefficient traffic, and collisions. Walking can also be challenging along the narrow sidewalks on the road bridges that cross the river.

There are shared interests between people who move freight and people who bike to create a separate path to reduce conflict.

NEEDS

- Provide reasonable separation between path users and active rail or freight traffic. The optimal design standard is to provide freight trucks with 11-12 ft. travel lanes, wide radius intersections, and no curb extensions - the opposite of an urban environment that is safe and friendly to people walking and biking. Trucks' wide turns and blind spots make it particularly difficult to safely share the road.
- Design path connections and access points with separated bike lanes on one side of the road to make crossings and conflict points predictable for freight and rail.
- Minimize disruptions to rail access and operations during and after construction.



Truck loading area adjacent to rail in Vernon.

FLOOD CONTROL

The Los Angeles River through Vernon has been heavily channelized, engineered to serve its main function through Vernon, to move stormwater and prevent flooding of adjacent industries. The Los Angeles County Flood Control District holds an easement along the River Corridor through Vernon but the U.S. Army Corps of Engineers operates and maintains this reach of the river for flood control. The Army Corps role is to ensure the channel is serving its flood protection goals and to oversee any projects occurring within the channel or impacting the channel flood capacity.

River restoration efforts are underway in the City of Los Angeles in partnership with the Army Corps and conservation groups. However, there are no current plans for restoration of the river through Vernon.

NEEDS

- Meet needs for Army Corps access to the channel for maintenance and operation.
- Meet permitting standards for construction within the channel and coordinate with all federal, state, regional, county, and local agencies that have jurisdiction within the floodway.
- Provide hydrological modeling to show that the project does not have impacts to the hydrological function of the channel. The current hydrological model provided by the Corps shows the Vernon reach of the river is deficient in size but there are no plans to increase the channel capacity.

CHAPTER 3

Opportunities & Constraints

Navigating a Complex Urban Environment

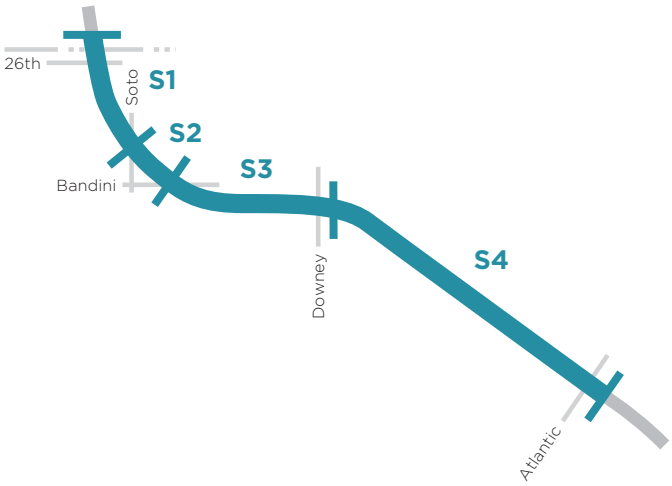
Introduction

The complex urban environment in Vernon creates both challenges and opportunities for the LA River Path. In many locations, industrial buildings, at-grade bridges, and utility corridors are located directly next to the river channel. Electrical towers partially obstruct the northern portion of the project area. Overall, increased momentum and enthusiasm for active transportation connectivity and river restoration create a more supportive environment of the LA River Path in Vernon.

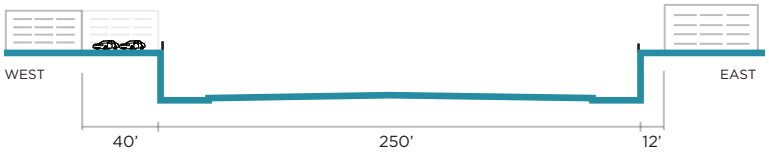
This chapter identifies the physical opportunities and constraints that guide the development of the alignment alternatives. Detailed maps of opportunities and constraints can be found in Appendix A.

Corridor Segments

The opportunities and constraints logically clump the river corridor into four segments with distinct cross-sections (Figure 3-1):

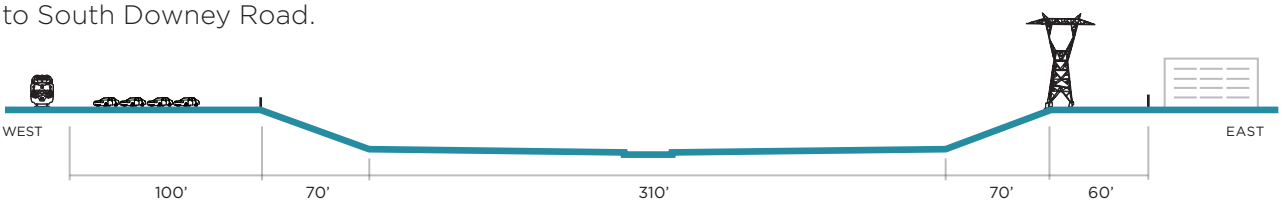


S1: North of City Limits to before Soto Street Bridge.



S2: Soto Street Bridge to Bandini Bridge.

S3: Past Bandini Bridge to South Downey Road.



S4: Past South Downey Road to Atlantic Boulevard.

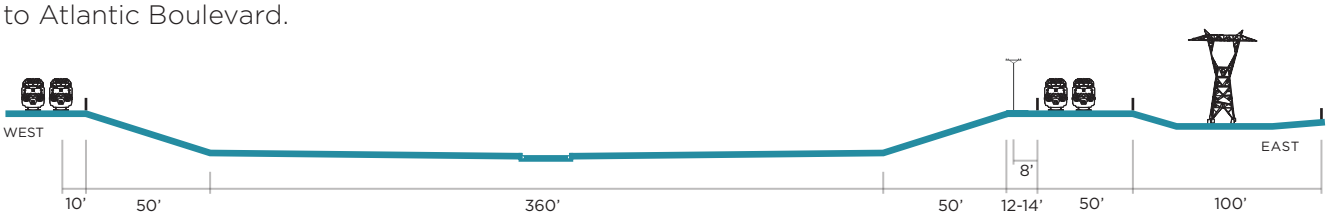


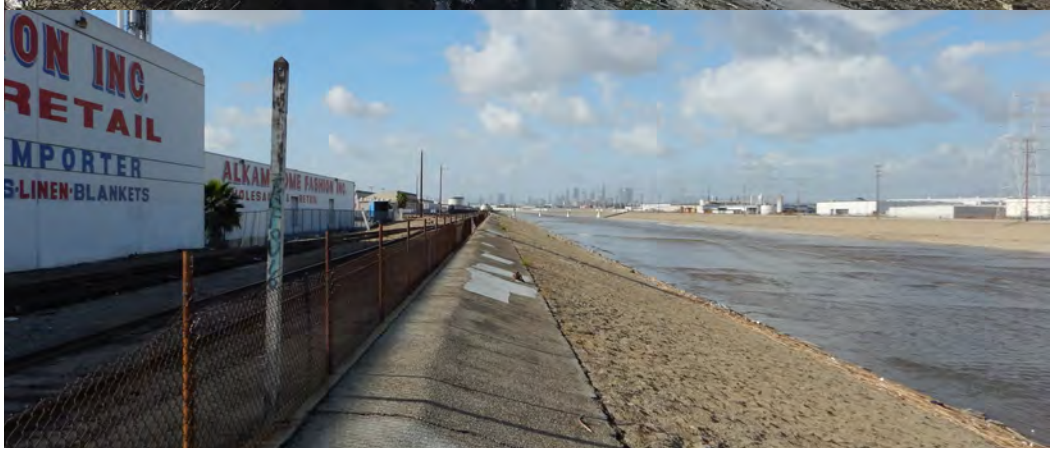
Figure 3-1: Typical existing channel segments.

S1 east bank looking north: A dense confluence of railways, bridges, and utilities.

S2 west bank looking north: Bandini Blvd bridge at the transition from a box to trapezoidal channel.

S3 west bank looking north: Chainlink security fence at top of trapezoidal channel.

S4 west bank looking north: 10' between rail centerline and fence. 8' wide sloped A/C pad along top of channel.



Opportunities & Constraints

ACTIVE TRANSPORTATION CONNECTIVITY

A central goal of the this study is to connect to the LA River Path and fill the gap in the region's bike network for both transportation and recreation. For this path to be successful, people need good access from their homes or transit stops to their jobs and destinations. Access points to the path will utilize existing road and rail bridges. However, comfortable and safe connections are needed to reach employment and transit centers. See Figure 3-2.

Opportunities

- Vernon's Bike Master Plan identifies four Class IV Separated Bikeway corridors.
- Adjacent regional bikeway corridors are at various stages of development and will provide additional access to the river for people walking and biking. The Active Transportation Rail to River Corridor Project will create an east-west path along Randolph and Slauson Avenues bringing people to the Los Angeles River in Huntington Park, just south of Vernon.
- The Harbor Subdivision is a north-south corridor identified as a proposed trail corridor in the Metro Active Transportation Strategic Plan and will provide good access to the LA River Path.
- Roadways cross the river within the project area at five locations: 26th Street, Soto Street, Bandini Boulevard, Downey Road, and Atlantic Boulevard, providing the potential for access to the river and the future path at each crossing.
- There are plans to reconstruct the 26th Street bridge. This creates opportunities for the future design to accommodate enhanced gateways to the path and or grade-separated crossings over the road and river. There is also potential for bicycle facilities on the bridge itself, providing linkage from the river to surrounding street network.
- At Bandini Boulevard and Soto Street there is a great opportunity to connect to a commercial center with services such as restaurants and restrooms for path users. This area could serve as a gateway to major employers in Vernon.
- At Atlantic Boulevard, two existing river access points are located on the east side of the bridge. One access point enters the path from the Atlantic Boulevard bridge, the other from District Boulevard, directly to the east.
- A future commuter rail line, Eco-Rapid Transit, has a planned stop in the City of Vernon. Proposed stations for the Eco-Rapid Transit train line, which will connect Los Angeles with Orange County, are located between 0.5 and 1 mile from future path access points. The station at Vernon Avenue and Santa Fe Avenue is closest to the future Bandini and Soto access point.

Constraints

- At Washington Boulevard, industrial towers partially obstruct potential access to the channel from the north side of the road and an elevated railway bridge obstructs potential access to the channel from the south side of the road.
- At 26th Street, industrial properties obstruct access to the channel on both the north and south sides of the road.
- Access to the river is obstructed by a commercial center on the east side of Soto Street and the north side of Bandini Boulevard.
- At Downey Road, a railway bridge obstructs potential access to the river on the east side of the road. The railway partially obstructs the top of channel on the west side of the road.
- At Atlantic Boulevard, rail lines partially obstruct potential access to the river channel to the north.

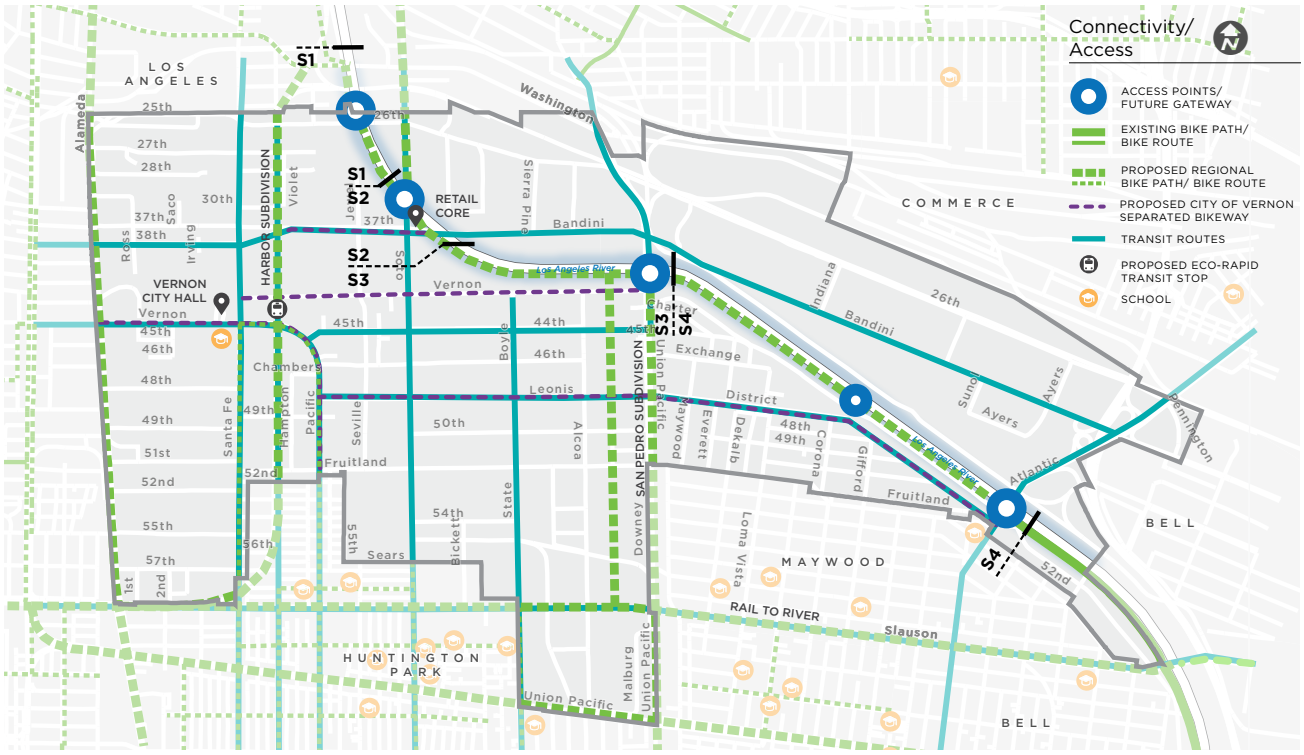


Figure 3-2: Connectivity to bikeways, transit, and major destinations.

32% of survey respondents identified Soto Street (bridge shown) as their preferred bikeway access point.

THE RIVER CHANNEL

A driving consideration for the corridor is the configuration of the LA River Channel, which has a vertical wall/box configuration in the northern part of the study area and transitions to a trapezoidal configuration in the southern part of the study area, shown in Figure 3-3.

BOX CHANNEL

- Narrower channel and vertical walls.
- The sides of the channel are at 90-degree angles and composed of sheet pile (as opposed to concrete).
- Two low-flow channels are located on either side of the channel; water is diverted to these channels via a peaked center of channel that slopes to the sides.
- Periodic drains are located on the vertical walls at irregular intervals, draining directly into the low-flow channels.

Opportunities

- Future path improvements could include a flood wall to mitigate the problem encountered by The Army Corps of Engineers. They report that the channel volume is not sufficient for anticipated future flood levels.
- Occupies less space in a very constrained corridor and provides more space at the top of bank for placing path elements.
- The sheet pile walls are easier to cut and form, but outdated. The Army Corps of Engineers is motivated to upgrade it to a concrete wall.

Constraints

- The vertical walls limit design options for integrating the path into the channel.
- With regard to flood control, there is less margin for error; any new elements will affect the waterline.
- While the box channel allows more space at the top of the bank, some properties have built directly to the edges of the channel, limiting available space outside of the channel.

TRAPEZOIDAL CHANNEL

- Wider channel and sloped walls.
- A low-flow pilot is located at the center of the channel. Curbs are located every 1,000 feet through this portion to direct water flow to the center of the channel.
- Periodic drains are located on the sloped bank at irregular intervals.

Opportunities

- There is more room to work with within the channel due to the wider shoulder space.
- In most places, there is a very narrow edge at the top of bank, and this space is often occupied by other uses (e.g., utilities, parking, rail).

Constraints

- Structural changes to any part of the wall will trigger replacement of the whole wall panel (top of wall to bottom channel). This can be very expensive.
- Curbs within the channel direct water flow to the center of the channel.
- Stormwater outflows serve to drain down the side of the channel wall.

Figure 3-3: Channel Configuration - segments 1 and 2 have box channels with low bridges, while segments 3 and 4 have trapezoidal channels.

Segments 1 and 2 have box channels with low bridges (shown S1 rail bridges north of 26th St), while segments 3 and 4 have trapezoidal channels.

RAILWAYS

Vernon is an important corridor for rail. An elevated Metrolink commuter rail crosses the LA River in segment 1 and freight lines cross in segments 1, 2, and 4. Freight rail lines run parallel to the river in segments 3 and 4, flanking the edge of the channel on the west bank. See Figure 3-4.

There is a need for creative navigation of barriers created by railway bridges and rights-of-way.

Opportunities

- Freight and commuter rail bridges present potential opportunities for a cantilevered path across the river.
- If rail service was no longer needed along an existing bridge, the rail bridge could be converted to a bicycle/pedestrian bridge.
- Along the trapezoidal channel wall in segments 3 and 4 there is adequate vertical clearance for a path under the rail bridges.
- An existing maintenance road on the west bank crosses under Downey Road and the adjacent rail bridge.
- Redondo Junction: unique opportunity for views toward 25-track roundhouse.

Constraints

- No vertical clearance under the at-grade rail bridges.
- Railroad operators require 24' vertical clearance from the top of the rail which would require significant ramping to go over the at-grade rail bridges.
- Rail lines along the top of the channel bank in segment 4 limit access to the path between Downey and Atlantic Boulevards.
- Existing rail lines and their rights-of-way extend to the edge of the river channel in the southern segment of the project area with trapezoidal channels. Freight rail operators prefer large setbacks for paths adjacent to active rail lines.
- Potential conflicts with transportation of hazardous materials.

UTILITY CORRIDORS

Los Angeles Department of Water and Power has a transmission line corridor that transverses the river through Vernon. A conductor's survey is needed to assess clearance of proposed structures under transmission lines. See Figure 3-5.

Opportunities

- Coordinate path construction efforts with needed utility upgrades. Transmission lines along the river generally have a 50-year life span and the LADWP transmission lines are 85 years old.
- Potential to align path through utility towers by reinforcing existing tower structure.
- Rethink industrial connection to the river with new sources of energy and the potential to recirculate runoff without draining into the ocean.

Constraints

- Crossing under overhead powerlines limits potential bridge construction and requires careful design and coordination.
- Undergrounding utility corridors is expensive.

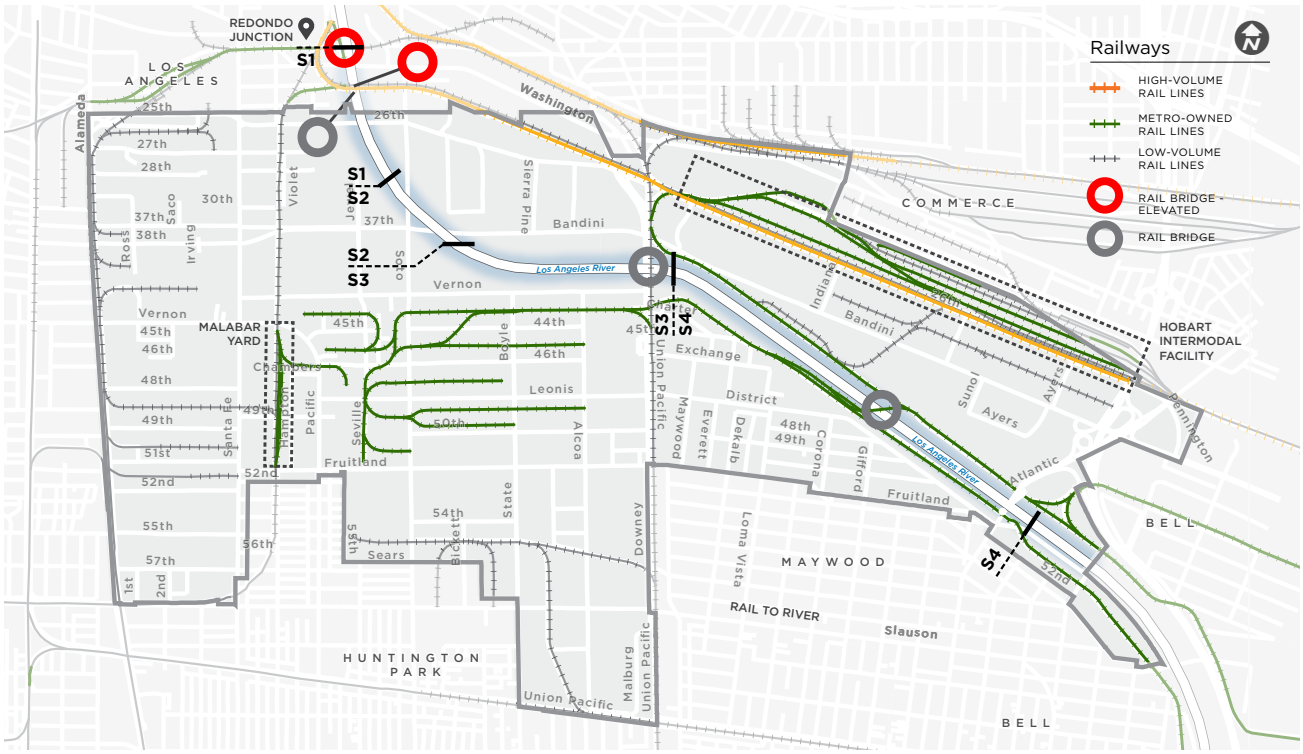


Figure 3-4: Railways and rail bridges.

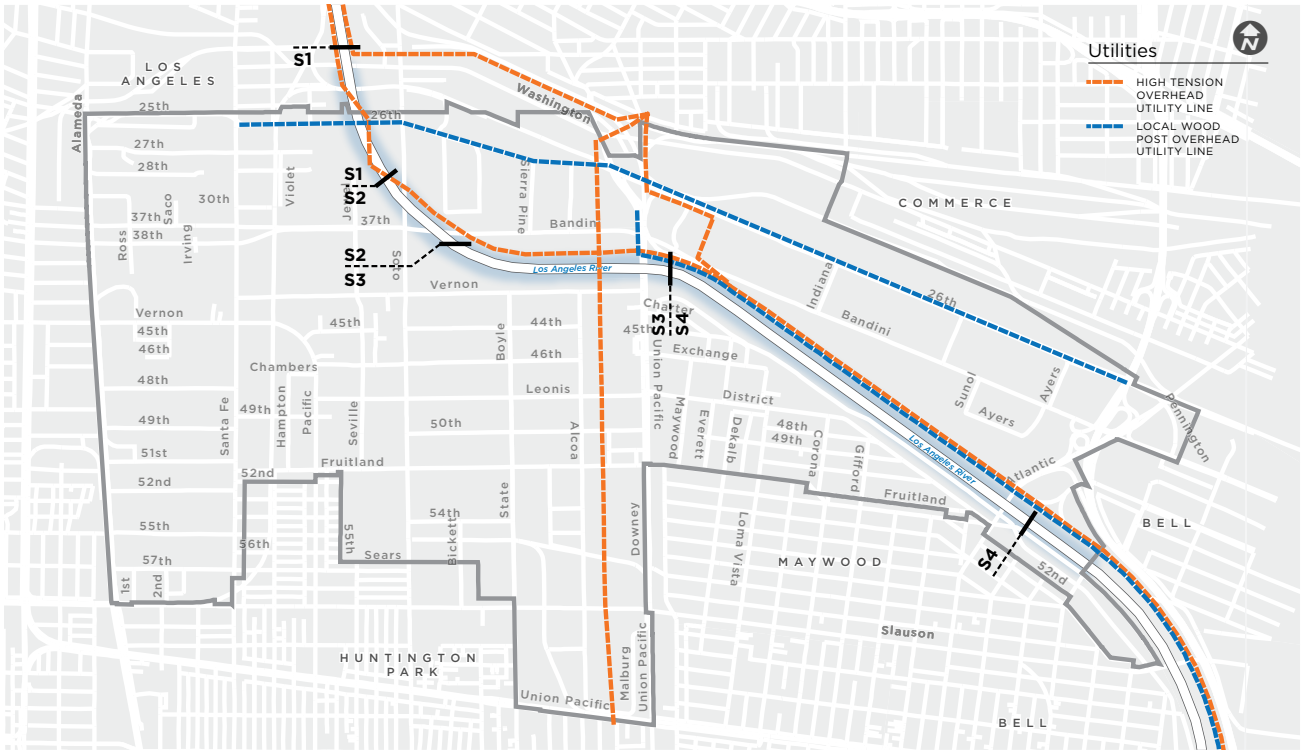


Figure 3-5: Utility lines.

PROPERTY OWNERSHIP

Ownership of the Los Angeles River corridor through Vernon is a mix of private and public ownership, as shown in Figure 3-6.

Opportunities

- Los Angeles County Flood Control District has an approximately 350'- to 500'-wide easement that encompass the length of the project study area.
- The channel and bank in segment 4 is 100% publicly-owned.
- Commercial and industrial businesses have parking lots along the banks of the river with minimal permanent structures.
- Privately-owned, narrow, undeveloped parcels provide an opportunity to work with property owners to develop access points.

Constraints

- Privately-owned parcels extend into the river channel between Washington Boulevard and Downey Road. Coordination and approval from private owners for a path is required to obtain a USACOE 408 permit.
- The publicly-owned parcels north of Downey Road largely follow high power transmission lines and towers, which limits overhead clearances.

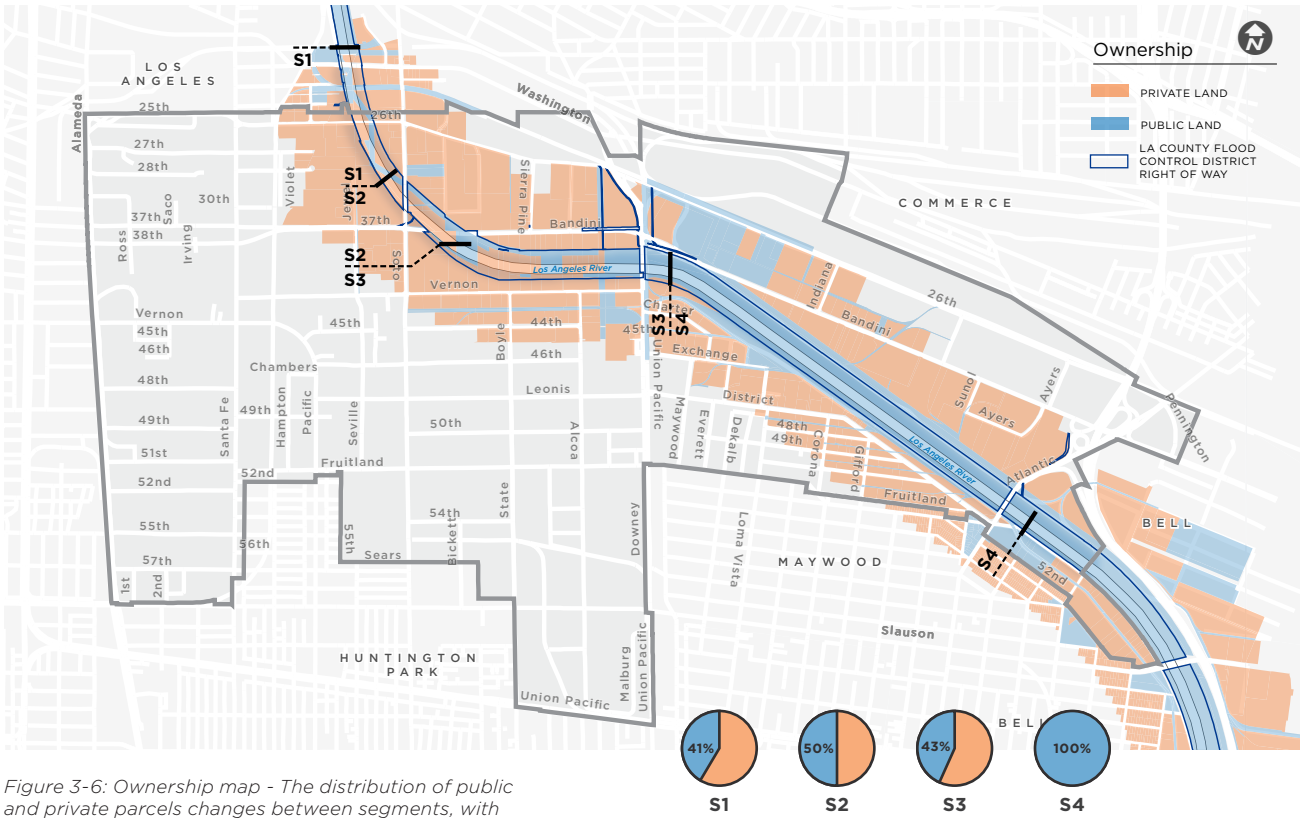


Figure 3-6: Ownership map - The distribution of public and private parcels changes between segments, with segments 1 through 3 featuring large percentages of private ownership.

Many properties along the box channel are privately owned and several have built up to the channel wall.

CHAPTER 4

EVALUATION APPROACH

A Framework for Selecting the Best Path

Introduction

There are many options for placing a path along the Los Angeles River Channel in the Vernon study area: along east bank or west bank, over the central channel, or along the channel bottom. Separate from the alignment location, there are also many ways to integrate the path into the channel through specific cross-section types and design choices.

Alignment evaluation involves a process of considering the pros and cons of each alignment to identify the approach that provides the most "bang for the buck", with the fewest obstacles and costs, while providing the highest quality experience and meeting the goals of the project. The purpose of this analysis is to provide information to help focus attention on the design solutions that meet multiple goals.

The evaluation criteria outlined in this chapter serve to first evaluate cross-section typologies in order to focus the feasibility study effort to develop and compare path alignments and channel crossing alternatives.

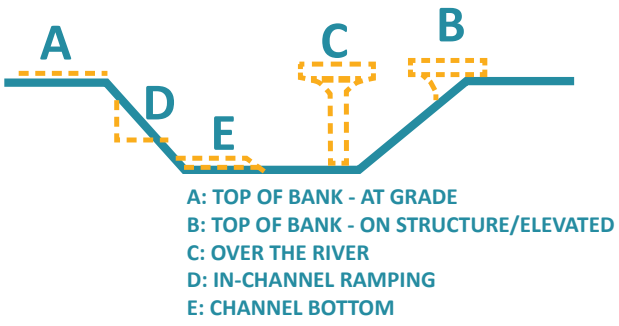


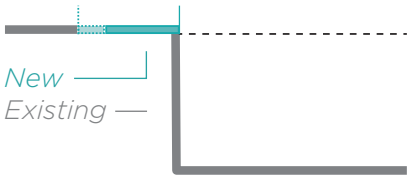
Figure 4-1: Cross-section typologies

Cross-section Typologies

Throughout the corridor, the path can be placed within the channel in different ways. Each approach results in a different cross-section, which illustrates the vertical and lateral placement of the path relative to the channel. The wide range of cross-section typologies outlined below can be applied at different points along the channel, and combined to create a continuous alignment.

A - TOP OF BANK: AT GRADE

The path sits at the top of the channel, on the surface, with no structure required.

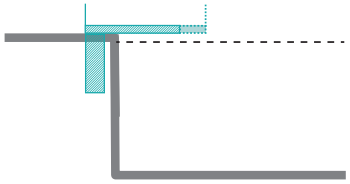


At Grade (Box Channel): Requires a railing on the channel-facing side of the path.

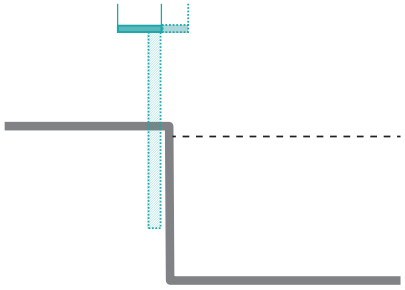
At Grade (Trapezoidal Channel): Does not require a railing.

B - TOP OF BANK: ON STRUCTURE / ELEVATED

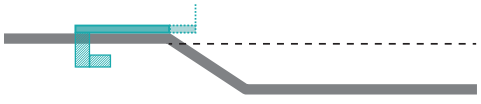
This family of cross-sections includes various methods for structurally supporting or attaching the path, excluding a new bridge.



Cantilevered to Bank (Box Channel): The path is on a cantilevered structure fully overhanging the channel, but supported by piles located behind the existing channel wall.



Elevated (Box Channel): With this type of structure, the path would be elevated on piers at the top of the channel.



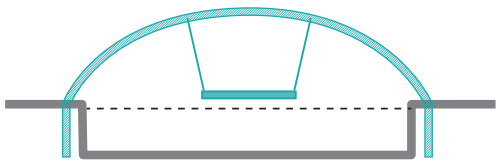
Cap (Trapezoidal Channel): The path is on a cantilevered structure that partially overhangs the bank. This allows for the possibility for the cantilever element to be a lighter material.

Incise (Trapezoidal Channel): The path sits on a ledge created by an incise cut into the channel wall. The path is below the high water level, so may be closed during seasonal floods. This design increases overall flood capacity.

Rail line crosses the LA River north of Washington Boulevard

C - OVER THE RIVER

This family of cross-sections includes the bridge types that would carry the path across the channel or over a road.



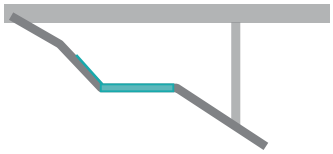
Suspended: The path is on a deck that is suspended over the channel by an arch or cable stay bridge. There are no support piers in the channel. The vertical nature of this type of bridge presents opportunities for iconic and visible design and does not affect the water levels.

On-piers: The path sits on a new bridge that is independently supported by piers in the channel, running parallel to rail bridges.

Cantilevered: The path is on a structure that is attached to an existing bridge, hanging off the side of it.

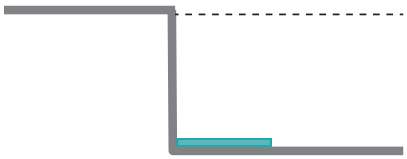
D - IN-CHANNEL RAMPING

Where the path changes grade due to a street crossing or bridge, the path will ramp up or down at a maximum 5% slope within the channel. Grade separation under a roadway introduces safety concerns and lighting challenges. Grade separation over a roadway provides a more open experience with better views, but disconnects users from the surrounding city because more space is required to ramp up to meet a roadway.



E - CHANNEL BOTTOM

The path sits at the bottom of the channel, outside of the pilot channel. The path would be closed during flooding season but would be open the majority of the year. Currently the pilot channel sits on the outer edge of the channel, so realignment of the pilot channel would be required to accommodate a path at the outer edge of the box channel.



Channel Bottom (Box Channel)

Channel Bottom (Trapezoidal Channel)

Evaluation Criteria

Any of the alignments would implement the goals outlined in Chapter 1 to some degree. The evaluation criteria are used to evaluate the performance of each potential segment, and provide qualitative guidance to inform a discussion of trade-offs. To evaluate the full range of alternatives and design options, three categories were used to focus the community discussion on weighting each alternative.

CATEGORY 1: FUNCTION

Is it a good idea? Would the path in this location be safe, potentially allowed by the property owner, and make the needed connections? Would the alignment separate freight traffic from people who are walking and biking, as desired by many stakeholders? The criteria used to address this question should assess the most fundamental characteristics of the alignment, and whether it should be evaluated in more detail.

CATEGORY 2: FEASIBILITY

Would it be feasible? Would a path in this location be reasonably feasible to implement with manageable risk and effective use of public funds? The criteria used to address these questions would consider cost, permitting, and the difficulty of solving known design problems.

CATEGORY 3: DESIRABILITY

Would it be great? Would a path in this location create a desirable connection and place, drawing users and making positive contributions to the community? Would the design be inspiring and iconic? The criteria used to address these questions would consider the benefits to the community and the environment.

The general evaluation rating method is shown in Table 4-1 on the following pages. Each alternative was screened beginning with Category 1 and progressing to Category 3. The goal of this exercise was to filter potential alignment alternatives toward a core alignment that best suits the needs of the community.

Category 1: Function

CRITERION	DEFINITION	APPROACH
Safety Related to Flooding	Some physical constraints of the corridor and the river itself could affect the safety of path users.	Consider danger to path users from flooding and access constraints and capacity to mitigate these issues through path design.
Ownership Feasibility	The alignment traverses land that is currently under ownership of a variety of property owners: Railroad, LA Flood, US Army Corps of Engineers, private owners, and other public agencies. The process for acquiring access or ownership of the land can be more challenging with some owners than others. Where the path passes through or adjacent to private property, business impacts need to be mitigated.	Assess process and difficulty with acquiring land from the land owners involved. Identify areas where land ownership is inordinately challenging and may prove to be a non-starter for regard to implementation.
Connectivity	The location of the path, combined with access points, determine whether the path will serve the transportation needs of the project.	Identify any missing links or key destinations that the alignment would not serve.
Separation of Uses	Different alignment options provide varying amounts of separation of people walking and biking from freight and other traffic.	Determine which alignment best balances safe separation with connectivity and access at key points.

Category 2: Feasibility

Ease of Permitting	Permitting for facilities in sensitive environmental areas involves addressing regulations from several jurisdictions. Approval may require time-consuming and expensive design and mitigation measures. Different options may involve different permitting agencies.	Preliminary assessment of the agencies that would require permits, and identify any particularly difficult permitting issues.
Obstructions	Within the built environment, there are some existing elements that are more difficult and costly to remove or relocate.	Identify utilities, poles, buildings, bridge abutments, and structures. Categorize which could be relocated.
Order of Magnitude Cost	Even before beginning design, path planners can identify elements of a path that will be more expensive to construct. Reconstructing slope protection or constructing piles and cantilevered structures may prove to be more expensive than those designs that travel along level grades.	For the purpose of the evaluation, cost assumptions are: At grade: $ Channel Bottom/ Cantilever: $$ Piers/on structure: $$$

Category 3: Desirability:

User Experience	The quality of the proposed path, from the perspective of the user, will affect how people value the path as part of the community. This criterion identifies the ability of the alignment option to accommodate groups of people traveling together and provide opportunities for enjoyment and interpretation of the surroundings. It considers potential views as well as characteristics of the alignment context such as noise and air quality.	Estimate potential width of path corridor, grade changes, enclosure, and opportunities for landscape, public art, and amenities.
Inspiring Design	Vernon community members and industry leaders have expressed interest in a bold and inspiring path design to highlight Vernon's dramatic urban form.	Use stakeholder feedback to gauge which path alignment is inspiring and bold.
Connection to the River	Paths provide an opportunity to address the human need to experience nature in order to have a physically and mentally healthy life. Even small encounters with rivers and street trees are an asset to the health of a community.	Assess the opportunity for direct access, and the scale and quality of views of the river from the path.
Safety	The principles of Crime Prevention Through Environmental Design (CPTED) emphasizes creation of "defensible space" clearly delineating ownership of a place and avoiding creation of hiding places. This criterion is focused on aspects related to the path alignment and presumes good path management, design, and enforcement.	Consider potential access points, whether the path will be visible from surrounding activated areas, flood risk to path users, and access constraints.
Connectivity	The connectivity and directness of the path between area destinations determine how useful the path will be for daily trips. Destinations include schools, parks, residential, commercial, and employment areas, as well as access to other paths.	Map potential access points and the destinations that would connect people to them.

Table 4-1: Selection Criteria

Cross-section Evaluation

For each category the potential cross-sections were measured using the best available tools, which included GIS data, local staff knowledge, in-field observation, and professional judgment. An evaluation matrix was developed to summarize the results in a simple red, yellow and green scoring. Red indicates least safe, very difficult or very expensive; yellow indicates moderately safe, moderately difficult or expensive; and green indicates safe, not difficult, or least expensive. The evaluation matrix is presented in Table 4-2

If the cross-section typology had six or more red criterion, then it was not considered as a potential alignment because the alignment would not meet the project goals. These include:

- Channel Bottom
- West Bank - Remove rail lines
- East Bank - LADWP Transmission Corridor

Chapter 6 identifies the top three alignment alternatives that were developed based on the results of the cross-section evaluation.

	Category 1: Function				Category 2: Feasibility			Category 3: Desirability				
	Safety Related to Flooding	Ownership	Connectivity	Access	Ease of Permitting	Obstructions	Cost	User experience	Inspiring Design	Connection to LA River	Safety	Compatibility with adjacent land uses
BOX CHANNEL												
West Bank - At grade (with existing structures)	🟢	🔴	🟡	🟡	🟢	🔴	🟢	🔴	🔴	🟢	🟡	🔴
West Bank - At grade (with available land)	🟢	🟡	🟡	🟡	🟢	🟢	🟢	🔴	🔴	🟢	🟢	🔴
West Bank - Cap	🟢	🟢	🟡	🟢	🟡	🟡	🟡	🟡	🟡	🟢	🟢	🟢
West Bank - Elevated	🟡	🔴	🟡	🟢	🟢	🟢	🟡	🟡	🟡	🔴	🟡	🟡
East Bank - At grade	🟢	🟡	🟡	🟢	🟢	🟡	🟢	🔴	🔴	🟡	🟡	🔴
East Bank - Cap	🟢	🟢	🟡	🔴	🟡	🟡	🟡	🟡	🟡	🟢	🟢	🟢
East Bank - At grade utility corridor	🟢	🟡	🟡	🟢	🟡	🟡	🟢	🟢	🟢	🟡	🟢	🟢
East Bank - Elevated	🟡	🟡	🟡	🟡	🟢	🟢	🟡	🟡	🟡	🔴	🟡	🟡
Central Channel - Suspended	🟡	🟢	🟢	🔴	🟡	🟢	🔴	🟢	🟢	🟢	🟡	🟢
Central Channel - On piers	🟡	🟢	🟢	🔴	🟡	🟢	🔴	🟢	🟢	🟢	🟡	🟢
Channel bottom	🔴	🟢	🔴	🟢	🔴	🟢	🟡	🔴	🔴	🟢	🔴	🟢
TRAPEZOIDAL CHANNEL												
West Bank - Fill	🟢	🟢	🔴	🟡	🟡	🟢	🟡	🟡	🟡	🟢	🟡	🟢
West Bank - Incise (cut)	🟢	🟢	🔴	🟡	🟡	🟡	🟡	🟡	🟡	🟢	🟡	🟢
West Bank - Remove rail lines	🟢	🔴	🔴	🟢	🔴	🔴	🔴	🟡	🟡	🟢	🟢	🔴
East Bank - Channel adjacent UTL corridor with overhead lines	🟡	🟡	🔴	🟢	🟡	🟡	🟡	🟡	🟡	🟢	🟢	🟢
East Bank - Channel adjacent UTL corridor with underground lines	🟡	🟡	🔴	🟢	🔴	🟢	🔴	🟢	🟢	🟢	🟢	🟢
East Bank - Large UTL corridor with LADWP transmission lines	🟡	🔴	🔴	🟢	🔴	🔴	🟢	🟢	🟢	🔴	🟢	🔴
East Bank- Large UTL corridor with underground transmission lines	🟡	🔴	🔴	🟢	🔴	🔴	🔴	🟢	🟢	🔴	🟢	🔴
Channel bottom	🔴	🟢	🔴	🔴	🔴	🟢	🟡	🔴	🔴	🟢	🔴	🟢
CROSSINGS												
At-grade crossing (26th Street)	🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟡	🟡	🟢	🟢	🔴
Elevated Road/rail crossings	🟢	🟢	🟡	🟡	🟡	🟢	🔴	🟡	🟡	🟡	🟡	🟢
Bridge - cantilevered	🟢	🟡	🟡	🟡	🟡	🟢	🔴	🟡	🟡	🟡	🟡	🟢
Convert rail bridge to bike ped bridge	🟢	🔴	🟡	🟢	🔴	🟢	🟡	🟡	🟡	🟡	🟡	🟢

Table 4-2: Cross-section evaluation matrix

CHAPTER 5

PATH DESIGN + VISION

Vernon's Unique Identity and Path Concept

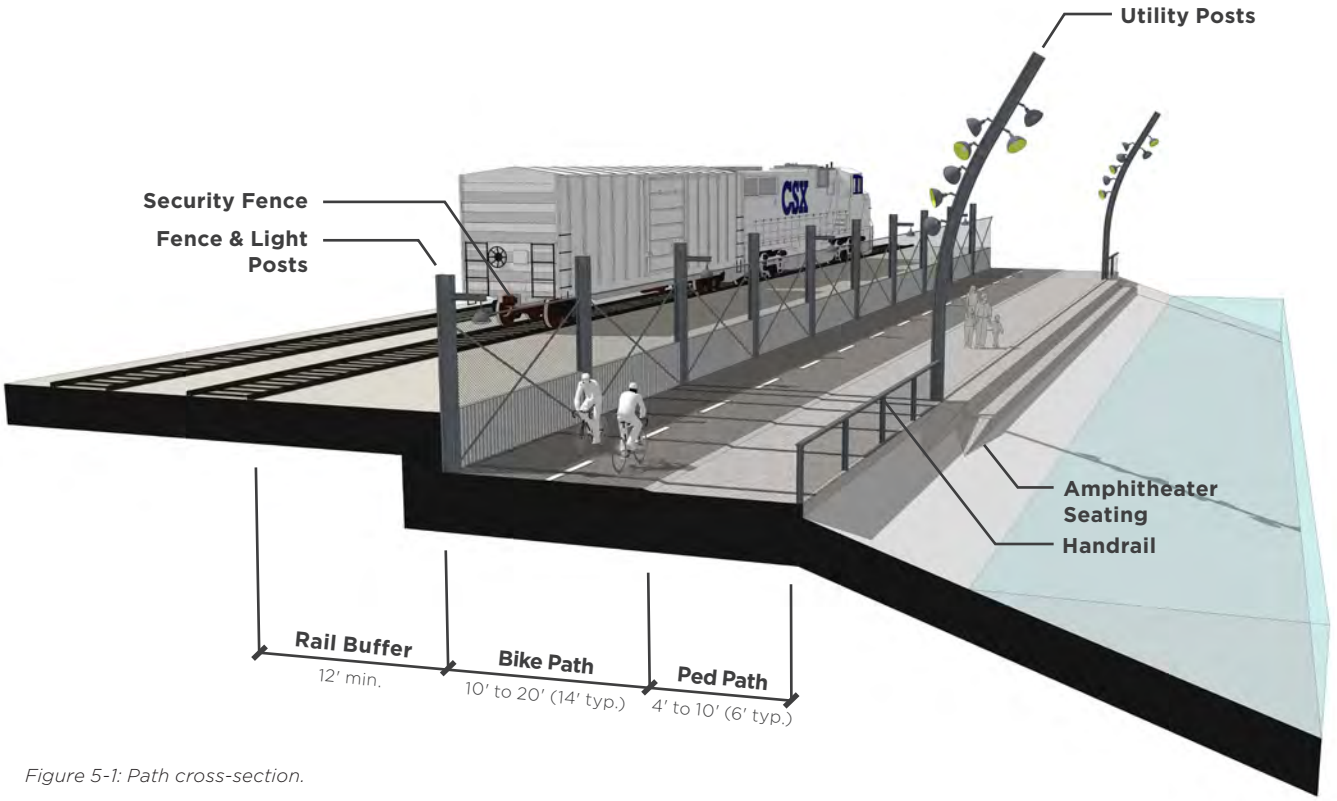


Figure 5-1: Path cross-section.

Design Overview

Path design often involves fitting a relatively slender path into a constrained existing environment. With the LA River Path in Vernon, the design process involved development of a wide range of alternatives: addressing the path's location relative to the channel (east or west bank), how to physically integrate the path into the existing structure, and how to best make the most of the opportunities in the study area while addressing needs.

This chapter provides an overview of the path design concept and guidelines. One of the key needs addressed through design is public safety. The design elements discussed in this chapter reflect best practices in Crime Prevention Through Environmental Design (CPTED) and consider potential flood levels.

This section of the LA River Path has a high future demand for active transportation. Though the path width will vary based on anticipated demand and physical constraints, the preferred typical path cross-section is a 14'-wide bike path with an adjacent 6'-wide pedestrian path, as shown in Figure 5-1. The bike path width provides for a 10'-wide path of travel with a 2'-wide clear shoulder on each side. The adjacent pedestrian path helps to alleviate safety concerns between fast-riding cyclists and people walking or running as described by people using the existing LA River bike path.

This cross-section width meets and exceeds Caltrans and AASHTO guidelines for a Shared Use Paths.

Design Concept

FRAME, INDUSTRY, EFFICIENCY

The economic & cultural significance of the LA River corridor in Vernon conjures a strong sense of place that should be celebrated and highlighted through design. Over three miles, the path alignment dives under, along, and through an impressive context of industrial vertical trusses, soaring concrete and steel bridges, rail yards, wide views to downtown LA, and the uniqueness of the LA River itself.

The design intent is to complement the context, creating a harmonious aesthetic while layering in industrial materials and framing views to the industry and river.

- Frame: spaces that open up views and direct eyes towards or across the river
- Industry: details with aesthetic, material, and functional simplicity
- Efficiency: multi-functional elements that create more with less

DESIGN GUIDELINES

The design of the LA River Path in Vernon includes the following key considerations:

USERS
The key user groups using the path and the features they require.

PATH FUNDAMENTALS
The spatial and programmatic guidelines for the path, transitions, crossings, and setbacks.

ELEMENTS & AMENITIES
The aesthetic, material, and functional aspects of path features.

BRIDGE DESIGN
An overview of the structural bridge options for the path.

GATEWAYS & POCKET PARK
Concept designs for access points and parklet opportunities.

Users

The LA River Path in Vernon will serve a wide array of users with a variety of abilities and needs. The collection of users below illustrates a baseline cross-section of users to be accommodated through design.

WALKERS:

Speed of travel: **1 to 3 mph**

Need wider areas for traveling in groups.

Comfortable on sidewalks and paths that are grade separated from vehicles and fast active users.

RUNNERS

Speed of travel: **5 to 9 mph**

Prefer off-street paths with consistent lighting.

Fast runners may prefer to share space with cyclists during periods of high pedestrian traffic.

WHEELCHAIR USERS

Non-motorized speed of travel: **1 to 3 mph**

Motorized speed of travel: **Up to 5 mph**

Comfortable on sidewalks and paths that are grade separated from vehicles and fast cyclists.

CASUAL & NEW CYCLISTS

Speed of travel: **6 to 12 mph**

Casual & new cyclists prefer riding on off-street facilities.

Compared to experienced cyclists, casual cyclists are more likely to utilize rest areas.

EXPERIENCED CYCLISTS

Speed of travel: **12 to 25 mph**

Very experienced cyclists may chose to use roadways over paths.

Most prefer fewer crossings, separated paths, and room to pass slower cyclists.

E-BIKE USERS

Speed of travel: **16 to 20 mph**

E-bikes typically have a maximum speed of 20mph.

Most prefer off-street facilities, separated paths, and minimal crossings.

Figure 5-2: Path users

Path Fundamentals

ACCESSIBLE PATH DESIGN

The goal of accessible path design is to create a facility that can be used by the broad range of users outlined in this chapter. To accomplish this goal and ensure continuity along the path, special attention needs to be given to slopes, turns, clearances, and markings.

PATH WIDTH

The width of the path should vary based on anticipated user demand and physical constraints. At a minimum, three standard cross-sections should be considered:

- High-demand: 20'-wide bike path with an adjacent 10'-wide pedestrian path. This may only occur at high demand access points.
- Typical: 14'-wide bike path with an adjacent 6' wide pedestrian path.
- Constrained/low-demand: 10'-wide bike path with an adjacent 4'-wide pedestrian path. This condition should only be utilized where the typical widths cannot be accommodated and user demand is low.

SLOPE/GRADE

In order for the facility to be accessible to the greatest number of users possible, design the path so that the lowest grade possible is used.

Paths used by bicyclists should not exceed 3%, but may be up to 5% for very short distances. Provide additional path width of 3' to 5' where grades exceed 3%, to provide additional space for safe maneuvering. When slopes are present for prolonged lengths, provide periodic flat areas for path users to rest.

TURNS

Sharp turns should be avoided when designing paths, as it can increase conflicts. Sharp turns (typically less than a 30' radius) create unsafe conditions by causing users to encroach on other users' path of travel. When a larger radius is not possible, the path should be widened to minimize potential conflicts at turn locations. Curve warning signs should be placed in appropriate locations to alert users of upcoming conditions.

Accessible slopes may require longer ramps, but greatly improve rider experience and safety.

Gentle turns should have long site lines to help users see potential obstacles.

HORIZONTAL CLEARANCES

A minimum 2'-wide shoulder is required adjacent to the bike path, which creates additional space to mitigate conflicts by providing space for those who must move off the facility.

VERTICAL CLEARANCES

Vertical clearance, the space above the path, is an often overlooked design consideration. Fixed objects, such as tree limbs, signs, wires, or structures, should not extend into the vertical clearance of the path. An ideal vertical clearance is 10' to 15', with a minimum of 8'. in constrained locations. Where maintenance or emergency vehicles are anticipated, a greater vertical clearance may be desired. Any vertical object that is greater than or equal to 3' in height should be offset to the side.

PATH MARKINGS

Edge lines should be marked on paths that are likely to be used in the evening, to increase path edge visibility in low-light conditions.

Centerline markings may be used for clarifying user positioning or preferred operating procedure; with a solid line indicating no passing and a dashed line indicating user placement within the path travel lane. Where there is a sharp blind curve, painting a solid yellow line with directional arrows reduces the risk of head-on collisions.

A solid yellow line should be used to separate directional flows 50' in advance of a transition or mixing zone, as passing should be discouraged in advance of an intersection or path connections.

Path segments with a high volume of bidirectional traffic should include a centerline. This can help communicate that users should expect traffic in both directions and encourage users to travel and pass correctly.

Vertical and horizontal clearance allows for clear site lines.

Centerlines, edge lines, and directional arrows.

TRANSITIONS & MIXING

Throughout the corridor there are locations that demand special attention and consideration. These include roadway crossings, transitions to roadways, and at access points/gateways. In these locations, additional design features are needed to create a safe and continuous path.

CROSSINGS

Several local streets cross over the channel. At these key crossings, it is important to assess whether or not path access is needed and how the path will pass over or under the street.

Grade-separated crossings have the advantage of separating path users from the vehicular traffic on the roadway, but may not provide full access to destinations.

At-grade crossings of the streets provide the most direct access for path users, but impact freight and vehicular traffic, and result in a less safe and less desirable user experience. Depending on the location, at-grade crossings may not connect to on-street bicycle facilities or existing sidewalks.

Path separation and access need to be balanced. For this corridor, the priority access point is at the Soto St. commercial area. Providing access to both sides of the river is also very important, and doing so will reduce the need for users to travel on-street to reach their destination. Some degree of out-of-direction travel on the path is preferable to using unsafe existing at-grade crossings.

Grade-separated crossing

At-grade crossing

TRANSITION TO ROADWAYS

Where the access to the path connects to a roadway, it is advisable to ramp between facilities. Curb ramps are a design element that allow cyclists and pedestrians to make a smooth transition from street to path. There are a number of factors to be considered in the design and placement of curb ramps. Properly designed curb ramps ensure accessibility and connectivity between facilities. The level landing at the top of a ramp shall be at least 4' long and at least the same width as the ramp itself. The transition should be complemented with appropriate advisory signage and intersection treatments.

The suggested ramp slope is no more than 1 unit rise over a 12 unit run (1:12), with a maximum cross slope of 2.0%. The ramp edge should be marked with a tactile warning device to alert path users to changes in the facility design.

MIXING ZONES

The transition between bikeway and pedestrian paths should be as seamless as possible. Though proposed as side-by-side facilities, mixing between cyclists and pedestrians will occur at access points/ gateways and parklets. It should be clear to all path users that they are approaching a potential conflict zone, with an appropriate length transition zone where crossing patterns are anticipated. Appropriate advisory signage must be installed to prepare users for a safe transition between the two facility types.

Transition to roadway with small trailhead and curb ramp.

Cyclist approach to mixing zone indicated by change in pavement surface.

TREAD SEPARATION

Tread separation helps maintain separate paths for pedestrians and cyclists by physically separating them. This may be accomplished by a planted buffer, curb, or split-level separation. Split level separation elevates the pedestrian path slightly above the bike path (minimum of 4") with a 1' to 2' rideable curb between them.

PAVEMENT MARKINGS

Pavement markings through transitions and mixing zones guide bicyclists and pedestrians on a safe and direct path through the crossing and provide a clear boundary between the paths of through-bicyclists and through-pedestrians.

Striping may include bicycle lane markings, high-visibility crosswalks, and colored-concrete crosswalks. Other options include inlays or paving surface changes to signal critical areas.

HIGH VISIBILITY CROSSWALKS

A marked crosswalk along a path signals to bicyclists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. High visibility crosswalks, also called continental or ladder crosswalks, improve visibility of both the crosswalk and people in the crossing.

YIELD LINES

A yield line, also known as "shark's teeth", is a type of pavement marking used to inform path users of the location where they need to yield and give priority to other users, such as where two paths intersect. Yield line/shark's teeth should continue throughout the path intersections.

Yield lines may be accompanied with signage to further communicate the appropriate location to yield, as well as which path users have the right-of-way.

Split-level tread separation.

Yield lines and signage at a busy crossing.

SETBACKS

Portions of the path would run adjacent to BNSF Railway Company (BNSF)-operated low-speed freight rail lines. Guidelines by the Rails-to-Trails Conservancy for Rails-with-Trails (RWT) should be followed. Each segment must be planned and designed in detail to anticipate the specific operational and safety requirements and establish special design features and management and operational practices to maintain a safe operating environment. Although RWTs currently operate along train corridors of varying types, speeds, and frequencies, there is no consensus on appropriate setback recommendations. The term "setback" refers to the distance between the paved edge of a RWT and the centerline of the closest active railroad track.

The minimum distance between the operating railroad and obstructions such as utility and signal poles, bridges, retaining wall structures, and fences is governed by the dynamic envelope of rail operations and measured in feet from the centerline of the track. The minimum dynamic envelope is 8.5'. In segment 4, a fence along the top of bank is approximately 10' from the rail centerline. BNSF requires 12' setback for construction adjacent to their tracks. This study assumes a 12' setback adjacent to rail lines and provides high-security fencing to separate and discourage trespassing.

The popular Springwater-OMSI Trail on the Willamette River in Portland,OR is a rail-with-trail. The trail parallels a track used for daily freight and occasional excursion train traffic.

Elements & Amenities

DESIGN ELEMENTS

The path design is comprised of three basic components that reinforce the concept, illustrated in Figure 5-3. It is critical that in keeping with the spirit of place, these elements are efficient and economical, each serving multiple functions. These elements include:

- Posts
- Edge Conditions
- Ground plane

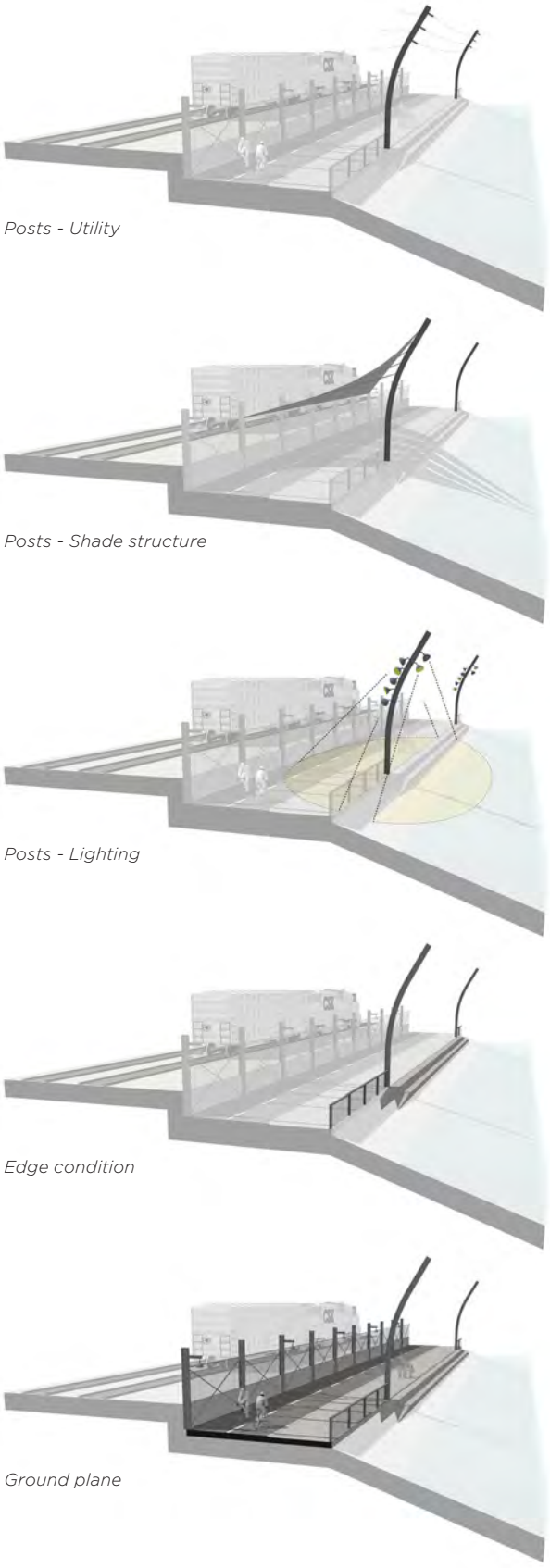


Figure 5-3: Design Elements.

POSTS

The posts form the backbone of the path aesthetic. As bold vertical elements, they contrast the horizontality of the path and help punctuate key locations such as gateways and pocket parks. They are versatile and allow for amenities that improve user experience to be located in constrained spaces, such as lighting, shade, and wayfinding.

The posts may serve any combination of the following functions:

- Shade: along the exposed segments of the path, posts provide structure for corrugated metal, photo-voltaic, or textile shade elements.
- Lighting: support structure for post and string lighting.
- Structure: the posts should integrate and serve as structural components for cantilevers, fencing, and retaining walls, where possible.
- Wayfinding: the vertical edge of the posts can provide markings that improve orientation, be it color or directional cues.
- Context: to the extent possible, the posts should reinforce the context by drawing attention to important sites in the landscape through words, symbols, or colors.
- Utility and Energy: there is a unique opportunity along areas of the path to create a new utility corridor and/or to utilize photo-voltaic panels for lighting or to put energy back into the grid.

Post and tensile shade structure.

Posts with lights can increase a users sense of safety and provide ambient lighting for the river and bridges.

EDGE CONDITIONS

The edge condition consists of fences and railings punctuated by periodic amphitheater steps and posts. These elements serve to provide security while enhancing visual and physical access to the river.

Amphitheater steps provide seating amenities and a unique opportunity for path users to get closer to the river. They are intended to be stepped into the upper portion of the trapezoidal channel. When located adjacent to the pedestrian path, amphitheater steps do not require a railing.

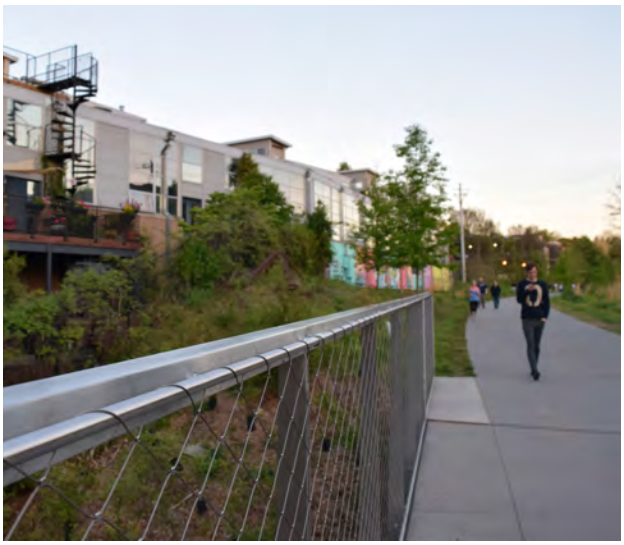
Security fencing may be required along edges of the path adjacent to active rail lines and businesses. Fencing height and structure should be developed to satisfy the needs of adjacent property owners while integrating into the aesthetic of the design elements.

Railings will be a constant vertical element along the path to provide separation between the path and the channel edge, rail lines, and private property. In some areas, railings and/or security fences will be on both sides of the path. In keeping with the design theme, they should utilize industrial materials while minimizing visual obstructions. The proposed design features include:

- Repeating posts: using a simple but bold repeating vertical element the length of the path. Small bollard-scale lights could be integrated.
- Fencing: using a lightweight material such as rope wire mesh provides a barrier while minimizing visual impacts.
- Lean rail: along the pedestrian path, a lean rail should be integrated to provide moments to view Vernon and the river.

Caltrans defines specific barrier and fence types, such as Type 26 and Type 732 barriers for overcrossing structures. The heights of the railing and fence will be designed to meet safety requirements maintaining a minimum combined height of 42”. Modifications to Caltrans standards will be made to incorporate project specific aesthetic requirements.

Security fencing may be required adjacent to businesses and rail corridors.



Lightweight fencing materials help to maximize visual and audible connection to the river.

GROUND PLANE

The ground plane not only serves the utilitarian purpose of differentiating modes of travel, but also reinforces the design concept and lends identity to the project. Any markings should be designed to reinforce the industrial context.

- Surface: utilize durable concrete (primary surface) and steel grating (in select areas). Multiple shades of neutral tone concretes may be used to differentiate bicycle and pedestrian paths.
- Markings: the ground plane is an excellent place to include wayfinding and signage in order to minimize visual clutter in the form of traditional post signs.
- Inlays: the ground plane may be enhanced with metal rail inlays that connect the history of Vernon. These inlays may double as wayfinding and signage that communicate mileage, location, and slow-down areas.

Concrete is more durable than asphalt and should be used for the trail.

Rail inlays in pavement connect users to the history of a corridor, as shown here at the High Line in NYC.

AMENITIES

LIGHTING

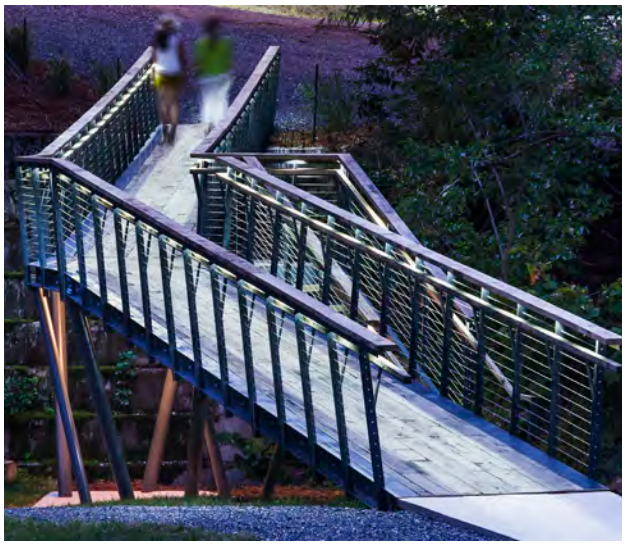
Lighting is an integral part of the path, which will be lit from dusk to dawn. Additional consideration will be given to lighting on proposed bridges and undercrossings to comply with safety requirements as per the applicable standards. For example, lighting on the overcrossings and undercrossings of highways and local roads is required to meet additional safety and illumination requirements that may not be applicable to the pathway at-grade lighting.

SEATING

The LA River Path in Vernon is predominantly designed for recreation and transportation. However, periodic shaded seating nodes on long stretches may be needed to accommodate senior citizens and families with small children. Care should be exercised in locating seating areas so that there is high visibility from the surrounding neighbors.

DRINKING FOUNTAINS

Drinking fountains along the path enable a greater diversity of users to utilize the path for longer durations without risking dehydration. Fountains should be spaced at regular intervals that correspond with key gateways and landmarks. Locating fountains with multiple heights will help accommodate a range of user ages and physical abilities, as well as pets.



In addition to overhead post-lights, under-rail lighting provides a visually striking and continuous source of light along a path.

Simple and integrated seating at key nodes and gateways can transform a path into a desirable place to rest.

GREEN INFRASTRUCTURE & TREES

Green infrastructure treats and slows runoff from impervious surface areas such as roadways, sidewalks, and buildings. Sustainable stormwater strategies may include bioretention swales, rain gardens, tree box filters, and pervious pavements (pervious concrete, asphalt and pavers).

Bioswales are natural landscape elements that manage water runoff from a paved surface, reducing the risks of erosion or flooding of local streams and creeks, which can threaten natural habitats. Plants in the swale trap pollutants and silt from entering a river system.

Trees can be used to provide shade, manage runoff, reduce greenhouse gases, aid in carbon sequestration, and increase urban habitat. They may be used in areas where there is enough space for a minimum 15' setback from the toe or channel wall (per Army Corps 404 permitting regulations).

PUBLIC ART

Public art installations and murals contribute and enhance a community's identity and character, creating a strong "sense of place" branding. Public art provides visual cues that the facility is "owned" and cared for by the community.

Graffiti and vandalism are an ongoing challenge in Vernon, as they are with other urban trails and public spaces in LA. Public art elements proposed as part of this project will be carefully considered to ensure that they do not invite vandalism or graffiti.

From a CPTED perspective, the use of public art in the landscape is an effective 'target hardening' strategy. Public art has the potential to deter graffiti vandalism, define path edges, improve the appearance of the community, and discourage unwanted behaviors.

Trees and landscape help mitigate noise, pollution, and heat while creating a sense of arrival and comfort.

Public art can contribute to an overall sense of place, perceived safety, and wayfinding.

WAYFINDING

An individual's ability to navigate through a city is informed by landmarks, natural features, and other visual cues. A comprehensive wayfinding system will increase users' comfort and accessibility to the path. The complete family of wayfinding elements should comply with relevant regulations and coordinate with existing LA River Path wayfinding while also advancing the project's design aesthetic and lending identity to the project.

Wayfinding signs located throughout the corridor should indicate to bicyclists and pedestrians:

- Location of destinations
- Directions & distances
- Mileage in quarter-mile intervals

Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the path corridor and network
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping emergency vehicles pinpoint exact locations

Wayfinding signs also visually cue motorists and fast moving cyclists that they are arriving at the entrance of a path and should use caution. Signs are typically placed at key locations leading to and along path routes, including the intersection of multiple routes. Too many signs create visual clutter, and it is recommended that these signs be posted at a level most visible to path users rather than per vehicle signage standards.

Pavement markings are a great tool to reduce vertical clutter, and work well for mile markers and street names in addition to bike and pedestrian symbols with directional arrows.

Wayfinding can be integrated into both vertical elements such as lighting and ground plane inlays.

Custom wayfinding elements can help support the design and community history.

Bridge Design

Bridges and elevated structures are necessary to avoid obstacles, maintain separation of path users from freight traffic and create a seamless path through Vernon. This study reviewed three types of bridge designs that could be used along segments of the LA River path. However, innovative approaches to bridge design and new light-weight materials should be explored. There is a great opportunity to develop lighter, cheaper, and quicker ways to design and construct the bicycle/pedestrian bridge elements through Vernon.

TRADITIONAL: CAST-IN-PLACE POST-TENSIONED BOX GIRDER

This alternative consists of a cast-in-place post-tensioned concrete box girder superstructure supported on concrete piers and abutments. The superstructure is integrally built with the intermediate bent/pier caps offering additional structural redundancy. This would help to minimize the required structure depth and the overall bridge and ramp lengths needed at a given location.

This alternative is suitable for spans ranging from 100 ft. to 250 ft. The superstructure depth is about 4% of the span length. The estimated cost of this alternative is $180/sf.

Advantages:

- Economical
- Most common structure type in California
- Low maintenance
- Longer spans

Disadvantages:

- Longer construction time than prefabricated bridge
- Falsework is required
- Traffic disruption expected

Weerdsprong Bridge
Venlo, Netherlands

High Trestle Trail Bridge
Slater, Iowa

CUSTOM PREFABRICATED: STRUCTURAL STEEL GIRDER/TRUSS

This alternative consists of steel girders or prefabricated steel truss superstructures with a cast–in-place concrete deck. The truss superstructure is a proprietary system pre-designed and prefabricated by the manufacturer/supplier. Steel truss modules of fixed lengths are delivered to the site where the contractor assembles and erects them on-site per manufacturer's recommendations.

While the prefabricated products are patented, once purchased, the owner gets full rights of the product and can use, inspect, and maintain the bridge like any other traditional bridge structure. Different manufactured products are available on the market offering competitive prices.

This alternative is suitable for bridges with span lengths ranging from 100 ft. to 300 ft., deck width from 10 ft. to 30 ft. For longer span applications, a cable-stayed steel truss option is available up to a maximum span length of 300 ft. The estimated cost of this alternative varies from $250/sf to $400/sf depending upon the span length.

Advantages:

- Economical
- Easy erection/installation
- Minimal or no traffic disruption
- Shorter construction time
- Aesthetically pleasing
- Custom-made/wide range of options
- Proven technology

Disadvantages:

- Maintenance cost

Hofstraat Bridge (IPV Delft)
Landgraaf, Netherlands

Kick Pruijsbrug Bridge (Verburg Hoogendijk Architekten)
Hoofddorp, Netherlands

SUSPENSION: LONG-SPAN ARCH OR CABLE-STAYED

The Vernon community has expressed interest in an inspiring, iconic bridge design that would complement the dramatic Vernon urban landscape and draw people to use the path.

Arch bridges are relatively difficult to build compared to cable-stayed bridges. While both require significantly more time to build than other bridge types, construction time can be minimized by using prefabricated steel trusses or arches for superstructures.

This alternative is suitable for spans of 250 - 3,500 ft. Table 5-3 lists spans and heights for suspension bridges comparable to what may be anticipated in Vernon. Within this alternative, multiple structure types are available, ranging from concrete or steel arch to cable-stayed bridge option. The cost of these bridges varies from $750/sf-$900/sf.

Advantages:

- Structural efficiency for longer span lengths
- Aesthetically pleasing
- Enhances/uplifts the neighborhood profile and helps to boost the local economy

Disadvantages:

- Cost & schedule
- Requires custom design and specialty contractors

Suspension Bridge	Location	Span	Height
Sundial	Redding, CA	420ft	220ft
Margaret Hunt Hill	Dallas, TX	610ft	400ft
Humber Bay Arch	Toronto, ON	325ft	70ft
Mary Ave	Cupertino, CA	330ft	80ft
Passerelle des Deux Rives	Kehl, Germany	600ft	N/A
Puente del Alamillo	Seville, Spain	590ft	460ft
Agora Arts	Valencia, Spain	550ft	410ft

Table 5-3: Comparison of existing suspension bridge

St. Gerardusstrat Bridge (IPV Delft)
Emmen, Netherlands

Hovenring (IPV Delft)
Eindhoven, Netherlands

Gateways & Pocket Park

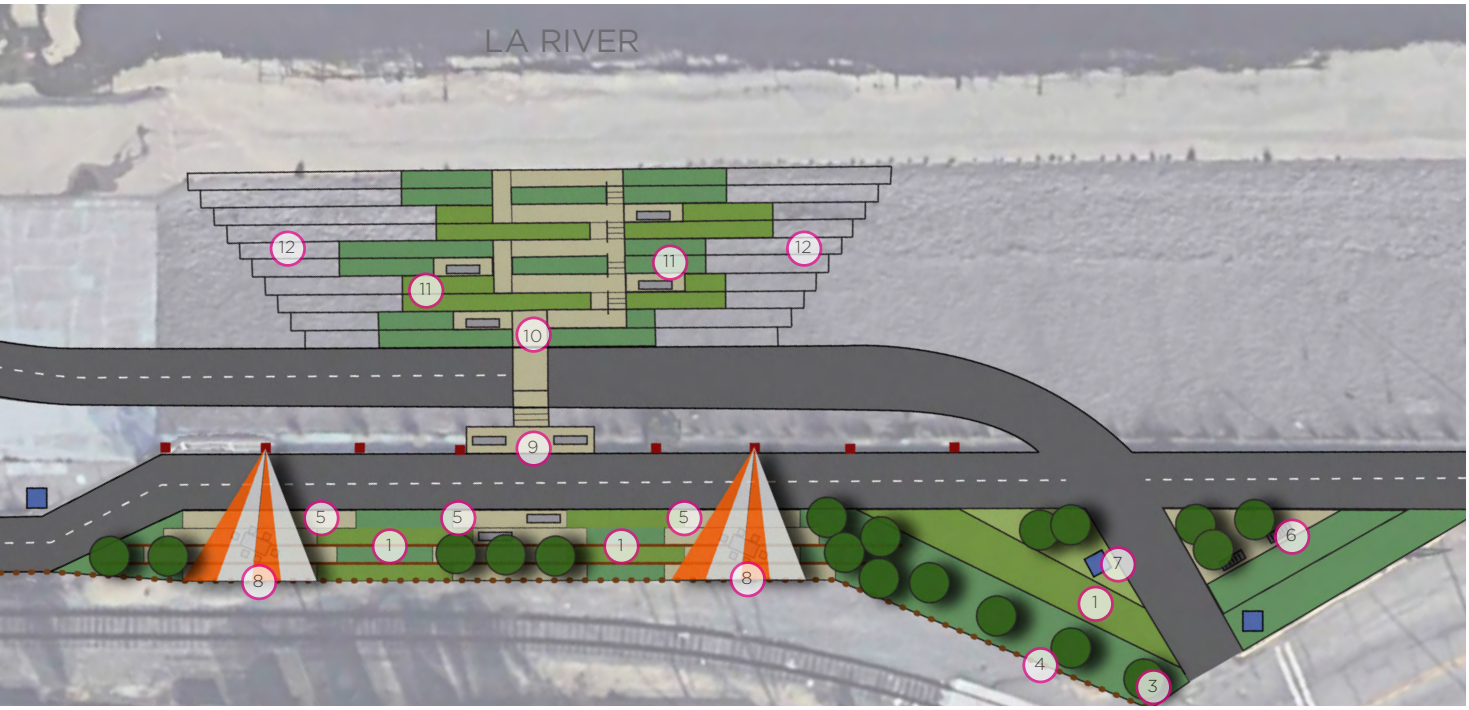
Figure 5-4: Gateway and pocket park plans.

GATEWAYS

A series of gateways has been identified throughout the project. These are major nodes of special design focus and destinations along the path that provide opportunities for rest and gathering. These areas present opportunities to reinforce the design identity through special paving and art elements that celebrate the industrial context. Gateways provide and incorporate:

Figure 5-5: Gateway locations along river.

1. Public art elements and interpretive elements
2. Scenic overlook points to the LA River and Downtown LA
3. Vehicle-scale path signage to increase trailhead visibility
4. Seating areas
5. Shade structures
6. Bike racks + stations
7. Planting, where feasible



POCKET PARK

There is an opportunity for a pocket park, approximately 1/3 of an acre large, on the south bank of the river west of Atlantic Avenue. Here the LA River Path in Vernon meets with the existing path in the City of LA via an undercrossing. This offers an opportunity to create a major destination along the greater LA River Path. The following potential design elements are shown:

1. Rain gardens provide an opportunity to clean and detain runoff and showcase riparian plantings
2. Terraced landforms create opportunities for native demonstration gardens
3. Trees will be visual markers drawing users to the path and provide shade and environmental benefits
4. Fence separates users from active rail and provides opportunity for decorative element
5. Nodes for small gathering/activities, such as outdoor fitness equipment or picnic seating. Paving elements here celebrate the pattern created by rail lines are carried through from the Gateway on the east side of Atlantic Ave.
6. Bike parking + repair stations
7. Public art/wayfinding/interpretive opportunities
8. Shade structures, supported by the steel I-beams create shadow patterns in the day and provide lighting opportunity in the evening.
9. An observation platform provides views to the river and Downtown LA
10. A set of stairs originating at the observation platform provides an opportunity for users to access and engage with the LA River
11. A series of planted terraces creates a unique environment for users to descend through
12. Gabion retaining walls filled with rocks or recycled concrete from project demolition flank the planted terraces

CHAPTER 6

ALIGNMENT ALTERNATIVES

Identifying a Core Alignment

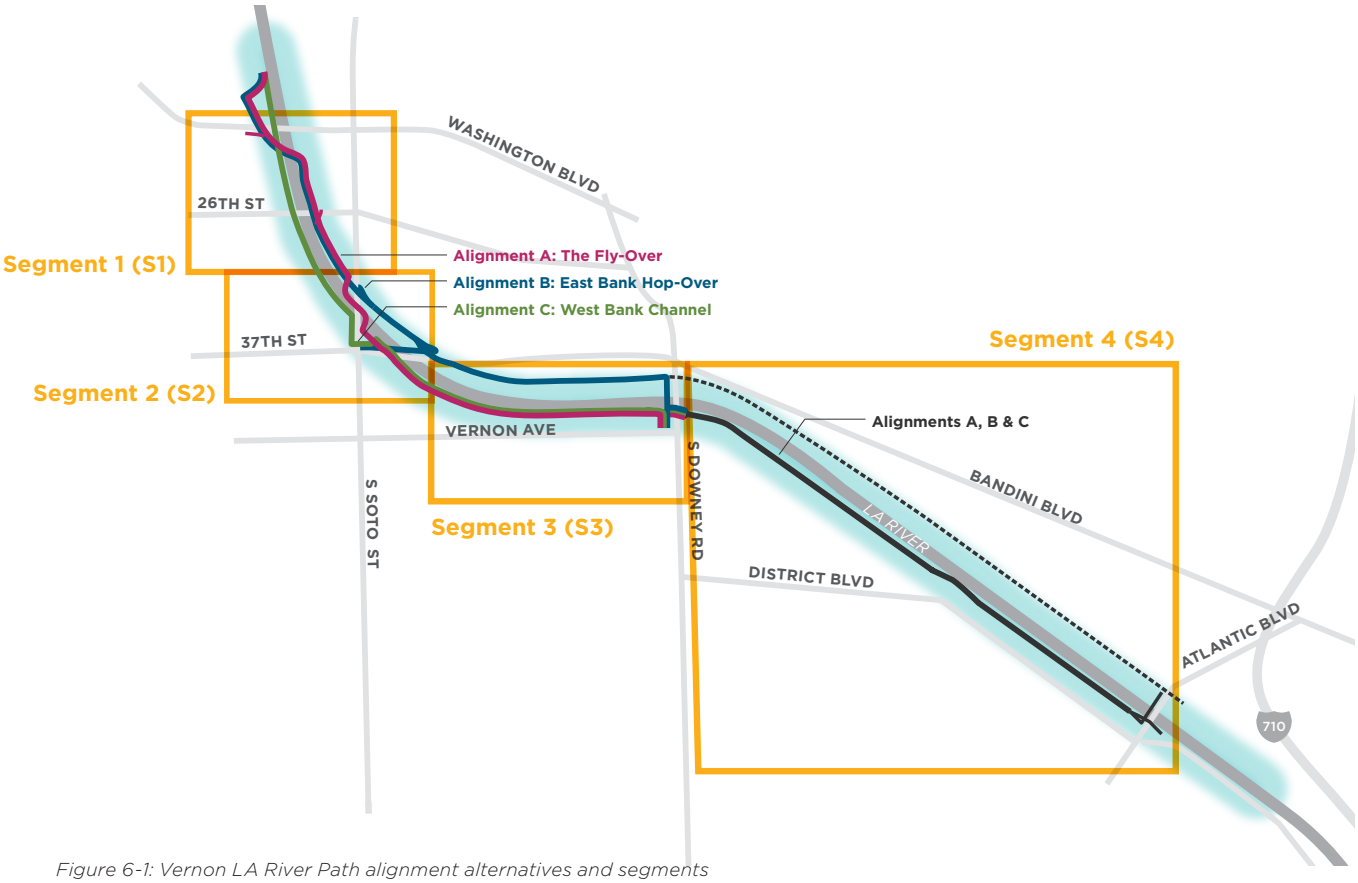


Figure 6-1: Vernon LA River Path alignment alternatives and segments

Overview

The Project Team developed three alignment alternatives for the Vernon path. The design process involved combining the cross-section options outlined in Chapter 4 in different ways, searching for combinations that maximize benefits, take advantage of opportunities, avoid impacts and obstructions, and meet the community's needs. The purpose of this chapter is to present the three alternative alignments between Washington Boulevard and Downey Road (segments 1-3):

- A: The Fly-Over
- B: The East Bank Hop-Over
- C: The West Bank Channel

The alignments have many similarities in how they navigate this complex industrial river channel, and some key differences which are described in this chapter. Detailed maps of the alignments can be found in Appendix A.

The Vernon path corridor is divided into four segments to enable comparison of the three alignments:

- S1: From the northern terminus to just north of the Soto Street bridge. The channel has a box channel configuration.
- S2: From just north of the Soto Street bridge to just south of the Bandini Street bridge. In this segment, the channel transitions from box to trapezoidal channel configuration.
- S3: From just south of the Bandini Street bridge to Downey Road. The channel has a trapezoidal channel configuration.
- S4: From Downey Road to the southern terminus. In this segment, the channel has a trapezoidal channel configuration. There is only one core alignment for this segment.

A: THE FLY-OVER

After evaluating the available options, the Project Team chose the Fly-Over as this study's core alignment. This route is safe from flooding, feasible, avoids obstructions, and employs a design that is inspiring to commuters, industry partners and tourists alike. The Fly-Over starts on the west bank then makes a brief crossing to the east before soaring back across the channel and over Soto Street on a suspension bridge. It then continues along the west bank for the remainder of the path. The Fly-Over is the most direct route through Vernon and provides an excellent connection to Vernon's commercial district in between Soto Street and Bandini Boulevard.

B: EAST BANK HOP-OVER

After evaluating all the alignment options, the East Bank Hop-Over is this study's first alignment alternative. Compared to the Fly-Over, this route's primary benefit is that it provides better access to both the east and west banks of the channel. This alignment starts out the same as the Fly-Over in Segment 1, then diverges to stay on the east bank of the river along the path of a future greenway. The name "Hop-Over" comes from the bridges that provide access to the west bank at Soto Street and Downey Road.

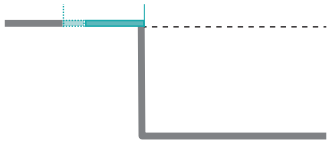
C: WEST BANK CHANNEL

The West Bank Channel Alignment is this study's second alignment alternative. This route stays on the west bank of the channel for the entire corridor, without any added bridges for people walking and biking.

Figure 6-2: Alignment alternatives A, B, and C

Cross-section Typologies

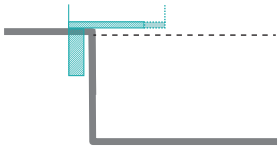
A - TOP OF BANK: AT GRADE



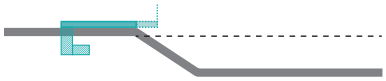
At Grade (Box Channel)

At Grade (Trapezoidal Channel)

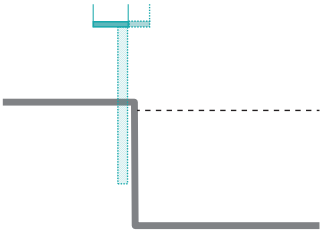
B - TOP OF BANK: ON STRUCTURE/ELEVATED



Cantilevered to Bank (Box Channel)



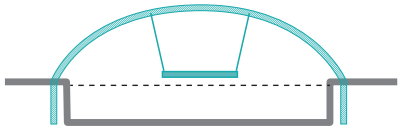
Cap (Trapezoidal Channel)



Elevated (Box Channel)

Incise (Trapezoidal Channel)

C - OVER THE RIVER



Suspended

On-piers

Cantilevered

D - IN-CHANNEL RAMPING

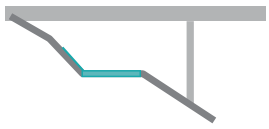


Figure 6-3: Alignment cross-section alternatives

Segment 1 (S1)

Segment 1 is characterized by the complexity of crossing three bridges: Washington Boulevard, an elevated Metrolink rail bridge and an at-grade BNSF freight rail line. Coordination with the City of Los Angeles is necessary for a feasible alignment as ramping over or under the bridges crosses jurisdictional boundaries.

Alignments A and B assume that the path enters the City of Vernon above Washington Boulevard. Alignment C assumes that the path enters Vernon below Washington Boulevard as described in Table 6-1.

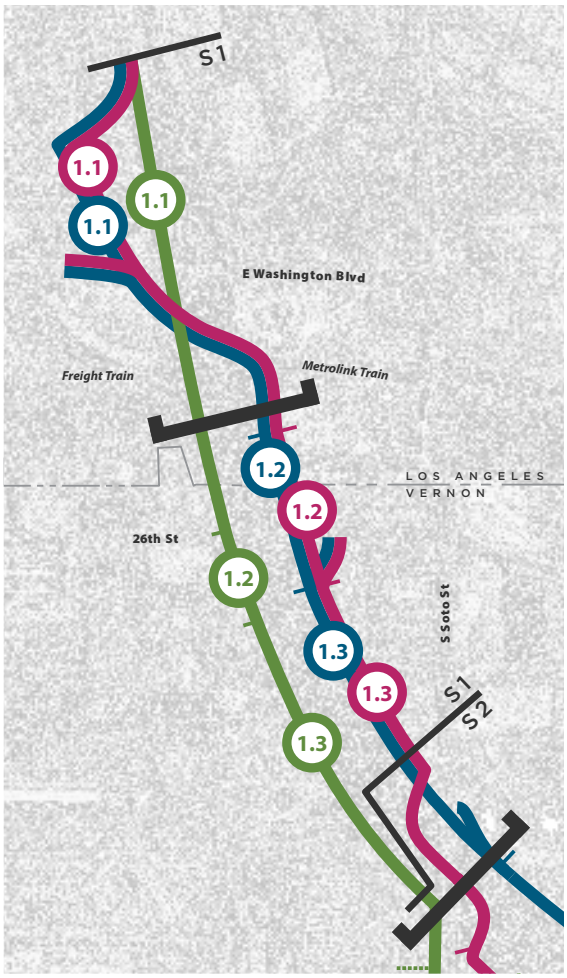


Figure 6-4: Alignments A, B, and C through Segment 1; see Table 6-1 for corresponding cross-sections

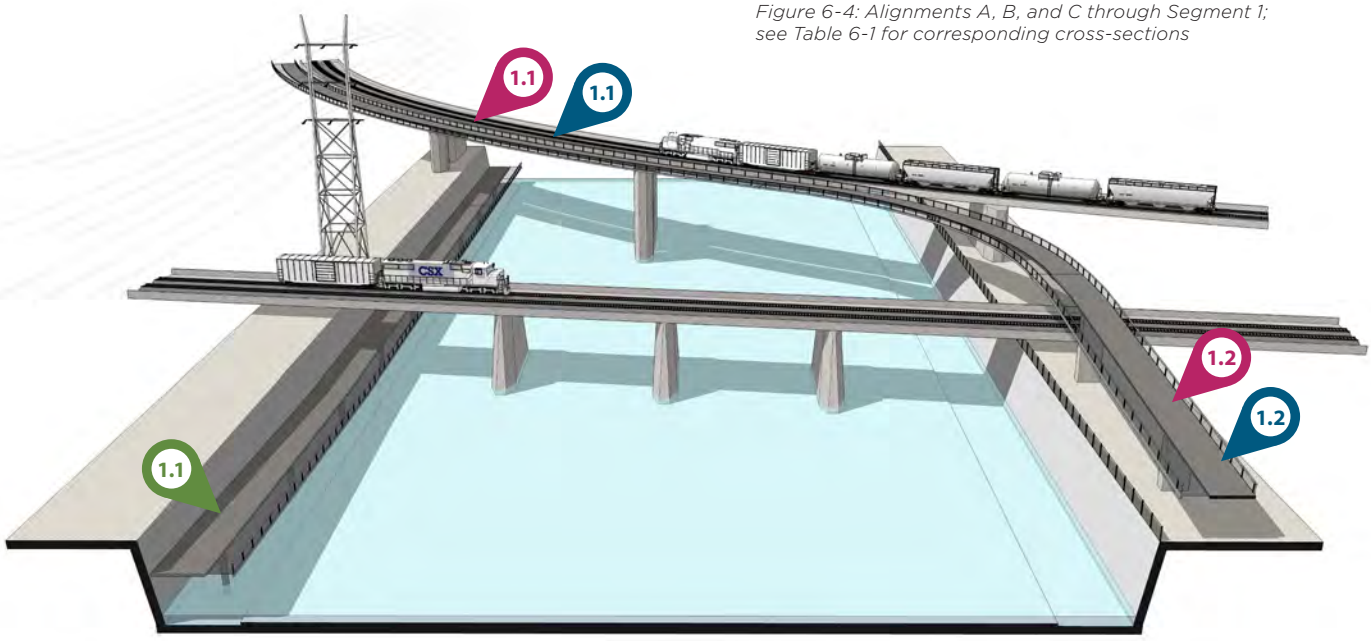


Figure 6-5: View of alignment options at the three bridge conditions in Segment 1. See Table 6-1 for corresponding cross-sections.

SEGMENT 1	CROSS-SECTION CONDITIONS		
A: FLY-OVER	**A1.1 Rail Bridge Connector - Cantilever**	**A1.2 East Bank Elevated**	**A1.3 East Bank at Grade**
Along Segment 1, the Fly-Over alignment parallels an active, elevated Metrolink railway. The path alignment starts on the west bank then crosses to the east bank on a cantilevered bridge paralleling the railway. On the east bank, the elevated path continues over 26th Street before coming back down to the top of the river bank.	**Pros:** • Provides stunning views to the Redondo Junction 25-track roundhouse and surrounding industrial landscape • Safe from flooding • No hydrological impacts • Potential for iconic design • Pleasant user experience • Good separation of freight traffic and people walking and biking • Provides access point at Washington Boulevard **Cons:** • Requires coordination with Metrolink to build a cantilevered bridge on existing bridge • Expensive • Less direct connection to the river	**Pros:** • Safe from flooding • Pleasant user experience • Good separation of freight traffic and people walking and biking • Provides access point at 26th Street **Cons:** • Requires coordination with property owners and BNSF for right-of-way within LA County Flood Control easement required • Possible undergrounding of utility line along 26th Street needed for 26th Street overcrossing • Expensive	**Pros:** • Provides access to east bank jobs • No existing structures along top of bank • Straight forward at-grade design is cheaper to construct **Cons:** • Requires coordination with two private property owners within LA County Flood Control easement • People walking and biking will be closer to industrial uses, which may decrease user experience
B: EAST BANK HOP-OVER	**B1.1 Rail Bridge Connector - On Piers**	**B1.2 East Bank At-Grade Crossing**	**B1.3 East Bank at Grade**
Along Segment 1, the East Bank Hop-Over alignment is very similar to the Fly-Over. The alignment parallels an active, elevated railway line. The path alignment starts on the west bank then crosses to the east bank on a bridge supported by elevated piers, continuing to parallel the railway. This alignment crosses 26th Street at grade under a utility corridor along 26th Street and utilizes land along the top of the east bank.	**Pros:** • Provides stunning views to the Redondo Junction 25-track roundhouse and surrounding industrial landscape • Outside of rail right-of-way • Safe from flooding • Potential for iconic design • Pleasant user experience • Good separation of freight traffic and people walking and biking • Provides access point at Washington Boulevard **Cons:** • Potential hydrological impacts from piers in river, potential to mitigate impacts by aligning with existing piers • Expensive • Less direct connection to the river	**Pros:** • Safe from flooding • Provides access point at 26th Street **Cons:** • Requires coordination with property owners and BNSF for right-of-way within LA County Flood Control easement required • At-grade crossing creates safety concerns for people walking and biking and traffic concerns from industry partners • Expensive	**Pros:** • Provides access to east bank jobs • No existing structures along top of bank • Less costly design **Cons:** • Requires coordination with two private property owners within LA County Flood Control easement • People walking and biking will be closer to industrial uses, which may decrease user experience
C: WEST BANK CHANNEL	**C1.1 West Bank In-Channel and Ramping**	**C1.2: West Bank On Structure - Cap**	**C1.3: West Bank at Grade**
Segment 1 of the West Bank Channel assumes the path is entering Vernon from the channel bottom. This alignment passes under the two rail bridges on a structure within the channel. The path would ramp up to cross 26th Street at-grade then continues along the top of the channel along the west bank. Path access is provided at 26th Street.	**Pros:** • Clear separation of path users and freight traffic • Good connection to 26th Street • Close connection to the river **Cons:** • Negative impacts on hydrology and channel capacity • Path would need to close when the channel floods • Path users are isolated • Lackluster user experience traveling adjacent to vertical channel wall • At-grade crossing creates safety concerns for people walking and biking and traffic concerns from industry partners	**Pros:** • Utilizes some available land • Cap is less costly than a full cantilevered design **Cons:** • Requires coordination with three private property owners within LA County Flood Control easement for construction of footing • People walking and biking will be closer to industrial uses, which may decrease user experience	**Pros:** • No existing structures along top of bank • Less costly design • Access to adjacent employers **Cons:** • Conflicts between industry uses and path users • Requires land and coordination with one private property owner within LA County Flood Control easement • People walking and biking will be closer to industrial uses, which may decrease user experience

Table 6-1: Pros and cons of potential cross-section alternatives for Alignments A, B, and C through Segment 1.

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Segment 2 (S2)

Segment 2 is characterized by the gateway opportunity at the intersection of Soto Street and Bandini Boulevard. This commercial node is the entry point into the City of Vernon from the LA River Path and has the potential for enhanced development opportunities.

Alignment options in Segment 2 were driven by the need to cross Soto Street and Bandini Boulevard in a constrained box channel while navigating overhead transmission lines. Table 6-2 describes the details of the alignment options by segment.

Figure 6-6: Alignments A, B, and C through Segment 2; see Table 6-2 for corresponding cross-sections

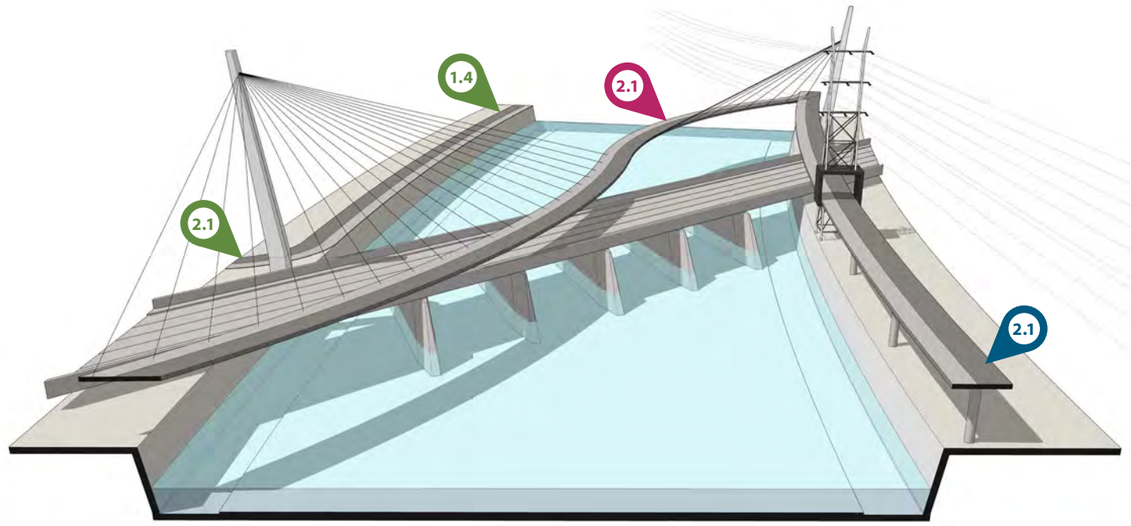

Figure 6-7: View of alignment options at the Soto Street and Bandini Boulevard crossing; see Table 6-2 for corresponding cross-sections

SEGMENT 2	CROSS-SECTION CONDITIONS			
A: FLY-OVER	**A2.1: Central Channel Suspended - Over Soto Street**	**2.2: West Bank On Structure Piers - Over Bandini Boulevard**	**A2.3: West Bank at Grade - Connection to Soto /37th Streets**	
Segment 2 of the Fly-Over Alignment continues at grade before launching back over the channel on a beautiful suspension bridge. The path touches back down in between Soto St. and Bandini Boulevard, in Vernon's commercial center. From here, the path will ramp over Bandini Boulevard before continuing along the west bank for the remainder of the route.	**Pros:** • Inspiring and iconic design • Safe from flooding • Great user experience • Key stakeholders have expressed support for this design • Avoids an at-grade crossing obstruction at Soto Street **Cons:** • Expensive • Potentially complicated to construct around transmission lines	**Pros:** • Provides a valuable connection to Vernon's commercial area, with restaurants • Safe from flooding • Takes advantage of undeveloped land along top of bank • Avoids obstructions • Designed to mitigate conflicts between path users and industrial vehicular traffic • Direct travel path for people walking and biking • Provides easy crossing of a busy road **Cons:** • Expensive, complicated overcrossing • Adjacent to food processing companies	**Pros:** • Provides a connection to city streets and bus line on Soto St. **Cons:** • Requires access through private property	
B: EAST BANK HOP-OVER	**B2.1: East Bank Elevated - Over Soto Street**	**B2.2: East Bank at Grade**	**B2.3: East Bank Ramping - under Bandini Boulevard**	**B2.4: Cantilevered Bandini Boulevard Bridge**
Segment 2 of the East Bank Hop-Over Alignment stays on the east bank of the channel, but includes a bridge, or "hop," to the west bank at Bandini Boulevard. This bridge provides access from 37th St. on the west bank. East bank path access is provided at Soto St. and Bandini Boulevard.	**Pros:** • Provides easy crossing of a busy road • Connects to LADWP utility corridor on the south side of Soto St. • Provides a connection to commercial center and enhances east-west active transportation connectivity Safe from flooding **Cons:** • Needs to navigate around utility lines and towers	**Pros:** • Takes advantage of available land along LADWP utility corridor • Pleasant user experience because there is more width than other points along both banks • Does not route trail users along food processing companies • Less costly design • Provides access to employers **Cons:** • Potential permitting and coordination challenges with LADWP	**Pros:** • Ramping under the road makes on the east bank is feasible because the channel shape is trapezoidal • Less costly that overcrossing and associated ramps **Cons:** • Lighting and safety concerns under the bridge • Lackluster user experience traveling adjacent to channel wall • Path would need to close when the channel floods	**Pros:** • Provides access to Vernon's commercial center between Bandini and Soto on the west bank, but less direct access than the Fly-Over • Less expensive bridge than the Fly-Over • Direct connection to city streets and bus line on Soto St. • Creates additional access points on both sides of the river and enhances access to jobs • Safe from flooding **Cons:** • Less iconic style of design • On-street facility could be less safe for people walking and biking
C: WEST BANK CHANNEL	**C2.1: West Bank At Grade - Sidepath along Soto Street**	**C2.2: West Bank At Grade - Sidepath along Bandini Boulevard**	**C2.3: West Bank Ramping - Incise Channel Under Bandini Boulevard**	
Segment 2 of the West Bank Channel continues along the west bank using a variety of cross-section designs. There is good access to employers on the west bank and the Bandini/Soto commercial center, but no access to the east bank.	**Pros:** • Less costly design • Utilizes crossing at existing signal **Cons:** • Requires easement along private property • Potential conflicts between industry uses and path users • People walking and biking will be closer to industrial uses, which may decrease user experience • At grade crossing creates safety concerns for people walking and biking and traffic concerns from industry partners • No direction connection to river	**Pros:** • Does not impact private property • Safe from flooding **Cons:** • Requires space from the outside vehicle travel lane which may change turning capacity at intersection • People walking and biking will be closer to freight traffic on Bandini Boulevard, which will decrease user experience • No direction connection to river	**Pros:** • Designed to avoid conflicts between path users and industrial traffic **Cons:** • Potentially moderate flood capacity impacts for ramp in the box to trapezoidal channel • Path would need to close when the channel floods • Lighting and safety concerns under the bridge	

Table 6-2: Pros and cons of potential cross-section alternatives for Alignments A, B, and C through Segment 2

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Segment 3 (S3)

Segment 3 begins the trapezoidal channel configuration. Alignments A and C are the same and located on the west bank adjacent to a freight rail yard. Alignment B follows a LADWP utility corridor on the east bank. Table 6-3 describes the details of the alignment options by segment.

Figure 6-10: Alignments A, B, and C through Segment 3; see Table 6-3 for corresponding cross-sections

Figure 6-8: Alignments A, B, and C through Segment 3; see Table 6-3 for corresponding cross-sections

Figure 6-9: View of alignment options through a typical portion of Segment 3; see Table 6-3 for corresponding cross-sections

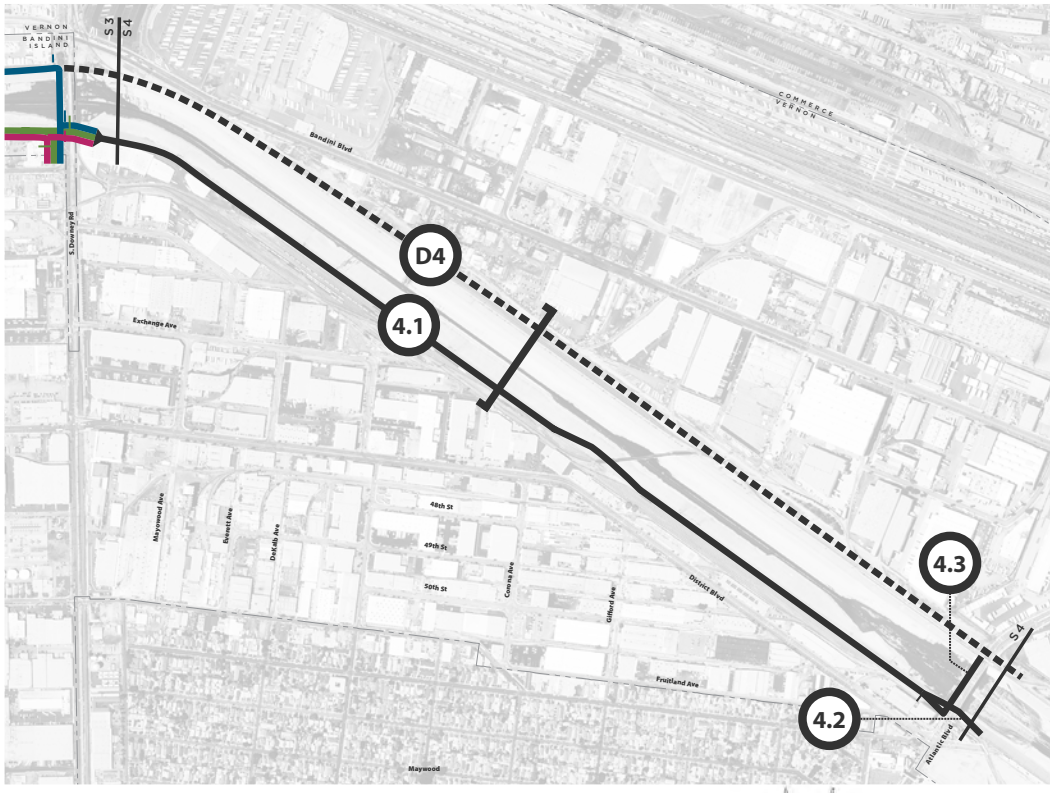
SEGMENT 3	CROSS-SECTION CONDITIONS		
A: FLY-OVER	**A3.1: West Bank On Structure - Incise or Cap**	**A3.2: West Bank at Grade (Downey Connector)**	**A3.3: West Bank Ramping under Downey Road**
C: WEST BANK CHANNEL	**C3.1: West Bank On Structure - Incise or Cap**	**C3.2: West Bank on Structure (Downey Connector)**	**C3.3: West Bank Ramping under Downey Road**
Segment 3 of the Fly-Over (Alignment A) and the West Bank Channel (Alignment B) continue at grade along the west bank, until it crosses over and connects to S. Downey Rd.	**Pros:** • Strong connection to the river • Pleasant user experience • Significant separation of people walking and biking from freight traffic **Cons:** • Requires coordination with four private property owners within LA County Flood Control easement • Adjacent to food processing companies • Limited connections with city destinations and major employers • Potential permitting issues	**Pros:** • Connection between city streets and path • Designed to minimize conflict between path users and freight traffic by using appropriate signaling and signage **Cons:** • Intersection between people using the path and industrial uses must be carefully designed for safety and to avoid conflicts.	**Pros:** • Upgrade existing ramp under Downey Rd and Railway for path alignment • Less costly than new ramp **Cons:** • Lighting and safety concerns under the bridge • Lackluster user experience traveling adjacent to channel wall • Path would need to close when the channel floods
B: EAST BANK HOP-OVER	**B3.1: East Bank At Grade**	**B3.2: Bridge along Downey Road - Cantilevered or on Piers**	**B3.3: West Bank at Grade - Downey Road Connector**
Segment 3 of the East Bank Hop-Over Alignment proceeds down the east bank at grade, with another bridge "hop" to the west side at Downey Road. East bank access is also provided at Downey Road.	**Pros:** • Uses land along LADWP utility corridor • Potential connections to employers on east bank • Site of potential future greenway, as it extends up from the south • Pleasant user experience • Does not route trail users along food processing companies • Successful separation of path users and freight traffic • Less costly design **Cons:** • Path width limited by utility towers • Requires coordination and access from LADWP	**Pros:** • Creates additional access points on both sides of the river and enhances access to jobs • Separates path users from freight traffic • No hydrological impacts if cantilevered • Safe from flooding **Cons:** • Less iconic style of design than suspension bridge • Potential hydrological impacts from piers in river, potential to mitigate impacts by aligning with existing piers	**Pros:** • Direct connection to city streets and bus line on Downey Road • Designed to minimize conflict between path users and freight traffic by using appropriate signaling and signage **Cons:** • Intersection between people using the path and industrial uses must be carefully designed for safety and to avoid conflicts

Table 6-3: Pros and cons of potential cross-section alternatives for Alignments A, B, and C through Segment 3

Segment 4 (S4)

All three options follow the same alignment along the west bank in Segment 4. A future greenway is proposed on the east bank within the wide LADWP utility corridor. Table 6-4 describes the details of the alignments by segment.

Figure 6-11: Alignments A, B, and C through Segment 4; see Table 6-4 for corresponding cross-sections



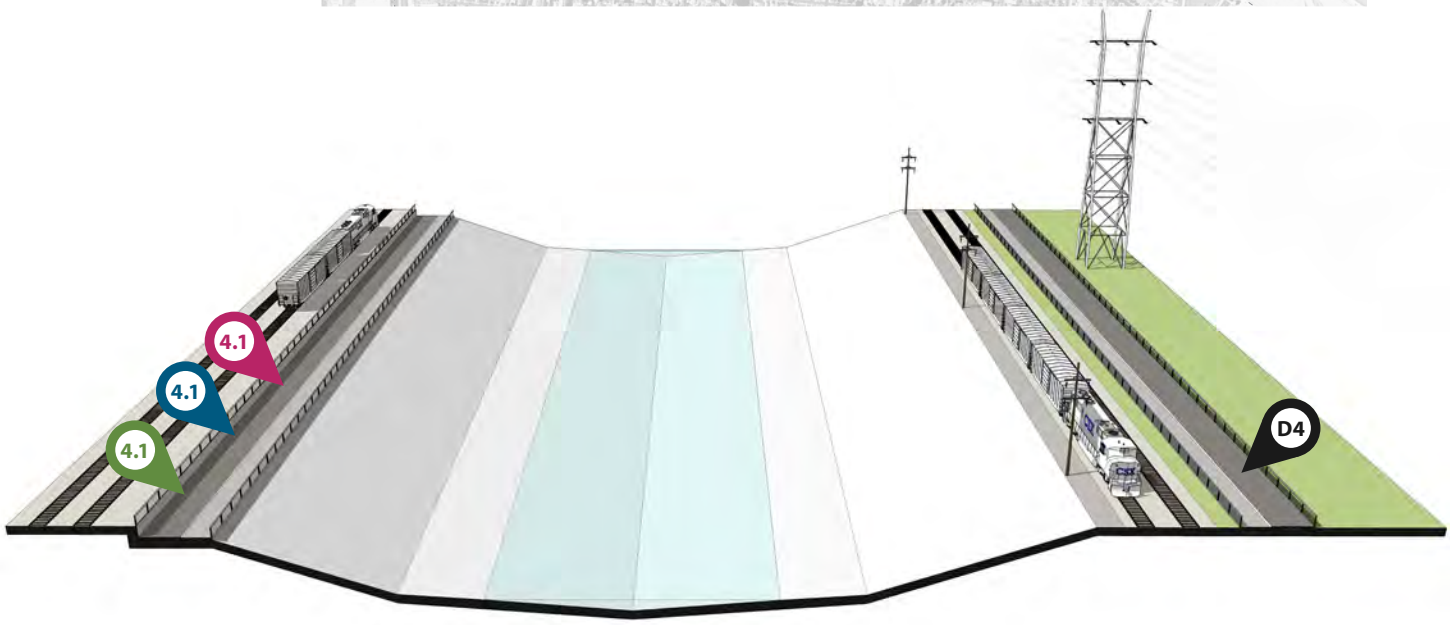


Figure 6-12: View of alignment options through a typical portion of Segment 4; see Table 6-4 for corresponding cross-sections

SEGMENT 4	CROSS-SECTION CONDITIONS		
A: FLY-OVER	**4.1: West Bank On Structure-Incise or Cap**	**4.2: West Bank Ramping under Atlantic Boulevard**	**4.3: Bridge along Atlantic Boulevard**
B: EAST BANK HOP-OVER			
C: WEST BANK CHANNEL			
In Segment 4, there is one feasible alignment for the Vernon path corridor. This route is on the west bank of the trapezoidal channel, using a cantilevered or incised cross-section design.	**Pros:** • Strong connection to the river • Pleasant user experience • Significant separation of people walking and biking from freight traffic **Cons:** • Requires permitting approvals from adjacent rail owner for construction easement • Limited connections with city destinations and major employers	**Pros:** • Adequate vertical clearance under Atlantic Boulevard makes ramp feasible **Cons:** • Lighting and safety concerns under the bridge • Lackluster user experience traveling adjacent to channel wall • Path would need to close when the channel floods	**Pros:** • Creates an east-west active transportation path to enhance access to jobs and access to the LA River Path • Safe from flooding **Cons:** • Not on the critical path for the LA River alignment. Would require additional funding.
D: East Bank Greenway	**D4 - East Bank At Grade**		
A future greenway is proposed for the east bank of the river. This wide utility corridor holds the potential for a linear park with opportunities for urban ecological restoration, agriculture, or active park space in addition to a path. This greenway is imagined to occur in conjunction with coordinated efforts along the east bank south of Vernon where the utility corridor runs to Long Beach. The Lower LA River Working Group is exploring opportunities for this utility corridor.	**Pros:** • 100-ft.-wide corridor provides opportunity for a linear park experience • Significant separation of people walking and biking from freight traffic **Cons:** • Rail lines run along the east bank between the river and the utility corridor limiting connectivity • Rail spurs, which are overgrown with vegetation and appear to have a very low volume of use occur throughout the segment and would require abandonment or at-grade crossing with rail owner/operator • Less connection to Vernon employers • Less connection to the river • Does not connect directly to the existing LA River Path		

Table 6-4: Pros and cons of potential cross-section alternatives for Alignments A, B, and C through Segment 4

Evaluation

To provide a decision-making framework for the City, the Project Team drafted a set of alignment evaluation criteria outlined in Chapter 4. The criteria are generally qualitative and the Project Team evaluated each segment based on their understanding of the corridor, best path design practices, and professional judgment.

KEY SIMILARITIES BETWEEN THE ALIGNMENTS

After applying the criteria to each alternative, it was clear that in some ways the alternatives perform similarly. Below is a list of key similarities among the three alternatives:

- All alignments avoid obstructions, such as buildings that meet the edge of the channel or railway tracks, and take advantage of available land to navigate a feasible route through the corridor.
- Permitting could be challenging for all alignments.
- Private property coordination is required for all alignments at varying degrees.
- All alignments maintain a strong connection to the river.
- All alignments would provide a positive user experience and incorporate similar amenities.

KEY DIFFERENCES BETWEEN THE ALIGNMENTS

Under some important criterion, alternatives do not perform equally. Table 6-5 summarizes the key differences between the alignments.

KEY FINDINGS

The core alignment A, the Fly-Over, is the most expensive option but not as logistically complicated to build as the East Bank Hop-Over or the West Bank Channel. The Fly-Over provides inspiring design and connectivity while providing abundant separation between path users and industrial land uses, apart from key access points.

The Hop-Over does not provide access to the Bandini/Soto commercial center as efficiently as the Fly-Over, but does provide better connections to destinations on both banks of the river and would be less costly. The alignment has the fewest unique private property owners and is not adjacent to food processing properties. The impacts on flood capacity would be similar to the Fly-Over. Overall, the East Bank Hop-Over sacrifices grand design and some user separation for better connectivity and less financial cost.

Compared to the Fly-Over and the East Bank Hop-Over, the West Bank Channel has significant impacts on hydrology and channel flood capacity, which could make the northern portion of this alignment infeasible. The West Bank Channel is less expensive and as a result has a less inspiring and visible design. It also has more right-of-way-conflicts, obstacles along the route, and tricky at-grade crossings of major roads.

	A: FLY-OVER	B: EAST BANK HOP-OVER	C: WEST BANK CHANNEL
Category 1: Function	**Safety:** Segment 1 decreases flood control capacity because of bridge pilings but does create good user safety. **Connectivity:** Serves job destinations on both sides of the river and connects with the Soto commercial area. **Ownership:** Crosses 18 unique property owners within LACFC easement. Segment 3 may require mitigation of business impacts. **User Separation:** Provides the highest degree of separation between path users and freight traffic and industrial activities.	**Safety:** Segment 1 decreases flood control capacity because of bridge pilings, but does provide good user safety. **Connectivity:** Provides best connections to job destinations on both sides of the river, to wider Los Angeles, and an indirect connection to the Soto commercial area. **Ownership:** Alignment crosses the fewest number of unique property owners (14) within LACFC easement and minimizes business impacts. **User Separation:** Moderate level of separation between path users and freight traffic and industrial activities.	**Safety:** All segments maintain current flood control capacity, but locating the path in the channel bottom does create some safety concerns with flooding for path users **Connectivity:** Does not provide a connection to the east bank of the river. **Ownership:** Crosses 16 unique property owners within LACFC easement. Segment 3 may require mitigation of business impacts. **User Separation:** Provides the least amount of separation between path users and freight traffic and industrial activities.
Category 2: Feasibility	**Cost:** Most expensive option.	**Cost:** Less expensive than the Fly-Over, but more expensive than the West Bank Channel.	**Cost:** Least expensive option.
Category 3: Desirability	**User experience:** Great user experience with sweeping views over the channel and iconic design. **Inspiring Design:** Bold and visible design with elevated pier bridge and suspension bridge.	**User experience:** Good user experience with views and spacious areas along the top of the east bank in segment 3. **Inspiring Design:** Less iconic bridge design but still visible and appealing.	**User experience:** Placing the path within the channel is not the most pleasant for path users and reduces the perception of personal safety. **Inspiring Design:** More conservative design along the west bank without any crossings.

Table 6-5: Evaluation matrix of alignments A, B, and C

CHAPTER 7

NEXT STEPS

Introduction

The LA River path is coming soon! Los Angeles County Metropolitan Transportation Authority (Metro) has funding to design and build the 8-mile gap in the LA River Path. Metro's Los Angeles River Bike Path Gap Closure Project will take the project through the environmental clearance, design, permitting, and construction. Metro's funding allocation has the construction of the path starting in 2023 and being completed by 2025.

This feasibility study sets Vernon's 3-mile segment of the LA River path ahead of the northern 5-mile gap. The analysis of existing conditions, meeting with stakeholders and vetting of alignment alternatives allows for the next phase of detailed structural and hydrological analysis.

Opinions of probable costs have been developed for the three alignments presented in this study. Although the route and design variations have not been finalized and are subject to negotiations with stakeholders and the public during the environmental clearance process, the preliminary cost estimates allow for a comparison between alignment options. The preliminary costs also help to identify where additional funding may be needed.

Operating and maintaining the LA River path is just as important as building it. This chapter also outlines recommendations for a sustainable Operations and Maintenance (O&M) Plan. As an exclusively industrial city without a department to operate and maintain the path, this study suggests that a Joint Powers Authority (JPA) or another umbrella organization manage the LA River Path in Vernon.

Cost Estimate

The investment required for this critical transportation link is competitive when compared to widening roads, building freeway interchanges, or addressing health impacts resulting from car dominated environments. The initial alignment costs are given in Table 7-1. These values are subject to change based on stakeholder and public input during design development and the environmental clearance process. The estimates also consider a number of hard and soft cost assumptions. For detailed cost breakdowns of each segment and alignment, refer to Appendix B.

ALIGNMENT COSTS

The predominant difference in cost between the alignments is due to the variation in cross-section composition, as shown in Figure 7-1. The core alignment A (most costly) utilizes a higher percentage of bridge structures, the largest cost associated with the suspension bridge. Alignment B (middle cost) utilizes fewer bridges and has the highest percentage of at-grade trail. Alignment C (least costly) has the highest percentage of in-channel ramping which has hydrological impacts.

The variation in path cross-section and resulting costs reflects each alignments degree of impact. Though more costly, the core alignment A minimizes floodway impacts and maximizes user experience and separation.

Segment	A: Fly Over	B: East Bank Hop Over	C: West Bank Channel
1	$25,300,000	$25,600,000	$14,100,000
2	$34,000,000	$17,000,000	$4,100,000
3	$31,500,000	$11,200,000	$31,500,000
4	$59,300,000	$59,300,000	$59,300,000
TOTAL	**$150,100,000**	**$113,100,000**	**$109,000,000**

Table 7-1: Cost estimate summary for the three alignments

ASSUMPTIONS

The cost estimate includes the following assumptions:

1. *The cross-section typology contains the bulk of the cost*

   Structural costs indicated in Table 7-2 factor in the cost of the path, structures, and modifications to the channel wall. They do not include the cost of ROW acquisition, utility relocation, track shifting, and special shoring costs if needed.

2. *Path width is consistent throughout*

   A total path width of 20' was used, with 14' of bike path and 6' of pedestrian path. This is the preferred typical width throughout the path, where feasible. A cost reduction strategy could be to narrow portions of the path along segments between access points. Parklets, gateways, and nodes where the surface area widens have been accounted for separately, and should be maintained.

3. *Concrete and steel grating instead of asphalt is proposed for paving*

   Concrete is more costly upfront but cheaper to maintain over the long run. Concrete would be the dominant trail material with grating used for pedestrian path on cantilevers and bridges to minimize costs and weight.

4. *Access points must be fully integrated*

   At access points, the trail must fully tie into existing roadways and trails. This includes curb cuts, crosswalks, signals, signage, and striping where necessary.

5. *Lighting spaced every 60ft*

   Lighting the path minimizes real and perceived safety risks. In addition to the path lighting, additional lights have been located at parklets, gateways, and nodes.

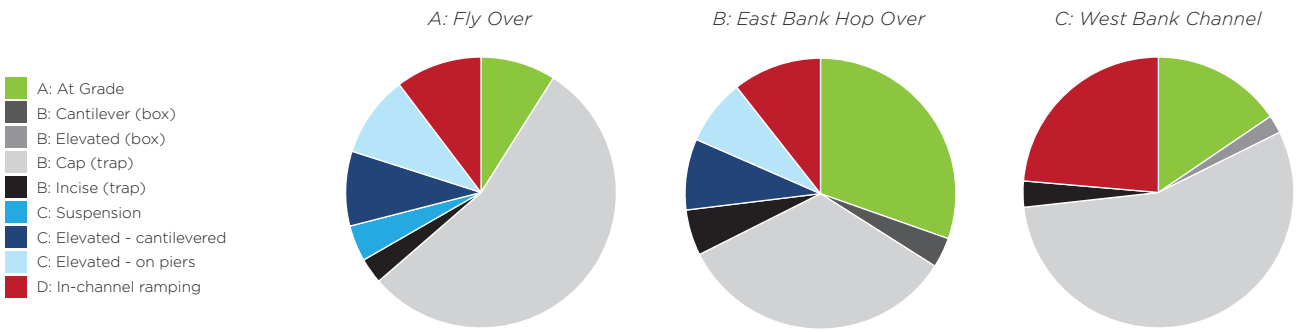


Figure 7-1: Alignment cross-section percentage by length

6. *Amenities*

   Users specifically identified lighting, wayfinding, drinking fountains, and shade as top priorities. In addition to specifically located parklets and gateways, nodes have been located along the longer uninterrupted segments south of Bandini Blvd.

7. *Soft Costs*

   Total costs assume 35% contingency, 10% mobilization, 10% design, and 15% for construction management.

Structure Type	General Features	Cost/sf
A: At Grade	• Path at grade	$18
B: Cantilever (box)	• Slab bridge with C-bent on piles • Piles away from channel wall	$170
B: Elevated (box)	• Slab bridge on pile shafts • Piles adjacent to channel wall requiring deep penetration below channel invert level to gain capacity	$180
B: Cap (trap)	• Slab bridge with C-bent on piles • Piles away from channel wall"	$160
B: Incise (trap)	• Path cutting into top of channel side slope with retaining wall on one side	$50
C: Suspension (Long Span Arch)	• Bike path suspended on series of steel arches straddled across channel at 20 degree skew	$1,600
C: Suspension (Cable-Stayed)	• S-shaped bridge alignment suspended on two pylons	$790
C: Elevated - cantilevered	• Steel framing attached to side of existing railroad bridge. • Mutually exclusive use between railroad and bicycles/pedestrians to be enforced	$160
C: Elevated - on piers	• CIP/PS concrete box girder on piers • Increased span length to reduce number of piers in channel	$210
D: In-channel ramping	• Path cutting into middle of channel side slope with rebuilt side slope	$35

Table 7-2: Cost per cross-section

Funding

In November 2016, Los Angeles County residents voted to approve Measure M, a half-cent sales tax to fund transportation improvements. Metro has identified the 8-mile Los Angeles River Bike Path Gap Closure Project as a "shovel ready" project and is one of the first projects Metro plans to fund.

The Los Angeles County Transportation Expenditure Plan for Measure M identified $365 million (in 2015 dollars) for design and construction of the path. This funding will cover the costs of constructing the path along the river corridor including grade-separated crossings, access points, lighting, and transportation related amenities. The Measure M funding does not cover the critical connections to/from local destinations. The funding source also may not cover enhanced gateway elements or wayfinding which are key components to the users experience.

Future capital development funding sources for connections and trail enhancements may include state, local/regional, and private sources. The following pages provide a summary of funding sources for the additional needs shown in Figure 7-2.

8 MILE LA RIVER GAP

METRO MEASURE M FUNDING
$365 MILLION

- Alternative analysis
- Environmental clearance
- Permitting
- Trail construction (grade-separated crossings, lighting, access points, transportation-related amenities)

3 MILE VERNON LA RIVER GAP

ADDITIONAL FUNDING NEEDS FOR:

- On-street connections to local destinations
- Enhanced gateway elements
- Community amenities

Figure 7-2: Funding sources and needs

STATE PROGRAMS

ACTIVE TRANSPORTATION PROGRAM

The Active Transportation Program (ATP) has consolidated a number of state-funded programs centered on active transportation into a single program. The ATP's authorizing legislation also includes placeholder language to allow the ATP to receive funding from the newly established Cap-and-Trade Program in the future.

The California Transportation Commission writes guidelines and allocates funds for the ATP, while the ATP will be administered by the Caltrans Division of Local Assistance. Goals of the ATP are currently defined as the following:

- Increasing the proportion of trips accomplished by biking and walking
- Increasing safety and mobility for active transportation users
- Advancing active transportation efforts of regional agencies to achieve the greenhouse gas reduction goals
- Enhancing public health
- Ensuring that disadvantaged communities fully share in the benefit of the program
- Providing a broad spectrum of projects to benefit many types of active transportation users

There are two projects that are good candidates for ATP funding. One are bike and pedestrian bridges that connect the east and west sides of the LA River. Another is to build the on-street protected bikeway corridors from the path gateways to local destinations in the City.

SENATE BILL (SB) 1

The Road Repair and Accountability Act of 2017, Senate Bill (SB) 1, provides transportation funding in a number of programs. In addition to SB1 providing additional funding to the Active Transportation Program, another program the City of Vernon could be competitive for is the Trade Corridor Enhance Program (TCEP). This program will allocate approximately $300 million annually to fund corridor-based freight projects that further the state's economic, environmental, and public health objectives for innovative and effective freight policy and infrastructure improvements. A potential way to optimize freight corridors could be to build parallel bikeways on adjacent streets. A layered network that removes smaller and slower modes of transportation, including bicycles, could potentially improve freight movement.

STATE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)

Funds new construction projects that add capacity to the transportation network. STIP consists of two components, Caltrans' Interregional Transportation Improvement Program (ITIP) and regional transportation planning agencies' Regional Transportation Improvement Program (RTIP). STIP funding is a mix of state, federal, and local taxes and fees. Bicycle and pedestrian projects may be programmed under ITIP and RTIP.

REGIONAL & LOCAL SOURCES

CLEAN AIR FUND (AB 434/2766 – VEHICLE REGISTRATION FEE SURCHARGE)

Administered by SCAQMD. Local jurisdictions and transit agencies can apply. Funds can be used for projects that encourage biking, walking, and/or use of public transit. For bicycle-related projects, eligible uses include: designing, developing and/or installing bikeways or establishing new bicycle corridors; making bicycle facility enhancements/ improvements by installing bicycle lockers, bus bicycle racks; providing assistance with bicycle loan programs (motorized and standard) for police officers, community members and the general public. Matching requirement: 10-15 percent.

ROADWAY, CONSTRUCTION, REPAIR AND UPGRADE

Planned resurfacing projects are one means of combining motor vehicle, transit, bicycle, and pedestrian projects into one, multi-modal construction project. To ensure that planned roadway construction projects considers ways to combine multiple multi-modal projects, it is important to adopt a complete streets policy that includes a review all facility types during each phase of the project. This policy and review process should follow California's 2008 Complete Streets Act and Caltrans' 2014 Deputy Directive 64-R2 which require that the needs of all roadway users be considered during "all phases of state highway projects, from planning to construction to maintenance and repair."

UTILITY PROJECTS

By monitoring the capital improvement plans of local utility companies, it may be possible to coordinate upcoming utility projects with the installation of motor vehicle, transit, bicycle, and pedestrian infrastructure within the same area or corridor. Often times, utility companies will mobilize the same type of forces required to construct transportation projects, resulting in the potential for a significant cost savings. These types of joint projects require a great deal of coordination, a careful delineation of scope items and some type of agreement or memorandum of understanding, which may need to be approved by multiple governing bodies.

In Vernon, the Los Angeles Department of Water and Power transmission corridors are over 80 years old and are aging out. These utility corridors along the river allow for potential synergistic improvements.

FIBER OPTIC AND WIRELESS INSTALLATION PROJECTS

Technology companies are continuously looking for new cable routes within public rights-of-ways. Recently, this has most commonly occurred during expansion of fiber optic networks. Since these projects require a significant amount of advance planning and disruption of travel lanes on streets, it may be possible to request reimbursement for affected bicycle and pedestrian facilities to mitigate construction impacts. In cases where cable routes cross undeveloped areas, it may be possible to provide for new transportation facilities such as a path. Furthermore, wireless companies have also funded lighting projects when they can attach equipment to the top of new light poles. These partnerships could be beneficial to industries in Vernon along the river as well as future path users.

PRIVATE SOURCES

CORPORATE DONATIONS

Corporate donations are often received in the form of liquid investments (i.e. cash, stock, bonds) and in the form of land. Employers recognize that creating places to bicycle and walk is one way to build community and attract a quality work force. Businesses often support bicycling and outdoor recreation projects and programs. Municipalities typically create funds to facilitate and simplify a transaction from a corporation's donation to the given municipality.

For example, logistics companies may want an opportunity to sponsor a bicycle and pedestrian bridge that could enhance future cargo bicycle deliveries to downtown Los Angeles.

Operations + Maintenance

This section covers the key aspects of operations and maintenance (O&M) that must be addressed in order to sustainably provide an attractive, safe, and secure facility.

The 3-mile path in Vernon is only one short segment of the 51-mile LA River Path. As the 8-mile gap is closed, the path becomes a regional transportation asset. The City of Vernon does not have a department that could take on the operations and maintenance. In order to create a continuous, high-quality experience, it is recommended that a single entity, such as a Joint Powers Authority (JPA) be created to run all aspects of operations and management. As the regional transportation authority, Metro may be the best O&M lead agency. A new JPA would offer the opportunity to customize the membership to represent the various stakeholders along the River.

There are five components of O&M:

- Oversight
- Management
- Maintenance
- Promotion and Advocacy
- Enforcement

OVERSIGHT

Oversight of management functions includes strategic reviews; funding plan approvals, and overall level of service goal setting. These tasks should be performed on an annual basis following a staff report on metrics such as financial performance, user volumes, asset condition, and emergency response incident statistics.

MANAGEMENT

Path management relates to the ongoing efforts of an entity to ensure a safe, user friendly facility. Management and maintenance are closely related, but management refers to the operational context and necessity associated with keeping a trail in good working order. This is an ongoing technical and resource based task from the outset of a path design. Paths require not only managers who will serve as the "boots on the ground" but also administrators who can perform managerial tasks behind the scenes. Managers often help assist with the maintenance of facilities, ensuring the life-cycle of the facility is maintained.

A manager contracted or employed by the JPA would work cooperatively with other department heads, non-profit and private sector partners, and agency staff to assure a coordinated effort amongst all jurisdictions and activities. Duties would include:

- Development of the recommended component plans (financial, marketing, safety, risk management, asset management)
- Financial planning including capital fundraising for additional grade
- Separations and path extensions and for operational funding
- Coordination with agencies leading various promotions and programs

An additional task of management is regular monitoring/evaluation. Annual reporting should include development progress, user counts, conditions survey, intercept survey, comment card evaluations, an enforcement review, and year-end fiscal evaluation. The data collection schedule will be determined early in the year. Ideally, hourly and daily user counts should be conducted at least once per quarter in the first year.

MAINTENANCE

Path maintenance refers to the long-term well-being of the path and its facilities. Generally, paths and path amenities have a life cycle considered during design and construction. If well maintained, facilities should meet this life cycle. Thus, care should be given to the facilities maintenance also includes inspection activities to detect defective pieces in a system. This could be as simple as monitoring potentially hazardous situations on the path as risk becomes more apparent to path users, or generating repaving schedule as the path's life cycle ends. Generally, maintenance is completed by trail managers or planners. It includes:

- Routine maintenance
- Remedial maintenance
- Asset management plan

ROUTINE MAINTENANCE

Routine maintenance refers to the day-to-day regimen of litter pick-up, trash and debris removal, graffiti removal, weed and dust control, street sweeping, sign replacement, tree and shrub trimming, and other regularly scheduled activities. Routine maintenance also includes minor repairs and replacements, such as fixing cracks and potholes or repairing a broken hand railing.

An inspection checklist should be generated to assist path staff and/or contractors in identifying potential problems and hazardous conditions in a timely manner. The checklist should include, but not be limited to:

- Are shrubs and other vegetation maintained in such a manner that they retain a natural form while still allowing for resident amenity, path surveillance, and minimize personal security issues?

- Are tree branches, including the trees on the top and sides of the embankments, trimmed to provide 8 feet (min.) to 10 feet (preferred) vertical clearance from the ground?
- Is there any graffiti present?
- Are there worn pathways in undesired locations?
- Is the pavement surface in good condition, free of trip hazards and debris accumulation?

REMEDIAL MAINTENANCE

Remedial maintenance refers to correcting significant defects in the network, as well as repairing, replacing, or restoring major components that have been destroyed, damaged, or significantly deteriorated from normal usage and old age. Some items ("minor repairs") may occur on a two to five year cycle, such as repainting of structures, spot concrete repairs, or replacing signage. Major reconstruction items will occur over a longer period or after an event such as a flood. Examples of major reconstruction include stabilization of a damaged embankment, repaving a surface or a street used for biking, or replacing a bridge. Remedial maintenance should be part of a long-term capital improvement plan, funded through an annual reserve contribution.

ASSET MANAGEMENT PLAN

The Asset Management Plan should include defined levels of service and performance metrics for the maintenance staff or contractors, a routine maintenance schedule, an inspection database (including what was discovered, when, and any corrective action taken), and a capital improvements plan for remedial maintenance and network development.

PROMOTION AND ADVOCACY

The promotion and advocacy of LA River Path in Vernon is important as the user base expands. As demand grows on a path system, so too must the operations, management and maintenance of a system. Advocacy plays an important role through informing individuals with decision making authority about the role the system plays. Promotion of the system is more directly related to the advertisement and education of the system's users. Some users groups participate in promotion and advocacy efforts while others focus their efforts on one task.

All collateral materials such as brochures and event invitations will be produced in Spanish as well as English. Marketing promotional activities should include:

- Grand opening campaign to raise awareness and excitement
- Sporting and fitness events such as bike tours, runs and jogs, dog walk days to improve community health
- Business community engagement for fundraising, Adopt-A-Path type activities, and events sponsorship
- Community outreach using online and print newsletters and promotional materials to raise awareness and attract users

Educational programs could include:

- User and interest group outreach to manage conflicts and address maintenance issues
- Neighborhood liaison to address safety, privacy, and access issues
- Educational events programming, especially at schools near the path

ENFORCEMENT

Enforcement on paths relates to the overall safety and welfare of users. Personal safety, both real and perceived, influences an individual's decision to use the path and the community's support of any improvements. Residents may cite concerns about crime, violence, transients, or drug use; however, research has shown just the opposite; a high quality public space tends to reduce crime by improving the landscape and attracting more people to use the space. Design, enforcement, and programming help reduce the opportunity for crime and create a safe and welcoming atmosphere.

Enforcement strategies include:

- Crime Prevention through Environment Design (CPTED)
- Safety and Security Plan

CRIME PREVENTION THROUGH ENVIRONMENT (CPTED)

Proper design addresses both the perceived safety issues (i.e. feeling safe or fear of crime) and actual safety threats (i.e. infrastructure failure and criminal acts). The basic premise of CPTED is that the arrangement and design of infrastructure and open spaces can encourage or discourage undesirable behavior and criminal activity. When all spaces have a defined use and the use is clearly legible in the landscape, it is easier to identify undesired behavior.

There are four key CPTED principles:

1. Natural access control helps differentiate public and private space, and considers the placement of entrances, exits, fencing, landscaping, hours of operation and lighting.
2. Natural surveillance increases the opportunity to be seen by others and thereby deters unwanted behavior. This principal considers the placement of physical features, activities, and people to maximize visibility within the corridor.
3. Territorial reinforcement puts the spotlight on undesired behavior and activities, thereby increasing the perception of being watched. Strategies include the use of physical attributes, such as fences, paving materials, public art, signage, and "security" landscaping to convey the sense of ownership of the space. Mile markers and emergency phones are also reinforcement strategies.
4. Maintenance is an expression of ownership of a property. Unmaintained facilities indicate that there is a greater tolerance of disorder. Regular maintenance sends a message that the facility is cared for, while simultaneously contributing eyes on the corridor.

SAFETY AND SECURITY PLAN

The JPA should work with local authorities to implement a safety and security plan for LA River Path in Vernon. Among the items that may need discussion:

- Coordination procedures
- User Rules and Regulations (disseminated through signage and marketing programs)
- Funding
- Emergency access and wayfinding
- Emergency procedures: employees should be provided with a flow chart and regular training on response procedures.
- Linkages to Risk Management Plan and Asset Management Plans
- Incident Reporting System and analysis

Local Coordination

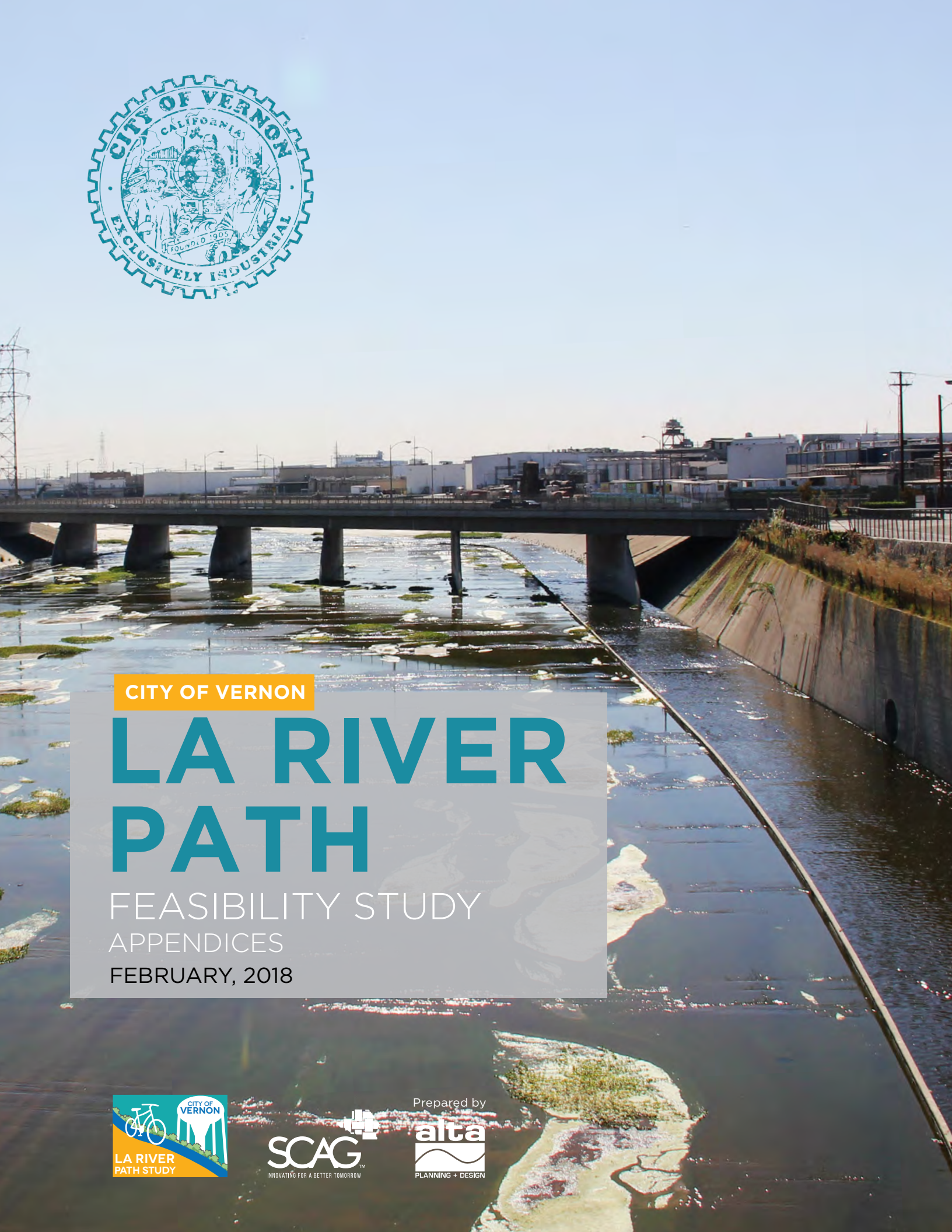
As the LA River Bike Path Gap Closure Project moves forward, key issues for Vernon's local business stakeholders require further coordination. Table 7-3 summarizes needs raised by Vernon's Business and Industry Commission (VBIC). Additional meeting notes from the VBIC are located in Appendix B.

A focus group should be set up to allow collaboration between the business community and the path design team. The goals of the focus group would be listen to concerns and needs and work together to establish an alignment and path that meets the business community's needs. It will be critical to communicate the benefits the path can bring to the City and its businesses and this venue could be a great way to engage the business community in that effort.

Safety/Security
Ensure adjacent industrial operations properties are secure from path users and prevent trespass onto private property.
Develop an Operations and Maintenance plan that meets the needs of the Vernon Police Department.
Address concerns and develop solutions to prevent potential homeless encampments along the path corridor.
Business Operations
Mitigate construction impacts on local roads.
Maintain rail operations during path construction.
Ensure private property owners are engaged throughout the design and permitting process.
Permitting
Obtain necessary permits from US Army Corps of Engineers and LA County Flood Control which ensure path does not have negative impacts on flood protection.
Ensure environmental clearance process is met prior to construction.

Table 7-3: Local coordination next steps.


SOUTH BANK
Los Angeles River



CITY OF VERNON

LA RIVER PATH

FEASIBILITY STUDY

APPENDICES

FEBRUARY, 2018

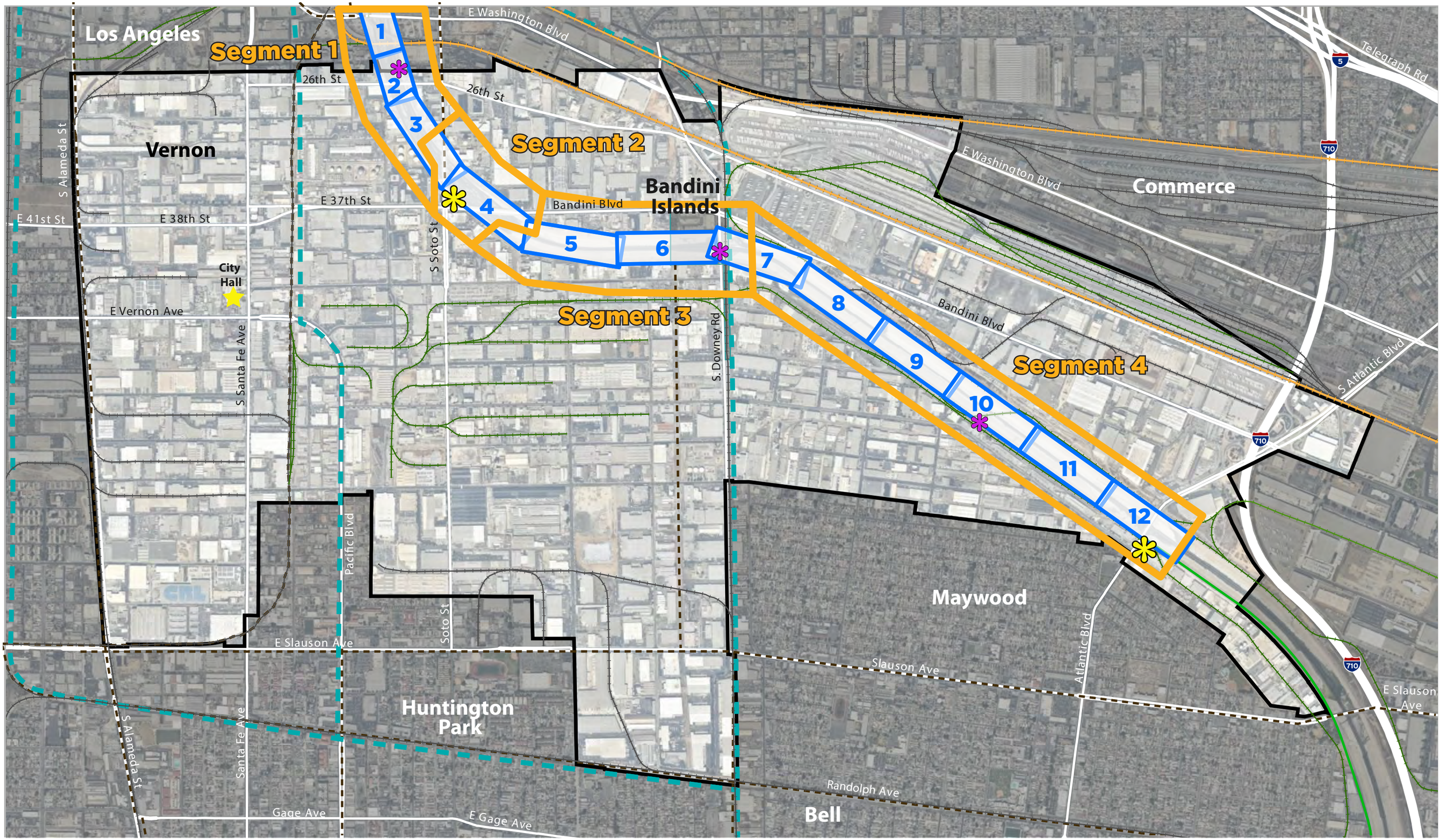
Prepared by

alta PLANNING + DESIGN

SCAG INNOVATING FOR A BETTER TOMORROW

APPENDIX A

ALIGNMENT MAPS



Potential Access Point

Potential Gateway

City of Vernon

Existing LA River Bikeway

Planned Regional Bikeways

High-Volume Rail Lines

Freight Rail Lines

Low-Volume Rail Lines

Proposed WSAB Alternative Alignments

0 MILES 1

NORTH

alta PLANNING + DESIGN

PERRINO,SAM J AND FRANK
L A CITY DEPT OF WATER AND POWER
L A CITY
L A CITY
ROBERSON, CRAIG R CO TR
LONG BEACH CITY
L A CITY
L A CITY DEPT OF WATER AND POWER
CALMAT CO
W Caldwell St
W Tichenor St
L A CITY DEPT OF WATER AND POWER
LEBATA ING
E Washington Blvd
Metrolink
L A CITY
L A CITY DEPT OF WATER AND POWER
LONG BEACH CITY
FARMERS AND MERCHANTS TRUST TR
FARMERS AND MERCHANTS TRUST
FARMERS AND MERCHANTS TRUST
FARMERS AND MERCHANTS TRUST
LA COUNTY FLOOD CONTROL DISTRICT
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
UP/BNSF
SO CALIF GAS CO
LONG BEACH CITY
Metrolink
BNSF
Metrolink
Butte St
L A CITY
L A CITY
E 23rd St
WASHINGTON PRODUCE LLC
BNSF
E 24th St
AT AND SF RY CO
AT AND SF RY CO
AT AND SF RY CO
DJSAY HOLDINGS LLC
AT AND SF RY CO

City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

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26th Street is a 2-lane road. At-grade crossing is feasible with enhanced crossing treatments.

Arched bridge supports obstruct channel bank

Fence between adjacent parking lot and ~10' level A/C access road

Elevated rail

At-grade rail

Industrial uses and buildings come directly to the edge of the channel

ROBERSON, CRAIG R CO TR
L A CITY DEPT OF WATER AND POWER
CALMAT CO
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
FARMERS AND MERCHANTS TRUST TR
FARMERS AND MERCHANTS TRUST
FARMERS AND MERCHANTS TRUST
L A CITY DEPT OF WATER AND POWER
SO CALIF GAS CO
L A CITY
WASHINGTON PRODUCE LLC
AT AND SF RY CO
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
LA COUNTY FLOOD CONTROL DISTRICT
AT AND SF RY CO
LEBATA INC
A T&S F RY CO
THE ALPERT CO
LA COUNTY FLOOD CONTROL DISTRICT
DARLING DELAWARE CO INC
DARLING DELAWARE CO INC
DARLING INTERNATIONAL INC
DARLING INTERNATIONAL INC
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
THE ALPERT CO
HAMPSTEAD PROPERTIES
HAMPSTEAD PROPERTIES
BFI MEDICAL WASTE INC
HERCULES FORWARDING INC
PICK, CHARLOTTE Y TR
ABRAMS, RONALD S CO TR
WILLIG, WALTER F TR ET AL
WILLIG, WALTER F TR ET AL
15211 FRIENDS STREET INC
QUESADA, MARK AND CECILIA
2640 VERNON LLC
MILAGERD LLC
DARLING DELAWARE CO INC
AT AND SF RY CO

Metrolink
BNSF
E Washington Blvd
Vernon
E 26th St
E 23rd St
Los Angeles

City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

PERRINO,SAM J AND FRANK
L A CITY DEPT OF WATER AND POWER
L A CITY
L A CITY
ROBERSON, CRAIG R CO TR
LONG BEACH CITY
L A CITY
L A CITY DEPT OF WATER AND POWER
CALMAT CO
W Caldwell St
W Tichenor St
L A CITY DEPT OF WATER AND POWER
L A CITY
L A CITY DEPT OF WATER AND POWER
LONG BEACH CITY
FARMERS AND MERCHANTS TRUST TR
E Washington Blvd
LEBATA ING
Metrolink
FARMERS AND MERCHANTS TRUST
FARMERS AND MERCHANTS TRUST
FARMERS AND MERCHANTS TRUST
LA COUNTY FLOOD CONTROL DISTRICT
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
SO CALIF GAS CO
UP/BNSF
LONG BEACH CITY
Metrolink
BNSF
Butte St
L A CITY
L A CITY
E 23rd St
WASHINGTON PRODUCE LLC
BNSF
AT AND SF RY CO
AT AND SF RY CO
DJSAY HOLDINGS LLC
E 24th St
AT AND SF RY CO

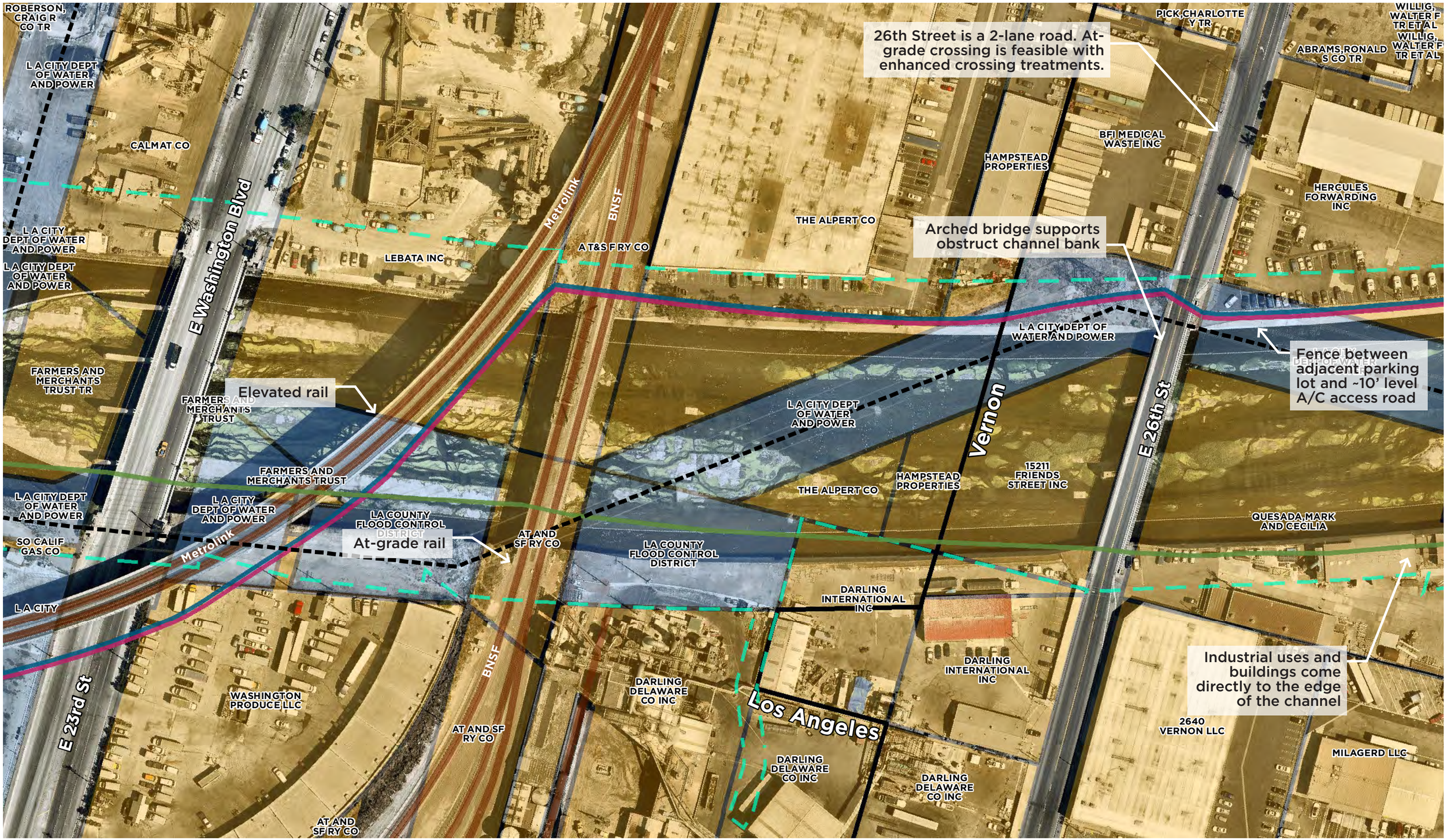
City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

alta PLANNING + DESIGN



City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

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Rail Lines
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Alternative C
Power Lines
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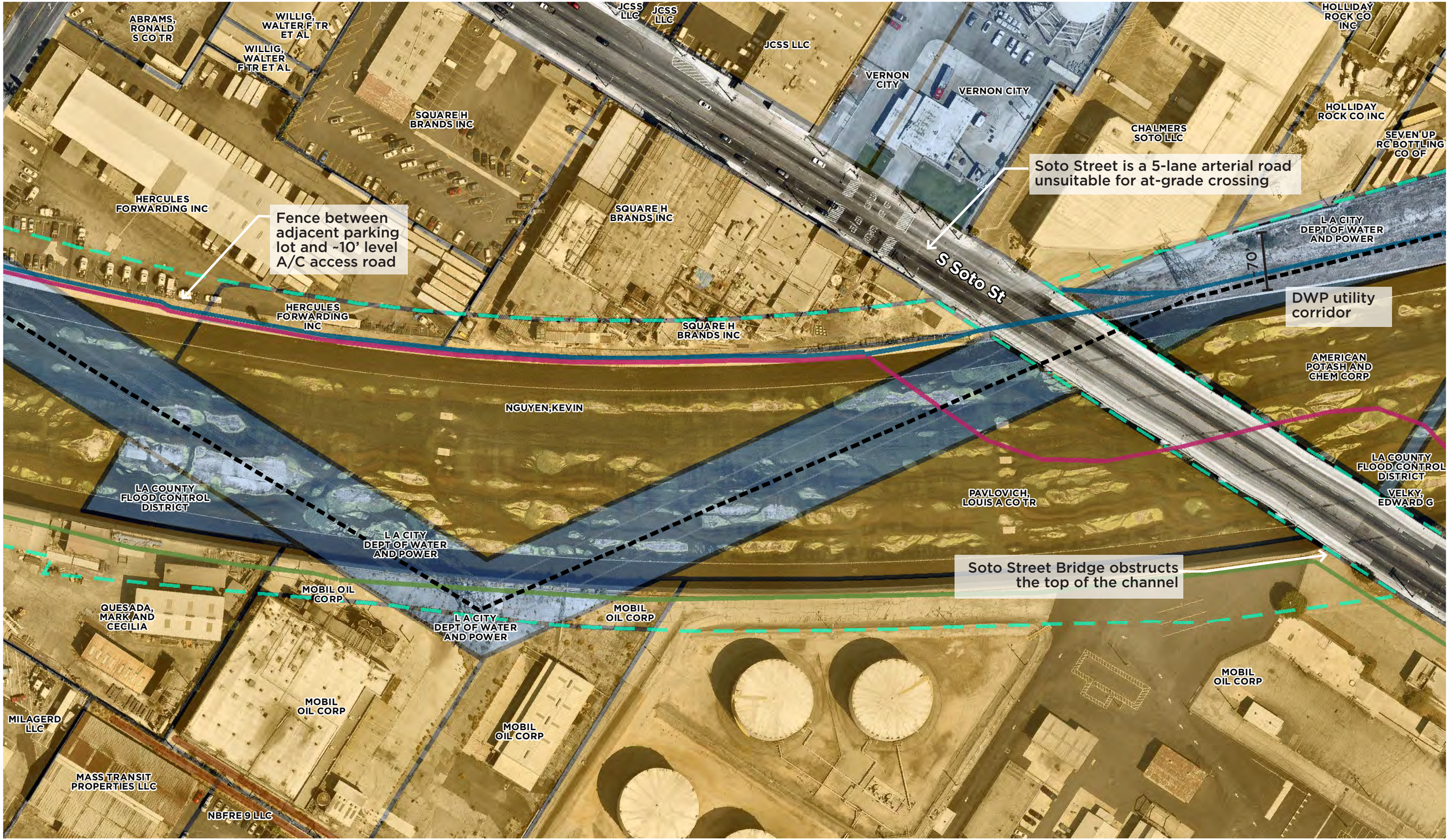
0 100 200 FEET



City of Vernon: LA River Bikeway Study

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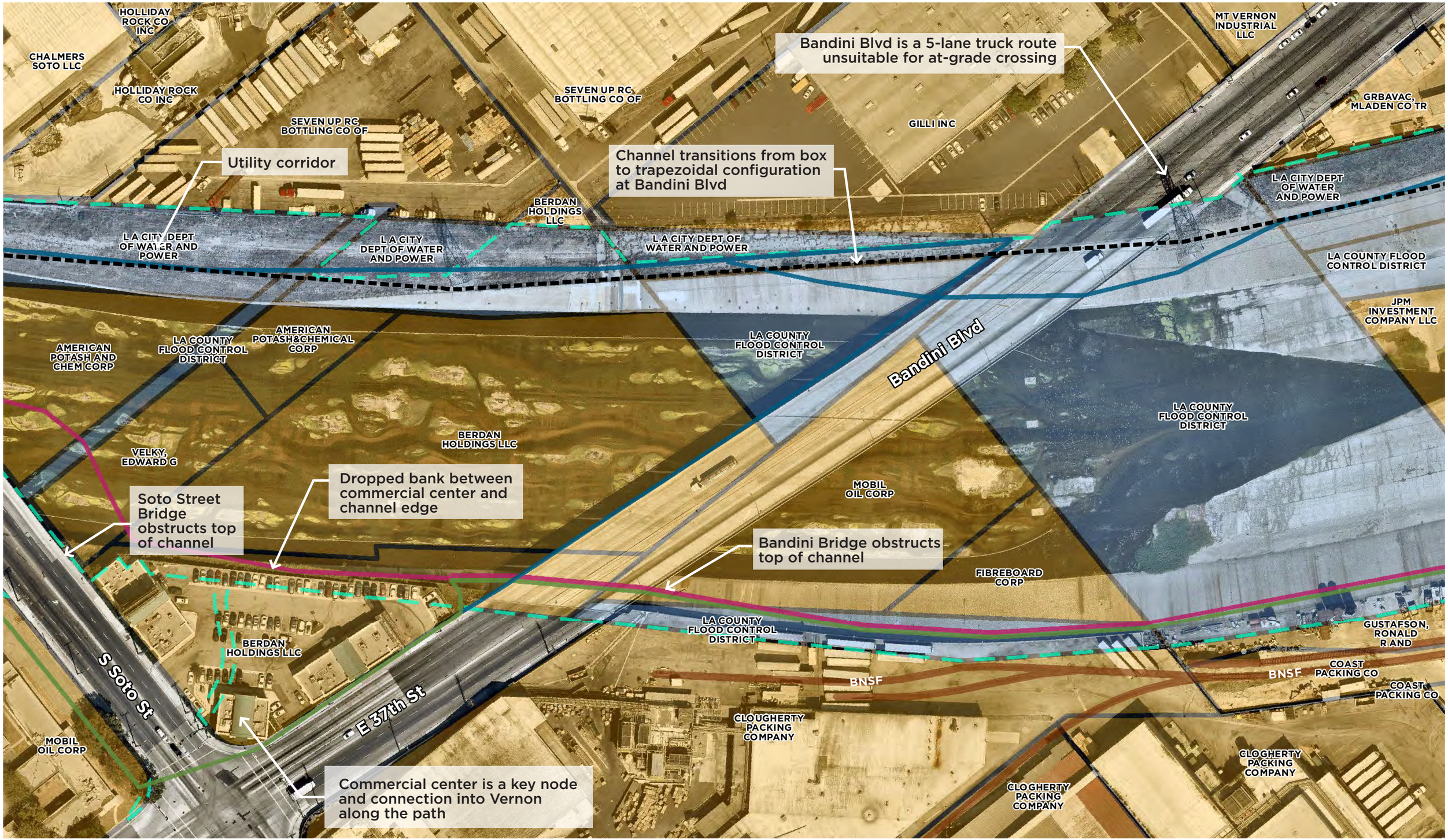

City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

GILLI INC
MT VERNON INDUSTRIAL LLC
Bandini Blvd
GRBAVAC, MLADEN CO TR
TORRES, CARLOS O AND MELVIN C
LEE,ANNA M
DRESMAN, PAUL C TR
LARSEN, LILLIAN J TR
DRESMAN, PAUL C TR
MILLER, DALE L CO TR
DALES TRANSPORT
SONG, SANG JUN AND
50'
100'
GRBAVAC, MLADEN CO TR
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
LA COUNTY FLOOD CONTROL DISTRICT
LA COUNTY FLOOD CONTROL DISTRICT
LA COUNTY FLOOD CONTROL DISTRICT
DWP utility corridor
~20' level A/C maintenance road
under utility towers
DRESMAN, PAUL C TR
ABTAHI, KHOSROW
ABTAHI, KHOSROW
LEE,ANNA M
DRESMAN, PAUL C TR
8' wide sloped A/C pad along
top of channel
18'-20' between rail centerline
and fence
LA COUNTY FLOOD CONTROL DISTRICT
JPM INVESTMENT COMPANY LLC
HUFF REAL ESTATE HOLDINGS L L C
LARSEN,JOYCE
BNSF
PPF DEDEAUX INDUSTRIAL 3425 E
GUSTAFSON, RONALD R AND
COAST PACKING CO
BNSF
LA COUNTY FLOOD CONTROL DISTRICT
PPF DEDEAUX INDUSTRIAL 3425 E
VERNON B LLC
BNSF
VERNON B LLC
PPF DEDEAUX INDUSTRIAL 3425 E
PPF DEDEAUX INDUSTRIAL 3425 E
COAST PACKING CO
JPM INVESTMENT COMPANY LLC
HUFF REAL ESTATE HOLDINGS L L C
VERNON B LLC
VERNON B LLC
PPF DEDEAUX INDUSTRIAL 3425 E
PPF DEDEAUX INDUSTRIAL 3425 E

City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
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LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

DALES TRANSPORT
SONG, SANG JUN AND
WEST SOTO STREET PARTNERS
Q H SILK FLOWER INC
VERNON PROPERTIES LLC
Vernon
SAMPANIS, DAVID M
VALACAL CO
VALACAL CO
ART MORTGAGE BORROWER PROPCO
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER

DWP utility corridor
~20' level A/C maintenance road
under utility towers

Bandini Islands
/ LA County
jurisdiction

LA COUNTY FLOOD CONTROL DISTRICT
ART MORTGAGE BORROWER PROPCO
CASTILLO, ACTINO Q
KESHISHYAN, ARMEN AND KARINE
VERNON PROPERTIES LLC
THURMAN, ANNA
HARVEY, ALICE B ET AL
LA COUNTY FLOOD CONTROL DISTRICT

8' wide sloped A/C pad along
top of channel

18'-20' between rail centerline
and fence

ART MORTGAGE BORROWER PROPCO
LA COUNTY FLOOD CONTROL DISTRICT
LA County

Bikeway corridor proposed in
Metro Active Transportation
Strategic Plan

PPF DEDEAUX INDUSTRIAL 3425 E
BNSF
PPF DEDEAUX INDUSTRIAL 3425 E
BNSF
BNSF
Y I PROPERTIES INC
YONEKYU USA INC
RICHMAN, JOSHUA J TR
ART MORTGAGE BORROWER PROPCO
PPF DEDEAUX INDUSTRIAL 3425 E
PPF DEDEAUX INDUSTRIAL 3425 E
L A CITY DEPT OF WATER AND POWER
TSAI, CHIN ZONG CO TR
TSAI, CHIN ZONG CO TR
YONEKYU USA INC

City of Vernon: LA River Bikeway Study
Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
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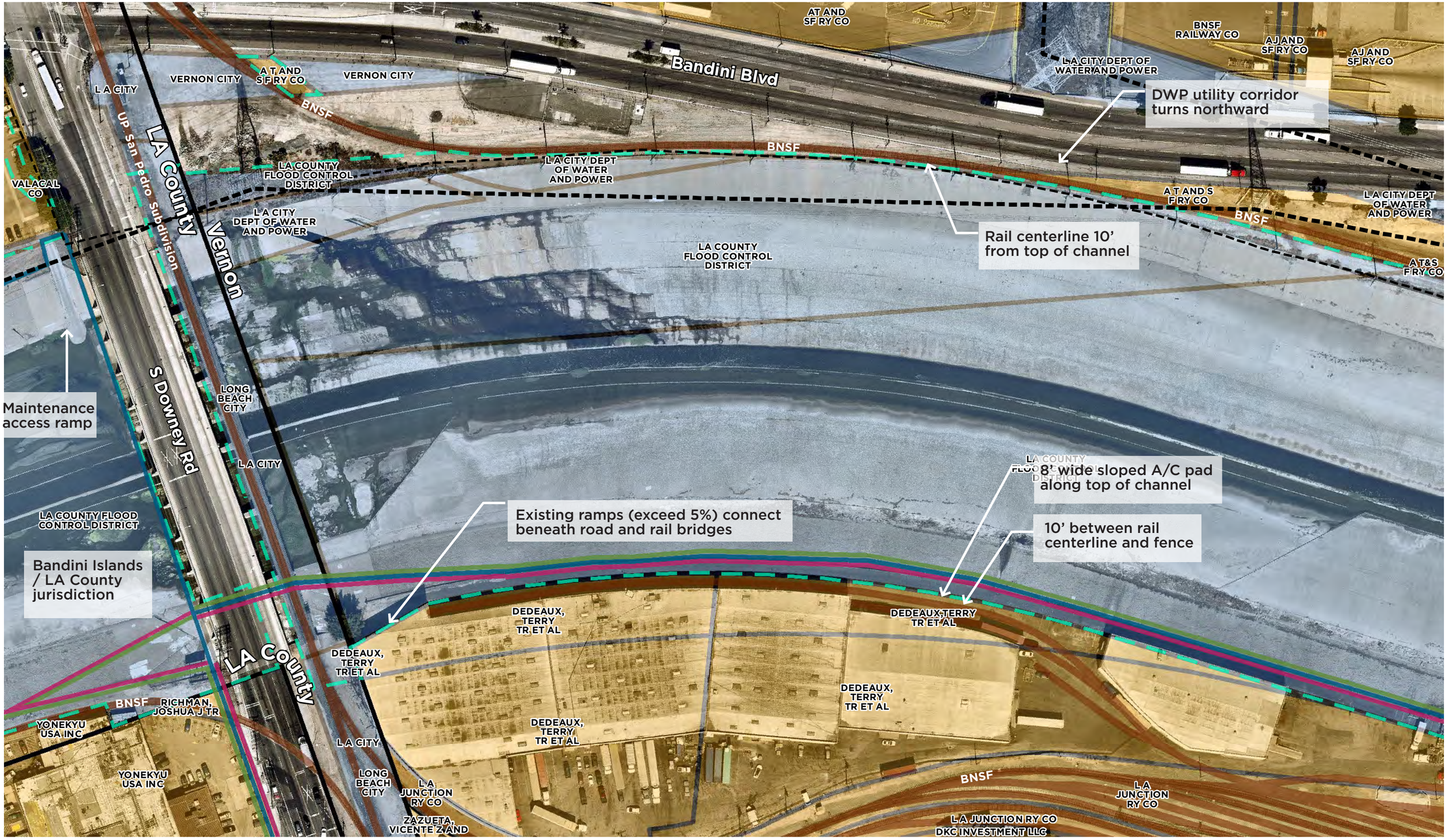
0 100 200 FEET



City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

SEGMENT 2 KEY MAP 6 OF 11

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

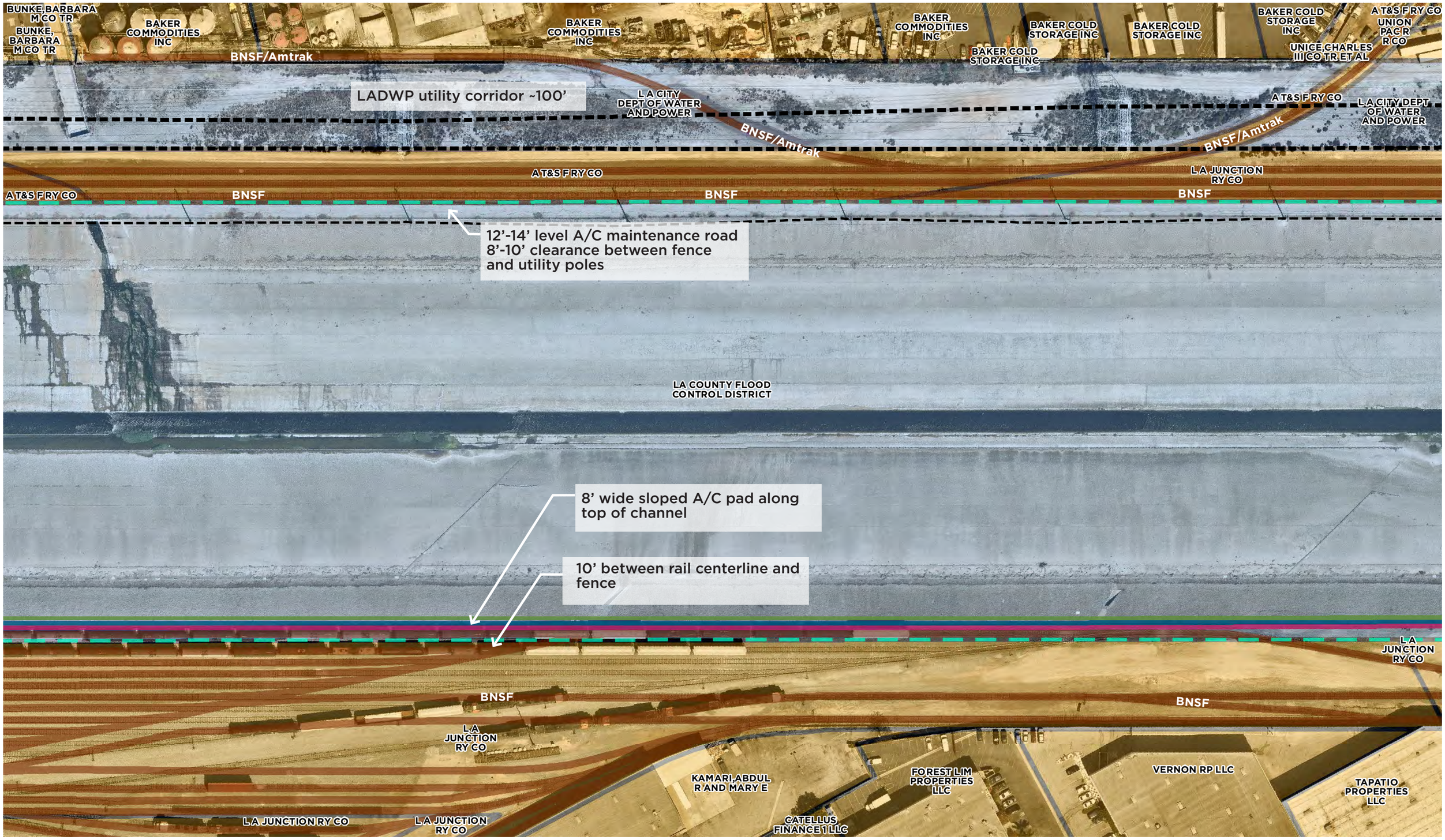
AJ AND SF RY CO
A T AND S F RY CO
Bandini Blvd
ROBERTSON, BOBBY R JR CO TR
ROBERTSON, BOBBY R JR CO TR
BUNKE, BARBARA M CO TR
BUNKE, BARBARA M CO TR
BAKER COMMODITIES INC
DWP utility corridor
L A CITY DEPT OF WATER AND POWER
L A CITY DEPT OF WATER AND POWER
A T AND S F RY CO
A T&S F RY CO
A T&S F RY CO
LA COUNTY FLOOD CONTROL DISTRICT
BNSF
BNSF
BNSF
12'-14' level A/C maintenance road
8'-10' clearance between fence and utility poles
LA COUNTY FLOOD CONTROL DISTRICT
8' wide sloped A/C pad along top of channel
10' between rail centerline and fence
DEDEAUX, TERRY TR ET AL
DEDEAUX, TERRY TR ET AL
BNSF
BNSF
BNSF
L A JUNCTION RY CO
L A JUNCTION RY CO
L A JUNCTION RY CO

City of Vernon: LA River Bikeway Study
Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

alta PLANNING + DESIGN



City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

4150 BANDINI LLC
PACKAGING CORP OF AMERICA
L A JUNCTION RY CO
PACKAGING CORP OF AMERICA
BNSF/Amtrak
LADWP utility corridor ~100'
L A CITY DEPT OF WATER AND POWER
Rail spurs cross utility corridor
BNSF
L A JUNCTION RY CO
BNSF
12'-14' level A/C maintenance road
8'-10' clearance between fence and utility poles
LA COUNTY FLOOD CONTROL DISTRICT
8' wide sloped A/C pad along top of channel
10' between rail centerline and fence
BNSF
L A JUNCTION RY CO
L A JUNCTION RY CO
L A JUNCTION RY CO
BNSF
VERNON RP LLC
FRIEDMAN, RICHARD AND
YOUNG, SUPATRA L
L A JUNCTION RY CO
L A JUNCTION RY CO
TAPATIO PROPERTIES LLC
SAAVEDRA, JOSE L SR TR
FRIEDMAN, RICHARD AND
YOUNG, SUPATRA L
YOUNG, SUPATRA L
YOUNG, SUPATRA L
VERNON CITY
L A JUNCTION RY CO
4825 DISTRICT LLC
L A JUNCTION RY CO

City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
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Alternative C
Power Lines
City Limits

0 100 200 FEET

alta PLANNING + DESIGN

PACKAGING CORP OF AMERICA

L A JUNCTION RY CO

CENTERPOINT PROPERTIES TRUST

J H AND SONS LLC

SOUTH OF BANDINI PARTNERS

LADWP utility corridor ~100'

L A CITY DEPT OF WATER AND POWER

L A JUNCTION RY CO

BNSF

BNSF

12'-14' level A/C maintenance road
8'-10' clearance between fence and utility poles

Rail spurs cross utility corridor

LA COUNTY FLOOD CONTROL DISTRICT

8' wide sloped A/C pad along top of channel

10' between rail centerline and fence

L A JUNCTION RY CO

BNSF

BNSF

BNSF

L A JUNCTION RY CO

4825 DISTRICT LLC

N AND N PARTNERS LLC

L A JUNCTION RY CO

GRANT, IRVIN ET AL

L A JUNCTION RY CO

GRANT, IRVIN AND

L A JUNCTION RY CO

L A JUNCTION RY CO

L A JUNCTION RY CO

City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
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Power Lines
City Limits

0 100 200 FEET

SOUTH OF BANDINI PARTNERS

SOUTH OF BANDINI PARTNERS

FEDEX NATIONAL LTL INC

L A JUNCTION RY CO

LADWP utility corridor ~100'

L A CITY DEPT OF WATER AND POWER

L A CITY DEPT OF WATER AND POWER

L A JUNCTION RY CO

BNSF

L A JUNCTION RY CO

BNSF

12'-14' level A/C maintenance road
8'-10' clearance between fence and utility poles

LA COUNTY FLOOD CONTROL DISTRICT

S Atlantic Blvd

Existing bikeway access onto Atlantic Blvd with narrow sidewalks and no bike facility

LA COUNTY FLOOD CONTROL DISTRICT

10' between rail centerline and fence along existing bikeway

Existing Bikeway paved width = 12' striped width = 8'

Existing bikeway access

Existing at-grade rail crossing

8' wide sloped A/C pad along top of channel

10' between rail centerline and fence

BNSF

L A JUNCTION RY CO

BNSF

L A JUNCTION RY CO

KRYSTAL ENTERPRISES LLC

District Blvd

L A JUNCTION RY CO

GRANT, IRVIN ET AL

GRANT, IRVIN AND

L A JUNCTION RY CO

L A JUNCTION RY CO

HASSAN,HASAN AND IKBAL

HASSAN,HASAN AND IKBAL

BNSF

City of Vernon: LA River Bikeway Study

Property Ownership and Alignment Alternatives

Private Parcels
Public Parcels
LACFCD Easment Area
Rail Lines
Alternative A
Alternative B
Alternative C
Power Lines
City Limits

0 100 200 FEET

APPENDIX B

SUPPLEMENTAL DOCUMENTS

LA River Path Plan Review

There have been numerous studies conducted over the last two decades concerning the LA River. The Project Team drew from 23 of those key studies to inform the development of the Vernon LA River Path Feasibility Study. Figure B-1 is a visual representation of those studies. The colored lines indicate which segments of the river were studied for each plan, and the intensity of the green indicates the number of studies happening concurrently in a given year. The deeper the shade of green, the more concurrent studies occurred in that particular year.

Table B-1 on the following pages provides a narrative summary of these same studies and thier relvance to the Vernon LA River Path Feasibility Study.

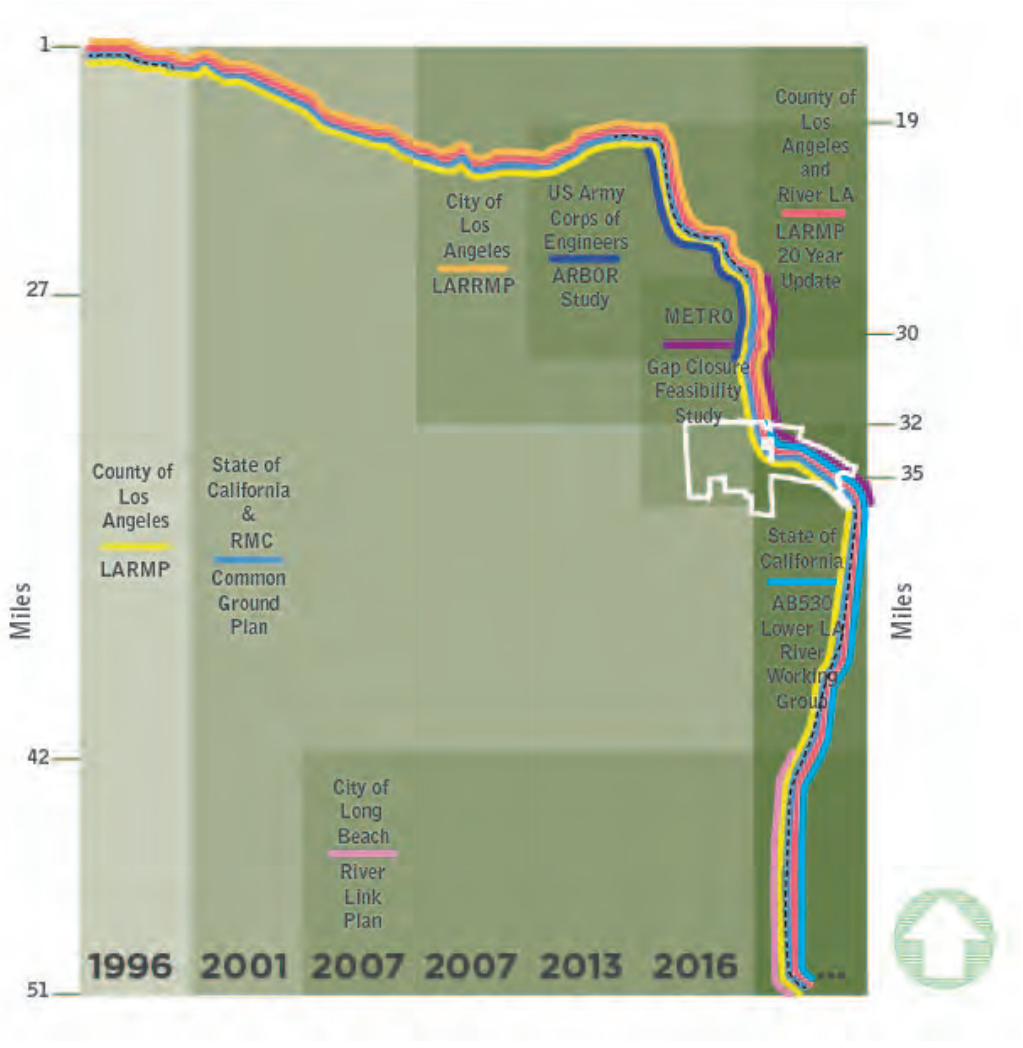


Figure B-1: Previous plans focused on the LA River, 1996 - present

appendix

Lower LA River Revitalization Plan

Assemblymember Rendon's Assembly Bill 530 allowed for the creation of a working group consisting of local municipalities, agencies, and stakeholders to develop a revitalization plan of the Lower Los Angeles River from 26th Street in Vernon to its outlet in Long Beach. With support from the San Gabriel and Lower LA Rivers and Mountains Conservancy and the LA County Department of Public Works, the working group will create a revitalization plan that connects river-adjacent communities to this important environmental resource. This work will then be utilized while updating the County Master Plan for the entire Los Angeles River.

The working group consists of three River Segment Committees and five Plan Element Committees. The River Segment Committees are Vernon to Rio Hondo, Rio Hondo to Compton Creek, and Compton Creek to LA River Outlet. The Plan Element Committees are Public Realm, Implementation, Water and Environment, Community Engagement, and Community Economics, Health, and Equity. Both the River Segment and Plan Element Committees regularly meet to discuss issues and opportunities and develop principles and guidelines that are shared with the overall working group. Beginning in 2016 the working group performed initial inventory, mapping, and analysis that has lead into technical feasibility studies of policies, projects, and programs which will ultimately result in a final revitalization plan for adoption in 2018.

Relevant Plans and Studies Matrix

Plan	Agency	Year	Applications to Bikeway	Project Extents
Active Transportation				
Vernon Bicycle Master Plan	City of Vernon	2016	Proposed Class I bikeway from city limit to existing bikeway at Atlantic Avenue. Reviewed and conforms to previous county and regional plans.	Vernon City Limits
Metro's Active Transportation Strategic Plan	Metro	2016	Proposed Class I bikeway in LA River Corridor. Recommendations incorporated into Vernon Bicycle Plan	Los Angeles County
Metro's Bicycle Transportation Strategic Plan	Metro	2006		
Los Angeles River Bike Path Closure Feasibility Study	Metro	2016	Developed bikeway alignment alternatives to close gap in the LA River Bikeway between the San Fernando Valley in Los Angeles and Maywood.	City of Vernon, City of Los Angeles, Unincorporated LA county
Gateway Cities Council of Governments (GCOG) Active Transportation Plan	GCOG	2016	North LA River Bikeway Gap Closure	Gateway Cities Region
County of Los Angeles Bicycle Master Plan	LA County	2012	River bikeway within the unincorporated area of Bandini Islands	Unincorporated LA County
Mobility Plan 2035	City of LA	2016	Implement Greenway 2020 Plan by constructing river bikeway from Riverside Ave to Washington Blvd.	City of LA
City of Los Angeles Bicycle Plan	City of LA	2010	River Bikeway from Riverside Ave to Washington Blvd	City of LA
Greenway 2020 Movement	River LA		Develop an active transportation corridoralong the river which connects to existing bike and pedestrian corridors	Entire LA River

Table B-1: Relevant plans and studies matrix

River Improvement				
LA County LA River Master Plan	LA county	1996	Improve appearance of the river including aesthetic improvements like murals, tree planting, trails, and interpretive sites.	LA River
Common Ground Plan	Rivers and Mountains Conservancy (RMC), Santa Monica Mountains Conservancy (SMMC)	2001	Network of multi-use trails along the river corridor.	LA River
City of Los Angeles River Revitalization Master Plan	City of LA	2007	Continuous bikeway along river. Crown River Gateway and Ecological park to be built just north of Washington Blvd.	City of LA
US Army Corps of Engineers LA River Ecosystem Restoration Integrated Feasibility Report (ARBOR Plan)	US Army Corps of Engineers	2013	Recreational access to and crossings over the Los Angeles River from Griffith Park to Downtown Los Angeles	City of LA
Lower LA River Working Group	RMC, AB530	Ongoing	Update the LA County LA River Master Plan with a focus on the 21 Southern Miles of the LA River including the project area	LA River from downtown LA to Long Beach
LA River Index	River LA, Gehry Partners, OLIN, Geosyntec Constultants	Ongoing	Develop a new master plan for the LA River that considers all 51 miles.	Enitre LA River

Plan	**Agency**	**Year**	**Applications to Bikeway**	**Project Extents**
Rail				
PEROW/WSAB Corridor Alternatives Study Initial study to identify future transit service options and alignments connecting downtown LA and Santa Ana	SCAG with Metro and OCTA	2012	Rail project planned to incorporate parallel bike path.	Two alignments through Vernon: 1) using UP ROW along Downey St across river to run along East Bank (Leonis/District Station); 2) Pacific Blvd, Harbor Sub and underground (Pacific/Harbor Sub Station)
West Santa Ana Branch Corridor Technical Refinement Study Follow-on study to evaluate future ridership and several key project engineering constraints	Metro	2015	None	Three final alignments: 1) UP ROW to run along East Bank (Leonis/District Station); 2) Pacific Blvd, Harbor Sub/underground (Pacific/Harbor Sub Station); 3) Metro Blue Line (existing Vernon Ave Station)
West Santa Ana Branch Corridor Environmental Study Environmental review and advanced conceptual engineering design of alignments identified in the Technical Refinement Study	Metro	Ongoing	Rail project planned to incorporate parallel bike path.	Three final alignments: 1) UP ROW to run along East Bank (Leonis/District Station); 2) Pacific Blvd, Harbor Sub/underground (Pacific/Harbor Sub Station); 3) existing Metro Blue Line (existing Vernon Ave Station)
California State Rail Plan (CSRP) State-wide rail plan updated every four years, includes passenger and freight rail activity projections using BNSF-owned tracks along west bank of LA River in the City of Vernon	CalSta	2013-2018	None. Increased passenger and freight rail activity projected for 2018; no rail projects or ROW width changes.	BNSF RR owns/operates rail alignment along west bank of LA River through City of Vernon.

Plan	Agency	Year	Applications to Bikeway	Project Extents
Rail				
California High Speed Rail Plans Design/environmental clearance of future HSR connection from LA Union Station south to Anaheim, and east to San Bernardino/Riverside; HSR operations primarily will use existing rail ROW	CHSRA	Ongoing	None. Future HSR passenger rail service projected to be initiated in 2039 with Metrolink trains, use of CHSRA vehicles TBD.	None. HSR service will cross over from west bank of LA River at Redondo Junction (approximately Washington Blvd) to operate along tracks used by Amtrak and Metrolink trains.
Eco-Rapid Transit Joint Powers Authority (JPA) organization of cities advocating for transportation improvements in the Gateway Cities subregion Works closely with Metro and Gateway Cities Council of Governments	Eco-Rapid Transit	Ongoing	Funding Advocates	
Gateway Cities Strategic Transportation Plan includes: 1) Active Transportation Sheets (includes LA River Bike Path North Gap Closure project sheet); and 2) Description of Regionally Significant Bicycle Project Ideas	Gateway Cities Council of Governments (COG)	Ongoing	Funding Advocates, such as for Cap and Trade funding	Update existing LA River Bike Path North Gap Closure Project Sheet with final plan results; update/submit other bikeway project sheets
Long Range Transportation Plan (LRTP) Metro is in the process of updating the 2009 LRTP to an anticipated 2017 RTP document	Metro	Ongoing	Funding Source, such as Call for Projects program	Identified bikeway improvements should be included in all applicable Metro documents.

Context Maps

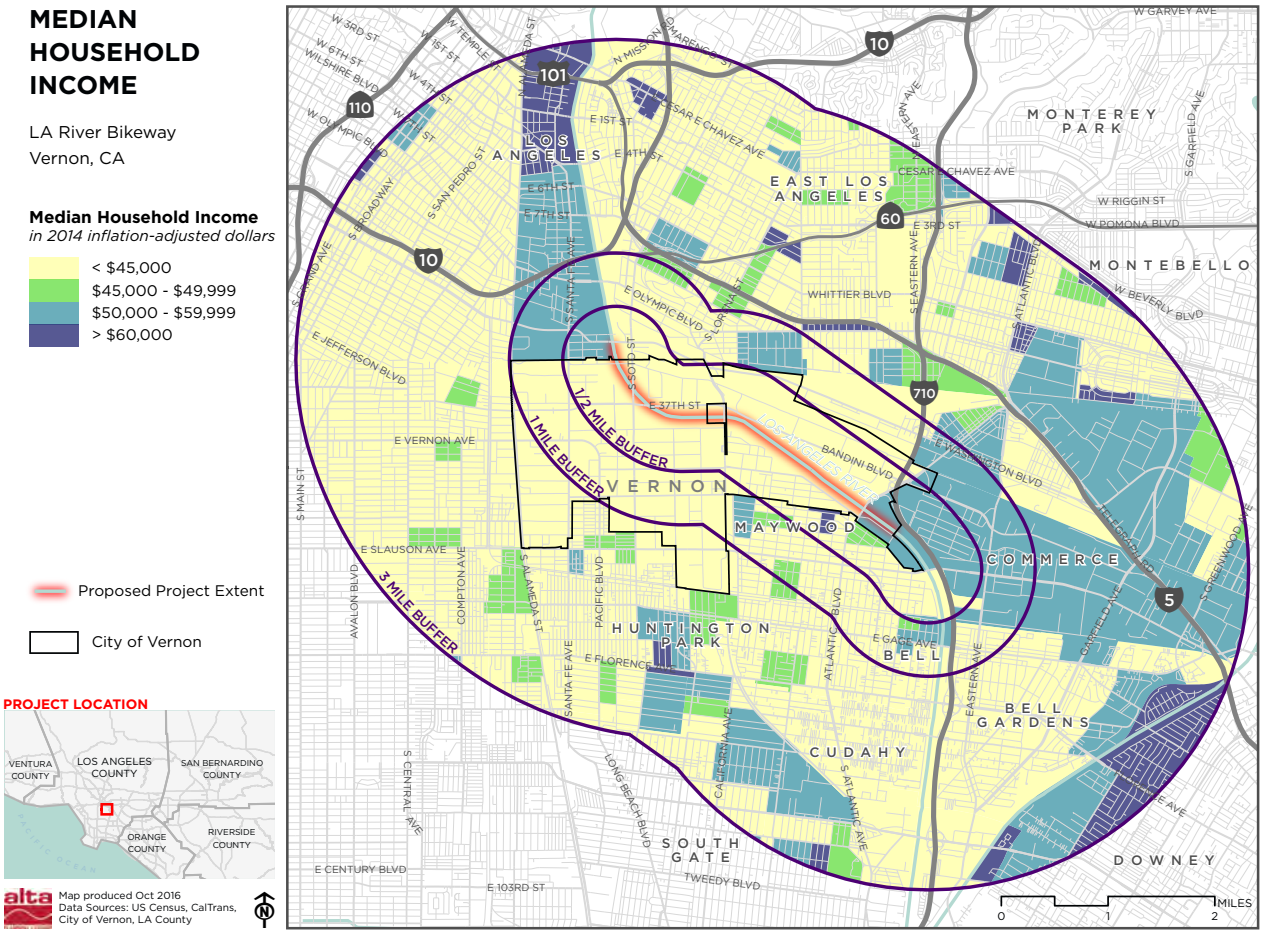
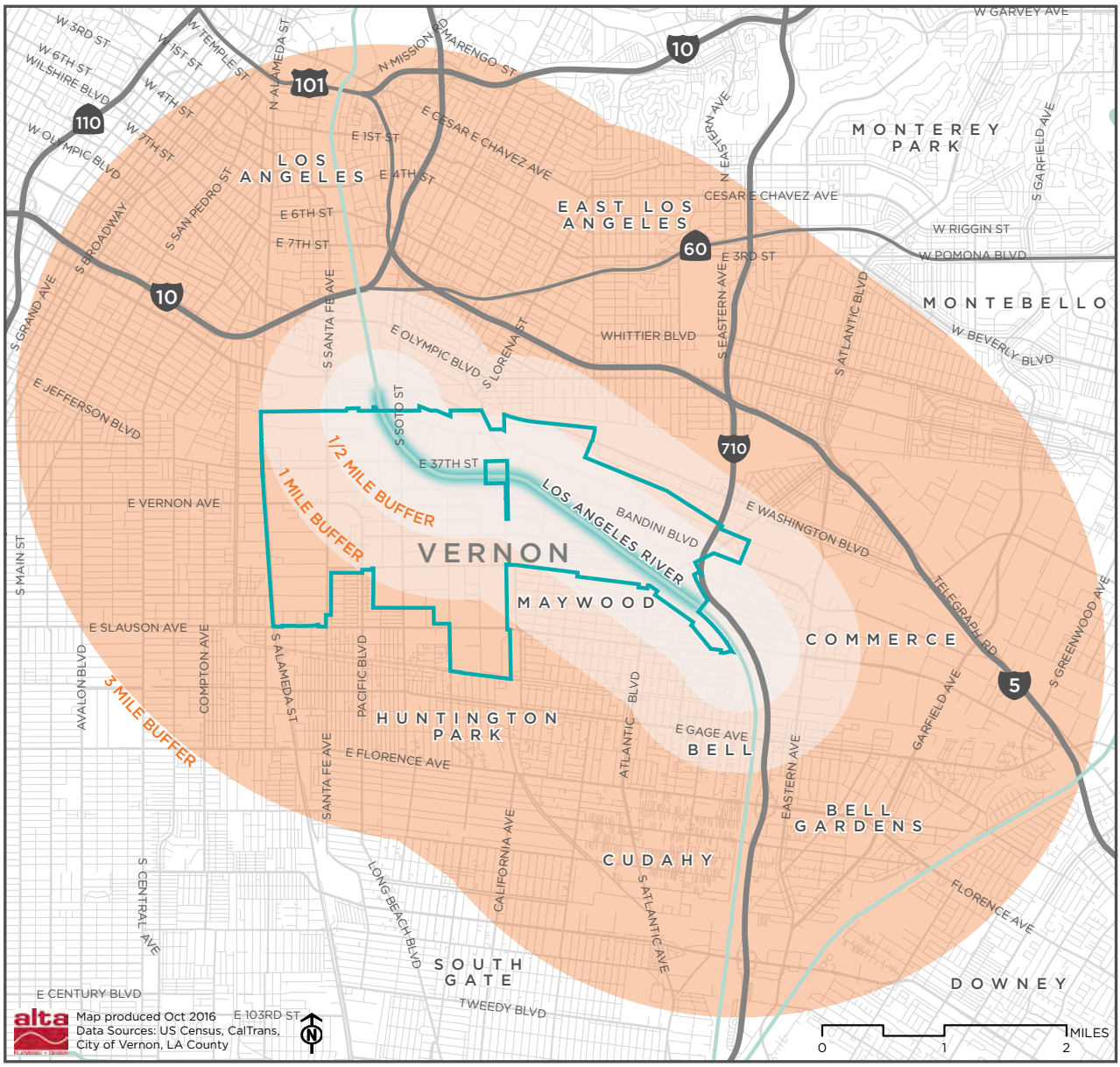


Figure B-2: Vernon median household income



32,500 Residents
89,000 Residents
680,950 Residents

Proposed Project Extent

City of Vernon

Figure B-3: Vernon population density

AVERAGE HOUSEHOLD SIZE

LA River Bikeway
Vernon, CA

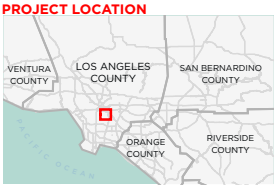
People per Household

- 1
- 2
- 3
- 4
- 5
- 6+

Proposed Project Extent

City of Vernon

PROJECT LOCATION



Map produced Oct 2016
Data Sources: US Census, CalTrans, City of Vernon, LA County

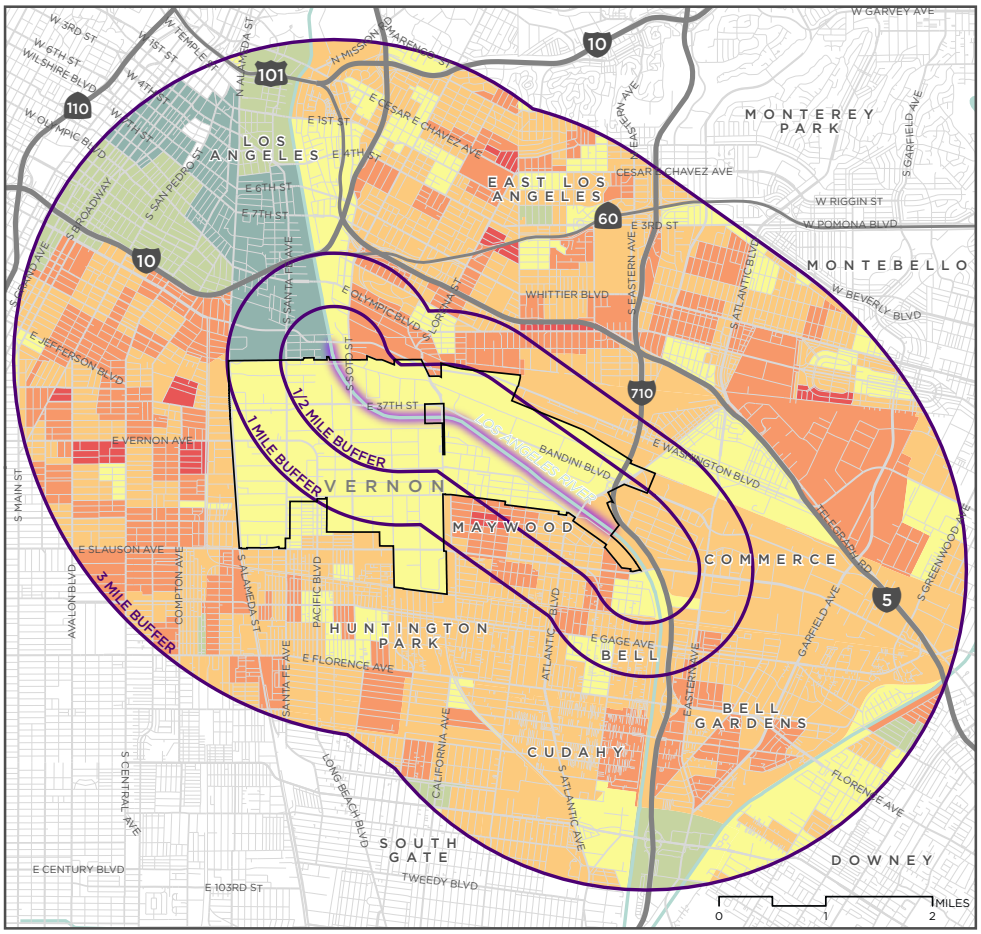


Figure B-4: Vernon household size

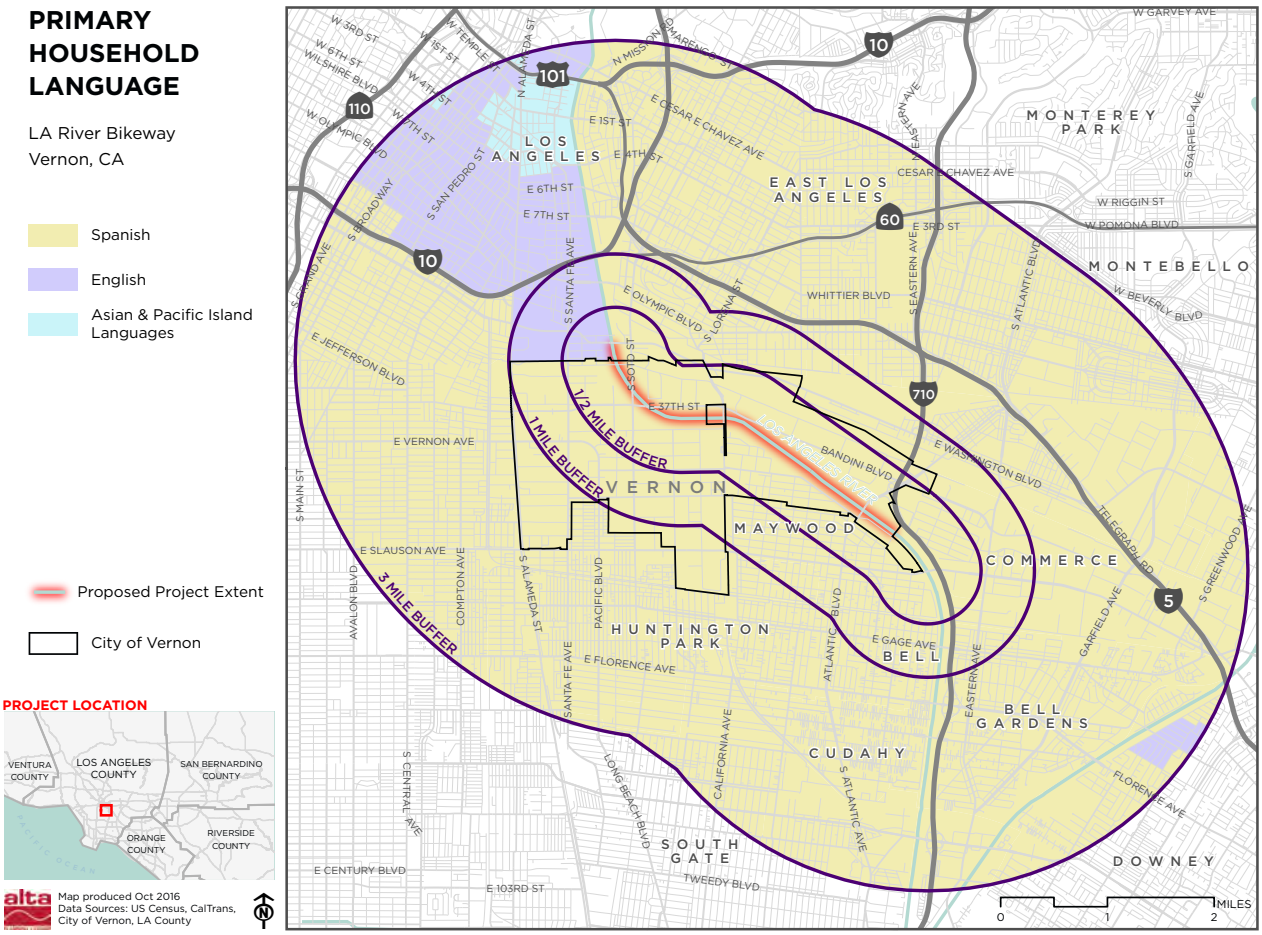


Figure B-5: Vernon primary household language

Business & Industry Commission Meeting Notes

PROJECT	City of Vernon Los Angeles River Path Study
SUBJECT	Vernon Business and Industry Commission Meeting
LOCATION	Vernon City Hall Office
DATE/TIME	November 9, 2017 9:00 a.m. – 11:00 a.m.

- Agenda Item 1: Los Angeles River Path Feasibility Study Presentation
    - Overview of Study – Goals, Findings, Plan, presented by Emily Duchon, Alta Planning + Design
    - Commissioner Comments/Discussion:
        - Type of layout – why was one side of the bank picked over the other?
        - Food manufacturing companies on west bank – what kinds of measures will be taken to ensure no one is trying to enter facilities from the rear. Facilities are mandated by USDA and Dept. of Homeland Security. Curious what the Army Engineers Corps thinks about this. How will this concern be addressed? What kind of encroachments will happen on their properties?
        - Must maintain security within food facilities. Federal government may have thoughts on how path should look.
        - Impact to rail service? Vernon is one of the oldest customers in the LA Basin for Union Pacific. If there's any disruption to business – who's going to pay for this cost?
        - Where will this be elevation-wise? Once the path comes through Bandini and Soto there are concerns re: flood control channel. It there really enough room for people to be cruising through there? Concerns re: safety for when water is running.
        - Is there a similar example of a bike path revitalization plan around Los Angeles County right now? Asked about Frogtown example in LA.
        - What kind of intensity of use have you seen when you've gone in and spent this much money on something? How many people actually truly enjoy the benefits of it? Particularly in a community that is absent of residential development, and somewhere where there isn't a plan to push for residential development. It sounds like a lot of displacement. This is a huge undertaking for what I think will be a very limited benefit to the residents of the City of Vernon, all 96 of us.

Figure B-6: Business & Industry Commission Meeting Notes.

- Has Vernon Police Department weighed in on this? Is this going to bring folks into Vernon that typically we haven't had here? (A: we can relay the message to them and have them get back to the commission)
- My concern is that the constituents that are really going to be suffering from this – the guys that will need to add additional security for the people coming here that don't have a purpose other than to ride along the river. Vernon doesn't have a lot of activity—it doesn't have those coffee shops, those pocket parks, and I don't think there's a plan for any development like that along the river. It's a lot of resources to pour into a place that would bring more problems than good.
- Is the City getting money just to spend the time and energy to determine how this could impact the city? Or do they just get 100k to say we're going to consume your resources to figure out whether this is good, bad or indifferent for you.
- The other concern I'm thinking of as an Orange County resident with the Santa Ana River Trail situation is how homeless encampment is something we need to address. Homeless encampment would be very problematic for all of us, which is something that doesn't exist now.
- What's the real value-added benefit? I haven't heard anyone clamoring for this. We haven't been asked how this is going to affect us. What happens when the first guy tries to scale the fence, and follows onto our property and then sues us?
- Unless someone's going to be willing to pay for a 30-40 foot wall to protect my plant, I just don't see how it creates a benefit. We need more of a security corridor than a river walk in Vernon.
- With my employees – biking to work isn't even remotely on their radar. It's important that you're aware that this is not something that's going to impact Vernon employees.
- For construction phase – are they going to close off Bandini?
- Is there somewhere that money could be put to better use? Where do we go voice those concerns?
- Is there any latitude in the expenditure of those funds, or are they dedicated by law through the measure?
- Are there two or three examples/options of river paths we could take a look at? Especially paths used for a business purpose – I'm looking for a reason to support it, but I need a little more information.
- Pocket parks that you mentioned – are they secure parks? Are they gated? The only secure parks in LA are state parks, with rangers.

PROJECT	City of Vernon Los Angeles River Bikeway Study
SUBJECT	Stakeholder Meeting with Metrolink
LOCATION	2558 Supply St, Building A Pomona, CA 91767, MOC - Conference Room
DATE/TIME	April 5, 2017 10:00 a.m. – 11:00 a.m.

1. Introductions

   Kim Chan, Metrolink

   Andy, Metrolink

   Felix Velasco, City of Vernon

   Emily Duchon, Alta Planning + Design

   Angelka Grandov, AECOM

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2. Project Overview
   - Vision of Vernon's LA River Bikeway Study
   - Location of Metrolink tracks in relation to the bikeway study corridor

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3. Discussion
   - Metrolink would like to be involved in the project going forward. Andy should be the main point of contact.
   - As the project moves into design, Metrolink will require a design services agreement for further evaluation.
   - If project team needs access to site for survey and structural review then would need to go through Metrolink and have people certified with rail protection training for access.

   - *Does Metrolink have design standards for rail bridge crossings that the design team should consider?*
     - Metrolink prefers the bikeway to go under the existing rail bridge. Their typical vertical clearance is 16.5' to accommodate trucks. Metrolink would allow for a variance on that clearance to accommodate a bikeway with a posted clearance on the bridge. If maintenance trucks need access, a higher vertical clearance may be needed.

- 24' vertical clearance is required over the tracks. Enclosure of trail also required.
- An 8' lateral clearance for the dynamic envelope of the train is already accommodated within the existing rail bridge. Anything outside of the Metrolink bridge is outside of their ROW (laterally) and they don't have jurisdiction.

- *Does Metrolink have any future projects planned that the design team should consider when evaluating bikeway alignment options along the LA River through the City of Vernon?*
  - No planned projects. Since there are currently two lines going across the bridge, Metrolink would unlikely expand the number of tracks anytime in the near future.
  - High-speed rail run-through track from Union Station is somewhere within this corridor. Metrolink does not have insight into which alignments are preferred for the high-speed rail line. They support the idea of moving forward with the bikeway alignment and consideration of current constraints because of the long-term and unknown time frame of high-speed rail.

- *Does the Metrolink have as built drawings for the rail bridge between Washington Blvd and 26th Street?*
  - Metrolink does not have as-built drawings. This is a legacy track that they inherited. They will look for bridge inspection report.
  - Metrolink provided pdfs of construction drawings for the Redondo Junction Fly-over. Alta will review to identify key elements for consideration of the bikeway design.

PROJECT	City of Vernon Los Angeles River Bikeway Study
SUBJECT#	Stakeholder Meeting with Army Corps of Engineers #
LOCATION#	US Army Corps of Engineers, 915 Wilshire Blvd, Los Angeles, CA 90017#
DATE/TIME	February 22, 2017 9:00 a.m. – 10:00 a.m.
ATTENDEES	Huma Nisar, Army Corps of Engineers, (408 Permitting) Hassan Harirchi, Army Corps of Engineers (Hydrology) Chris Chambers, Army Corps of Engineers (Geotech) Deborah Lamb, Army Corps of Engineers (Environmental) Felix Valasco, City of Vernon Emily Duchon, Alta Planning + Design Deven Young, Alta Planning + Design James Powell, Alta Planning + Design

1. 408 Permitting
   - The reach of the LA River in Vernon is operated and maintained by Army Corps.
   - Vernon could submit the 408 permit directly.
   - 408 permitting process can take about 6 months to 1 year at the district level. If the project is proposing major changes then it would need to go to Army Corps Head Quarters for review, which can take around 2 years. This project should be able to stay at the district level for review.
   - Local municipalities may apply for a Section 214 agreement to expedite 408 review to a 90+ days. It expedites the process by allowing the local agency to pay for the Army Corps staff time. LA County currently has a 214 agreement.
   - To meet the 408 Permit the project must show that there are no impacts to the hydrological function of the channel (capacity) and that the operations and maintenance needs are met. The Army Corps staff were accepting of designs that placed piers in the channel or redesigned the top of the levee as long as the previously stated objectives are met.
   - The 408 starts at 60% design. Army Corps staff open to collaboration and meeting to review preliminary design drawings (10%, 30%)
   - Improvements above the channel require a 404 permit but the 408 needs to be in process or approved before the 404 process would begin.
   - Checklists:
     - Ms. Nisar can provide an operations and maintenance checklist (not on website)
     - Hydro constraints and NEPA checklist on website
     - Vegetation setbacks on website (15' tree setback from the toe or channel wall).

2. Hydrology
   - The bikeway project would need to evaluate the hydrological impacts with a 2D HECRES system. The model must evaluate up and downstream impacts as well as all future projects.

- Does the Corps has a list of existing deficiencies along this portion of the channel? If so does the Corps have a public document describing the improvement projects associated with these deficient areas?
    - Yes, the new hydro model increased from 109,000 cfs to 114,000 cfs. (133 year frequency)
    - Mr. Harirchi provided the channel hydrologic design details from 7-15-39
    - The levee safety group survey's the deficiencies and sponsors have to pay for upgrades. There may be modifications in the future such as a flood wall.

- Does the Corps have any large up-stream or down-stream in-channel projects planned that would affect the high water in our reach of the project (aside from the larger restoration master plan)?
    - No additional projects were identified

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3. Geotech
    - Sheet pile vertical walls and concrete vertical walls are used in this reach. Can you please provide the details for these wall types? Can you also please provide the trapezoidal slope protection detail?
        - Yes, Mr. Chambers said he could provide as built drawings by email
    - Does the Corps have geotechnical maps for this reach ie. information on depth to bedrock?
        - Mr. Chambers said he will check and if he finds maps, he could provide by email

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4. Structural
    - Robert Ngo is the structural engineer who could review plans. Need a structural detail and calculation for review.
    - Parameters identified in the engineering manual.

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5. Environmental/ NEPA
    - An EIS will be needed (construction equipment impacts to air quality and noise alone will exceed the federal standards).
    - Ms. Lamb recommends a 100-150 page EIS.
    - The Army Corps would be the Federal lead agency for the NEPA document.
    - Can submit at any time for review (i.e. the project description).

PROJECT	City of Vernon Los Angeles River Bikeway Study
SUBJECT	Steering Committee Meeting #1 Notes
LOCATION	Vernon Chamber of Commerce
DATE/TIME	November 22, 2016 1:00 p.m. – 3:00 p.m.
ATACHMENTS	Sign-in Sheet, Power Point Presentation

Meeting Goals:

- Present the project's goals, scope of services and schedule
- Gather insight from committee members from previous LA River Bikeway planning efforts
- Gather agency requirements, standards, opportunities and constraints

Meeting Notes:

The meeting began with a project introduction from the City of Vernon and a round of introductions of the meeting attendees. There were 19 people in attendance. The Alta team then presented a Power Point reviewing the project's goals, needs analysis, plan review and case studies. The group was asked to provide input on how this project can build upon previous planning efforts along the LA River. The following summarizes the main topics discussed.

1. Metro Coordination

   Metro Measure M has secured funding to design and build 8 miles of the LA River path with a time frame of 5 to 8 years. Metro will be brining on a consultant during the summer/fall of 2017 to take design to 60%. Metro will be doing outreach and alternatives analysis through the 8 mile gap but not until the consultant is chosen next year.
   Metro is also doing a livability analysis and will present findings at a future meeting. The Vernon project is at the leading edge of closing the gap in this process can be expanded. Riverfront access is largely procured.

   Lesson learned from 2016 Metro LA River Gap Study: Transitions from bottom of channel to the bank are the most expensive elements.

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2. Operations and Maintenance

   Current maintenance is discontinuous. Future maintenance coordination will be important. Ongoing bikeway closures in the Elysian Valley from Army Corps river maintenance are an example of a problem. Vernon prefers that the County builds and maintains the path. Metro may fund construction, but Los Angeles County Public Works

(DPW) would maintain it, under today's arrangements. Vernon is not in a place to maintain the bikeway. Vernon would only maintain if absolutely necessary.

A Joint Powers Authority (JPA) to operate and maintain the River Path would provide greater flexibility and responsiveness to ongoing needs. A JPA would allow Metro to be more flexible with its funding. Currently Metro cannot fund landscape maintenance, for example. In addition, LA City does not want maintenance responsibility. LA City Council District 13 is currently reviewing a proposal for a JPA to maintain the path.

Metro, Vernon, LA City and LA County DWP would see the recommendation and/or creation of a JPA as a successful outcome.

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3. Safety and User Conflict

Safety: The river path is currently not on any law-enforcement maps, and is not in the 311 system. The river needs to be added to 311 and emergency maps. Emergency mile markers also needed. LA County DPW (DWP) is coordinating with LA County Trails to install a mile marker system.

During storm events, DWP Flood Control locks gates in their jurisdiction. However Army Corps does not. DWP is looking into using warning signage instead of locking gates. DPW is responsible for the lower river, where there are concerns about homelessness and the perception of safety.

User Conflicts: High speed bicycling is a safety concern along the LA River Bikeway. Within the City of LA there are no speed limits on Class 1 paths as California Vehicle Code does not require speedometers on bikes. Municipal Code 55.15 governs safety and speed for LA City of LA, indirectly applies to bike paths. Some other California governments (in Orange County) have established speed limits but this is not legal or enforceable and has not yet been challenged in court. The MRCA has used park-like rules and regulations on paths, which have no speed limit and lean on the vehicle code for bike path conduct.

Bikeway Width: Metro understands 12 feet is recognized as a minimum width and acknowledges that more width is needed when pedestrians are mixed with bikes. The 12' minimum is a roadway standard from the Caltrans Highway Design Manual. LA City recommends making the path as wide as possible. Orange line is an example of separate bikes and pedestrians.

4. Other Efforts

710 Corridor LA River Bike Path Improvement Project: Brian Balderrama from AECOM provided an updated on this project which is providing designs for path improvements from the ocean to Atlantic Blvd. Path improvements include upgrading lighting to make it a 24-hour bikeway and adding bike repair stations. Access points are being evaluated. Landscape is broken down into three categories, to determine how sufficient existing landscape is. A linear cost was developed for each of the three different landscape tiers. A more in-depth update will be provided at the next Steering Committee Meeting.

Other projects: Current preferred Rail to River alignment is Randolph. Vernon and Hungtington Park are hosting a joint open street event next summer.
Friends of the Los Angeles River recognizes that many overlapping projects may burn out the public by engaging in too many public meetings. They suggest to consolidate/coordinate outreach. River LA's River index is ongoing.

5. Property

Rail easements follow both banks of the river through Vernon. This is a major negotiation and cost constraint. BNSF and UP easements are part of each property and would need to be purchased separately. It's unlikely that an unused rail easement can be claimed for lack of use by a public agency. The idea of collecting railway back taxes could be used during negotiations. Coast Packing has been trying to build adjacent to the river but get stuck with rail negotiations.

City of LA purchased public use easements on top of existing utility easements to build portions of the LA River Bikeway. County of Los Angeles Flood Control (LACOFC) considers public use for scenic access as part of the existing flood control easement. Coordination with County Council needed to provide framework for easement opportunities.

There are opportunities to connect the path directly to businesses, with private access points, but coordinating closures would present a challenge. If private property goes to the high water line, then access can't be prevented.

6. Other Opportunities and Constraints
    - Opportunity for path to connect to the commercial center along river at Soto Street and Bandini Blvd. There are currently a number of restaurants at this location.
    - Transmission lines along the river have a 50-year lifespan, these are 85 years old. There could be an opportunity to coordinate efforts with utility upgrades.
    - Flood Control low flow channels could be relocated within the bottom of the channel
    - Rio Hondo connection south of Atlantic is on the west bank.
    - Freeway/710 on east side of river blocks access from adjacent areas.
    - Opportunity to rethink the river from a visionary perspective: new sources of energy, capture and recirculate runoff without draining to the ocean.
    - Stormwater improvements and groundwater recharge opportunities. Explore permeable materials for pathway surface.
    - Provide direct access (via key card) to employers along path but would need coordination approval from Flood Control who manages river access.

7. What Does Success Look Like
    - Engage adjacent business.
    - Engage the community.
    - Recommend and advance the creation of a JPA to operate and maintain the path.
    - Explore the feasibility of bikeway alignments through Vernon that have not yet been inventoried in previous planning efforts.
    - Identify a preferred bikeway alignment through the City of Vernon.
    - Provide a model for future gap closure projects.

PROJECT	City of Vernon Los Angeles River Bikeway Study
SUBJECT	Steering Committee Meeting #2 Notes
LOCATION	Vernon Chamber of Commerce
DATE/TIME	January 24, 2016 1:00 p.m. – 2:30 p.m.
ATTACHMENTS	Power Point Presentation, Sign-in sheet

Steering Committee Meeting #2 Goals:

- Update on project status and schedule
- Review and discuss study area opportunities and constraints

Meeting Notes:

The meeting began with a project introduction from the City of Vernon and a round of introductions of the meeting attendees. The Alta team presented a Power Point with project status and schedule updates, an overview of the I-710 expansion existing bike path upgrades, and a summary of detailed opportunities and constraints. Creative concepts for constrained areas, such as cantilevered and elevated paths and bike and pedestrian bridges were also presented. Following the presentation, the group had a working discussion of the needs and questions in the study area. The following notes summarizes the main topics discussed.

1. Community Engagement

The project team will host a community workshop booth at the **Carnaval Primavera Downtown Festival in Huntington Park on Saturday, April 8th, 2017**. We are developing a flyer for this event and when the details are finalized, we will ask the Steering Committee to help spread the word.

Please help promote the project on social media by sharing the project on Facebook and following the project on Twitter.

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2. Update on I-710 Expansion: Existing Bike Path Upgrades

AECOM presented the scope of updates to the existing LA River path south of Vernon as part of the I-710 extension project. The project will be adding new access points, upgrading existing access points, solar lighting, and bike fix-it stations (which cost about $2,000 each).

Metro's Rail to Rail project will be using hard-wired lighting on recommendation from security agencies (LAPD, County Sherriff and Fire). There is concern that cloudy days

limit available solar output. Until the solar powered lighting technology can ensure safety lighting 24/7 365-days a year, security agencies do not recommend it along paths that need lighting. Additionally, the Rail to Rail project will be using freestanding lighting under bridges in order to avoid touching Caltrans structures.

A question was raised about the ADA accessibility to the bike path. AECOM to check on ADA access upgrades from a parallel project.

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3. Opportunities and Constraints

Alta presented an overview of the opportunities and constraints along the West and East banks for the River in Vernon and showed examples of how the Coachella Valley CV/Link trail project turned constraints into opportunities.

The group discussed opportunities and constraints along the corridor.

- Key connections:
    - The group discussed focusing on the areas identified as key connections into Vernon. These include the river adjacent commercial area between Soto Street and
    - A vacant building at the NW corner of Soto St and 37th St was suggested as a potential location for a bicycle/transit commuter station.
    -
- Property
    - Farmer John expressed that a private entrance to the river path is not desirable, as it presents another location that they must keep secure from trespassers.
    - Alta provided a list of APN's for LACFCD for right of way analysis.
    - Alta provided list of APN's to Metro for right-of-way analysis.

- Environmental/Historical Constraints
    - Adjacent business may be concerned about how a path or a park may change their Title 5 Guidelines which regulate runoff and nitrogen loading. There is desire to determine what could trigger a permit change affecting business within 2,500' of a sensitive receptor (the river path or a new park). Alta and the City will coordinate with Keith Allan, City of Vernon Director of Health and Environmental Control, to review Title 5 guidelines and requirements for river adjacent business.
    - The Farmer John mural along the river is said to be 50 years old. Does it have historical value? If so, what are the constraints?
- Operations & Maintenance

- Metro's office of Extraordinary Innovation could lead the investigation of determining options for a group to take on the operations and maintenance (O&M) of the path. Alta

to follow up with Metro about the feasibility and time frame for the Office of Extraordinary Innovation to develop options for LA River Path O & M Plan.

4. Next Steps

Project team will develop and evaluate alignments to present to Steering Committee in March

Project team will be meeting with Metrolink, UPRR and Army Corps.

PROJECT	City of Vernon Los Angeles River Bikeway Study
SUBJECT	Steering Committee Meeting #3 Notes
LOCATION	MLA Office
DATE/TIME	May 24, 2017 1:00 p.m. – 2:30 p.m.
ATTACHMENTS	Power Point Presentation, Sign-in sheet

Steering Committee Meeting #3 Goals:

- Review and discuss stakeholder and community engagement efforts, alignment alternatives, and project theme concepts.

- Stakeholder Outreach
    - Alta and the City met with the US Army Corps in February 2017.
        - o Existing channel size is deficient based on latest hydro model
            - o Constraints to in-channel structures
            - o Opportunity to improve deficiencies in river capacity through path design
        - o Supportive of design process
        - o Open to early reviews and collaboration through permitting process
        - o Data Provided:
            - o As-built channel drawings
    - Alta and the City met with Metrolink in May 2017.
        - o Metrolink prefers path to go under tracks
            - o Require 24' vertical clearance over tracks
        - o Will grant variance to vertical clearance under
            - o Standard 16.5 vertical clearance under tracks for trucks
        - o Supportive of design process
        - o Data Provided:
            - o Construction plans for the Redondo Junction Flyover

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- Community Engagement

    The Alta Team and Vernon staff held a workshop at a booth at the Carnival Primavera Downtown Festival in Huntington Park in May 2017. 100% of in-person surveys were

conducted in Spanish, English was also available. Notable community feedback included:

- Of the 40 attendees of the event mostly lived near or in the City of Vernon. 3 Lived in the Vernon and 8 respondents worked in Vernon. Everyone was supportive of the project.
- There is a perceived fear that the river is an unsafe space to be for both flood related aspects and personal safety.
- Respondents would like to see access points primarily at Soto St/Bandini Boulevard and Atlantic Avenue.
- Lighting, safety, bike fix-it stations and landscaping were the highest ranked amenities.

- Opportunities and Constraints

  As a review from the previous Steering Committee Meeting, Alta summarized the opportunities and constraints through the project area, emphasizing the drivers in evaluating alignment options. These included channel configuration, ownership, bridges, railways, and connectivity and access.

- Alignment Evaluation

  Alta discussed the approach to evaluating potential bikeway alignments, explaining metrics, potential cross sections, and resulting alignments.
  - Evaluation Metrics: A tiered point system was created for the following three .
    - Tier 1: Is it a good idea?
      - Is it in a safe location? Is access potentially allowed by the property owner? Does it provide connections?
    - Tier 2: Would it be feasible?
      - Cost, permitting, difficulty of solving known design problems
    - Tier 3: Would it be great?
      - User experience, community benefits, and environmental benefits
  - There was consensus among the Steering Committee members at the meeting that these metrics were a good way to evaluate the alignments.

Three alignments were presented. The alignment options provide variations for alignment along the northern, box, segment of the river. The segments can be interchangeable but were presented for comparison. See attached pdf for alignment maps and sections.

- Alignment 1: The Flyover:
- Assumes the path will be going OVER the railways north of the City of Vernon.

- Comments from Steering Committee Members:
    - *The suspension bridge could be a major regional iconic element which brings attention and visitors to Vernon and the bike path. (Cal trans).*
    - *There are concerns about what the long-term maintenance of the bike path will be, especially as the conversation moves into larger scale projects like suspended bridges (LA County Flood Control).*
    - *Elevated/suspended areas should potentially have increased widths for safety, viewpoints, and improved experience.*

- Southern Alignment (Same for all three alignments)
    - Comments from Steering Committee Members:
        - *The Lower LA River working group (AB530) has heard from stakeholders that there is a desire for a future equestrian network reaching from Long Beach to Griffith Park. Evaluate the potential for an equestrian path through the Vernon segment.*
        - *Lower LA River working group (AB 530) has discussed a potential joint powers authority for maintenance of the river corridor led by LA County Flood Control, the Army Corps, and individual cities.*
        - *The City of Vernon agreed to pass along the new section for the Atlantic Avenue Bridge project to the steering committee (request from LA County flood control).*
        - *The bikeway could be divided, so a portion is bike oriented and can support H-20 loads for maintenance vehicles, while the other portion would only be for pedestrians, no maintenance vehicles, and therefore simpler and cheaper to build.*

- Alignment 2: East Bank Hop Over
    - Assumes the path will be going OVER the railways north of the City of Vernon.
    - Comments from Steering Committee Members:
        - *Elevated/suspended areas should potentially have increased widths for safety, viewpoints, and improved experience.*

- Alignment 3: West Bank Channel
    - Assumes the path will be going UNDER the railways north of the City of Vernon along the channel bottom.
    - Comments from Steering Committee Members:
        - *Prefer not to be on the channel bottom. The bridge options would be more user friendly.*
        - *Important to make connections at the cross streets.*

- Pathway Themes

- Layer
    - The layer theme was well received by the by Steering Committee and will be carried forward into the Feasibility study
    - Comments from Steering Committee Members:
        - *In embracing the industrial aesthetic, care should be taken to not produce an overly stark, unwelcoming landscape.*
        - *Shipping containers could be re-used in this project.*
        - *The surrounding architectural beauty of Vernon is functional, it is important that future design also embrace functional design elements.*
- Frame
    - The frame theme was well received by the by Steering Committee and will be carried forward into the Feasibility study
    - Comments from Steering Committee Members:
        - *Lower LA River working group (AB 530) community engagement has heard that people want to emphasized the idea of this theme, add art, give portions of the corridor city specific identities, so users know they are moving through different places as they go down the river, and provide increased lighting for safety*
- Scribe
    - The scribe theme was not seen as a theme that would fit into the City of Vernon's identity and branding. It will not be carried forward into the Feasibility Study.
    - Comments from Steering Committee Members:
        - *Concern about who would manage/maintain art and graffiti*

PROJECT	City of Vernon Los Angeles River Path Study
SUBJECT	Steering Committee Meeting #4 Notes#
LOCATION	Vernon City Hall Office #
DATE/TIME	October 2, 2017 1:00 p.m. – 2:30 p.m.
ATTACHMENTS	Presentation, Sign-in sheet

Steering Committee Meeting #4 Goals:

- Review and discuss draft plan, design concept, alignment alternatives, implementation, funding, and plan approval process.

- Item 1: Project Name
  - Project name revised from LA River Bikeway Feasibility Study to LA River Path Feasibility Study
  - Based on the desire to accommodate multiple users, not just cyclists
  - Comments/Discussion:
    - *(no steering committee comments)*

- Item 2: Project Goals
  - 5 overarching goals include safety, accessibility, river access, connectivity, and wayfinding.
  - Comments/Discussion:
    - *(no steering committee comments)*

- Item 3: Outreach
  - Business groups, freight and rail, and flood control interests have been consulted during this process
  - Community outreach
    - Two outreach events have been held and documented: Festival Sabor de Mexico Lindo (2016) and HP Carnaval Primavera Festival (2016).
    - Input has helped guide understanding of key user groups, desired amenities, and primary access points to river path.

    - Third and final outreach event upcoming at Festival Sabor de Mexico Lindo (2017).
- Comments/Discussion:
    - *Per MLA employees, outreach boards for third event with have a large rendering, written surveys, and an engagement activity.*
    - *Per CALTRANS employee, consider having a bike on-hand at event to draw attention.*
    - *Per LACPW employee, it is important to take surveys to people, as few will come by the booth unprompted.*

- Item 4: Opportunities and Constraints
    - Project logically broken into four segments that correspond to real world opportunities and constraints.
    - Comments/Discussion:
        - *(no steering committee comments)*

- Item 5: Evaluation
    - Three evaluative tiers used to determine the three alignments and select a core alignment
    - Tiers are:
        - Function: Is it a good idea?
        - Feasibility: Can it be built?
        - Desirability: Is it great?
    - Comments/Discussion:
        - *(no steering committee comments)*

- Item 6: Design and Vision
    - Primary design concept celebrates frame, industry, and efficiency
    - Materials / aesthetics intended to complement the existing Vernon aesthetic with I-beams, trusses, steel, corrugated metal, concrete, etc…
    - Typical cross-section includes separated bike and pedestrian paths, buffers and security fences (along rail lines), handrails, amphitheater seating, and utility posts. Amphitheater seating allows sections of the path to not require a handrail.
    - Utility posts provide opportunity for unique lighting, tensile shade structures, and future utility lines.
    - Gateways and access points align with key locations identified in community outreach.
    - Bridge locations spaced along the alignments provide unique opportunities and challenges. New bridges provide a unique opportunity to create a landmark

feature. A big move such as this is an opportunity to change the perspective of the area.

- Comments/Discussion:
    - *Per CALTRANS employee, show white edge striping along wall, as the full width will not be useable to cyclists.*
    - *Per LACPW employee, concern over access for emergency vehicles. Team Response: At a minimum, the trail will be designed for H-10 loading which covers emergency vehicles and could be required to go up to H-20 loading. Emergency access has less to do with alignments and more with construction details. Overall the trail makes emergency access much better.*
    - *Due to space constraints and concerns over impacting flood control, shade along the bulk of the trail is limited to structures. Trees may be located at parklets, gateways, and access points.*

- Item 7: Alignments
    - Three alignments are:
        - Core alignment: The Fly-over
        - Alignment B: East Bank Hop-Over
        - Alignment C: West Bank Channel
    - All three alignments follow the same alignment for segment four south of Downey Bridge
    - Comments/Discussion:
        - *Per CITY OF VERNON employees, Bandini @ Soto is a critical access point because of its adjacency Farmer John, which employs upwards of 10,000 people.*
        - *Per METRO employees, regarding the in-channel alignment, prior studies identified numerous issues which include flood risk, dry-season flow, maintenance, personal safety concerns, and challenges/cost of accessing the surrounding areas.*

- Item 8: Implementation
    - Preliminary cost estimates have been developed for the three alignments:
        - The Fly-over ($150M): most expensive due to the high percentage of on-structure cross-section. This minimizes at-grade crossings provides the most unique user experience.
        - East Bank Hop-Over ($113M): second most expensive due to use of structures. Avoids major impacts of hydrology.
        - West Bank Channel ($109M): least expensive due to relatively simple cross-sections that minimize the use of structures. However, this alignment has

major potential hydrology and maintenance concerns being located in the channel for the first two segments.

- Funding
    - Metro measure M funding covers $365M for the 8-mile gap. This is enough to cover the base trail construction costs, but does not include on street connections to the trail.
    - Additional funds needed for local connections, gateways, and amenities.
- Caltrans Sustainability Grant (Planning Grant)
    - An opportunity to get funding for a study of 5 access points and 3 major corridors that will get users to the river.
    - Project titled "Vernon Los Angeles River Path Active Transportation Access Plan"
    - Due in October.
- Comments/Discussion:
    - *Per CALTRANS employees, the grant will be strengthened by and emphasis on equity and access to work. It is important to explicitly state and demonstrate the expected consequences of the project. Political viability and general feasibility should be somewhat understood and included in the grant application. The adopted Vernon BMP (which has already been vetted with public) will be an asset to elevate the application. Need to prove it will be a highly implementable study. Even though Vernon has a small population, make the case for the "daytime population" of employees.*
    - *Per METRO employees, Metro is considering river adjacent paths for cycle IV funding and may include it in the core construction of the path.*

- Final Comments
    - *Consider showing grades (up vs. down) on alignments as well as over vs. under crossings relative to bridges for clarity.*
    - *Send invites for outreach event invites to steering committee list.*

VERNON LA RIVER PATH - COST ESTIMATE
Segment 1

				A: THE FLYOVER		B: EAST BANK HOP OVER		C: WEST BANK CHANNEL	
			Total Length	**3570**		**3570**		**3830**	
			A: At Grade	810		810		1410	
			B: Cantilever (box)	0		0		0	
			B: Elevated (box)	0		0		410	
			B: Cap (trap)	0		0		0	
			B: Incise (trap)	0		0		0	
			C: Suspension	0		0		0	
			C: Elevated - cantilevered	1720		1720		0	
			C: Elevated - on piers	1040		1040		0	
			D: In-channel ramping	0		0		2010	
ITEM	**DESCRIPTION**	**UNIT PRICE**	**UNITS**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**
TRAIL ALIGNMENT									
1.1	A: At Grade	$360	LF	810	$291,600	810	$291,600	1410	$507,600
1.2	B: Cantilever (box)	$3,400	LF	0	$0	0	$0	0	$0
1.3	B: Elevated (box)	$3,600	LF	0	$0	0	$0	410	$1,476,000
1.3	B: Cap (trap)	$3,200	LF	0	$0	0	$0	0	$0
1.4	B: Incise (trap)	$1,000	LF	0	$0	0	$0	0	$0
1.5	C: Suspension	$15,800	LF	0	$0	0	$0	0	$0
1.6	C: Elevated - cantilevered	$3,200	LF	1720	$5,504,000	1720	$5,504,000	0	$0
1.7	C: Elevated - on piers	$4,200	LF	1040	$4,368,000	1040	$4,368,000	0	$0
1.8	D: In-channel ramping	$700	LF	0	$0	0	$0	2010	$1,407,000
					$10,163,600		**$10,163,600**		**$3,390,600**
NODES & ACCESS									
2.1	Parklet	$961,000	LS	0	$0	0	$0	0	$0
2.2	Major Gateways	$250,000	LS	2	$500,000	2	$500,000	1	$250,000
2.3	Minor Nodes	$261,000	LS	0	$0	0	$0	0	$0
2.4	Signal Upgrade	$150,000	EA	0	$0	1	$150,000	1	$150,000
2.5	Curb Ramps	$5,000	EA	2	$10,000	4	$20,000	0	$0
					$510,000		**$670,000**		**$400,000**
TRAIL DESIGN & AMENITIES									
3.1	Post Lighting	$7,000	EA	60	$420,000	60	$420,000	64	$448,000
3.2	Fencing - 8' to 10'	$300	LF	810	$243,000	810	$243,000	3830	$1,149,000
3.3	Guardrail - 42"	$400	LF	6330	$2,532,000	6330	$2,532,000	5840	$2,336,000
3.4	Wayfinding	$75,000	LS	1	$75,000	1	$75,000	1	$75,000
					$3,270,000		**$3,270,000**		**$4,008,000**
	Estimated Construction Cost Subtotal				**$13,943,600**		**$14,103,600**		**$7,798,600**
	Mobilization (10% of Estimated Construction Cost Subtotal)				$1,394,360		$1,410,360		$779,860
	Contingencies (35% of Estimated Construction Cost Subtotal)				$4,881,000		$4,937,000		$2,730,000
	ESTIMATED CONSTRUCTION COST TOTAL				$20,218,960		$20,450,960		$11,308,460
	Design (10% of Estimated Construction Cost Total)				**$2,022,000**		**$2,046,000**		**$1,131,000**
	Construction Managment (15% of Estimated Construction Cost Total)				**$3,033,000**		**$3,068,000**		**$1,697,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$5,055,000		$5,114,000		$2,828,000
	TOTAL ESTIMATED PROJECT COST:				**$25,273,960**		**$25,564,960**		**$14,136,460**

VERNON LA RIVER PATH - COST ESTIMATE
Segment 2

					A: THE FLYOVER		B: EAST BANK HOP OVER		C: WEST BANK CHANNEL	
				Total Length	**1890**		**3450**		**1310**	
				A: At Grade	220		1400		830	
				B: Cantilever (box)	0		730		0	
				B: Elevated (box)	0		0		0	
				B: Cap (trap)	0		0		0	
				B: Incise (trap)	0		0		0	
				C: Suspension	830		0		0	
				C: Elevated - cantilevered	0		0		0	
				C: Elevated - on piers	840		550		0	
				D: In-channel ramping	0		770		480	
ITEM	**DESCRIPTION**	**UNIT PRICE**	**UNITS**		**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**
TRAIL ALIGNMENT										
1.1	A: At Grade	$360	LF		220	$79,200	1400	$504,000	830	$298,800
1.2	B: Cantilever (box)	$3,400	LF		0	$0	730	$2,482,000	0	$0
1.3	B: Elevated (box)	$3,600	LF		0	$0	0	$0	0	$0
1.3	B: Cap (trap)	$3,200	LF		0	$0	0	$0	0	$0
1.4	B: Incise (trap)	$1,000	LF		0	$0	0	$0	0	$0
1.5	C: Suspension	$15,800	LF		830	$13,114,000	0	$0	0	$0
1.6	C: Elevated - cantilevered	$3,200	LF		0	$0	0	$0	0	$0
1.7	C: Elevated - on piers	$4,200	LF		840	$3,528,000	550	$2,310,000	0	$0
1.8	D: In-channel ramping	$700	LF		0	$0	770	$539,000	480	$336,000
						$16,721,200		**$5,835,000**		**$634,800**
NODES & ACCESS										
2.1	Parklet	$961,000	LS		0	$0	0	$0	0	$0
2.2	Major Gateways	$250,000	LS		1	$250,000	2	$500,000	1	$250,000
2.3	Minor Nodes	$261,000	LS		0	$0	0	$0	0	$0
2.4	Signal Upgrade	$150,000	EA		0	$0	0	$0	1	$150,000
2.5	Curb Ramps	$5,000	EA		1	$5,000	2	$10,000	2	$10,000
						$255,000		**$510,000**		**$410,000**
TRAIL DESIGN & AMENITIES										
3.1	Post Lighting	$7,000	EA		32	$224,000	58	$406,000	22	$154,000
3.2	Fencing - 8' to 10'	$300	LF		220	$66,000	2130	$639,000	830	$249,000
3.3	Guardrail - 42"	$400	LF		3560	$1,424,000	4770	$1,908,000	1790	$716,000
3.4	Wayfinding	$75,000	LS		1	$75,000	1	$75,000	1	$75,000
						$1,789,000		**$3,028,000**		**$1,194,000**
	Estimated Construction Cost Subtotal					**$18,765,200**		**$9,373,000**		**$2,238,800**
	Mobilization (10% of Estimated Construction Cost Subtotal)					$1,876,520		$937,300		$223,880
	Contingencies (35% of Estimated Construction Cost Subtotal)					$6,568,000		$3,281,000		$784,000
	ESTIMATED CONSTRUCTION COST TOTAL					$27,209,720		$13,591,300		$3,246,680
	Design (10% of Estimated Construction Cost Total)					**$2,721,000**		**$1,360,000**		**$325,000**
	Construction Managment (15% of Estimated Construction Cost Total)					**$4,082,000**		**$2,039,000**		**$488,000**
	ENGINEERING AND ADMINISTRATION TOTAL					$6,803,000		$3,399,000		$813,000
	TOTAL ESTIMATED PROJECT COST:					**$34,012,720**		**$16,990,300**		**$4,059,680**

VERNON LA RIVER PATH - COST ESTIMATE
Segment 3

				Same				Same	
				A: THE FLYOVER		**B: EAST BANK HOP OVER**		**C: WEST BANK CHANNEL**	
			Total Length	**4806**		**4240**		**4806**	
			A: At Grade	470		3720		470	
			B: Cantilever (box)	0		0		0	
			B: Elevated (box)	0		0		0	
			B: Cap (trap)	3726		0		3726	
			B: Incise (trap)	0		520		0	
			C: Suspension	0		0		0	
			C: Elevated - cantilevered	0		0		0	
			C: Elevated - on piers	0		0		0	
			D: In-channel ramping	610		0		610	
ITEM	**DESCRIPTION**	**UNIT PRICE**	**UNITS**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**
TRAIL ALIGNMENT									
1.1	A: At Grade	$360	LF	470	$169,200	3720	$1,339,200	470	$169,200
1.2	B: Cantilever (box)	$3,400	LF	0	$0	0	$0	0	$0
1.3	B: Elevated (box)	$3,600	LF	0	$0	0	$0	0	$0
1.3	B: Cap (trap)	$3,200	LF	3726	$11,923,200	0	$0	3726	$11,923,200
1.4	B: Incise (trap)	$1,000	LF	0	$0	520	$520,000	0	$0
1.5	C: Suspension	$15,800	LF	0	$0	0	$0	0	$0
1.6	C: Elevated - cantilevered	$3,200	LF	0	$0	0	$0	0	$0
1.7	C: Elevated - on piers	$4,200	LF	0	$0	0	$0	0	$0
1.8	D: In-channel ramping	$700	LF	610	$427,000	0	$0	610	$427,000
					$12,519,400		**$1,859,200**		**$12,519,400**
NODES & ACCESS									
2.1	Parklet	$961,000	LS	0	$0	0	$0	0	$0
2.2	Major Gateways	$250,000	LS	1	$250,000	1	$250,000	1	$250,000
2.3	Minor Nodes	$261,000	LS	2	$522,000	2	$522,000	2	$522,000
2.4	Signal Upgrade	$150,000	EA	0	$0	0	$0	0	$0
2.5	Curb Ramps	$5,000	EA	1	$5,000	1	$5,000	1	$5,000
					$777,000		**$777,000**		**$777,000**
TRAIL DESIGN & AMENITIES									
3.1	Post Lighting	$7,000	EA	80	$560,000	71	$497,000	80	$560,000
3.2	Fencing - 8' to 10'	$300	LF	4196	$1,258,800	4240	$1,272,000	4196	$1,258,800
3.3	Guardrail - 42"	$400	LF	5416	$2,166,400	4240	$1,696,000	5416	$2,166,400
3.4	Wayfinding	$75,000	LS	1	$75,000	1	$75,000	1	$75,000
					$4,060,200		**$3,540,000**		**$4,060,200**
	Estimated Construction Cost Subtotal				**$17,356,600**		**$6,176,200**		**$17,356,600**
	Mobilization (10% of Estimated Construction Cost Subtotal)				$1,735,660		$617,620		$1,735,660
	Contingencies (35% of Estimated Construction Cost Subtotal)				$6,075,000		$2,162,000		$6,075,000
	ESTIMATED CONSTRUCTION COST TOTAL				$25,167,260		$8,955,820		$25,167,260
	Design (10% of Estimated Construction Cost Total)				**$2,517,000**		**$896,000**		**$2,517,000**
	Construction Managment (15% of Estimated Construction Cost Total)				**$3,776,000**		**$1,344,000**		**$3,776,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$6,293,000		$2,240,000		$6,293,000
	TOTAL ESTIMATED PROJECT COST:				**$31,460,260**		**$11,195,820**		**$31,460,260**

VERNON LA RIVER PATH - COST ESTIMATE
Segment 4

				Same		Same		Same	
				A: THE FLYOVER		B: EAST BANK HOP OVER		C: WEST BANK CHANNEL	
			Total Length	9010		9010		9010	
			A: At Grade	230		230		230	
			B: Cantilever (box)	0		0		0	
			B: Elevated (box)	0		0		0	
			B: Cap (trap)	6810		6810		6810	
			B: Incise (trap)	590		590		590	
			C: Suspension	0		0		0	
			C: Elevated - cantilevered	0		0		0	
			C: Elevated - on piers	0		0		0	
			D: In-channel ramping	1380		1380		1380	
ITEM	**DESCRIPTION**	**UNIT PRICE**	**UNITS**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**
TRAIL ALIGNMENT									
1.1	A: At Grade	$360	LF	230	$82,800	230	$82,800	230	$82,800
1.2	B: Cantilever (box)	$3,400	LF	0	$0	0	$0	0	$0
1.3	B: Elevated (box)	$3,600	LF	0	$0	0	$0	0	$0
1.3	B: Cap (trap)	$3,200	LF	6810	$21,792,000	6810	$21,792,000	6810	$21,792,000
1.4	B: Incise (trap)	$1,000	LF	590	$590,000	590	$590,000	590	$590,000
1.5	C: Suspension	$15,800	LF	0	$0	0	$0	0	$0
1.6	C: Elevated - cantilevered	$3,200	LF	0	$0	0	$0	0	$0
1.7	C: Elevated - on piers	$4,200	LF	0	$0	0	$0	0	$0
1.8	D: In-channel ramping	$700	LF	1380	$966,000	1380	$966,000	1380	$966,000
					$23,430,800		**$23,430,800**		**$23,430,800**
NODES & ACCESS									
2.1	Parklet	$961,000	LS	1	$961,000	1	$961,000	1	$961,000
2.2	Major Gateways	$250,000	LS	1	$250,000	1	$250,000	1	$250,000
2.3	Minor Nodes	$261,000	LS	2	$522,000	2	$522,000	2	$522,000
2.4	Signal Upgrade	$150,000	EA	0	$0	0	$0	0	$0
2.5	Curb Ramps	$5,000	EA	1	$5,000	1	$5,000	1	$5,000
					$1,738,000		**$1,738,000**		**$1,738,000**
TRAIL DESIGN & AMENITIES									
3.1	Post Lighting	$7,000	EA	150	$1,050,000	150	$1,050,000	150	$1,050,000
3.2	Fencing - 8' to 10'	$300	LF	7630	$2,289,000	7630	$2,289,000	7630	$2,289,000
3.3	Guardrail - 42"	$400	LF	10390	$4,156,000	10390	$4,156,000	10390	$4,156,000
3.4	Wayfinding	$75,000	LS	1	$75,000	1	$75,000	1	$75,000
					$7,570,000		**$7,570,000**		**$7,570,000**
	Estimated Construction Cost Subtotal				**$32,738,800**		**$32,738,800**		**$32,738,800**
	Mobilization (10% of Estimated Construction Cost Subtotal)				$3,273,880		$3,273,880		$3,273,880
	Contingencies (35% of Estimated Construction Cost Subtotal)				$11,459,000		$11,459,000		$11,459,000
	ESTIMATED CONSTRUCTION COST TOTAL				$47,471,680		$47,471,680		$47,471,680
	Design (10% of Estimated Construction Cost Total)				**$4,748,000**		**$4,748,000**		**$4,748,000**
	Construction Managment (15% of Estimated Construction Cost Total)				**$7,121,000**		**$7,121,000**		**$7,121,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$11,869,000		$11,869,000		$11,869,000
	TOTAL ESTIMATED PROJECT COST:				**$59,340,680**		**$59,340,680**		**$59,340,680**

VERNON LA RIVER PATH - COST ESTIMATE

Parklets, Gateways, and Nodes

PARKLET				
DESCRIPTION	**UNIT PRICE**	**UNITS**	**QUANTITY**	**TOTAL**
Vertical Posts	$15,000	EA	8	$120,000
Shade Structures	$70,000	EA	2	$140,000
Bicycle Racks	$800	EA	10	$8,000
Trash Receptacles	$3,500	EA	3	$10,500
Drinking Fountain	$6,000	EA	1	$6,000
Bench	$3,000	EA	8	$24,000
Table & Chairs	$5,500	EA	2	$11,000
Concrete Paving	$12	SF	2800	$33,600
Ground Inlays	$40,000	LS	1	$40,000
Amphitheater Step	$125	LF	600	$75,000
Concrete Stair	$90	LF	110	$9,900
Trees	$800	EA	500	$400,000
Landscape Area	$15	SF	5471	$82,065
				$960,065

MAJOR GATEWAYS				
DESCRIPTION	**UNIT PRICE**	**UNITS**	**QUANTITY**	**TOTAL**
Vertical Posts	$15,000	EA	5	$75,000
Shade Structures	$70,000	EA	1	$70,000
Bicycle Racks	$800	EA	5	$4,000
Trash Receptacles	$3,500	EA	3	$10,500
Drinking Fountain	$6,000	EA	0	$0
Bench	$3,000	EA	4	$12,000
Table & Chairs	$5,500	EA	1	$5,500
Concrete Paving	$12	SF	4100	$49,200
Ground Inlays	$20,000	LS	1	$20,000
Amphitheater Step	$125	LF	0	$0
Concrete Stair	$90	LF	0	$0
Trees	$800	EA	0	$0
Landscape Area	$15	SF	210	$3,150
				$249,350

MINOR NODES				
DESCRIPTION	**UNIT PRICE**	**UNITS**	**QUANTITY**	**TOTAL**
Vertical Posts	$15,000	EA	10	$150,000
Shade Structures	$70,000	EA	1	$70,000
Bicycle Racks	$800	EA	2	$1,600
Trash Receptacles	$3,500	EA	1	$3,500
Drinking Fountain	$6,000	EA	0	$0
Bench	$3,000	EA	0	$0
Table & Chairs	$5,500	EA	1	$5,500
Concrete Paving	$12	SF	0	$0
Ground Inlays	$5,000	LS	1	$5,000
Amphitheater Step	$125	LF	200	$25,000
Concrete Stair	$90	LF	0	$0
Trees	$800	EA	0	$0
Landscape Area	$15	SF	0	$0
				$260,600

Vernon Bikeway Project Structure Cost Estimate

Structure Type	General Features	Cost/sf*	Assumptions**
A - TOP OF BANK: AT GRADE			
At Grade	- Path at grade	$6	Paving cost only; no railing
B - TOP OF BANK: ON STRUCTURE / ELEVATED			
Cantilevered to Bank (Box Channel)	- Slab bridge with C-bent on piles - Piles adjacent to channel wall requiring deep penetration below channel invert level to gain capacity	$170	CIP/PS slab bridge w/ long CIDH pile
Cap (Trapezoidal Channel)	- Slab bridge with C-bent on piles - Piles away from channel wall	$160	CIP/PS slab bridge w/ CIDH pile
Elevated (Box Channel)	- Slab bridge on pile shafts - Piles adjacent to channel wall requiring deep penetration below channel invert level to gain capacity	$180	CIP/PS slab bridge w/ long CIDH pile shaft
Incise (Trapezoidal Channel)	- Path cutting into top of channel side slope with retaining wall on one side	$50	Including channel removal, retaining wall (H=8'), and pavement
C - OVER THE RIVER			
Suspended (Long Span Arch)	- Bike path suspended on series of steel arches straddled across channel at 20 degree skew	$1,600	$300/SF base cost at Oregon, elevated 75% for California, and adjusted for bridge skew
Suspended (Cable-Stayed)	- S-shaped bridge alignment suspended on two pylons	$790	$450/SF base cost at Orgeon, elevated 75% for California
On-Piers	- CIP/PS concrete box girder on piers - Increased span length to reduce number of piers in channel	$210	
Cantilevered	- Steel framing attached to side of existing railraod bridge. - Mutually exclusive use between railraod and bicycles/pedestrians to be enforced	$160	Adding a 10' wide bike path on both sides of existing bridge with minimal modification to the bridge
D - IN-CHANNEL RAMPING			
Trapedoidal channel cut for ramping	- Path cutting into middle of channel side slope with rebuilt side slope	$35	Including channel removal, excavation, and rebuild cost; no railing

* The square footage cost covers only the bike path, structure, and channel wall modification. ROW acquisition, utility relocation, track shifting, and special shoring costs are not included.

** General assumptions:

1. All structures are designed for mixed use by bicycles and pedestrians, as well as exclusive use by AASHTO H-10 truck (when width is more than 10') or H-5 truck (when width is no more than 10') as required by Reference 1.
2. Width of bikeway is 20'.

Reference

1. LRFD Guide Specifications for the Design of Pedestrian Bridges
2. Caltrans Comparative Bridge Costs data
3. Caltrans Contract Cost Data website

AECOM

SHEET 1 OF 3

JOB TITLE: ORIGINATOR: DATE:

JOB No: CALCULATION No.: REVIEWER: DATE:

OVER THE RIVER - CANTILEVERED

Use the 4' wide walkway in a sample project (Attachment 1) as the starting point, then extrapolate the cost to a 10' wide bike path.

Unit wt. of steel: $\gamma s := 490pcf$

Define "dollar": $dol := 1$

Intermediate Diaphragm Connector Plate

$$W_1 := \gamma s \cdot \frac{(1ft + 6in) - 0.5in}{2} \cdot (4ft + 2in) \cdot 0.5in = 62.0298 \cdot lbf$$

1/2" Bracket Plate

Fillet size: $L := (1ft + 8.5in) - \frac{1ft + 6in}{2} + (1.75in \cdot 2 - 3in) = 12 \cdot in$

$$W_2 := \gamma s \cdot \left[(1ft + 7.25in) + L\right] \cdot (L + 3in) \cdot 0.5in = 66.4605 \cdot lbf$$

2L4x4x1/2 Diagonal Bracing

$$W_3 := 12.8plf \cdot (5ft + 9in) \cdot 2 = 147.2 \cdot lbf$$

2L4x4x1/2 Vertical Support

$$W_4 := 12.8plf \cdot (2ft + 10in) \cdot 2 = 72.5333 \cdot lbf$$

WT6x39.5 Grating Support

$$W_5 := 39.5plf \cdot (3ft + 11in) = 154.7083 \cdot lbf$$

Handrail

$$Wh := 3.65plf \cdot \left[8.5ft \cdot 3 + (3ft + 8.25in)\right] \cdot \frac{1}{8.5ft} = 12.5335 \cdot plf$$

Grating

Square footage cost: $Cg := \frac{505.8 \cdot dol}{3ft \cdot 10ft} = 16.86 \cdot dol \cdot ft^{-2}$ (Attachment 2)

Total Square Footage Cost

The sample walkway is 4' wide while the subject walkway is $w := 10ft$ wide on each side of the existing bridge. Assume the weight of the structural elements is proportional to the square of the width ratio.

Total square footage cost: $\frac{2.64dol + 0.98dol}{lbf} \cdot \left[\sum_{n=1}^{length(W)} W_n \div \left(\frac{w}{4ft}\right)^2\right] \cdot \frac{1}{8.5ft \cdot w} + \frac{Wh}{w} + Cg = 155.2658 \cdot dol \cdot ft^{-2}$

(Attachment 3)

IN-CHANNEL RAMPING

See attachment 4.

Bikeway width: $Lb := 20ft$

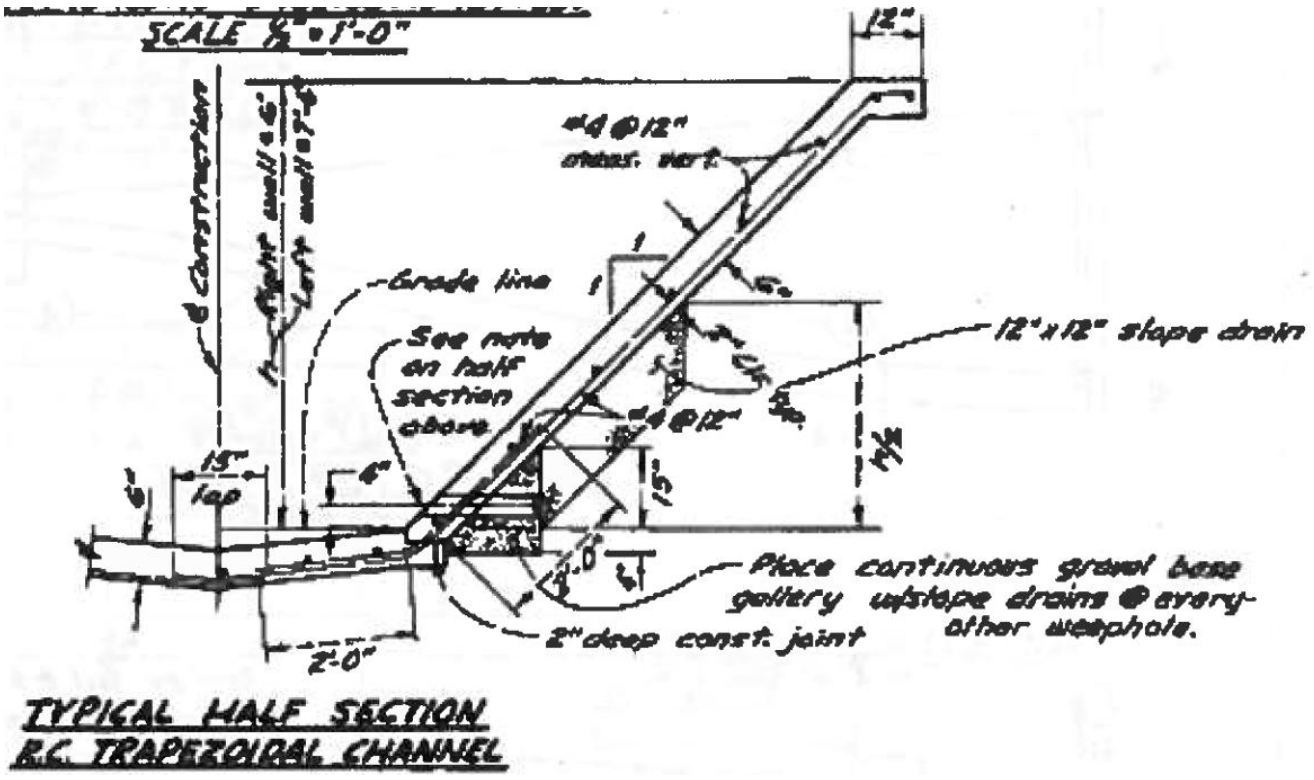
Exist. channel wall angle: $\alpha := \operatorname{atan}\left(\frac{1}{2}\right) = 26.5651 \cdot deg$

Channel wall rebuild width: $Ls := \frac{20ft}{\sin(180deg - 135deg - \alpha)} \cdot \sin(\alpha) = 28.2843\,ft$

Channel wall removal width: $Lr := \frac{Ls}{\sin(\alpha)} \cdot \sin(135deg) = 44.7214\,ft$

Excavation: $Ve := \frac{Lb \cdot (Ls \cdot \sin(45deg))}{2} \cdot 1ft = 7.4074 \cdot yd^3$

For the layout of the proposed channel wall, see following example:



TYPICAL HALF SECTION
R.C. TRAPEZOIDAL CHANNEL

Channel wall/bikeway rebuild cost

See Attachment 5 for unit price.

Concrete: $Cc := \left(224 \cdot dol \cdot yd^{-3} \cdot 1.1\right) \cdot 6in = 4.563 \cdot dol \cdot ft^{-2}$ (Elevate price by 10% to account for special treatment at old/new concrete interface.)

Reinf.: $Cr := \left(1.22 dol \cdot lbf^{-1}\right) \cdot 0.668 plf \cdot \left(1ft \cdot \frac{1ft}{12in} + 1ft \cdot \frac{1ft}{12in}\right) \cdot ft^{-2} = 1.6299 \cdot dol \cdot ft^{-2}$ (#4 @ 12" EW)

Excavation: $Ce := \left(20.43 dol \cdot yd^{-3}\right) \cdot Ve = 151.3333 \cdot dol$

Total square footage cost:

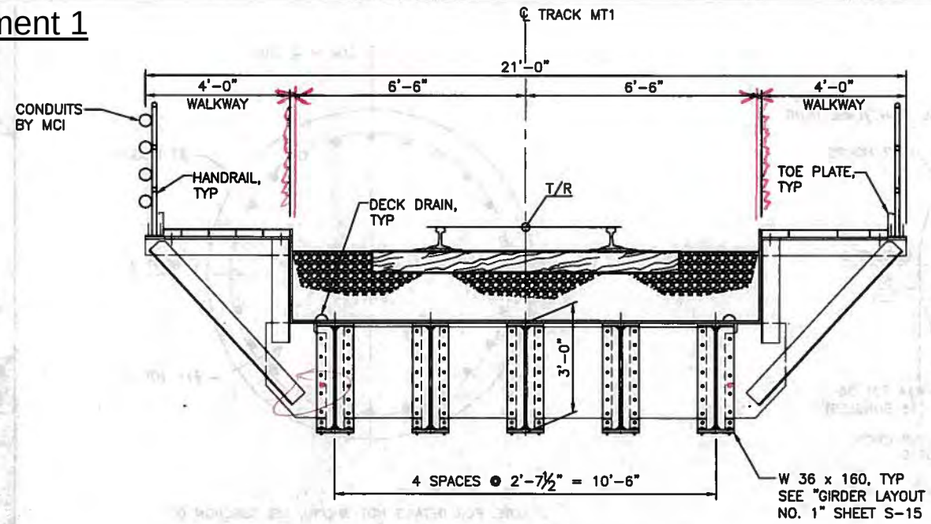
$$\frac{\left(4 dol \cdot ft^{-2}\right) \cdot Lr \cdot 1ft + \left(Cc + Cr\right) \cdot \left(Lb + Ls\right) \cdot 1ft + Ce}{20ft \cdot 1ft} = 31.4619 \cdot dol \cdot ft^{-2}$$

BRIDGE STRUCTURES

Refer to Attachments 6 and 7.

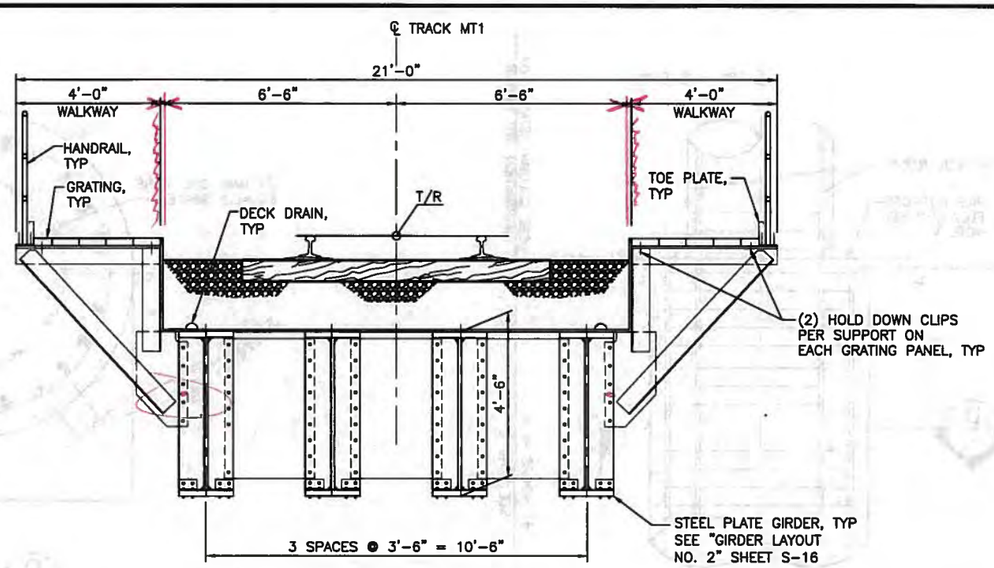
Note Attachment 7 is for the state of Oregon thus the cost needs to be adjusted and converted to California.

Attachment 1



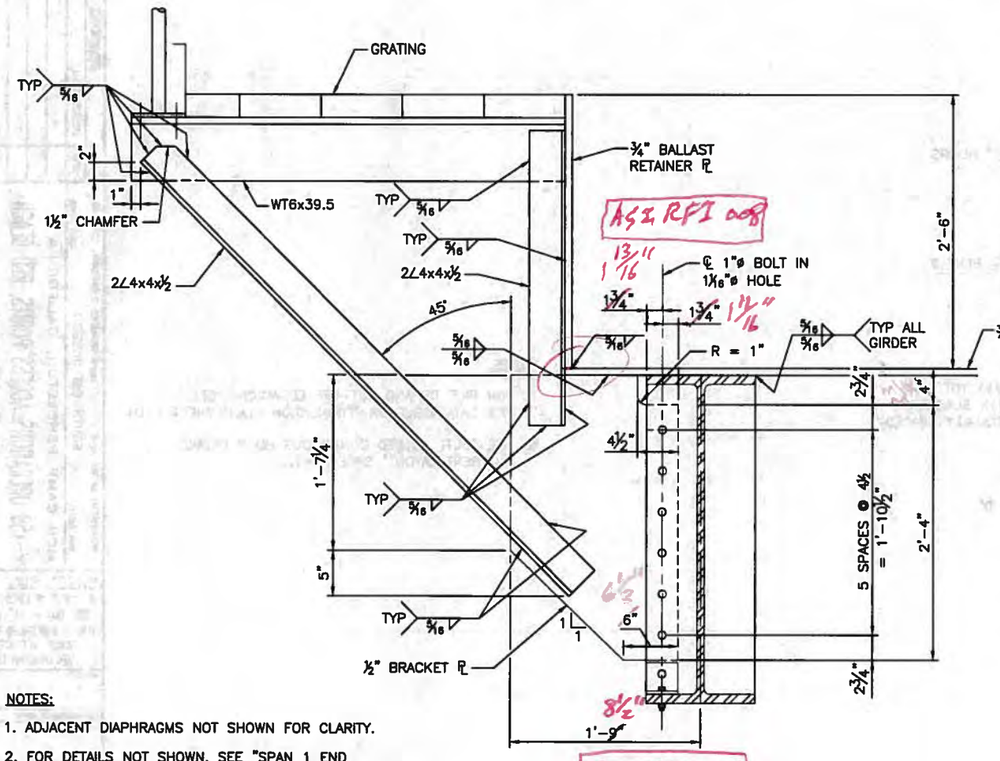
TYPICAL SECTION - SPAN 1

SCALE: 1/2" = 1'-0"



TYPICAL SECTION - SPAN 2

SCALE: 1/2" = 1'-0"



NOTES:

1. ADJACENT DIAPHRAGMS NOT SHOWN FOR CLARITY.
2. FOR DETAILS NOT SHOWN, SEE "SPAN 1 END DIAPHRAGM ELEVATION" AND "SPAN 1 INTERMEDIATE DIAPHRAGM ELEVATION" ON "GIRDER DETAILS" SHEET.

SPAN 1 BRACKET DETAIL

SCALE: 1 1/2" = 1'-0"

SCALE: AS NOTED

NOTES:

1. ADJACENT DIAPHRAGMS NOT SHOWN FOR CLARITY.
2. FOR DETAILS NOT SHOWN, SEE "SPAN 2 END DIAPHRAGM ELEVATION" AND "SPAN 2 INTERMEDIATE DIAPHRAGM ELEVATION" ON "GIRDER DETAILS" SHEET.

SPAN 2 BRACKET DETAIL

SCALE: 1 1/2" = 1'-0"

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AECOM
999 Town & Country Rd.
Orange, CA. 92868
T 714.567.2501
www.aecom.com

Hal Hays Construction Inc.

SUBMITTED:
DESIGN: BM
DRAWN: JW
CHECKED:
DM:
BM:
FP:

REVISIONS

STM	DESCRIPTION	DATE	APPR

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST DIVISION
SAN DIEGO CALIFORNIA

MCB CAMP PENDLETON, CALIFORNIA

P-159 OPERATIONS ACCESS POINTS, RED BEACH

TYPICAL SECTION

PRE FINAL

SHEET SIZE 'D'
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N62473-09-D-1604
T.O. 0013

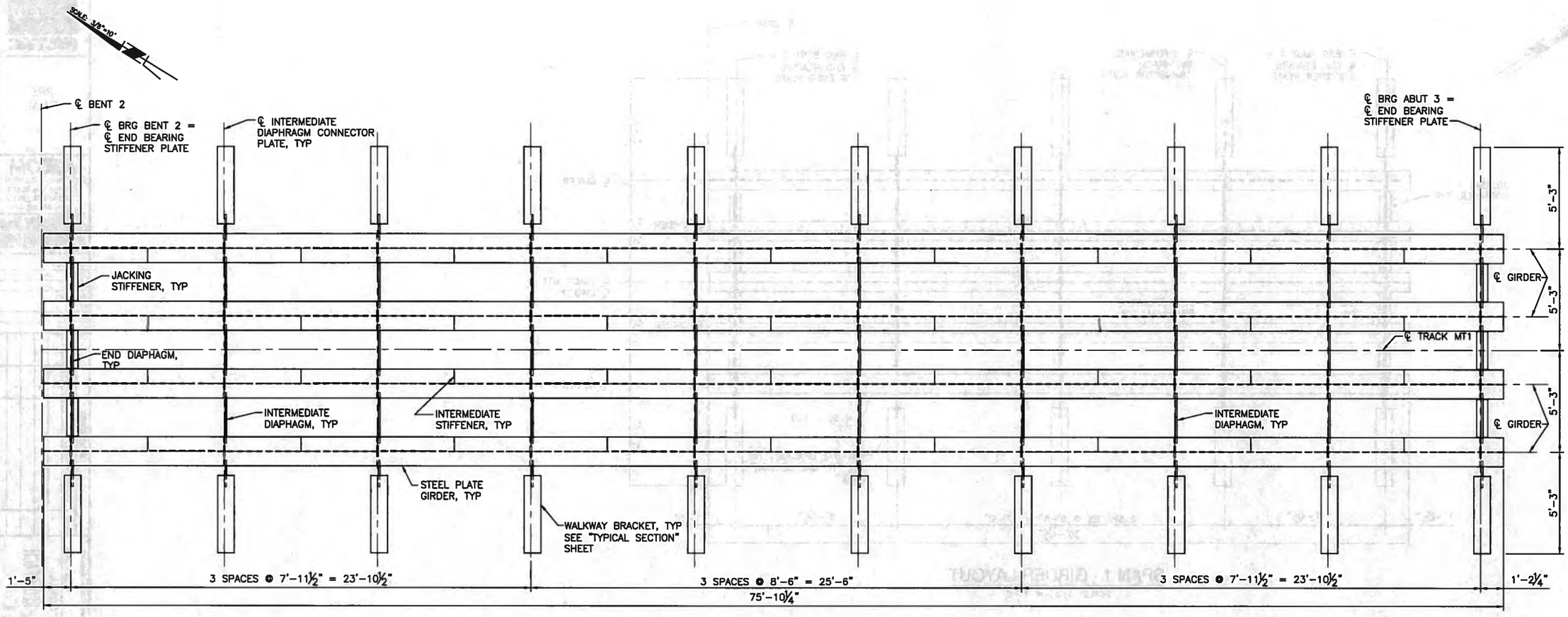
NAVFAC DRAWING NO.

SHEET 46 OF 135

S-14

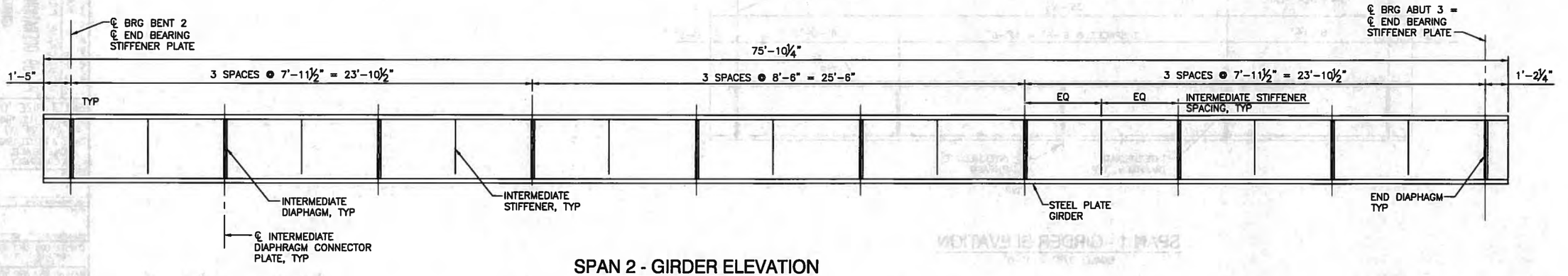
P:\60298817 Camp Pendleton Red Beach\900-CAD-GIS\008_Structural\Sheet\Bridge\4707s-14.dwg

User: wheatj DWG: 4707s-14.dwg PLOT: Sep 15, 2016



SPAN 2 - GIRDER LAYOUT

SCALE: 3/8" = 1'-0"



SPAN 2 - GIRDER ELEVATION

SCALE: 3/8" = 1'-0"

3 0 3 6

SCALE: 3/8" = 1'-0"

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999 Town & Country Rd.
Orange, CA. 92868
T 714.567.2501
www.aecom.com

Hal Hays Construction Inc.

SUBMITTED:
DESIGN: BM
DRAWN: JW
CHECKED:
DM:
BM:
FP:

REVISIONS

STM	DESCRIPTION	DATE	APPR

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST DIVISION SAN DIEGO CALIFORNIA

MCB CAMP PENDLETON, CALIFORNIA

P-159 OPERATIONS ACCESS POINTS, RED BEACH

GIRDER LAYOUT NO. 2

SHEET SIZE 'D'
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N62473-09-D-1604
T.O. 0013

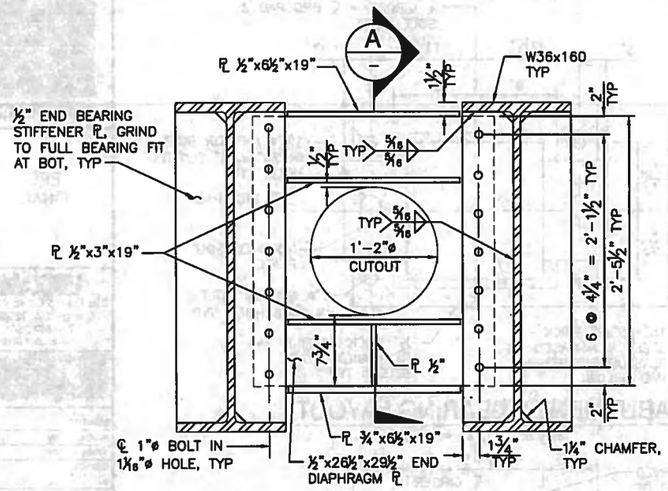
NAVFAC DRAWING NO.

SHEET 48 OF 135

S-16

P:\60298817 Camp Pendleton Red Beach\900-CAD-GIS\008_Structural\Sheet\Bridge\4707s-16.dwg

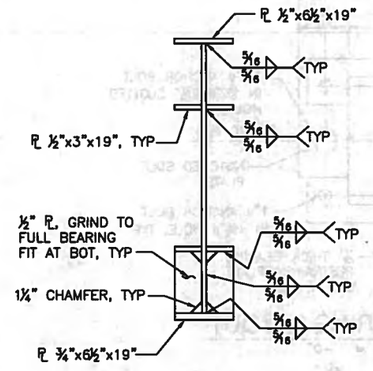
User: wheatj DWG: 4707s-16.dwg PLOT: Sep 15, 2016



NOTE:
ADJACENT DIAPHRAGMS NOT SHOWN FOR CLARITY.

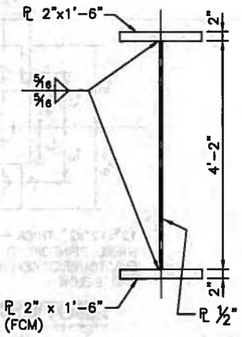
SPAN 1 END DIAPHRAGM ELEVATION

SCALE: 1 1/2" = 1'-0"



A — SECTION

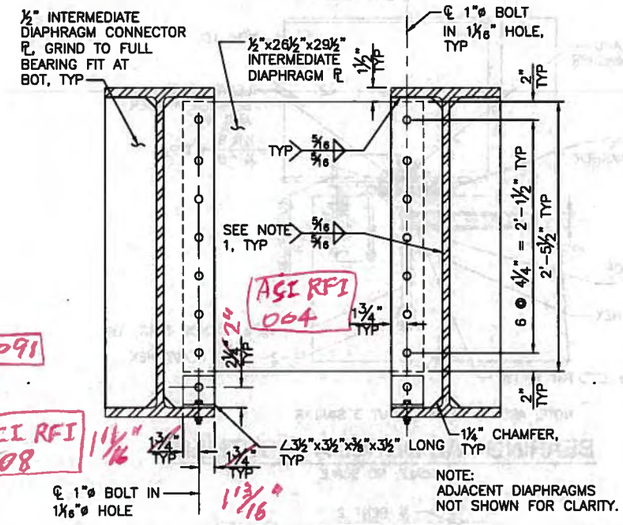
SCALE: 1 1/2" = 1'-0"



NOTE: FCM DENOTES FRACTURE CRITICAL MEMBER

STEEL PLATE GIRDER DETAIL

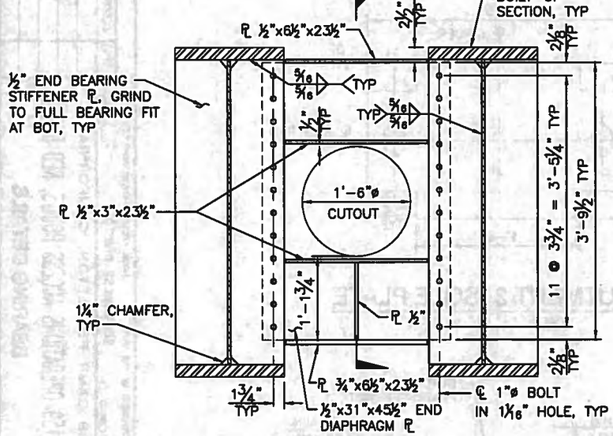
SCALE: 3/4" = 1'-0"



NOTE:
ADJACENT DIAPHRAGMS NOT SHOWN FOR CLARITY.

SPAN 1 INTERMEDIATE DIAPHRAGM ELEVATION

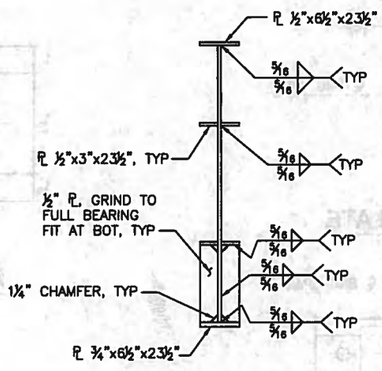
SCALE: 1 1/2" = 1'-0"



NOTE:
ADJACENT DIAPHRAGMS NOT SHOWN FOR CLARITY.

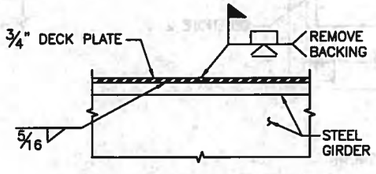
SPAN 2 END DIAPHRAGM ELEVATION

SCALE: 1" = 1'-0"



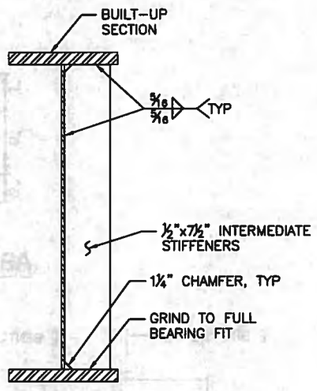
B — SECTION

SCALE: 1" = 1'-0"



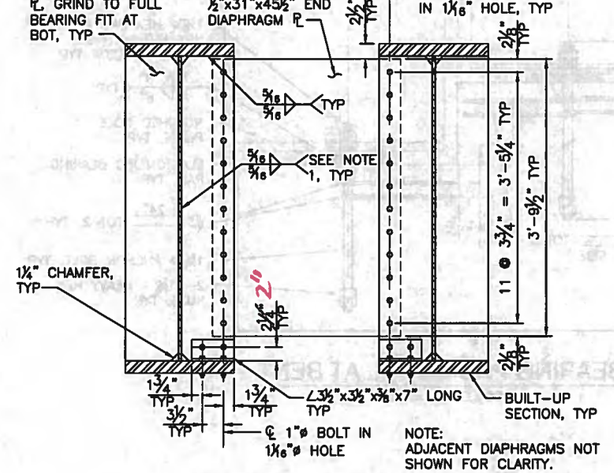
DECK PLATE TRANSVERSE FIELD SPLICE DETAIL

SCALE: 1" = 1'-0"



SPAN 2 INTERMEDIATE STIFFENER

SCALE: 1" = 1'-0"



NOTE:
ADJACENT DIAPHRAGMS NOT SHOWN FOR CLARITY.

SPAN 2 INTERMEDIATE DIAPHRAGM ELEVATION

SCALE: 1" = 1'-0"

NOTES:
1. TERMINATE WELDING 4" ABOVE TOP OF BOTTOM FLANGE.

SCALE: AS NOTED

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STM	DESCRIPTION	DATE	APPR

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
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SAN DIEGO CALIFORNIA
MCB CAMP PENDLETON, CALIFORNIA

P-159 OPERATIONS ACCESS POINTS, RED BEACH

GIRDER DETAILS

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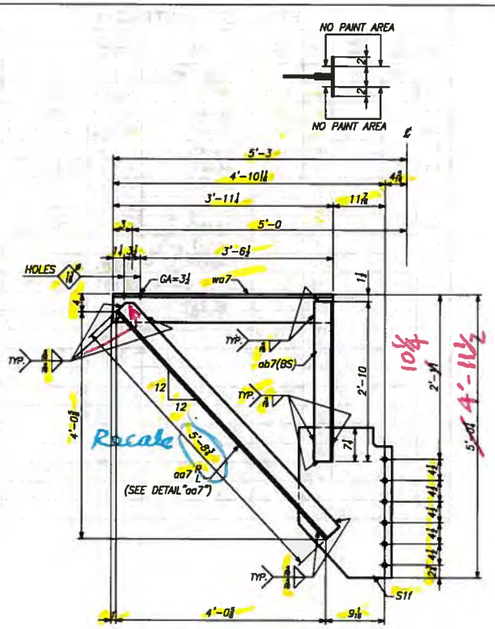
NAVFAC DRAWING NO.

SHEET 49 OF 135

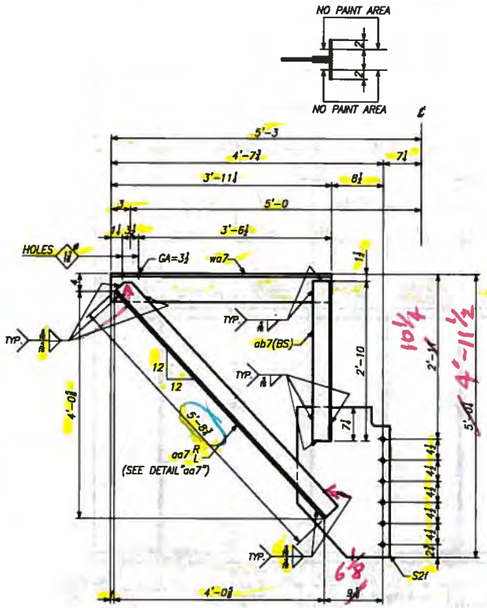
S-17

P:\60298817 Camp Pendleton Red Beach\900-CAD-GIS\008_Structural\Sheet\Bridge\4707s-17.dwg

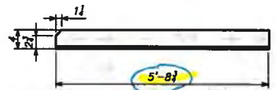
User: wheatj DWG: 4707s-17.dwg PLOT: Sep 15, 2016



10 – BRACKET – 7BR1

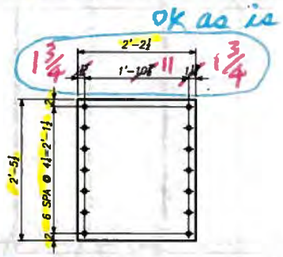


20 – BRACKET – 7BR2

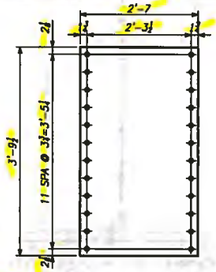


DETAIL OF "aa7 L R"

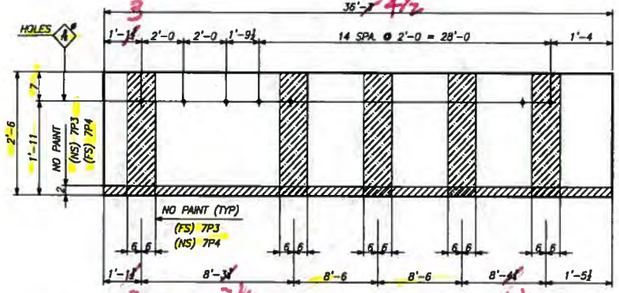
aa7 L R ?



12 – DIAPHRAGM – 7P1



24 – DIAPHRAGM – 7P2

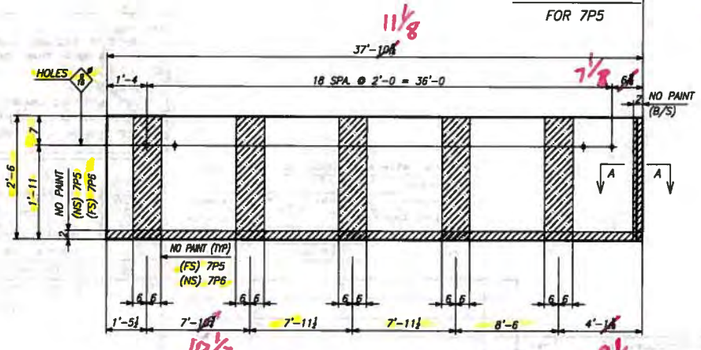


ONE – CURB PLATE – 7P3

ONE – CURB PLATE – 7P4

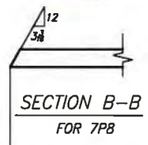
SECTION A–A
FOR 7P6

SECTION A–A
FOR 7P5

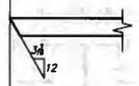


ONE – CURB PLATE – 7P5

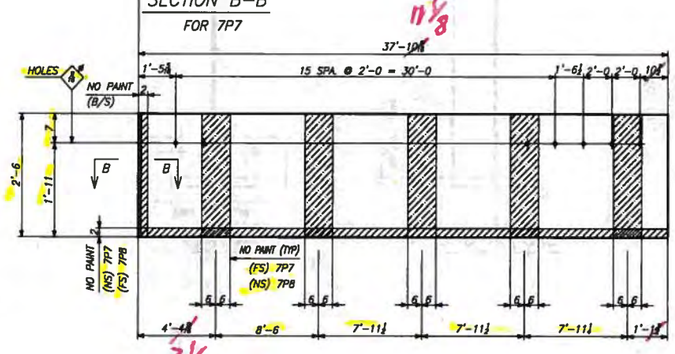
ONE – CURB PLATE – 7P6



SECTION B–B
FOR 7P8



SECTION B–B
FOR 7P7



ONE – CURB PLATE – 7P7

ONE – CURB PLATE – 7P8

BACKUP BAR

2–PL ⅜x2x10'–0 – 7P9
NO PAINT

BILL OF MATERIAL

ITEM NO.	NO. TO SHIP	SHIP MARK	TOT. NO. PCS.	PC. MARK	SIZE	LENGTH FT.	LENGTH IN.	REMARKS	WEIGHT
	10	7BR1			BRACKET				
1/18			10	S1F	PL ½x18x2	2	1		
1/11			10	wa7	WT6x39.5	3	11¼		
1/12			20	aa7 R L	L4x4x½	5	8¾		
1/13			20	ab7	L4x4x½	2	10		
	20	7BR2			BRACKET				
3-2			20	S2F	PL ½x15½x2	2	1		
3/3			20	wa7	WT6x39.5	3	11¼		
3/4			40	aa7 R L	L4x4x½	5	8¾		
3/5			40	ab7	L4x4x½	2	10		
1/5	12	7P1			PL ½x26½x2	2	5½		
2/8	24	7P2			PL ½x31	3	9½		
1/7	ONE	7P3			PL ¾x30	36	1		
1/7	ONE	7P4			PL ¾x30	36	1		
2/11	ONE	7P5			PL ¾x30	37	10 5/16		
2/11	ONE	7P6			PL ¾x30	37	10 5/16		
2/11	ONE	7P7			PL ¾x30	37	10 5/16		
2/11	ONE	7P8			PL ¾x30	37	10 5/16		
	2	7P9			PL 5/16x2	10	0	BACKUP BAR	

FOR APPROVAL
10/28/2014

SHOP NOTES:
1. ALL MATERIAL SHALL BE ASTM A709 GRADE 50(U.N.O.
2. FOR GENERAL NOTES SEE GN1.

Material ASTM A709 GRADE 50 Unless Noted
Electrodes
Connectors 1 Open Holes 1 1/16 Except as Noted
Ends and Edge Distance Except as Noted
Spacing Not Shown
Paint SEE GN1

REV	SHOP DISTRIBUTION				DATE
		PURCH	Approved	FINAL	

REV	DESCRIPTION	DATE	BY
	REVISIONS		

Fought & Company, inc
STEEL FABRICATION
14255 S.W. 72nd AVE 639-3141 TIGARD, OREGON 97223

TITLE: MISC

P-159 OPERATIONS ACCESS POINTS
RED BEACH BRIDGE
MCB CAMP PENDLETON, CA

DRAWN CH	CHECKED BY JIM		GSS 14-252

REFERENCES

DWG. NO. 7	REVISION
4102	

Attachment 2

gamut
A Grainger Company

HOME / RAW MATERIALS / GRATING

Corvex Molded Grating: 3 ft Wd, 10 ft Lg, Green, 1 in Ht, 1 1/2 in Bar Spacing, 1 1/2 in x 1 1/2 in

Item # 633X081

$505.80 Each

Length: **10 ft**

Product Specs

Color:	**Green**
Width:	**3 ft**
Height:	**1 in**
Bar Spacing:	**1 ½ in**
Opening Area:	**1 1/2 in x 1 1/2 in**
Length:	**10 ft**
Application:	**Screening; Walking Surface**
Features:	**Low Install Cost; Long Service Life; Slip Resistant; Low Maintenance; Fire Retardant; High Strength to Weight Ratio**
Finish:	**Grit**
Length Tolerance:	**+/-0.125 in**
Maximum Temperature:	**150 ° F**
Minimum Temperature:	**-100 ° F**
Plastic Grating Type:	**Molded Grating**

Resistance Properties:	**Corrosion Resistant; Impact Resistant**
Shore Hardness:	**80D**
Specifications Met:	**NSF Standard 61-Certified**
Weight:	**76 lb**
Width Tolerance:	**+/-0.125 in**

Compliance and Restrictions

Country Of Origin
Varies

More Information

Providing a stable surface while allowing liquid, air, light, or small parts to filter through, grating is commonly used for structural elements such as walkways in water treatment and food processing plants.

Made of polyester, Corvex molded grating is corrosion resistant and is an economical alternative to fiberglass and metal grating.

Similar Products

Corvex Molded

21 items

Safe-T-Span Pultruded

15 items

Rigidex

3 items

FGI-AM

6 items

Vi-Corr

3 items

View More

support@gamut.com
844 GO GAMUT (844.464.2688)

Attachment 3

CALIFORNIA DEPARTMENT OF TRANSPORTATION - CONTRACT COST DATA

	Item No. / Description	Unit	Dist	Qty	Unit Price	Adj Price	Total	Bid Open Date	Contract No.	Qtr	M	TRO
☑	550203 - FURNISH STRUCTURAL STEEL (BRIDGE)	LB	07	1000000	$1.95	$3.49	$1950000.00	02-09-2012	07-202114	1	M	TRO
☑	550203 - FURNISH STRUCTURAL STEEL (BRIDGE)	LB	07	3383684	$1.58	$2.77	$5346220.72	10-04-2012	07-1218W4	4	M	TRO
☑	550203 - FURNISH STRUCTURAL STEEL (BRIDGE)	LB	12	138740	$1.50	$2.63	$208110.00	11-29-2012	12-0C5704	4	M	TRO
☐	550203 - FURNISH STRUCTURAL STEEL (BRIDGE)	LB	07	810	$5.00	$5.39	$4050.00	05-09-2013	07-1W3604	2	M	
☑	550203 - FURNISH STRUCTURAL STEEL (BRIDGE)	LB	07	187000	$2.00	$2.74	$374000.00	12-19-2013	07-1170U4	4	M	TRO
☐	550203 - FURNISH STRUCTURAL STEEL (BRIDGE)	LB	07	46400	$3.00	$3.40	$139200.00	11-18-2015	07-290704	4	M	TRO
☑	550203 - FURNISH STRUCTURAL STEEL (BRIDGE)	LB	12	115030	$1.60	$1.60	$184048.00	08-09-2016	12-0M4904	3	M	TRO

uncheck all | check all cost indexes | legend

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	1.72	**2.64**	Avg No. Units	964890
Std Dev. (of Unit Price): ±$	0.20	**0.60**	Rows Selected	5
Weighted Avg.: $	1.67	**2.88**	Rows Returned	7
Minimum Price/Unit: $	1.50	1.60		
Maximum Price/Unit: $	2.00	3.49		

- Adjusted prices are adjusted to today's dollars based on the Caltrans Construction Cost Index
- To remove a row from the calculations, uncheck the checkbox next to that row.
- To see additional information for a contract, click on that contract number.
- To see a trend graph of prices for an item, click on the item number.

| Back | New Search |

PARAMETERS: Item = furnish structural steel; Units: LB; District=07,11,12; Year=2017,2016,2015,2014,2013,2012; Convert=Yes; Bidders=Awarded Only
TIMESTAMP: 09/13/2017 11:35:54
CURRENT 12-MO INDEX (CHCCI (2007 Base)): 145.33

CALIFORNIA DEPARTMENT OF TRANSPORTATION - CONTRACT COST DATA

	Item No. / Description	Unit	Dist	Qty	Unit Price	Adj Price	Total	Bid Open Date	Contract No.	Qtr	M	TRO
☑	550204 - ERECT STRUCTURAL STEEL (BRIDGE)	LB	07	1000000	$0.55	$0.99	$550000.00	02-09-2012	07-202114	1	M	TRO
☑	550204 - ERECT STRUCTURAL STEEL (BRIDGE)	LB	07	3383684	$0.69	$1.21	$2334741.96	10-04-2012	07-1218W4	4	M	TRO
☑	550204 - ERECT STRUCTURAL STEEL (BRIDGE)	LB	12	138740	$0.50	$0.88	$69370.00	11-29-2012	12-0C5704	4	M	TRO
☐	550204 - ERECT STRUCTURAL STEEL (BRIDGE)	LB	07	810	$18.00	$19.39	$14580.00	05-09-2013	07-1W3604	2	M	
☑	550204 - ERECT STRUCTURAL STEEL (BRIDGE)	LB	07	187000	$0.50	$0.68	$93500.00	12-19-2013	07-1170U4	4	M	TRO
☐	550204 - ERECT STRUCTURAL STEEL (BRIDGE)	LB	07	46400	$18.00	$20.40	$835200.00	11-18-2015	07-290704	4	M	TRO
☑	550204 - ERECT STRUCTURAL STEEL (BRIDGE)	LB	12	115030	$1.15	$1.15	$132284.50	08-09-2016	12-0M4904	3	M	TRO

uncheck all | check all cost indexes | legend

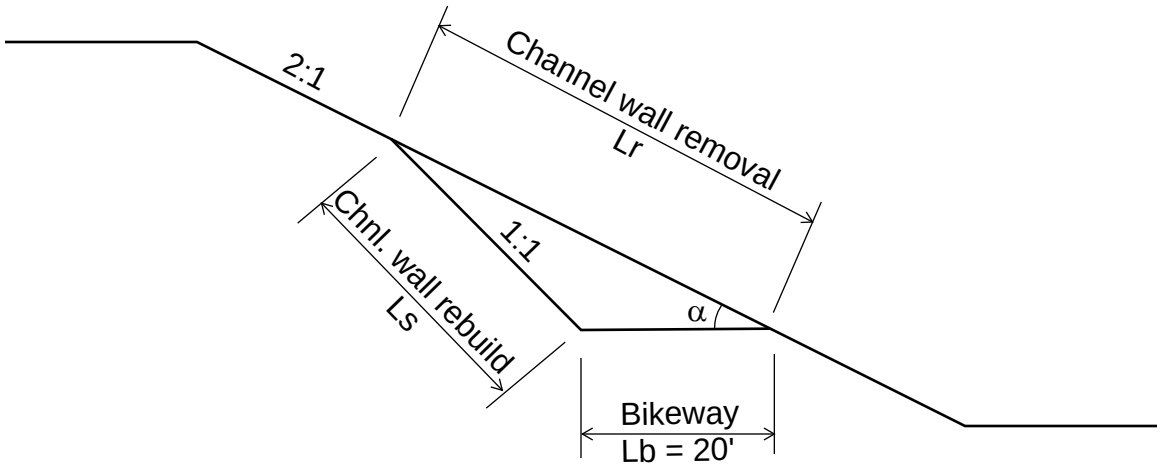
SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	0.67	**0.98**	Avg No. Units	964890
Std Dev. (of Unit Price): ±$	0.24	**0.19**	Rows Selected	5
Weighted Avg.: $	0.65	**1.13**	Rows Returned	7
Minimum Price/Unit: $	0.50	0.68		
Maximum Price/Unit: $	1.14	1.21		

- Adjusted prices are adjusted to today's dollars based on the Caltrans Construction Cost Index
- To remove a row from the calculations, uncheck the checkbox next to that row.
- To see additional information for a contract, click on that contract number.
- To see a trend graph of prices for an item, click on the item number.

| Back | New Search |

PARAMETERS: Item = erect structural steel; Units: LB; District=07,11,12; Year=2017,2016,2015,2014,2013,2012; Convert=Yes; Bidders=Awarded Only
TIMESTAMP: 09/13/2017 11:41:13
CURRENT 12-MO INDEX (CHCCI (2007 Base)): 145.33

Attachment 4



Attachment 5

CALIFORNIA DEPARTMENT OF TRANSPORTATION - CONTRACT COST DATA

	Item No. / Description	Unit	Dist	Qty	Unit Price	Adj Price	Total	Bid Open Date	Contract No.	Qtr	M	TRO
☑	021311 - STRUCTURAL CONCRETE CHANNEL INVERT SLAB	CY	07	300	$125.00	$224.00	$37500.00	02-09-2012	07-202114	1	M	TRO

uncheck all | check all

cost indexes | legend

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	125.00	**224.00**	Avg No. Units	300
Std Dev. (of Unit Price): ±$	0.00	**0.00**	Rows Selected	1
Weighted Avg.: $	125.00	**224.00**	Rows Returned	1
Minimum Price/Unit: $	125.00	224.00		
Maximum Price/Unit: $	125.00	224.00		

- Adjusted prices are adjusted to today's dollars based on the Caltrans Construction Cost Index
- To remove a row from the calculations, uncheck the checkbox next to that row.
- To see additional information for a contract, click on that contract number.
- To see a trend graph of prices for an item, click on the item number.
- Red highlighted rows contain one-time use item codes. Do not reuse them!

| Back | New Search |

PARAMETERS: Item = 021311; Units: CY; District=07,11,12; Year=2017,2016,2015,2014,2013,2012; Convert=Yes; Bidders=Awarded Only
TIMESTAMP: 09/13/2017 15:43:36
CURRENT 12-MO INDEX (CHCCI (2007 Base)): 145.33

CALIFORNIA DEPARTMENT OF TRANSPORTATION - CONTRACT COST DATA

	Item No. / Description	Unit	Dist	Qty	Unit Price	Adj Price	Total	Bid Open Date	Contract No.	Qtr	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	11	511887	$1.00	$1.23	$511887.00	09-03-2015	11-2T1904	3	M	TRO
☐	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	11	2567	$2.85	$3.51	$7315.95	09-15-2015	11-299204	3	M	
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	12	1353249	$0.68	$0.84	$920209.32	09-16-2015	12-0N5404	3	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	36080	$1.00	$1.13	$36080.00	10-08-2015	07-3X7114	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	4869904	$0.75	$0.85	$3652428.00	10-15-2015	07-1193U4	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	53136	$1.05	$1.19	$55792.80	10-29-2015	07-255104	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	3655	$1.43	$1.62	$5226.65	11-10-2015	07-287104	4	M	
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	3301	$0.80	$0.91	$2640.80	12-02-2015	07-2750U4	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	12	22292	$1.60	$1.81	$35667.20	12-02-2015	12-0M3404	4	M	
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	7326	$1.05	$1.17	$7692.30	04-05-2016	07-2827U4	2	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	1618868	$1.15	$1.28	$1861698.20	04-27-2016	07-2159U4	2	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	58755	$1.25	$1.39	$73443.75	06-01-2016	07-2849U4	2	M	
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	118266	$1.45	$1.61	$171485.70	06-08-2016	07-3X0214	2	M	
☐	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	12	5000	$5.50	$6.11	$27500.00	06-08-2016	12-0N3604	2	M	
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	43000	$0.91	$0.91	$39130.00	08-09-2016	07-279114	3	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	12	122000	$1.00	$1.00	$122000.00	08-09-2016	12-0M4904	3	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	11	147239	$1.00	$1.00	$147239.00	10-13-2016	11-244004	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	12	51000	$1.05	$1.05	$53550.00	10-19-2016	12-0M3504	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	12	27523	$0.89	$0.89	$24495.47	11-16-2016	12-0M5004	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	11	234188	$1.00	$1.00	$234188.00	11-29-2016	11-085784	4	M	TRO
☑	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	11	25845	$1.22	$1.23	$31530.90	12-13-2016	11-421604	4	M	TRO
☐	520103 - BAR REINFORCING STEEL (RETAINING WALL)	LB	07	2685	$2.45	$2.45	$6578.25	05-24-2017	07-290404	2	M	

uncheck all | check all

cost indexes | legend

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	1.06	**1.16**	Avg No. Units	489869
Std Dev. (of Unit Price): ±$	0.23	**0.27**	Rows Selected	19
Weighted Avg.: $	0.85	**0.97**	Rows Returned	22
Minimum Price/Unit: $	0.68	0.84		
Maximum Price/Unit: $	1.60	1.81		

- Adjusted prices are adjusted to today's dollars based on the Caltrans Construction Cost Index
- To remove a row from the calculations, uncheck the checkbox next to that row.

- To see additional information for a contract, click on that contract number.
- To see a trend graph of prices for an item, click on the item number.

| Back | New Search |

PARAMETERS: Item = bar reinforcing steel (retaining wall); Units: LB; District=07,11,12; Year=2017,2016,2015; Convert=Yes; Bidders=Awarded Only
TIMESTAMP: 09/13/2017 15:56:27
CURRENT 12-MO INDEX (CHCCI (2007 Base)): 145.33

CALIFORNIA DEPARTMENT OF TRANSPORTATION - CONTRACT COST DATA

	Item No. / Description	Unit	Dist	Qty	Unit Price	Adj Price	Total	Bid Open Date	Contract No.	Qtr	M	TRO
☑	190101 - ROADWAY EXCAVATION	CY	11	14400	$24.00	$24.00	$345600.00	01-04-2017	11-405704	1	M	TRO
☑	190101 - ROADWAY EXCAVATION	CY	07	19000	$17.00	$17.00	$323000.00	01-19-2017	07-293504	1	M	TRO
☑	190101 - ROADWAY EXCAVATION	CY	11	236000	$16.65	$16.65	$3929400.00	01-24-2017	11-418514	1	M	TRO
☑	190101 - ROADWAY EXCAVATION	CY	11	175000	$7.50	$7.50	$1312500.00	02-02-2017	11-418524	1	M	TRO
☑	190101 - ROADWAY EXCAVATION	CY	07	227000	$37.00	$37.00	$8399000.00	03-21-2017	07-252624	1	M	TRO

uncheck all | check all cost indexes | legend

SUMMARY	Unmodified	Adjusted		
Average Price/Unit: $	20.43	**20.43**	Avg No. Units	134280
Std Dev. (of Unit Price): ±$	9.80	**9.80**	Rows Selected	5
Weighted Avg.: $	21.31	**21.31**	Rows Returned	5
Minimum Price/Unit: $	7.50	7.50		
Maximum Price/Unit: $	37.00	37.00		

- Adjusted prices are adjusted to today's dollars based on the Caltrans Construction Cost Index
- To remove a row from the calculations, uncheck the checkbox next to that row.
- To see additional information for a contract, click on that contract number.
- To see a trend graph of prices for an item, click on the item number.

| Back | New Search |

PARAMETERS: Item = roadway excavation; Min Quant: 10000;Units: CY; District=07,11,12; Year=2017; Convert=Yes; Bidders=Awarded Only
TIMESTAMP: 09/13/2017 16:12:39
CURRENT 12-MO INDEX (CHCCI (2007 Base)): 145.33

Attachment 6

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN - OFFICE OF STRUCTURE OFFICE ENGINEER

COMPARATIVE BRIDGE COSTS

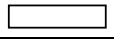
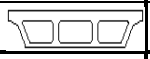
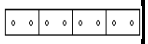
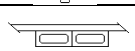
JANUARY 2015

The following tabular data provides some **general guidelines** for structure type selection and its relative cost. These costs should be used only for **preliminary estimates** until more detailed information is developed. The following factors must be taken into account when determining a price within the cost range:

Factors for Lower End of Cost Range	Factors for Higher End of Cost Range
Short Spans, Low Structure Height, No Environmental Constraints, Large Project, No Aesthetic Issues, Dry Conditions, No Bridge Skew	Long Spans, High Structure Height, Environmental Constraints, Small Project, Aesthetic Issues, Wet Conditions (cofferdams required), Skewed Bridges
Urban Location	Remote Location
Seat Abutment	Cantilever Abutment
Spread Footing	Pile Footing (Large Diameter Piling)
No Stage Construction	2-Stage Construction

Factors that will increase the price from 25% - 150% over the high end of the cost range

Structures with more than 2 construction stages	Unique substructure construction
Widenings less than 15 Ft.	

STRUCTURAL SECTION	(STR. DEPTH / MAX SPAN) SIMPLE	(STR. DEPTH / MAX SPAN) CONTINUOUS	COMMON SPAN RANGE (feet)	* COST RANGE (price/sqft)	REMARKS
RC SLAB 	0.06	0.045	16 - 44	90 - 200	CAST-IN -PLACE CONCRETE BRIDGES ACCOUNT FOR APPROXIMATELY 65% OF BRIDGES BUILT ON CALIFORNIA STATE HIGHWAYS
RC T-BEAM 	0.07	0.065	40 - 60	155 - 250	
RC BOX 	0.06	0.055	50 - 120	160 - 250	
CIP/PS SLAB 	0.03	0.03	40 - 65	115 - 200	
CIP/PS BOX 	0.045	0.04	100 - 250	110 -315	
PC/PS SLAB 	0.03 (+3" AC)	0.03 (+3" AC)	20 - 50	250 - 450	NO FALSEWORK REQUIRED
PC/PS T, TT, ⊥	0.06 (+3" AC)	0.055 (+3" AC)	30 - 120	No Current Cost Data	
BULB TEE GIRDER	0.05	0.045	90 - 145	115 - 290	
WIDE FLANGE GIRDER	0.045	0.04	90 - 180	125 -250	
PC/PS I 	0.055	0.05	50 - 120	150 - 325	
PC/PS BOX 	0.06	0.045	120 - 200	120 - 270	
STRUCT STEEL I GIRDER 	0.045	0.04	60 - 300	250 - 450	NO FALSEWORK REQUIRED

NOTE: Removal of a box girder structure costs from $8 - $15 per square foot.

* "Price/SQFT" is calculated using "Bridge Costs Only" as defined by the Federal Highway Administration. The "Bridge Cost Only" is the sum of the "Superstructure" and "Substructure" bridge items, listed in Chapter 11 of the Bridge Design Aids Manual, multiplied by the bid item price. The "Superstructure" and "Substructure" bridge items do not include items such as: time related overhead, mobilization, bridge removal, approach slabs, slope paving, soundwalls, or retaining walls.

Beam/Girder Bridge Examples

Attachment 7

top left: Palm Valley – Jacksonville, FL

bottom left: Coast Fork Willamette – Creswell

above: Lower Perry – La Grande

Beam/Girder Bridge Examples

top: 5th Street Bridge - Dayton, Ohio

bottom: Perry Street Bridge - Columbus, Ohio

Beam/Girder Bridge Examples

top left: Center Street Bridge – Salem

bottom left: Marion Street Bridge - Salem

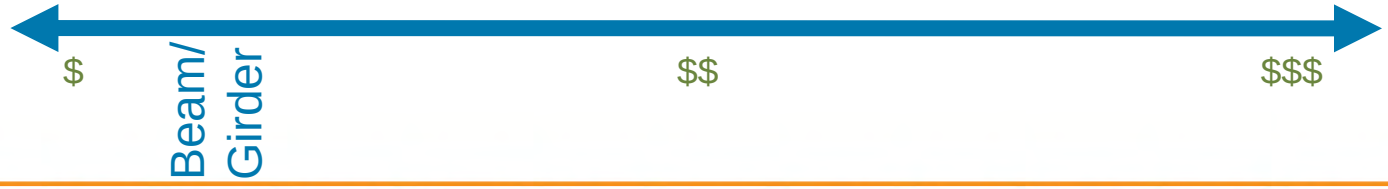
above: Willamette Bridge - Oregon City

Beam/Girder Bridge Examples

top left: Roosevelt Bridge - Stuart, Florida *(Precast Segmental Post-Tensioned Box Girder)*

middle left and right: Wabasha Bridge - St. Paul, Minnesota *(Cast-in-Place Segmental Post-Tensioned Box Girder)*

bottom left: Abernethy Bridge - Oregon City *(Steel Tub Girder)*



Beam/Girder Bridge Types

Bridge Type	Normal Span Range	Cost Range / sq.ft
Concrete Girder		
Precast Prestressed Girder	50' - 180'	$100-160
Post-Tensioned Girder	180' - 300'	$120-200
Segmental Girder	180' - 750'	$200-450
Steel Girder		
Steel Girder	100' - 400'	$120-250

Arch Bridge Examples

top: Sauvie Island Bridge – Portland, Oregon (Through-Tied Arch)

middle: Troup-Howell Bridge - Rochester, New York *(Through-Tied Arch)*

bottom: Lake Street Bridge - Minneapolis *(Deck Arch)*

Arch Bridge Examples

top left: Blennerhassett – West Virginia

bottom left: Gateway Boulevard - Nashville
(Partial Through Arch)

below: Page Avenue - Missouri

Arch Bridge

Bridge Type	Normal Span Range	Cost Range / sq.ft
Arch	150' - 900'	$300-600

Cable-Stayed Bridge Examples

top left: U.S. Grant Bridge - Portsmouth, Ohio *(Steel Edge Girders w/ Double Plane of Stays)*

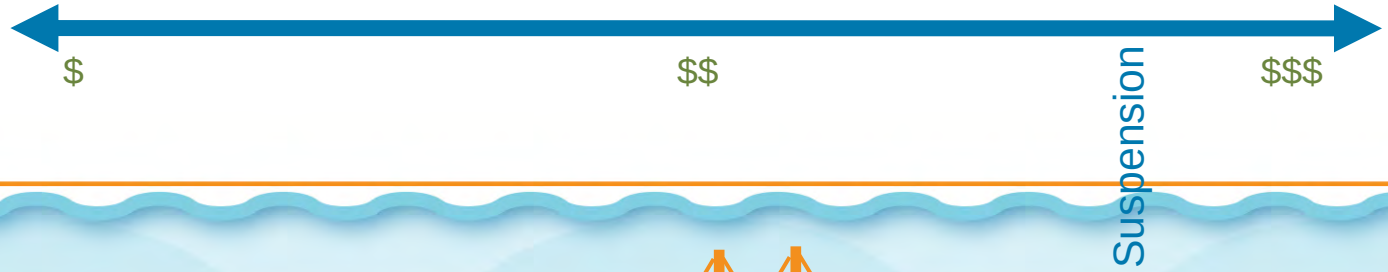
middle left: William Harsha Bridge - Maysville, Kentucky *(Concrete Edge Girders w/ Double Plane of Stays)*

bottom left: East Huntington Bridge - Huntington, West Virginia *(Single Pylon Asymmetric)*

below: Sunshine Skyway Bridge - St. Petersburg, Florida *(Concrete Box Girder w/ Single Plane of Stays)*

Hybrid Cable-Stayed/Girder Bridge

Odawara Blueway Bridge – Japan (Extradose Concrete Box Girder)



Cable Stayed Bridge

Bridge Type	Normal Span Range	Cost Range / sq.ft
Cable Stayed	350' -1500'	$ 350-600
Extradose Concrete Box Girder	300' - 900'	none built in US